KYSTVERKET

NORWEGIAN COASTAL ADMINISTRATION

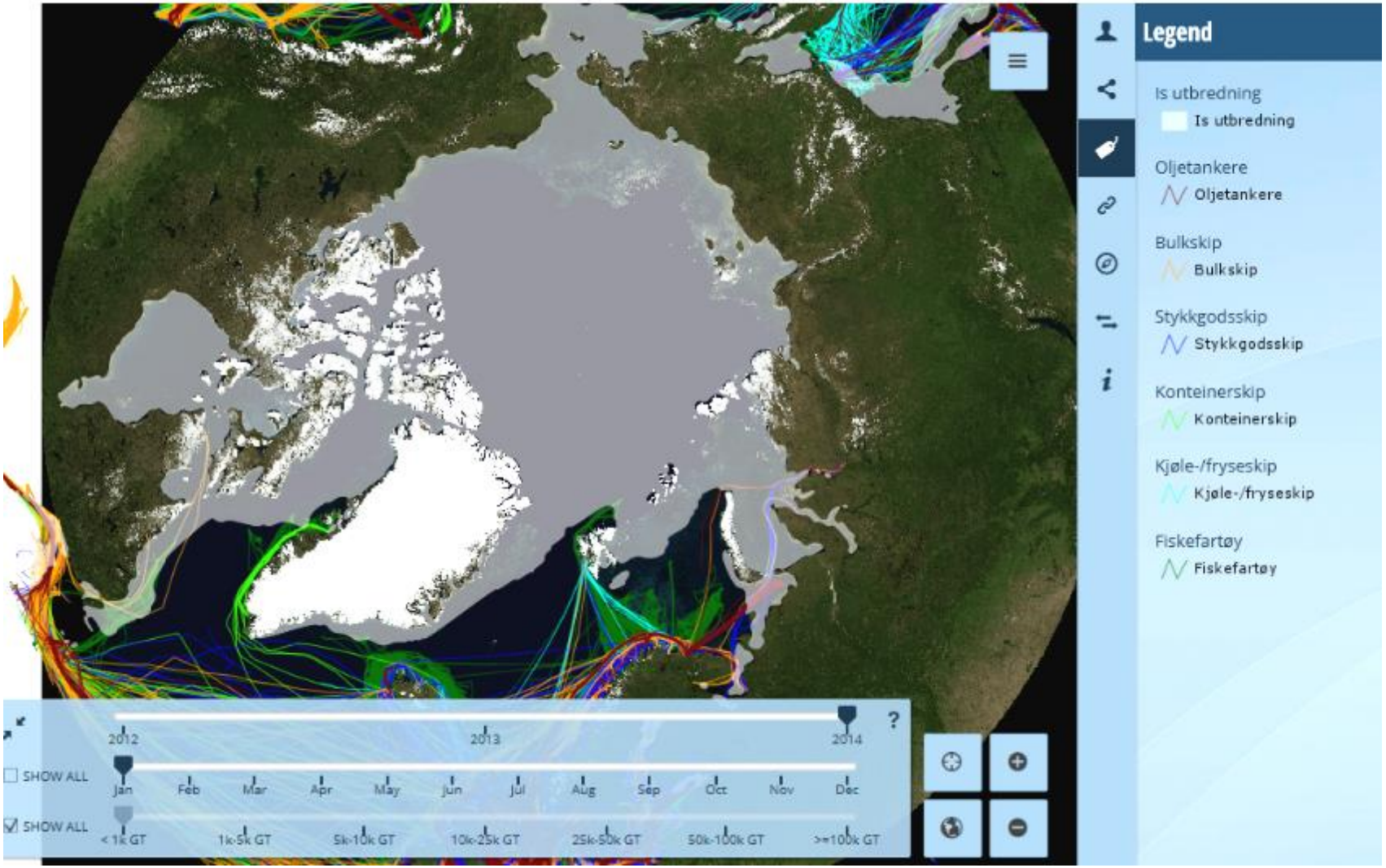
Vulnerability assessment and probability of ship accidents in the waters around Svalbard and Jan Mayen, contingency planning

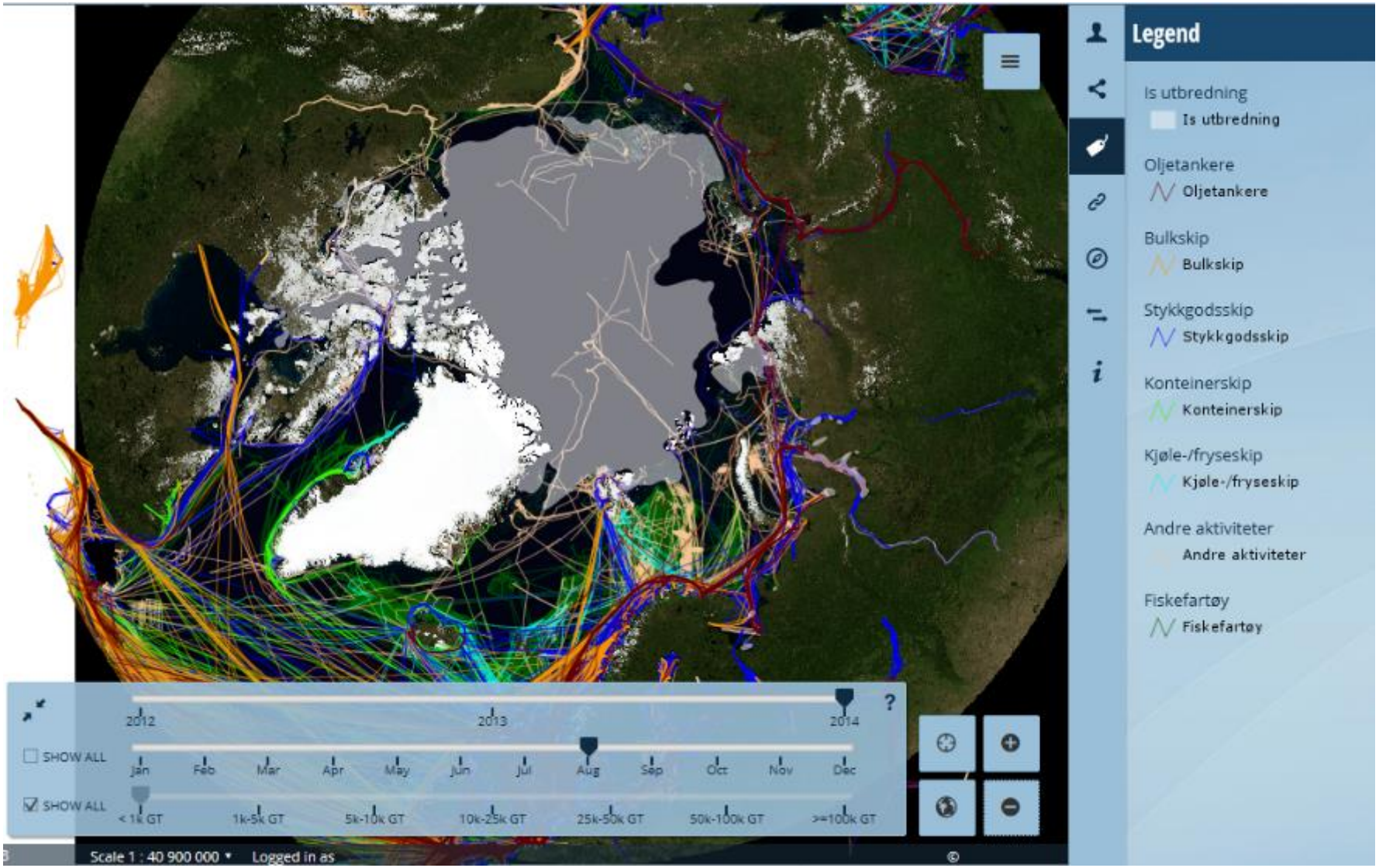
Rune Bergstrøm

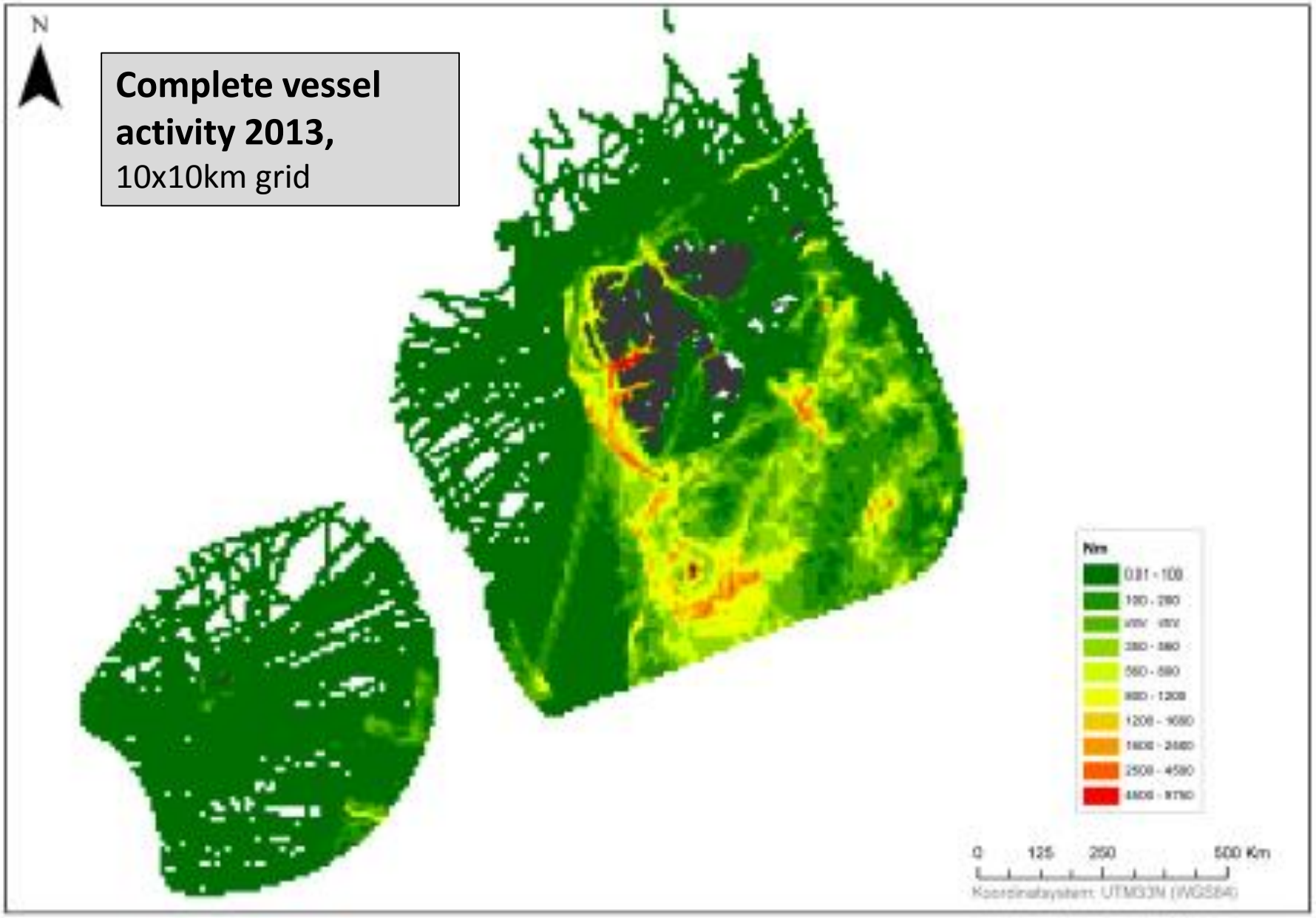
1. Probability of ship accidents that causes oil spills

2. Vulnerability assessment and environmental risk

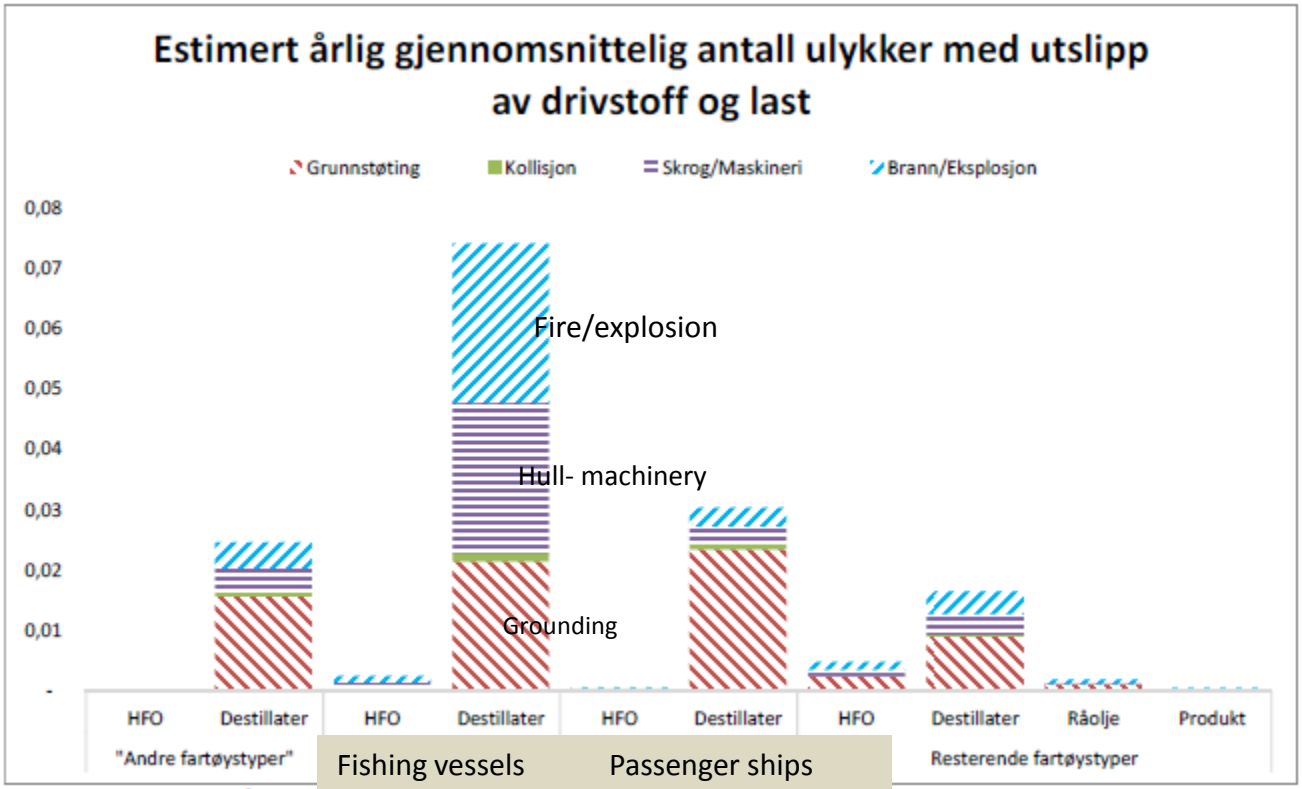
3. Contingency analyzes, equipment. Response time, human resources etc.


Legend
Is utbredning
Is utbredning
Oljetankere
Oljetankere
Bulkskip
Bulkskip
Stykkgodsskip
Stykkgodsskip
Konteinerskip
Konteinerskip
Kjøle-/fryseskip
Kjøle-/fryseskip
Fiskefartøy
Fiskefartøy
2012
2013
2014
SHOW ALL
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
SHOW ALL
< 1k GT
1k-5k GT
5k-10k GT
10k-25k GT
25k-50k GT
50k-100k GT
>=100k GT


Legend
Is utbredning
Is utbredning
Oljetankere
Oljetankere
Bulkskip
Bulkskip
Stykkgodsskip
Stykkgodsskip
Konteinerskip
Konteinerskip
Kjøle-/fryseskip
Kjøle-/fryseskip
Andre aktiviteter
Andre aktiviteter
Fiskefartøy
Fiskefartøy
2012
2013
2014
SHOW ALL
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
SHOW ALL
< 1k GT
1k-5k GT
5k-10k GT
10k-25k GT
25k-50k GT
50k-100k GT
>=100k GT
Scale 1 : 40 900 000
Logged in as

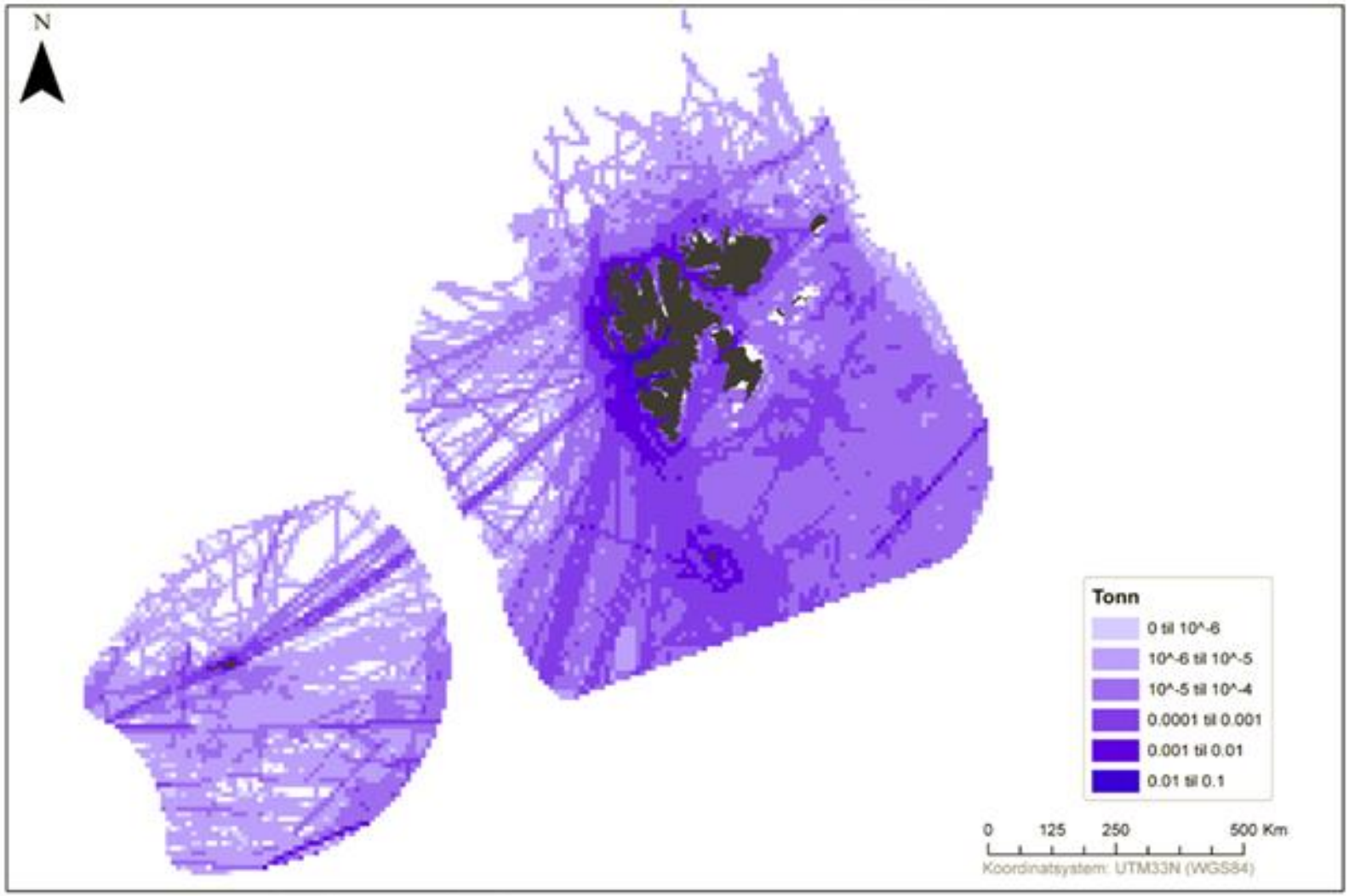

N
Complete vessel activity 2013,
10x10km grid
Nm
0 125 250 500 Km

Estimated yearly ship accidents resulting in oil spills



Figur 40 Estimert årlig gjennomsnittlig antall ulykker med utslipp av drivstoff og last.

Estimated average oil spills pr. year (tons)



Figur 3-3: *Geografisk framstilling av estimert gjennomsnittlig mengde utslipp av drivstoff eller last for Svalbard og Jan Mayen (per 10 x 10 km gridrute) per år [1]*

Properties of oil Products in the Arctic

- From Heavy Fuel (IFO 180 and thicker) to Marine Diesels.
- Toxic effects of marine diesels, ice edge ?
- Marine diesel- wide variety of products
- Operational challenges to handle marine diesel spills.
- Crude oils vary from light to heavy

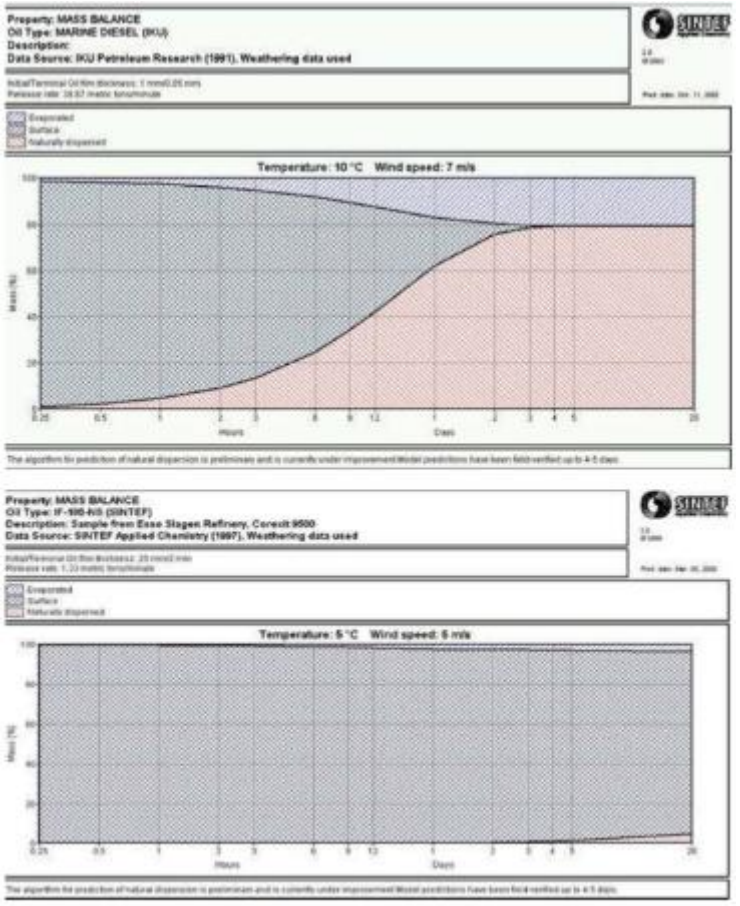


Figure 4.1 Mass balance of marine diesel oil (top) and HFO (IF-180-NS) (bottom) on water.

Accidents in the Arctic or in arctic climate

•2-3 ship accidents in Svalbard every season, normally no or small amounts of pollution. Estimated an accident with oil spill (average 4 tons) every 5 year, Jan Mayen every 225 year.

•Challenge with complex- and time consuming SAR -operations with large cruise ships, before we can address the pollution problem.

PRIMOS

A GIS tool for oil spill contingency planning in Svalbard

Rune Bergstrøm, Norwegian Coastal Administration

Dag Vongraven, Norwegian Polar Institute

NORSK·POLARINSTITUTT

NORWEGIAN COASTAL ADMINISTRATION

NORWEGIAN DIRECTORATE FOR NATURE MANAGEMENT

SYSSELMANNEN SVALBARD

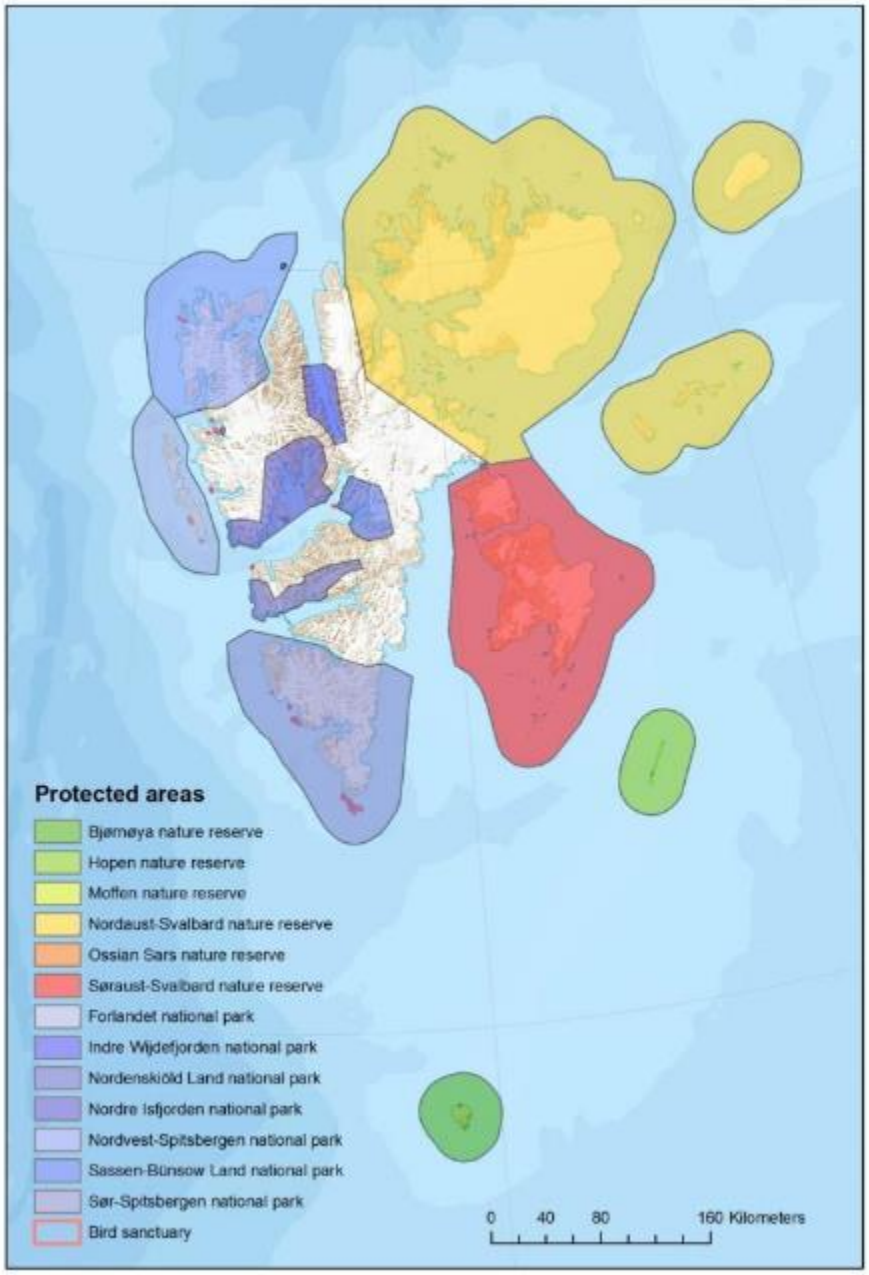
THE GOVERNOR OF SVALBARD

Svalbard archipelago

- High conservation ambitions, ”the best protected and managed wilderness in the world”

- Substantial present traffic from tourism, scientific expeditions and fisheries

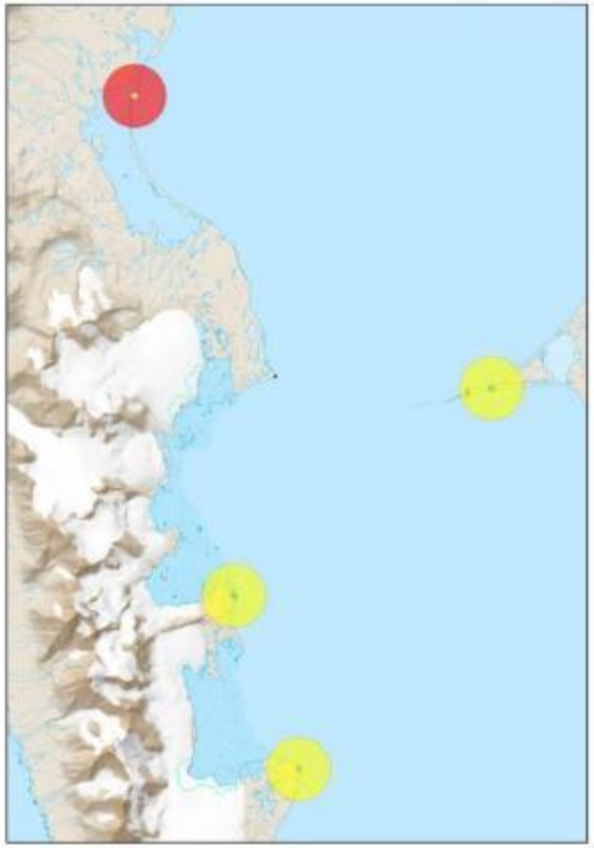
- Projected increase in traffic, Northern sea routes, more fisheries



Walrus

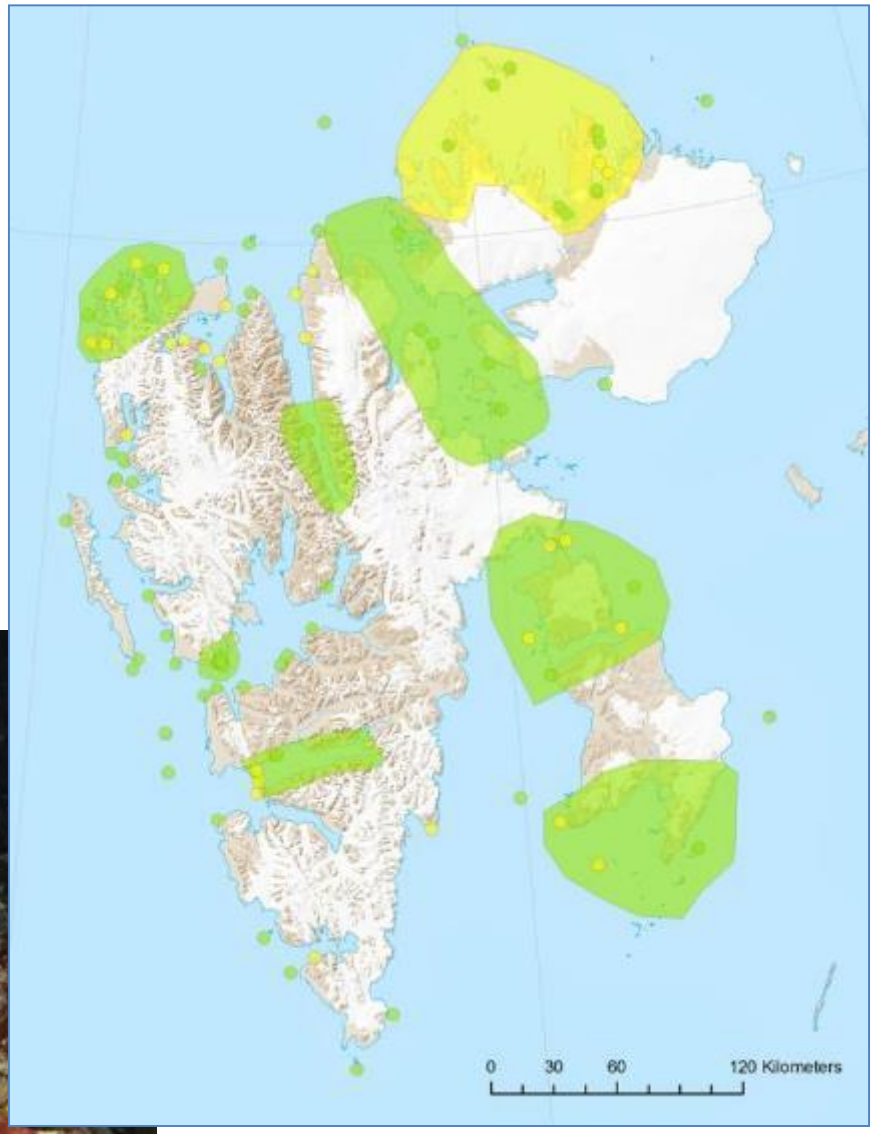
Haul-out sites:

82 sites – High, Medium, Low importance
Center – vulnerability 1 or 2
Buffer (1000 m) – vulnerability 2 or 3



Marine benthos

- Database: 30000 records on 1871 species from 1000 dive stations in the period after 1979.
- Some vulnerability analysis carried out, but further analyses and assessments needed.



Effects of oil spills, oil type and amount, K1- K6

Effects on surface: seabirds, sea mammals and beaches

Effects on Water column: fish

Tabel *sjøpattedyr og strand (olje på sjøoverflaten) og for fisk (olje i vannsøylen) for ulike utslippskategorier (type og mengde). Konsekvensene er inndelt i klasser (K1 til K6) med økende alvorlighetsgrad for miljøet som følge av økte utslippsmengder av ulik type som gir ulik eksponering. Mørk farge indikerer høy konsekvens.*

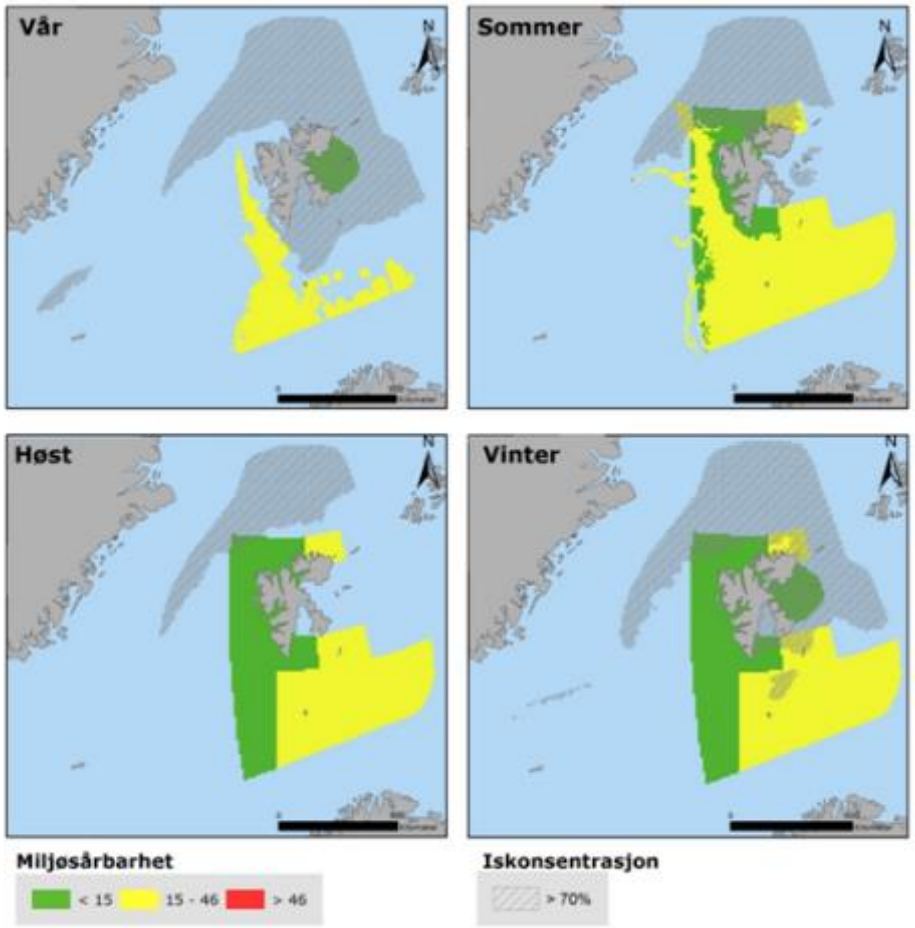
	Mengdekategori (tonn)	Konsekvenskategori sjøoverflate	Konsekvenskategori vannsøyle
Råolje	100-2 000	K3	K1
	2 000-20 000	K4	K3
	20 000-100 000	K5	K4
	> 100 000	K6	K5
Produkt	100-2 000	K2	K2
	2 000-20 000	K3	K3
	20 000-	K4	K4
Destillat	< 400	K1	K1
	400-1 000	K2	K2
	1 000-5 000	K3	K3
Tung bunkers (HFO)	< 400	K2	K1
	400-1 000	K3	K1
	1 000-5 000	K4	K2

Crude

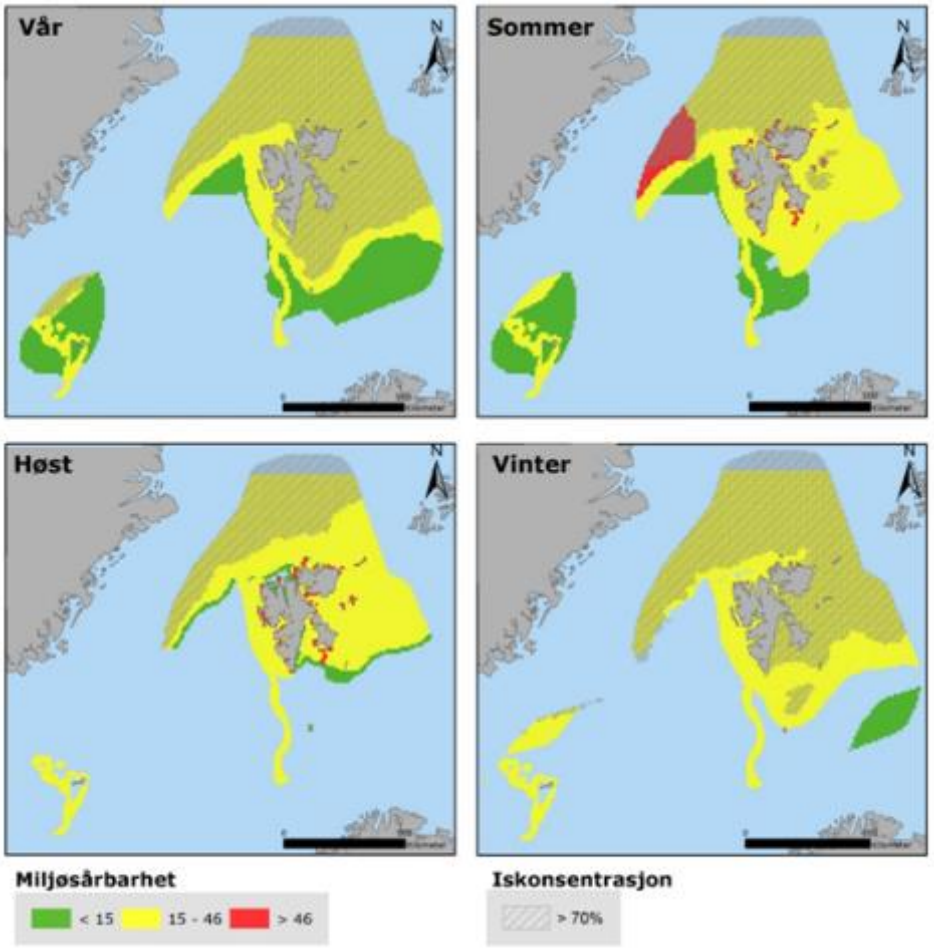
Marine Diesel etc.

Heavy Fuel Oils

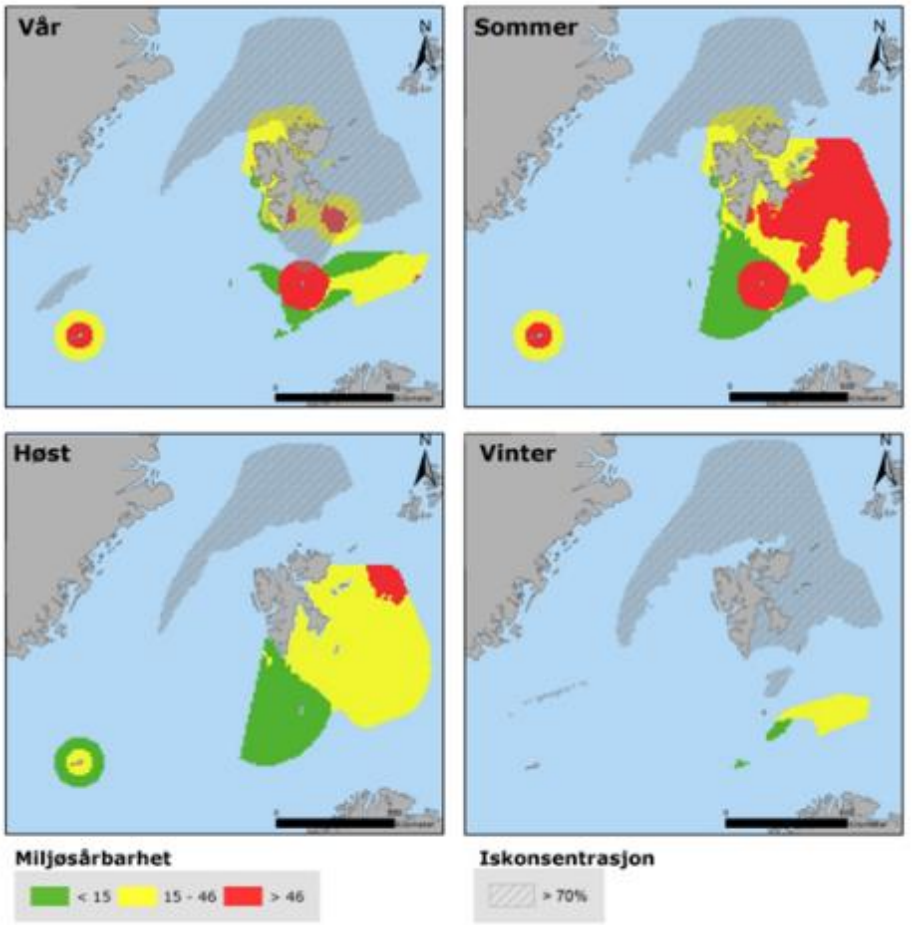
Effects on fish, 4 seasons



Effects on Sea mammals



Effects on Seabirds

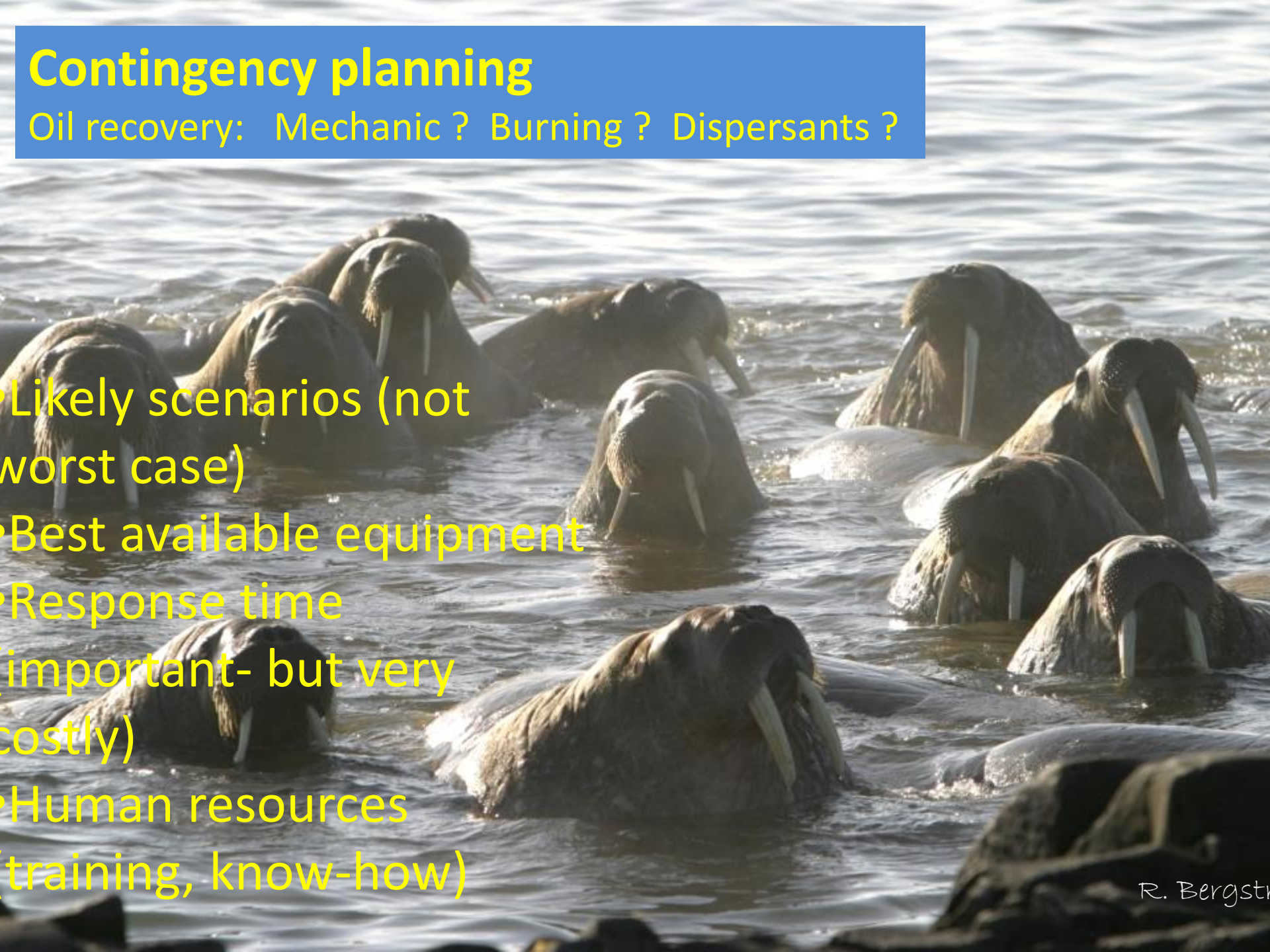


Recommendations

- Recommended routes (safe). Updated sea maps, electronic and visual navigation aid.
- Traffic Control for main ports (VTS) and emergency towing vessels
- Passenger ships must always have at least on other passenger ship nearby
- Quality check of existing maps, and establishing “Precautionary areas”
- Dynamic - continuous enforcement based on present g ice conditions and climate (Ice class etc)

Contingency planning

Oil recovery: Mechanic ? Burning ? Dispersants ?



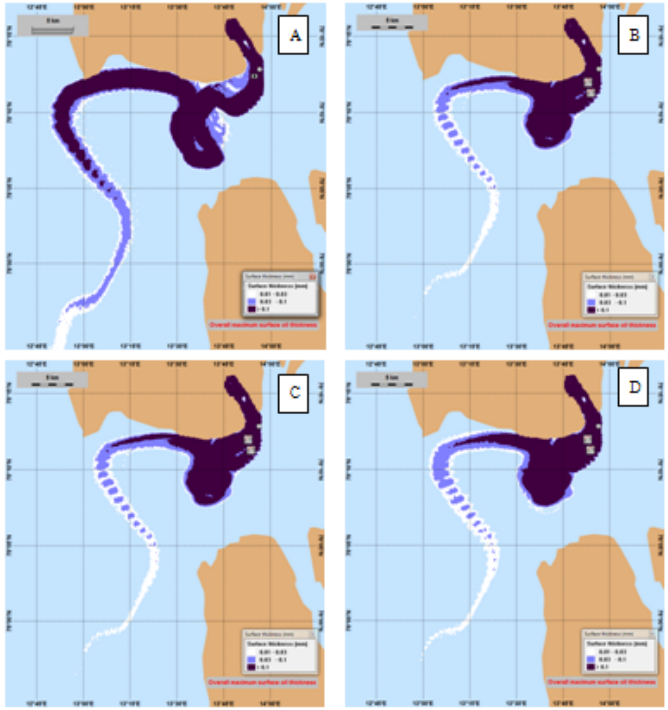
- Likely scenarios (not worst case)
- Best available equipment
- Response time (important- but very costly)
- Human resources (training, know-how)

R. Bergstr

Part 3. Probable scenarios and contingency planning

Results of more response systems and shorter response times

SINTEF



Figur 5.6 Påvirket areal > 0,01 mm for A: Ingen tiltak, B: TP1+RT1, C: TP1+RT2 og D: TP1+RT3.

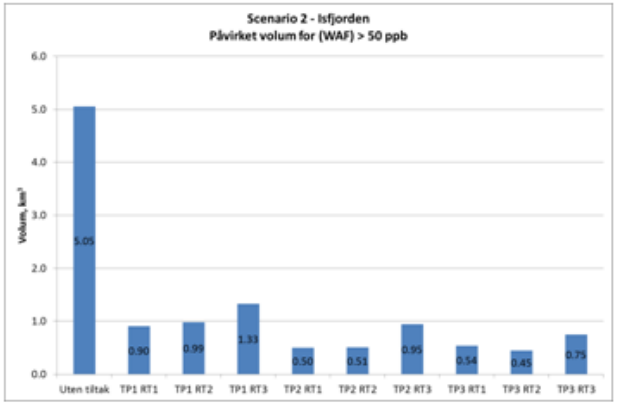
SINTEF

5.6 Influert vannsøyle

5.6.1 Vannløste komponentyer (WAF)

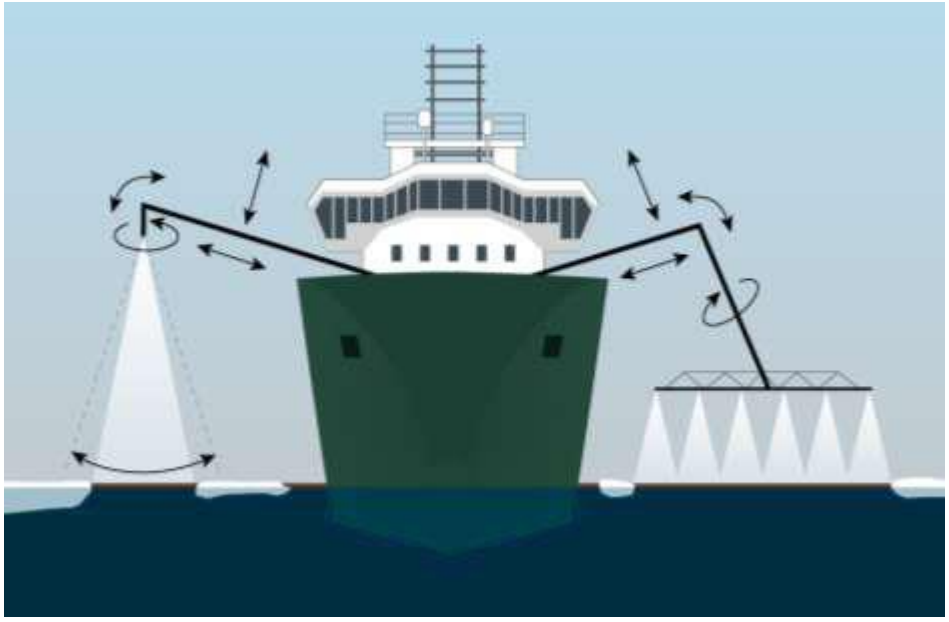
Figur 5.7 viser påvirket (sveipet) volum i kubikk-kilometer (km^3) som representerer summen av vannvolum som har konsentrasjoner av løste komponenter (WAF) større enn 50 ppb i løpet av simuleringsperioden på 10 døgn, gitt her som stolpediagrammer. Alle de 9 tiltakspakkene gir en klar reduksjon i berørt vannvolum (< 1,5 km^3) med konsentrasjoner større enn 50 ppb, sammenlignet med simuleringen uten tiltak (ca. 5 km^3 berørt vannvolum).

Figur 5.8 illustrerer eksempler av påvirket (sveipet) volum som WAF > 50 ppb for ingen tiltak og for de utvalgte tiltakspakkene. Figuren viser at ved ingen tiltak fås relativt store vannvolum med WAF > 50 ppb av den tynne oljefilmen som dispergeres naturlig ned i vannmassene fra dag 8.



Figur 5.7 Scenario 2 - grunnstøting av cruiseskip på Sagarkjeret i Isfjorden, Svalbard: Påvirket volum (km^3) av løste komponenter (WAF) > 50 ppb i vannsøylen. Figuren viser tiltakspakke (TP1) 1, 2 og 3 og responstider (RT) 1, 2 og 3, samt ingen tiltak.

In-situ burning.



Dispersants (very short window of opportunity, important sea bottom-nature resources.


W330

Lamor brush belt skimmer - KBV 001
- Took also ice, good capacity due to heavy heating capacity on board

Thank you for your attention !

Photo: Rune Bergstrøm