15.11.2023 / Logistikdag Norr

SOV-Vessels in Ice Conditions

STEERPROP OY

TOM EKEGREN, DIRECTOR, ARCTIC SEGMENT

STEERPROP

About the Speaker

Mr. Tom Ekegren
Arctic Segment Director

- Master Mariner 1997, EMBA 2019
- Tank ships, Icebreakers, Multi purpose Icebreakers 20 years
- Ship management, operations manager 4 years, SVP Icebreaking 4 years, Sales Director 2 years
- Joined Steerprop as Arctic Segment Director 2023

Steerprop in Brief

Steerprop is the leading designer and manufacturer of high-performance propulsion systems for the most demanding applications and toughest conditions. Since our founding in Finland in 2000, we have delivered fit-for-purpose propulsion units for vessels working in the arctic, offshore, tug, workboat, cruise and ferry industries.

We are expanding our offering as the demands of our customers become more diverse.

Employs more than

450

Net sales

31.5 MEUR

Units delivered

over 900

Operates direct or with authorized distributors or agents in

more than 50 countries

Condition monitoring

in every delivery

Operating hours in total

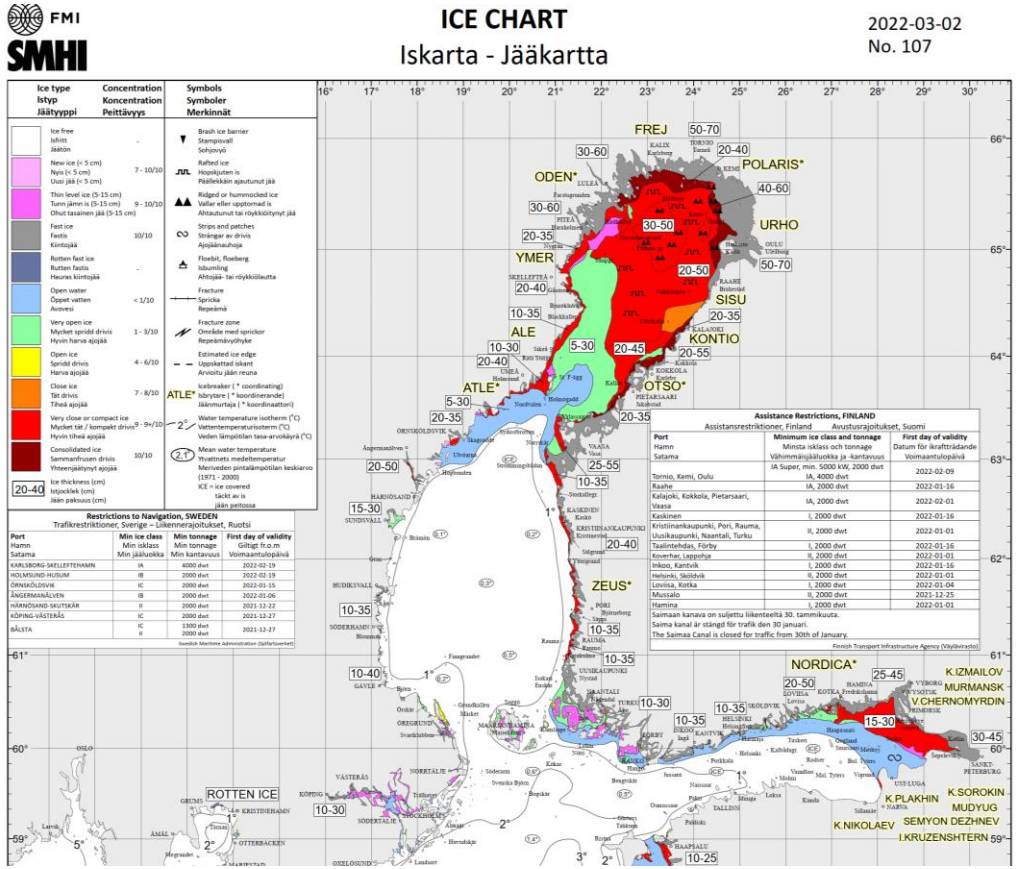
over 12 million

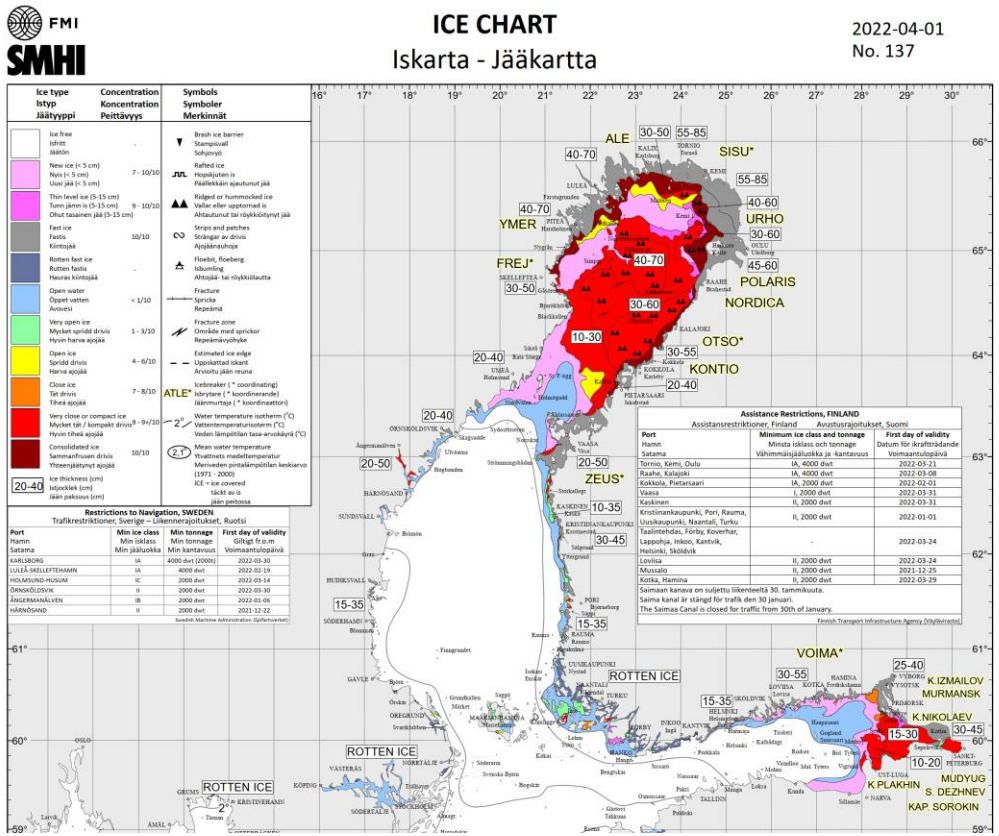
Steerprop propulsion systems

in every third icebreaker

Development in the Bay of Bothnia

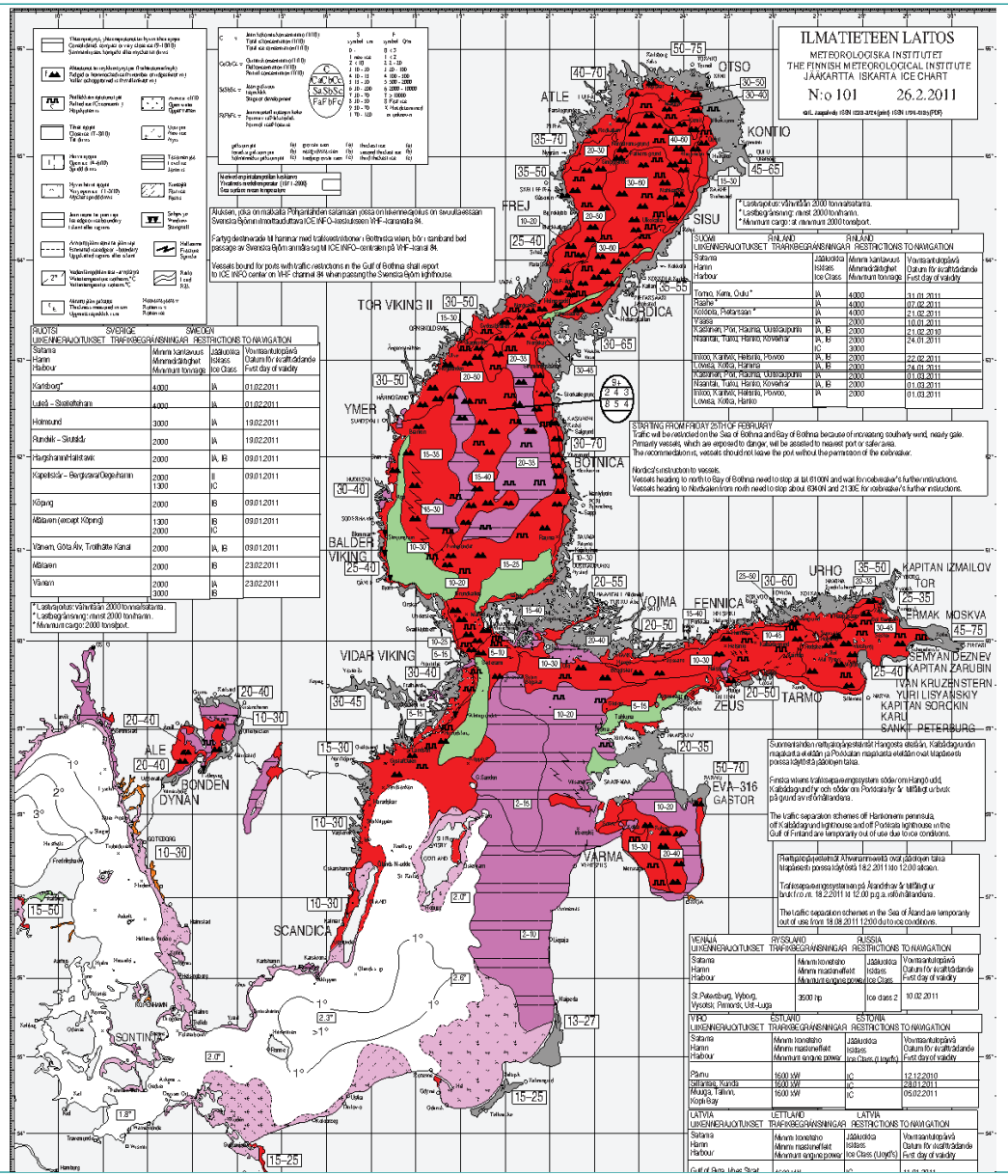
Ice in the Northern Baltic – an Example



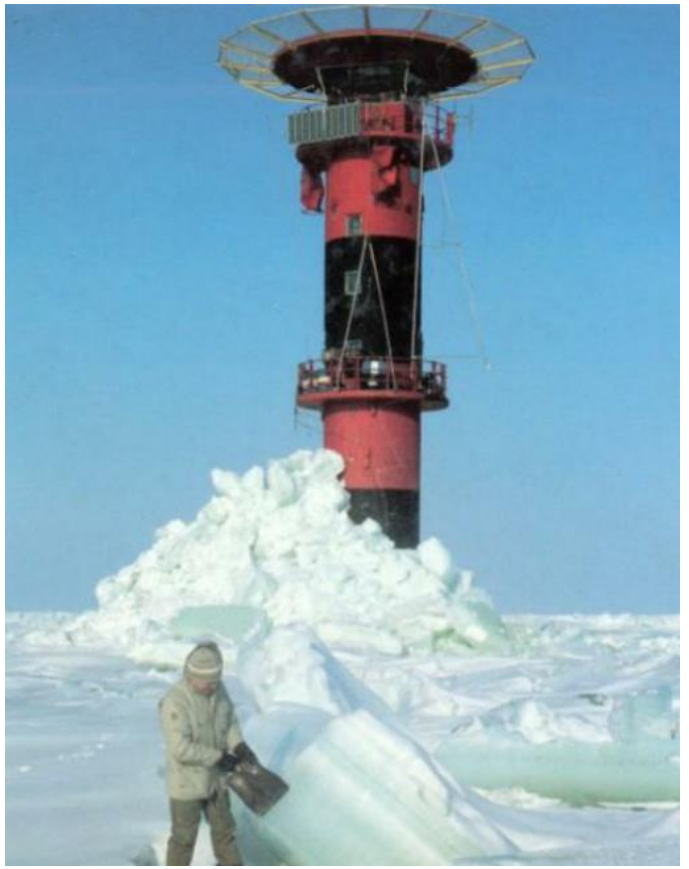


Harsh Winter Example

- Bay of Bothnia severe conditions
- Also Sea of Bothnia and Sea of Aaland have similar severe conditions
- Not typical, but happens
- Likely not the type of winter when turbines falling off the grid is accepted

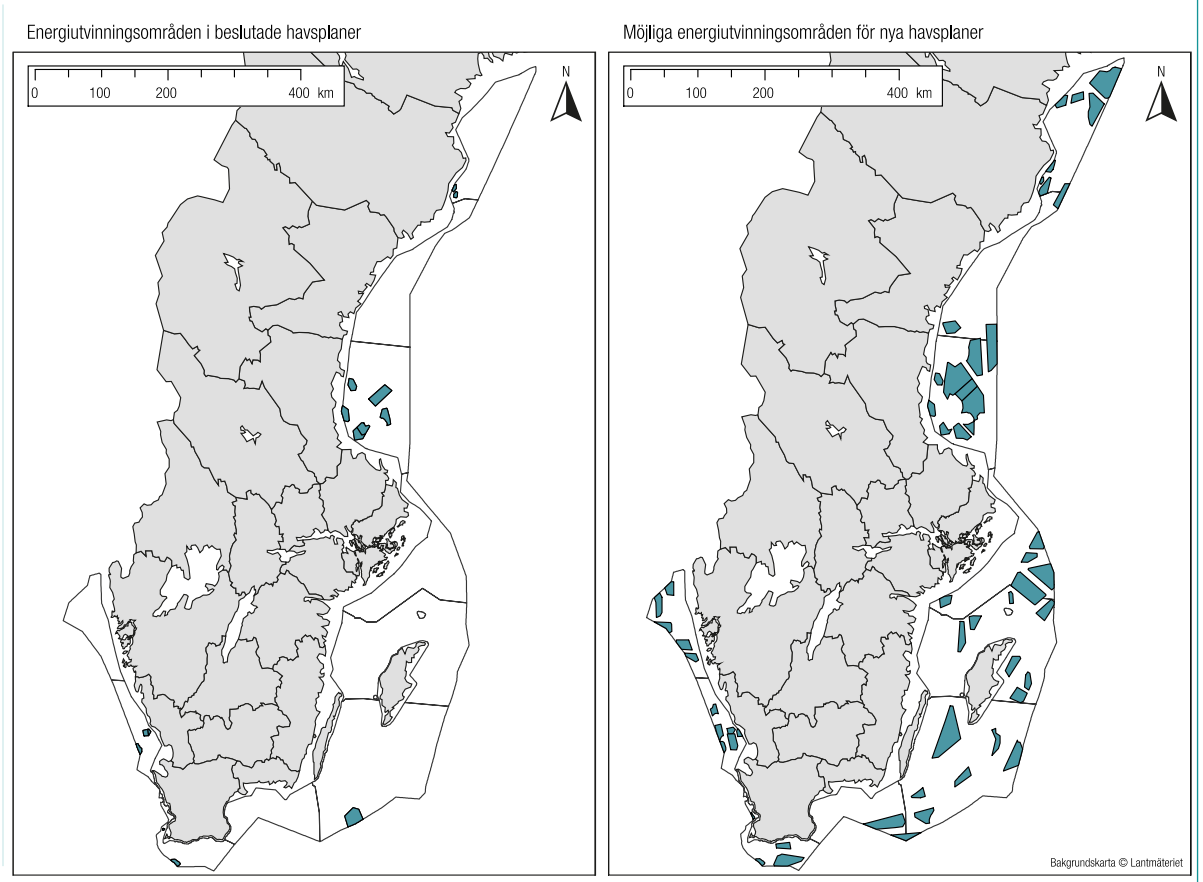


Ice Dynamics Around Fixed Structures



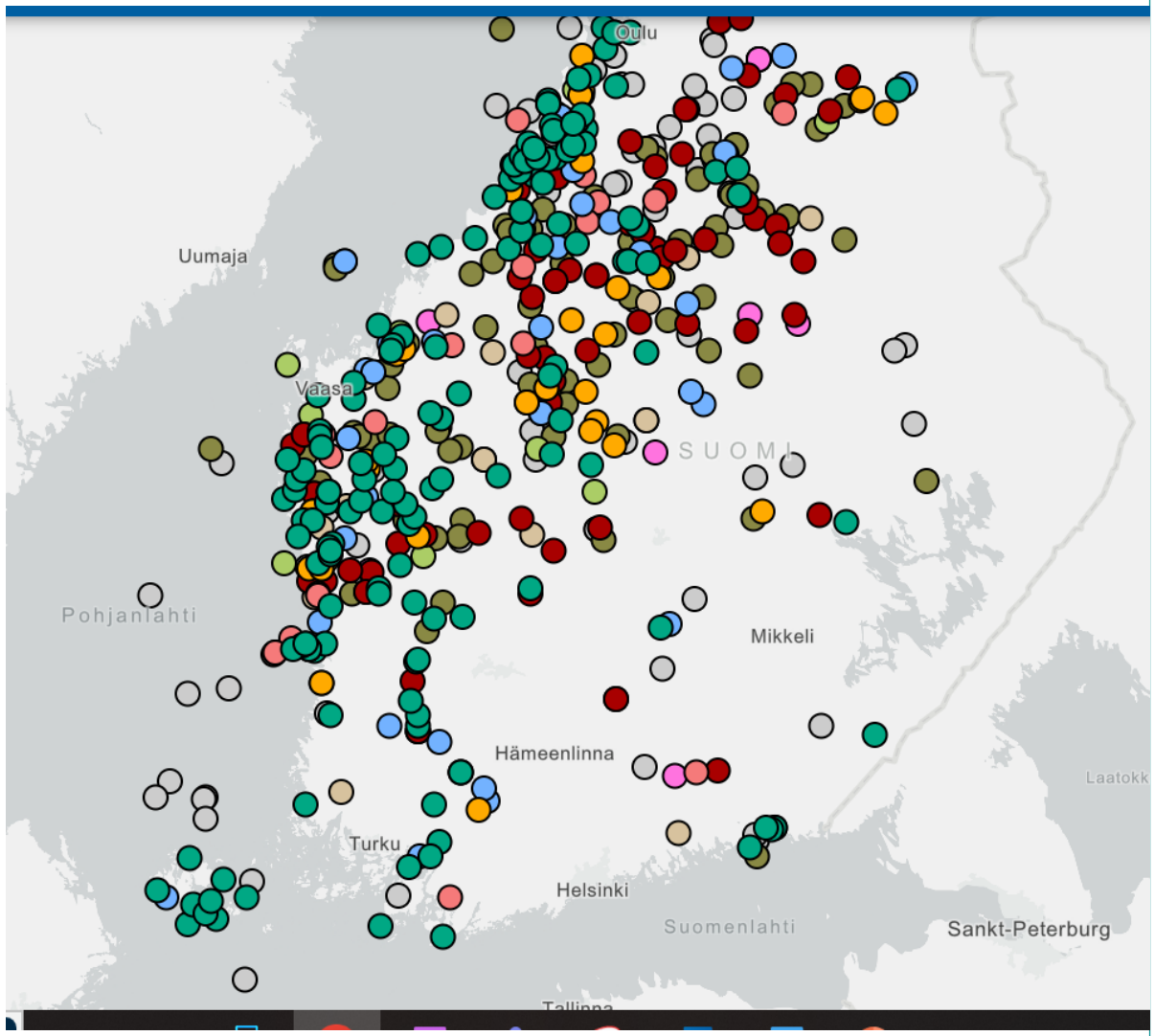
Offshore Wind in Sweden

- Existing plans by 31.3.2023:
  20 – 30 TWh/year
- New report from Energimyndigheten (Swedish Energy Agency) expected by December 2024
- The new report will have potential for 90 TWh/year



Offshore Wind in Finland

- Evaluation and planning currently
- Exact number of windfarms and turbines unknown although estimates exist
- Wind farm areas are the same as the shipping routes especially in winter
- Wind turbines will affect ice field and routing
- How much service required during winter?



Accessing Wind Farm Installations in ice

- The ice is more broken due to wind farm fundaments interaction with drifting ice fields
- The amount and change in ridging of ice in these windfarms is still not entirely understood
- SOV-vessels must access the structures for maintenance purposes
- SOV:s (and others) must either be assisted or be self capable in ice.

Picture: By SteKrueBe - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=17009450

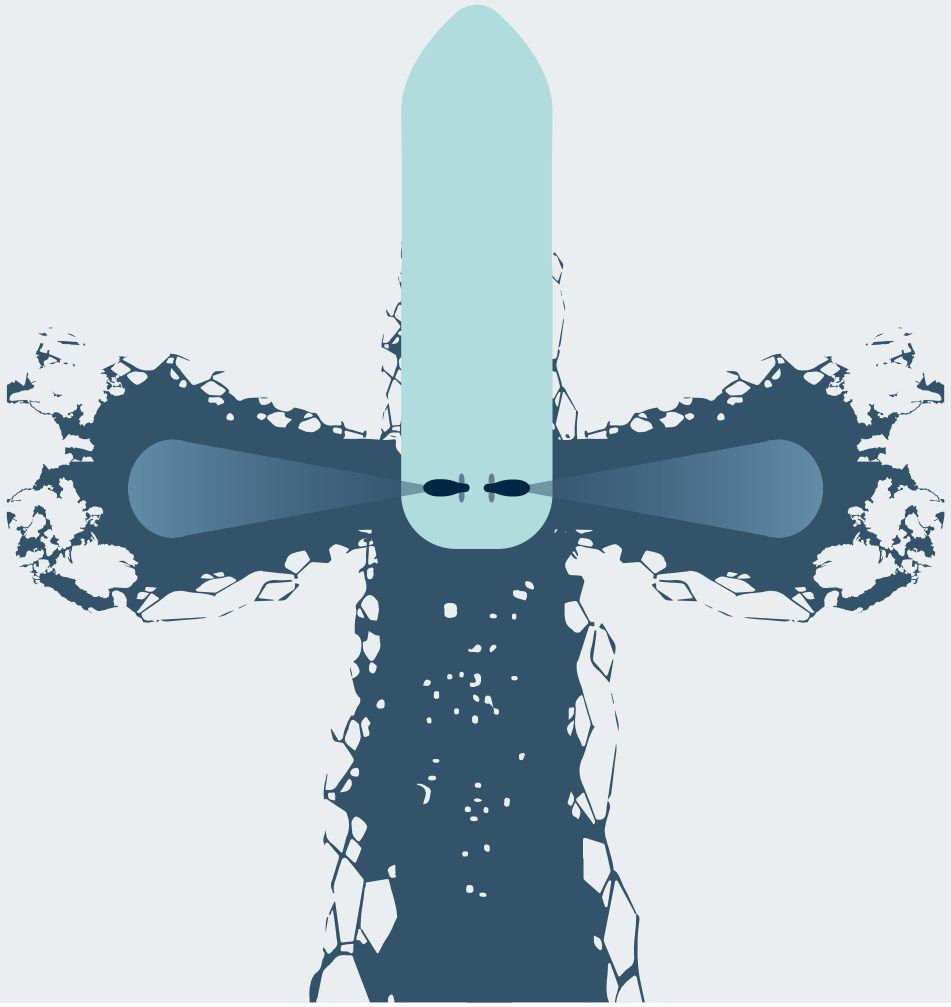
Concerns for Operations and Safety

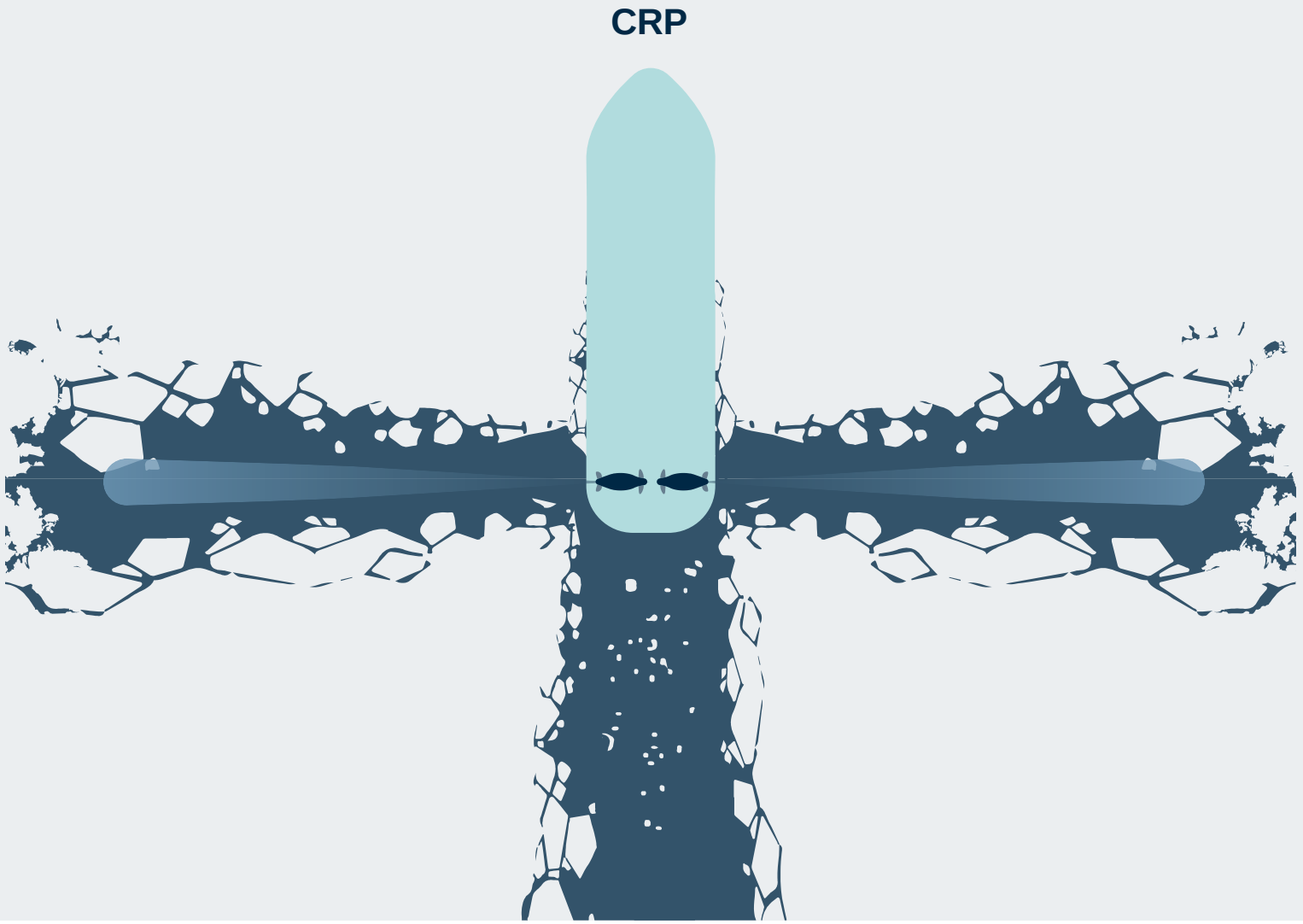
- Despite capabilities, conditions do not always allow for operation
- The propulsion and ship may be a) capable in ice and b) DP capable. This does not mean you are always able to approach a wind turbine tower.
- Drifting ice around the structure prevents staying still in ice and prevents staying on DP. This causes days of waiting for improved weather conditions - downtime

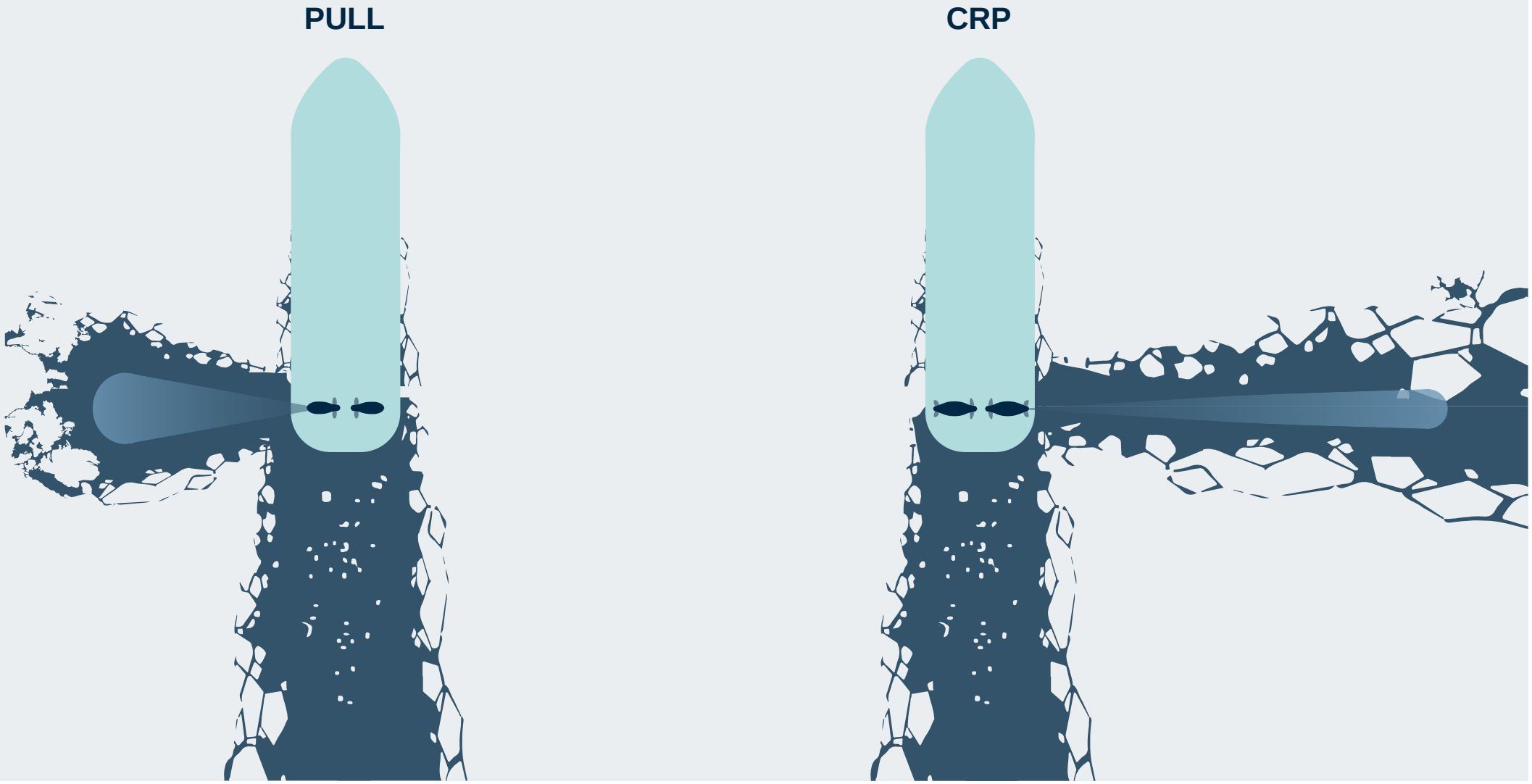
Ice Operations with SOV-vessels in the Northern Baltic

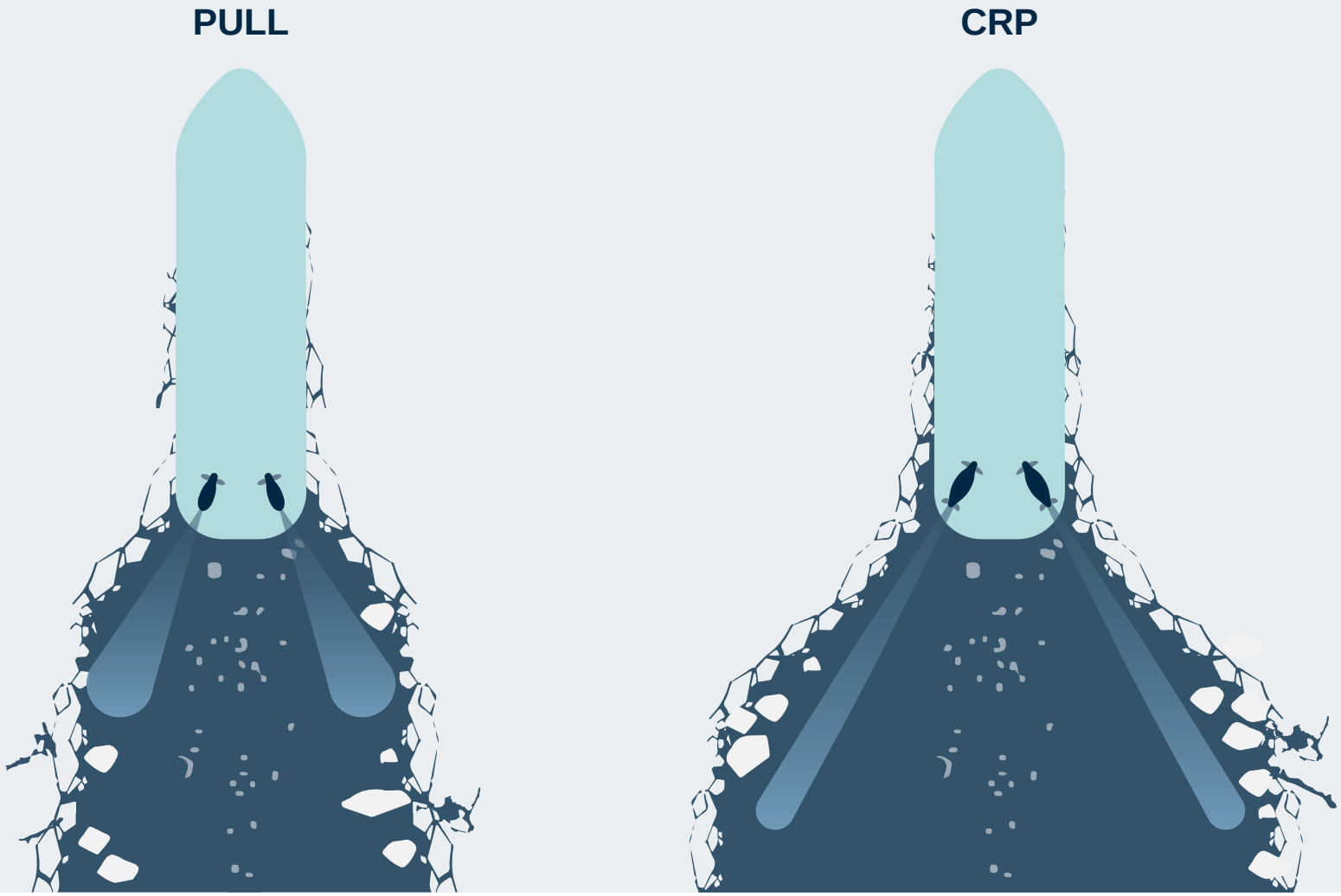
STEERPROP

PULL



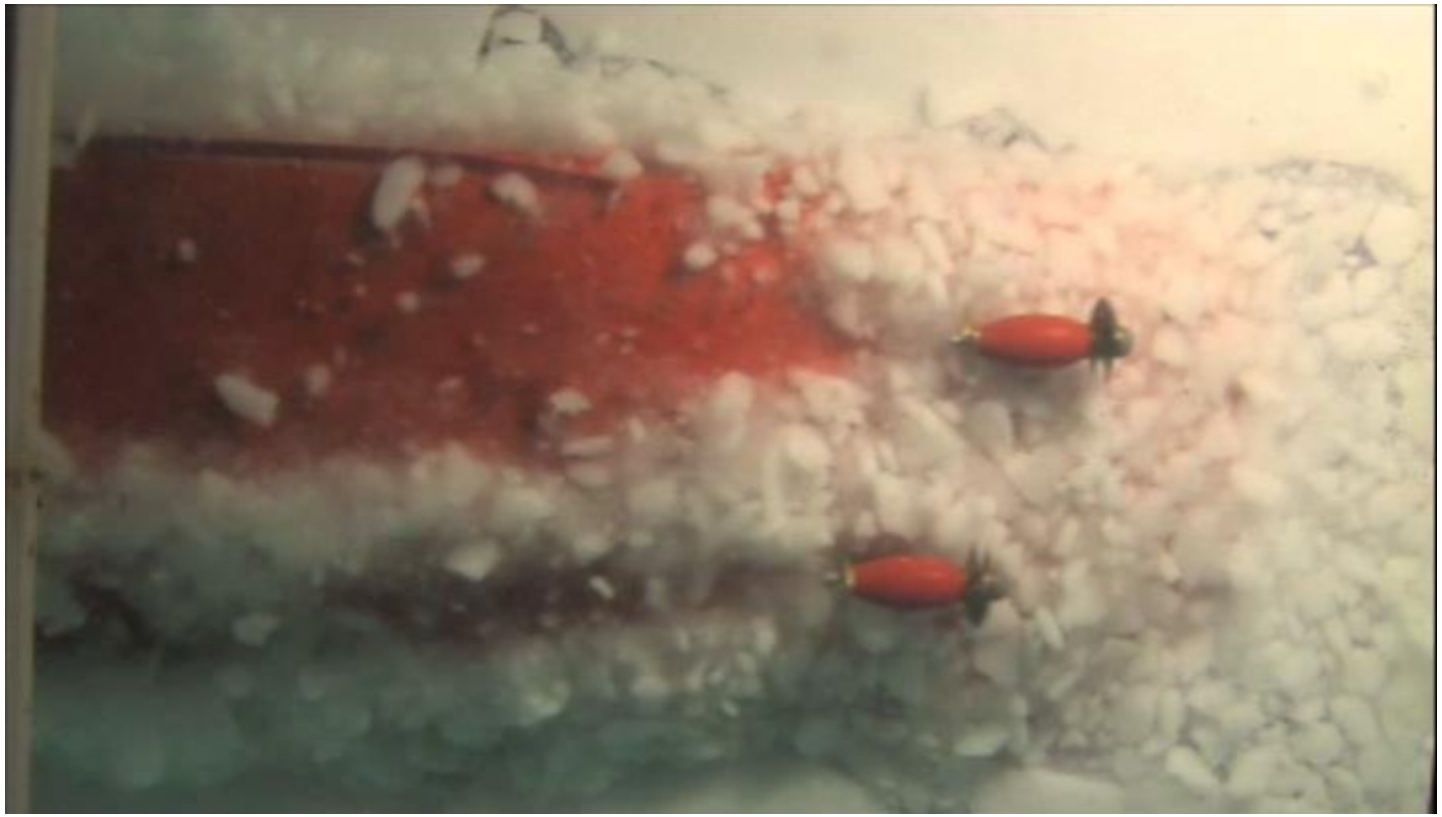

CRP




PULL
CRP

Stern First Operation

- Thruster wash can clear the hull
- SOV ”assisting itself”
- No need to think about channel like with assistance icebreaking



No ice, Assisted or Independent?

Classic SOV for open water

SOV (approx. 85 m x 17,5 m)
No ice class

Only little or no ice

Propulsion:
- Diesel-electric
- Steerprop CRP 2 x ~2 MW

- Propulsion allows for alt. fuel and hybrid electric.

Assisted

SOV (approx. 85 m x 17,5 m)
1A Super (~PC6 equivalent)

Min. 0,6 m level ice @ 2-3 knots

Propulsion:
- Diesel-electric
- Steerprop CRP 2 x ~3 MW

- Propulsion allows for alt. fuel and hybrid electric.

Independent

SOV (approx. 85 m x 17,5 m)
PC5 – PC4, Icebreaker (ramming)

Min. 1,0 m level ice @ 2-3 knots

Propulsion:
- Diesel-electric
- Steerprop CRP ARC 2 x ~5 MW
- Propulsion allows for alt. fuel and hybrid electric

Multifunctional IB

IB (approx. 115 m x 24 m)
PC4 Icebreaker

Min. 1,5 m level ice @ >0 knots

Propulsion:
- Diesel-electric
- Steerprop CRP/Pull 2 x 7,5 MW
- Propulsion allows for alt. fuel and hybrid electric.

Steerprop

RELENTLESS PERFORMANCE
FOR UNRELENTING CONDITIONS

Steerprop Azimuth Propulsors for Icebreaking Vessels

- SP PULL ARC Series

- Icebreaking conventional pulling propulsors

- SP CRP ARC Series

- Icebreaking counter rotating propulsors

- SP TT ARC Series

- High ice class gridless bow thrusters

Main demands on propulsors in ice operations

1. **Ecology**: Pretensioned shafts – no pumping motion.
2. **Ecology**: Two or three chamber pressureiced seals etc.
3. **Mechanical**: Slewing bearing designed for ice load impact
4. **Mechanical**: Unit, propellers, propeller hubs, bearings and gears designed for ice loads
5. **Performance**: Required power, push and overtorque to meet operational demands
6. **Classification:** Ice class requirements
7. **Risks:** Built up propellers are recommended over monoblock
8. **Operations:** Hydrodynamics and ice dynamics selected and designed for ice
9. **Operations:** ”Ice management” capability

Sterprop’s ARC product line

The most reliable solution with the lowest lifecycle costs on the market

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