Circumpolar Oil Spill Response Viability Analysis

Eric Miller
United States Delegation to EPPR

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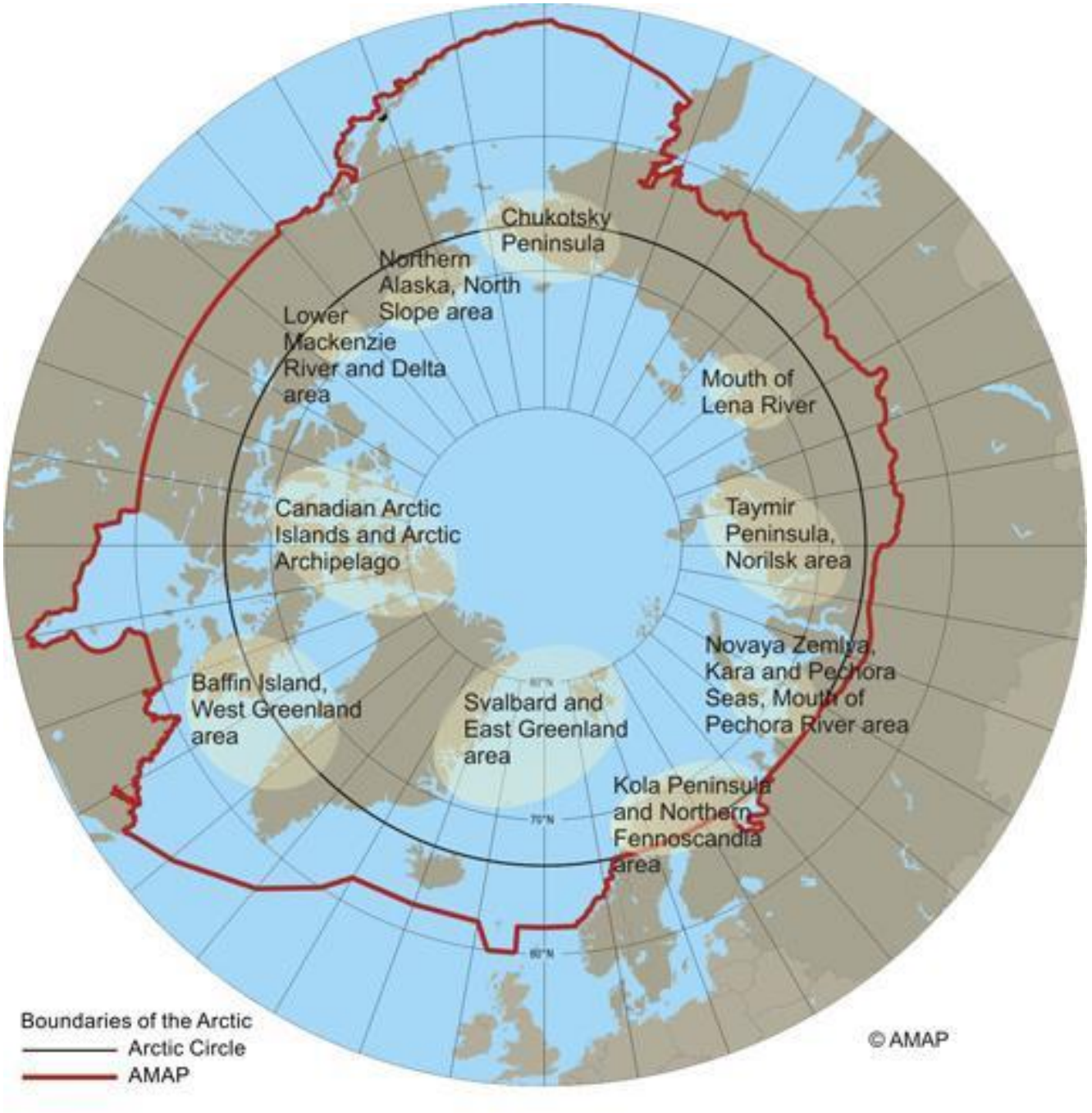
"To promote safety, protect the environment and conserve resources offshore through vigorous regulatory oversight and enforcement."



Source: http://www.amap.no/uploads/images/amap_key_areas.jpg

Study Objectives

- Assess the ability of oil spill response systems to operate in the Arctic marine environment
- Estimate the percentage of time conditions for oil spill response are:

Favorable

Marginal

Not favorable

Study commissioned by the Emergency Preparedness, Prevention, and Response Working Group (EPPR) and co-sponsored by Denmark, Norway, and the United States

DNV GL and **Nuka Research and Planning Group, LLC** under contract to the Norwegian Coastal Administration and U.S. Bureau of Safety and Environmental Enforcement

Wind

Sea ice

Sea state

Air temperature

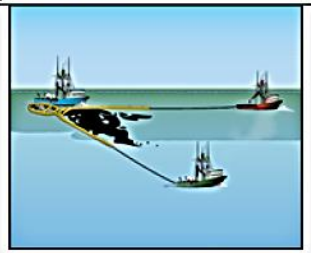
Wind chill

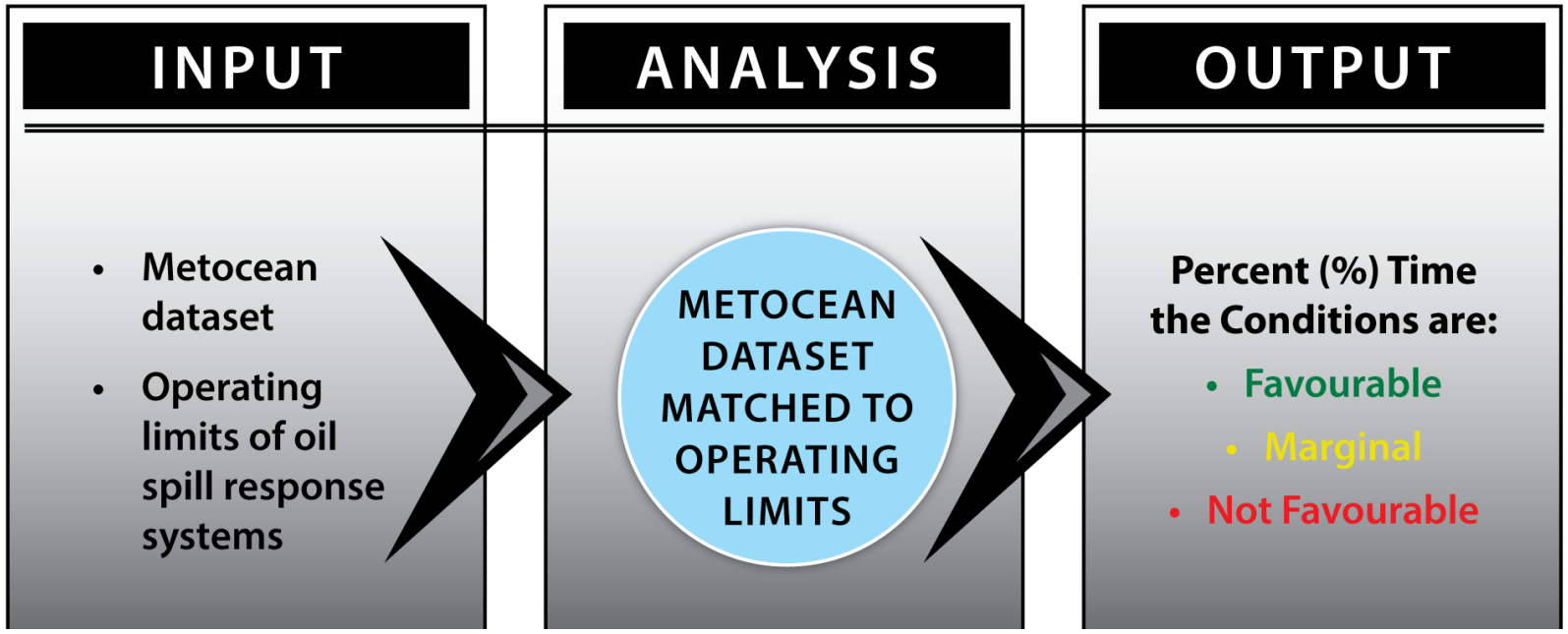
Structural icing

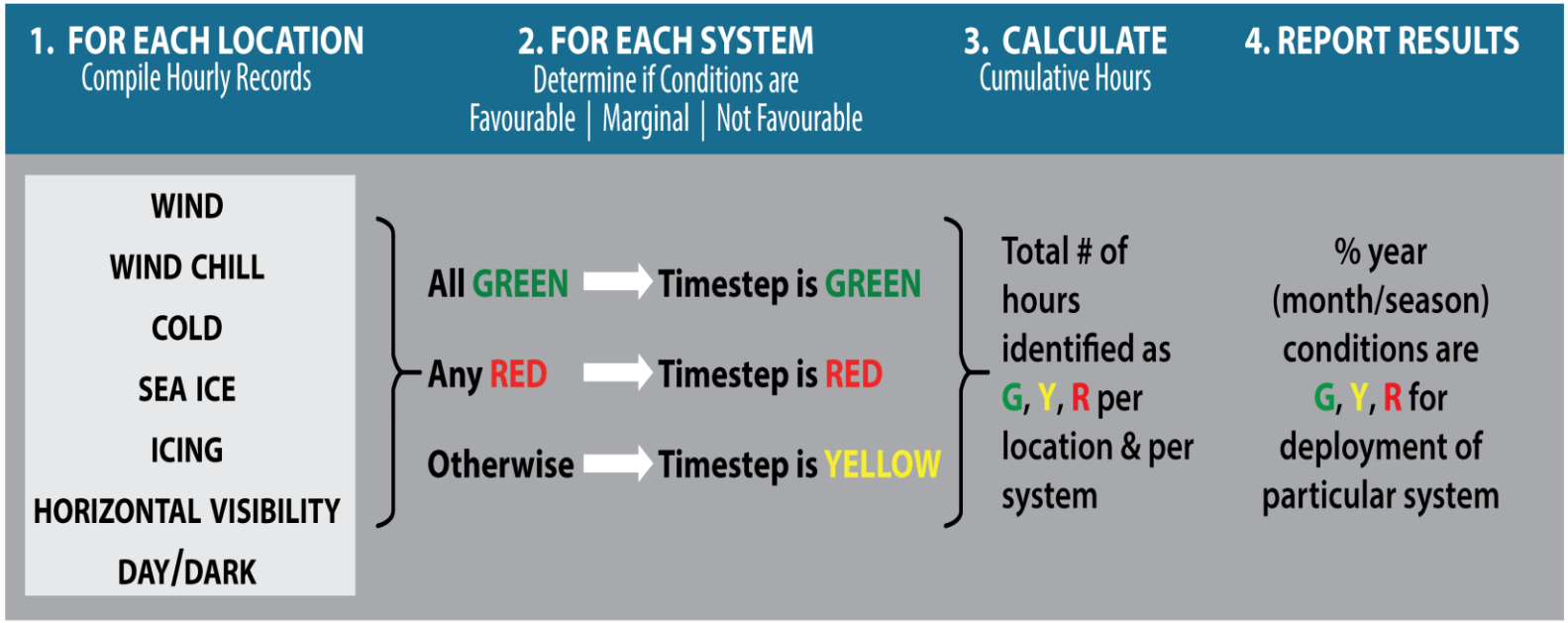
Light conditions

Horizontal visibility

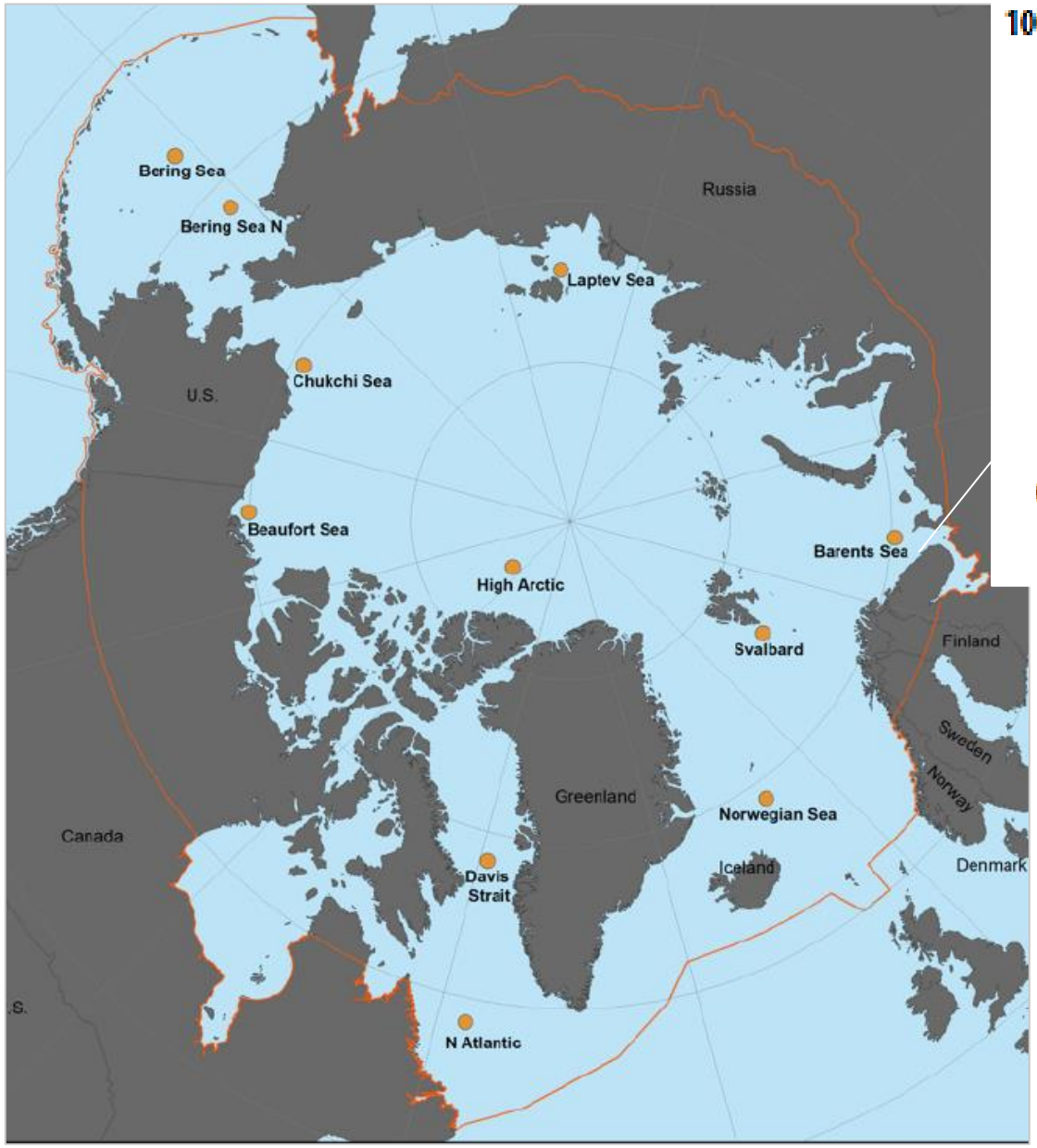
Vertical visibility

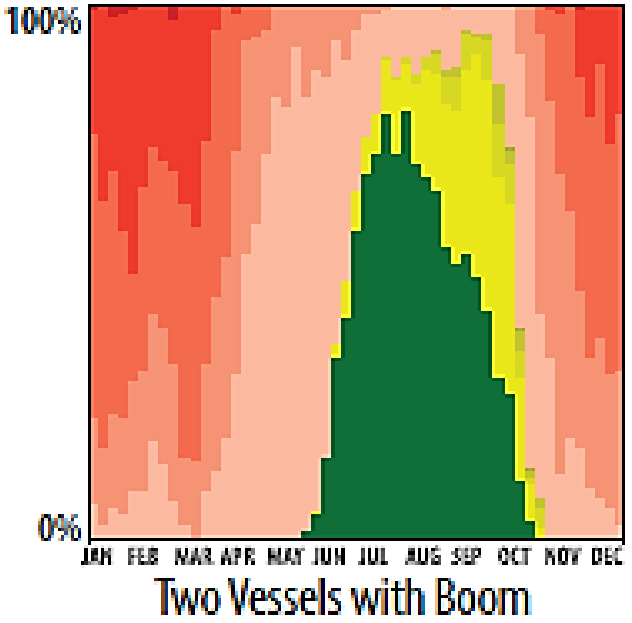
Response strategy	Baseline systems			
Mechanical Recovery Contain and collect oil from the water's surface for disposal.	 Two vessels operating containment boom	 Single vessel with outrigger and containment boom	 Three vessels-of-opportunity with boom	 Single vessel in ice (no boom)
Dispersants Add chemicals to the slick to speed the dispersion of oil droplets into the water column.	 Vessel application	 Fixed-wing aircraft application	 Helicopter application	
In-situ Burning Conduct a controlled burn of oil on the water's surface. The slick may need to be contained using vessels and boom in order to achieve a thickness adequate for ignition and burning	 Vessel-based ignition with fire boom for containment	 Helicopter-based ignition, using ice for containment (no boom)	 Helicopter-based application of herders as well as ignition	

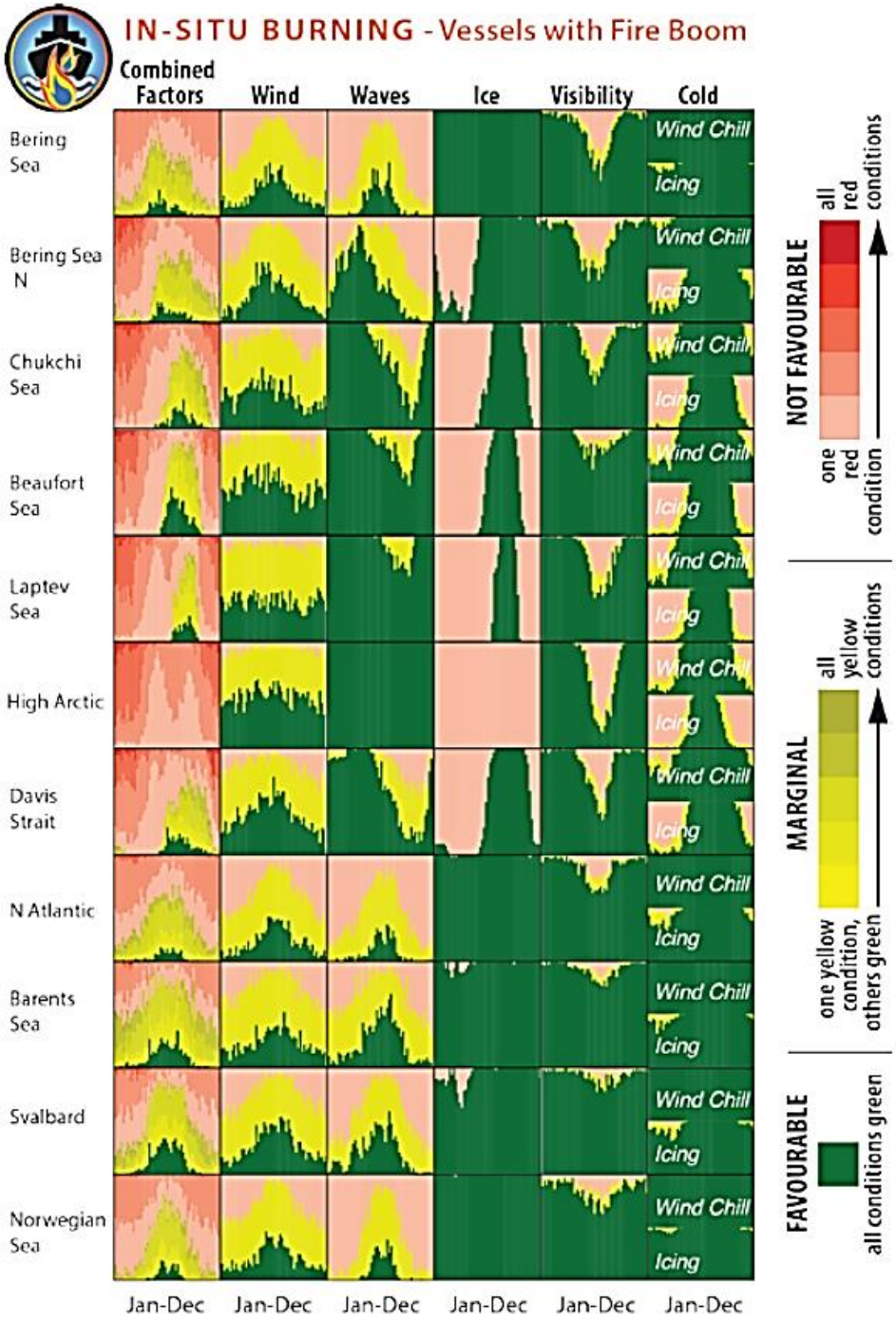

INPUT
ANALYSIS
OUTPUT
• Metocean dataset
• Operating limits of oil spill response systems
METOCEAN DATASET MATCHED TO OPERATING LIMITS
Percent (%) Time the Conditions are:
• Favourable
• Marginal
• Not Favourable


1. FOR EACH LOCATION
Compile Hourly Records
2. FOR EACH SYSTEM
Determine if Conditions are
Favourable | Marginal | Not Favourable
3. CALCULATE
Cumulative Hours
4. REPORT RESULTS
WIND
WIND CHILL
COLD
SEA ICE
ICING
HORIZONTAL VISIBILITY
DAY/DARK
All GREEN → Timestep is GREEN
Any RED → Timestep is RED
Otherwise → Timestep is YELLOW
Total # of hours identified as G, Y, R per location & per system
% year (month/season) conditions are G, Y, R for deployment of particular system

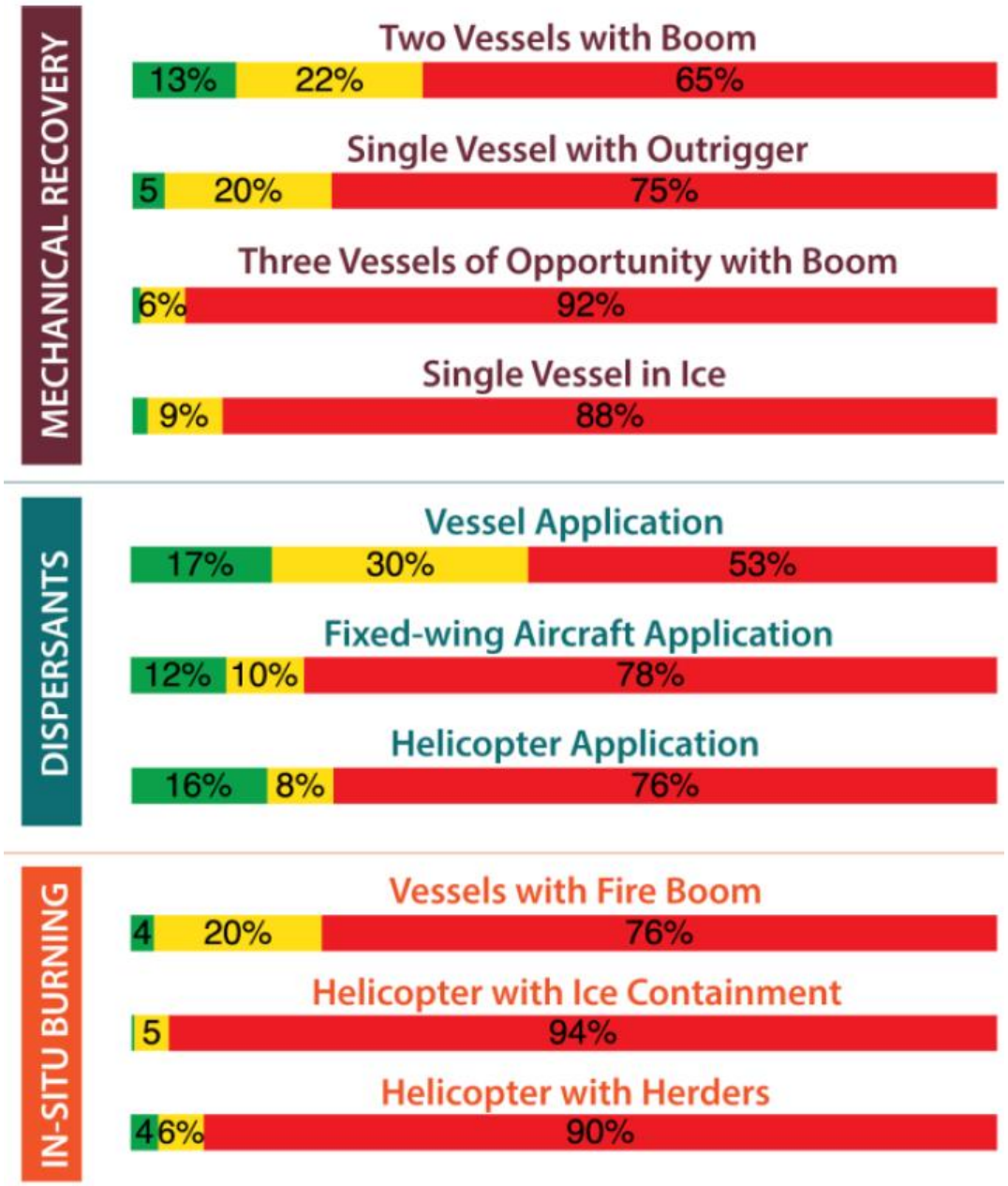
Geospatial Analysis and Location Specific Analysis

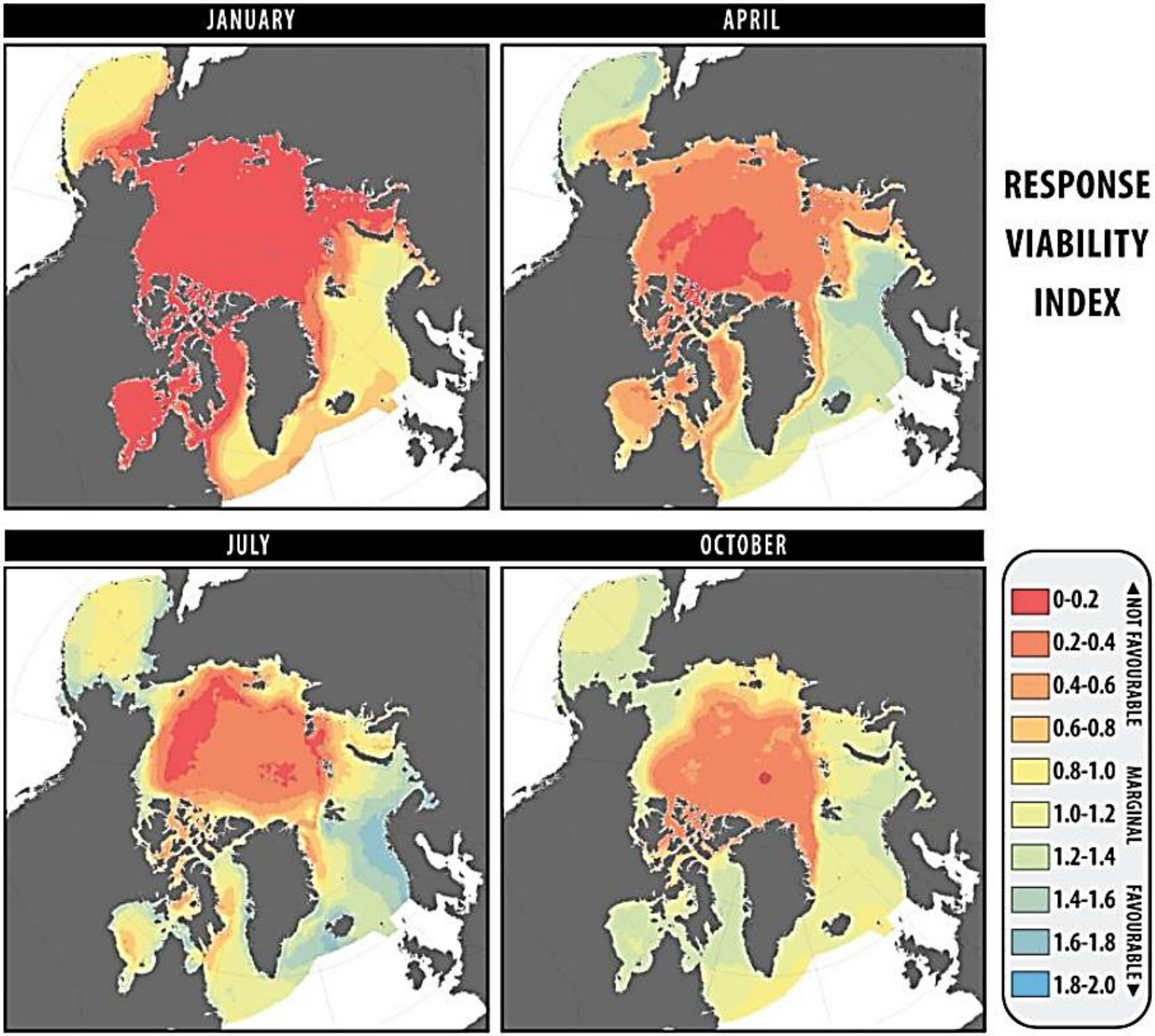





IN-SITU BURNING - Vessels with Fire Boom
Combined Factors
Wind
Waves
Ice
Visibility
Cold
Bering Sea
Bering Sea N
Chukchi Sea
Beaufort Sea
Laptev Sea
High Arctic
Davis Strait
N Atlantic
Barents Sea
Svalbard
Norwegian Sea
Wind Chill
Icing
Jan-Dec
NOT FAVOURABLE
all red conditions
one red condition
MARGINAL
all yellow conditions
one yellow condition, others green
FAVOURABLE
all conditions green

Comparison of Response Systems




JANUARY
APRIL
JULY
OCTOBER
RESPONSE
VIABILITY
INDEX
0-0.2
0.2-0.4
0.4-0.6
0.6-0.8
0.8-1.0
1.0-1.2
1.2-1.4
1.4-1.6
1.6-1.8
1.8-2.0
NOT FAVOURABLE
MARGINAL
FAVOURABLE

Conclusions

- Response viability varies considerably with system, season and location.
- Optimization of strategies and systems to the local conditions can significantly benefit response.
- Subsequent analyses could also explore changes to response viability as the Arctic environment changes, or inform technological development.
- Response viability based on metocean conditions is an important aspect of the overall risk profile for the Arctic, as response represents the last intervention between hazard and consequences.

Access this study at:

https://oaarchive.arctic-council.org/handle/11374/1928

ARCTIC COUNCIL

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Circumpolar Oil Spill Response Viability Analysis; Technical Report

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This study considers the comb... (13.3 Mb)

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Emergency Prevention, Preparedness and Response (EPPR)

Metadata
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Subject
EPPR; Fairbanks Ministerial; Oil spill; Oil

The purpose of this circumpolar Arctic response viability analysis is to better understand the potential for different oil spill response systems to operate in the Arctic marine environment. The EPPR Working Group commissioned this study of oil spill response viability for the circumpolar Arctic region, co-sponsored by Norway, the United States, and Denmark. DNV GL and Nuka Research and Planning Group, LLC conducted the study under contract to the Norwegian Coastal Administration and the U.S. Bureau of Safety and Environmental Enforcement.

Description
This analysis estimates how often different type of oil spill systems could be deployed in the Arctic based on defined operational limits and compares these to a hindcast of metocean data.

URI
http://hdl.handle.net/11374/1928

Collections
Safety Projects, Map Products, and Other Work
10. Ministerial meeting in Fairbanks, USA, May 11 2017

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