KYSTVERKET

Sensitivity mapping

Discussion of some key aspects of the Methodology applied in the Norwegian environmental risk assessment preformed in 2010

Brussels 10. October 2013

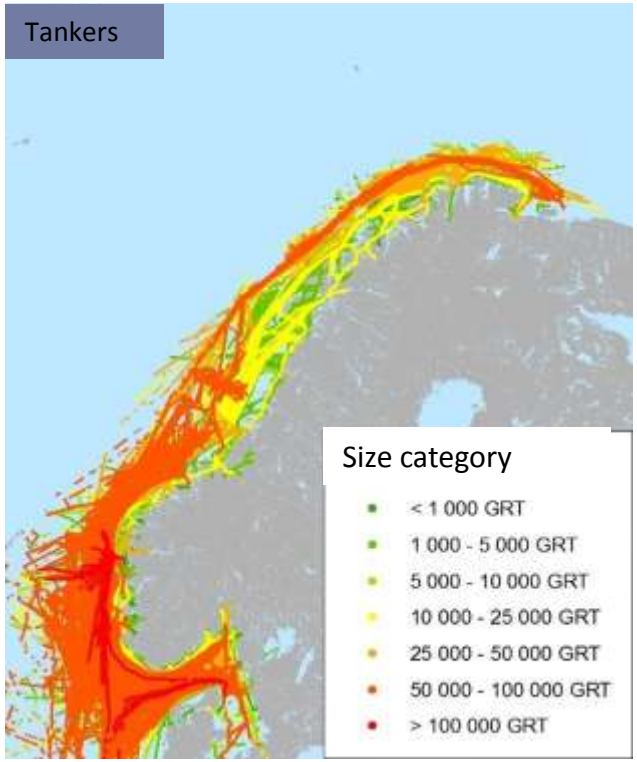
Content

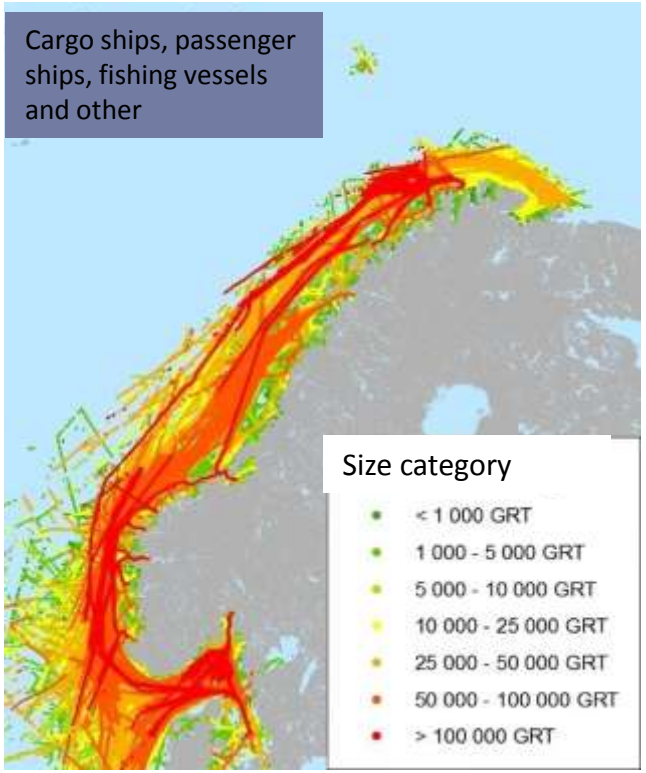
- Process on how to establish an environmental risk picture
  - Establish ship traffic pattern – AIS data on ship movements
  - Mapping of spill probability and impact potential
  - Analysis of environmental risk
    - Mapping of environmental sensitivity
    - From potential damage to consequence
    - Establish the risk picture
- Results
  - and use of results as input to oil spill response planning

Work performed for The Norwegian Coastal Administration in 201

Probability for acute oil pollution from ship traffic (Same as Be aware and Brisk)

- Establish a traffic pattern based on Automatic Identification System (AIS) data from ships
  - Ship types & size categories





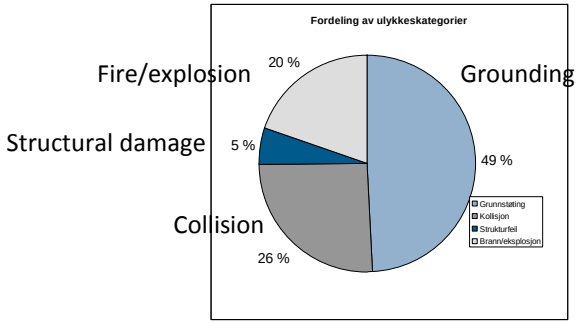
Probability for acute oil pollution from ship traffic

Type and volume categories

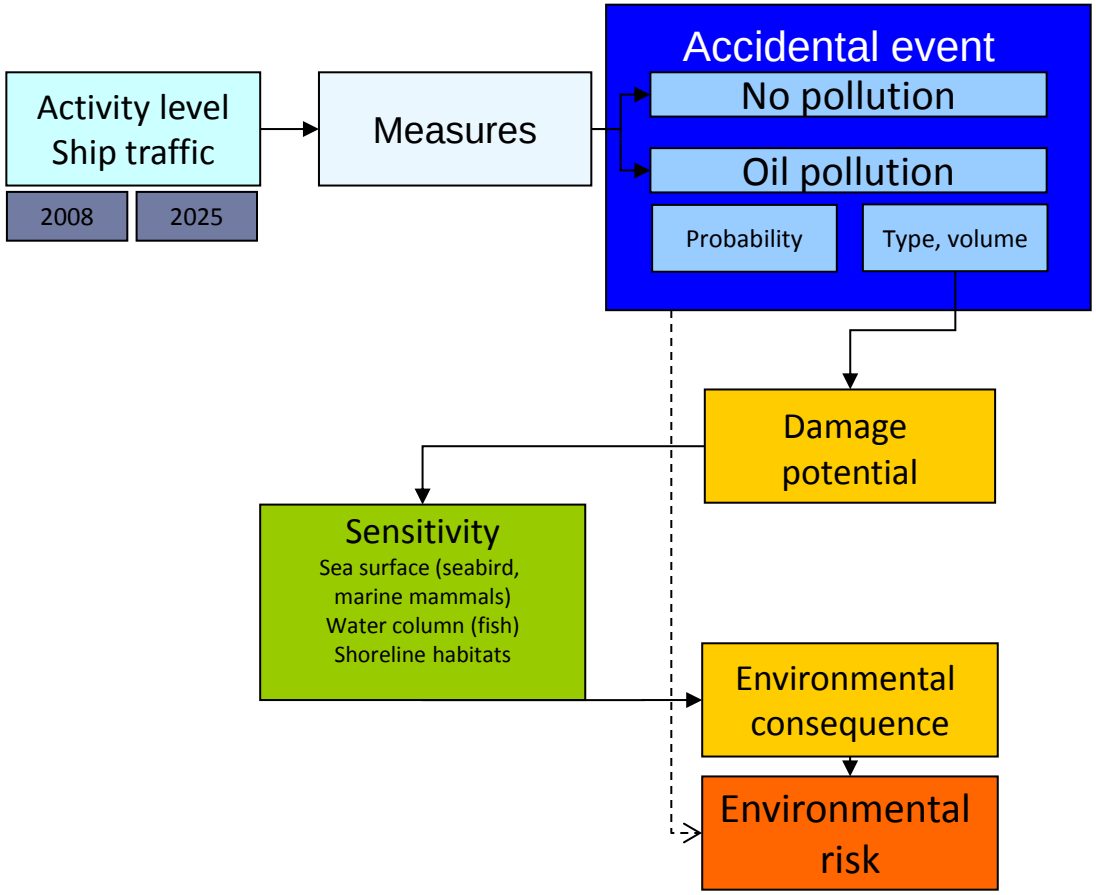
Modeling of ship traffic → **Estimation of accidental frequencies** → **Modeling of spill potential** → **Assessment of effect of measures TTS & Tugs** → **Assessment of effect of other measures**

Oil tankers
Product tankers
Bunker oil

Int. statistics
incl. adjustments
to Norwegian waters



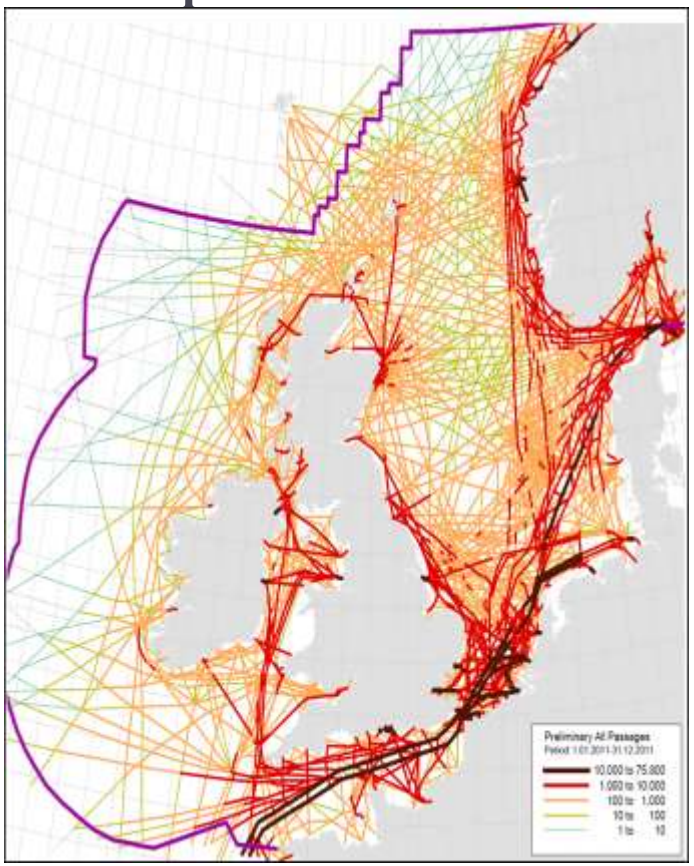
Environmental risk analysis

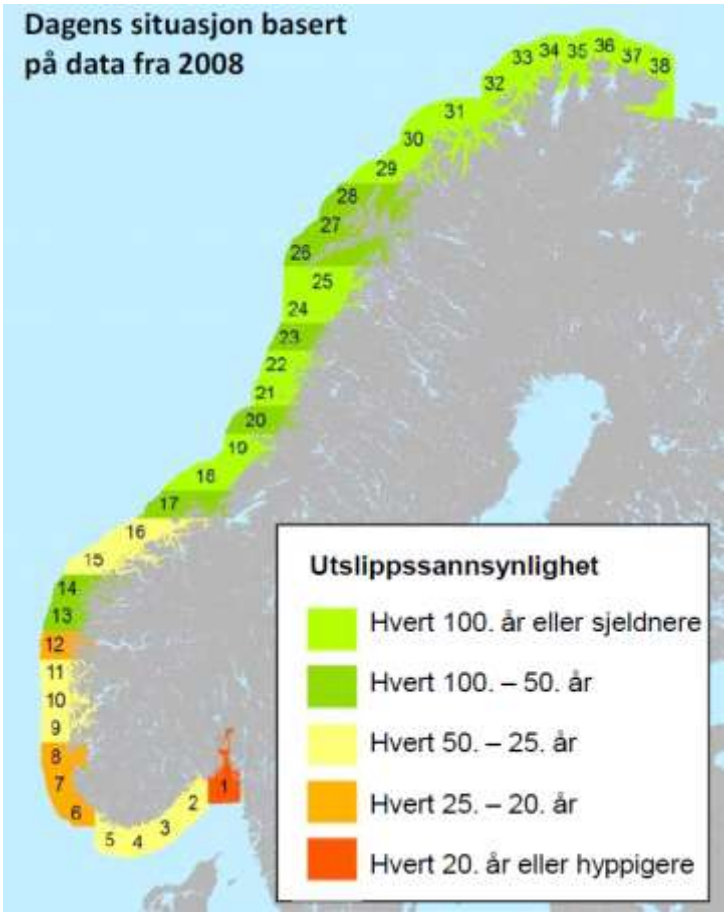


Tabell 3-2: *Anvendt fordeling av tungolje i ulike farvann langs kysten av fastlands-Norge*

Bunkers type	Oslofjorden til og med Lindesnes	Lindesnes-Stad	Stad til og med Lofoten	Lofoten-Kirkenes	Snitt for hele kysten
Tungolje	40 %	27 %	23 %	19 %	25 %
Destillater	60 %	73 %	77 %	81 %	75 %

Difference in methodology – no rout net established for calculating probability for spill



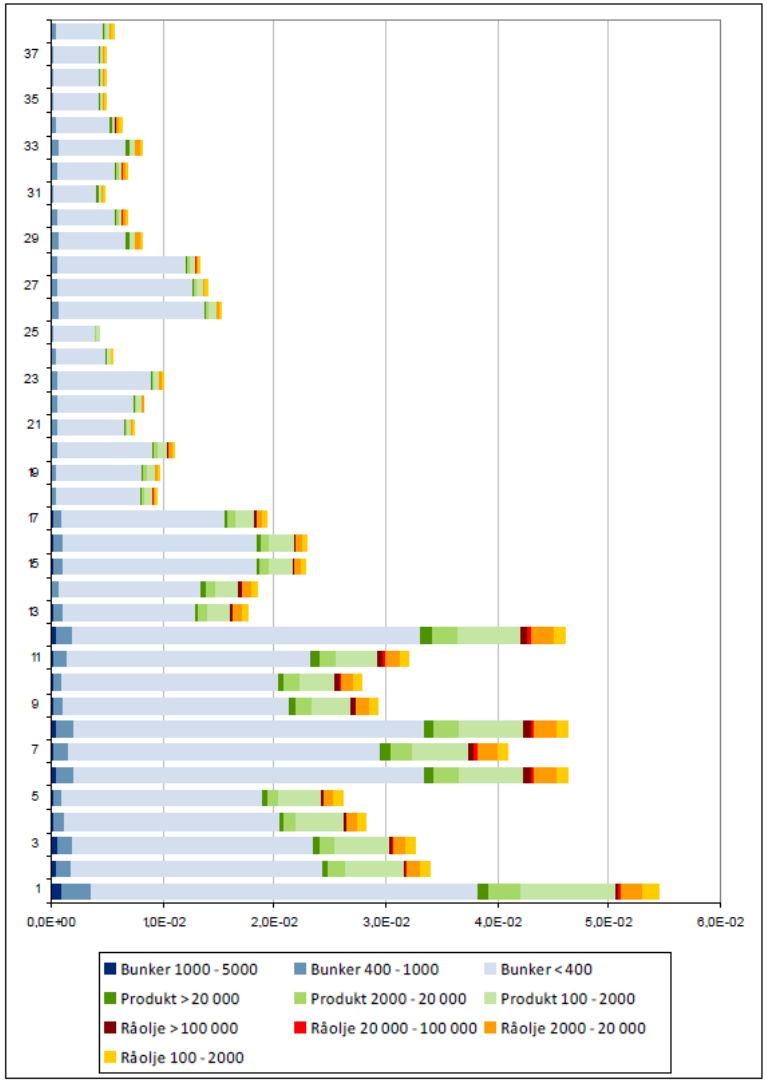


Map on the right: Illustrates probability for an accidental spill unrelated to oil type and volume. Presented as frequency for an accidental spill

Volumes that can possibly be spilled (spill potential) from ships along the Norwegian coast where divided into four "Volume categories" and three "oil types"

Mengdekategori	Råolje [tonn]	Produkt[tonn]	Bunkers[tonn]
M1	100 - 2000	100 - 2000	< 400
M2	2000 – 20 000	2000 – 20 000	400 - 1000
M3	20 000 – 100 000	> 20 000	1000 - 5000
M4	>100 000	-	-

Calculated spill probability for each of thevolume categories in each coastal segment here shown for 2008

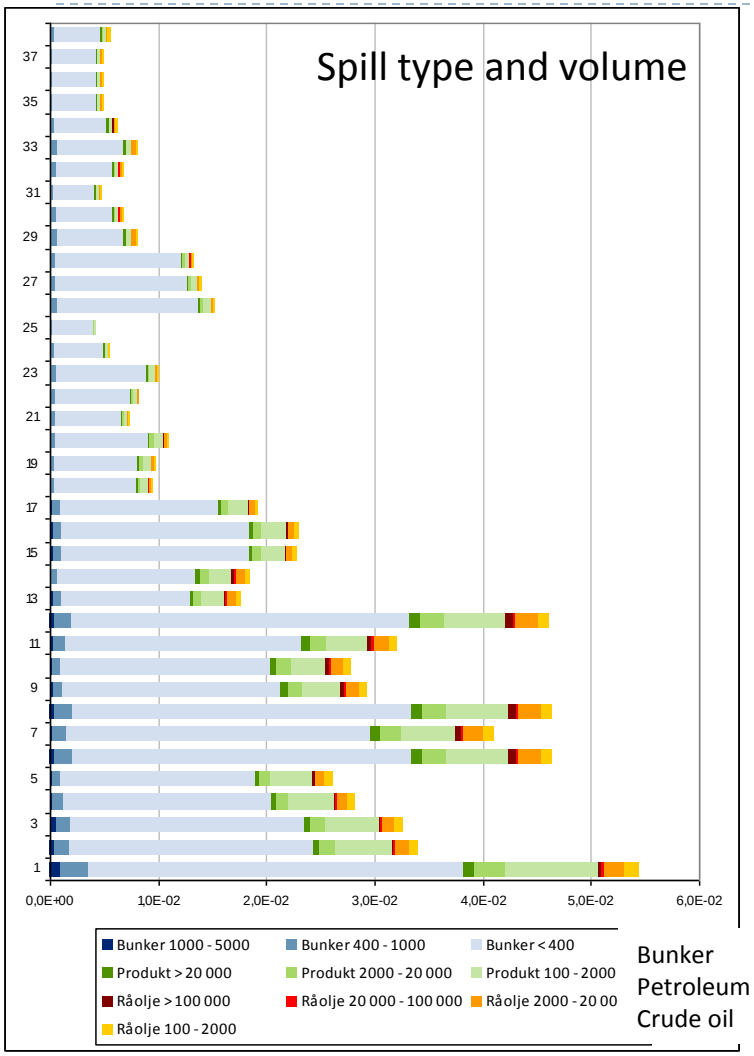


Probability for oil spill per year, total and divided into volume categories (in ton) for each coastal segment (1-38)based on AIS data for 2008

Environmental damage potential

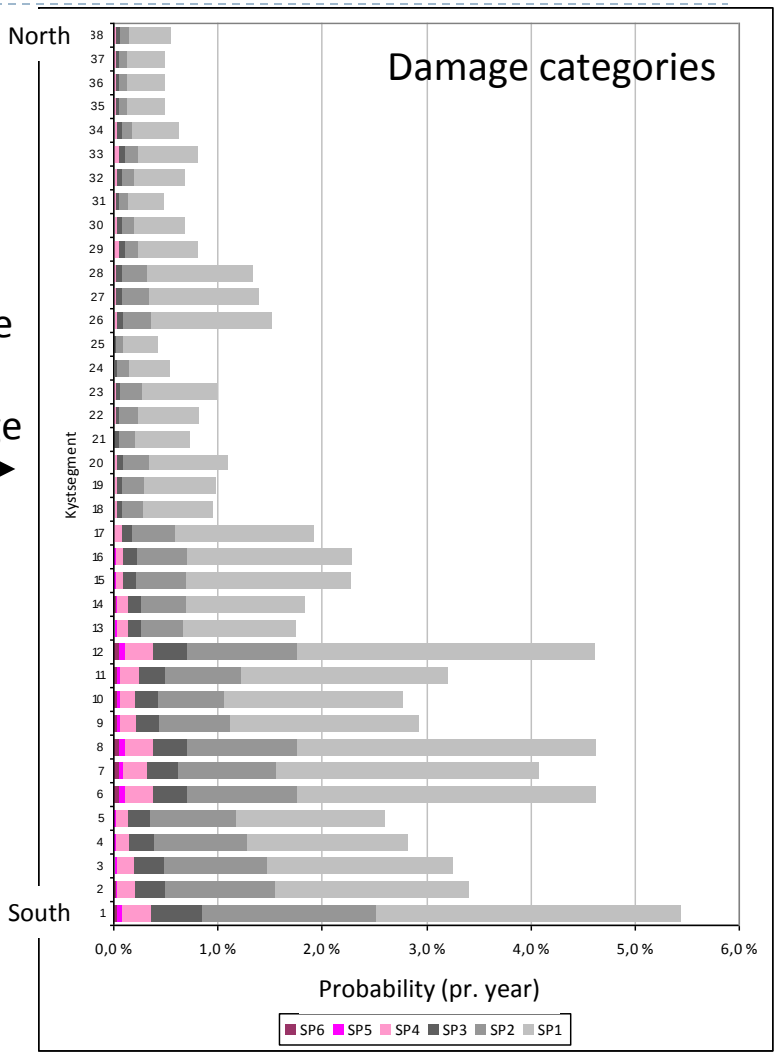
Sea surface impact (seabirds / marine mammals) + shoreline	Spill volume (tons)	Damage potential category					
		DP1	DP2	DP3	DP4	DP5	DP6
Crude oil	100-2000			X			
	2000-20000				X		
	20000-100000					X	
	> 100000						X
Light refined oil products	100-2000	X					
	2000-20000		X				
	20000-			X			
Heavy refined oil products	100-2000			X			
	2000-20000				X		
	20000-					X	
Light bunker oil	< 400	X					
	400-1000	X					
	1000-5000		X				
Heavy bunker oil	< 400		X				
	400-1000			X			
	1000-5000				X		

Environmental damage potential



Bunker
Petroleum products
Crude oil

Type and volume decides potential damage



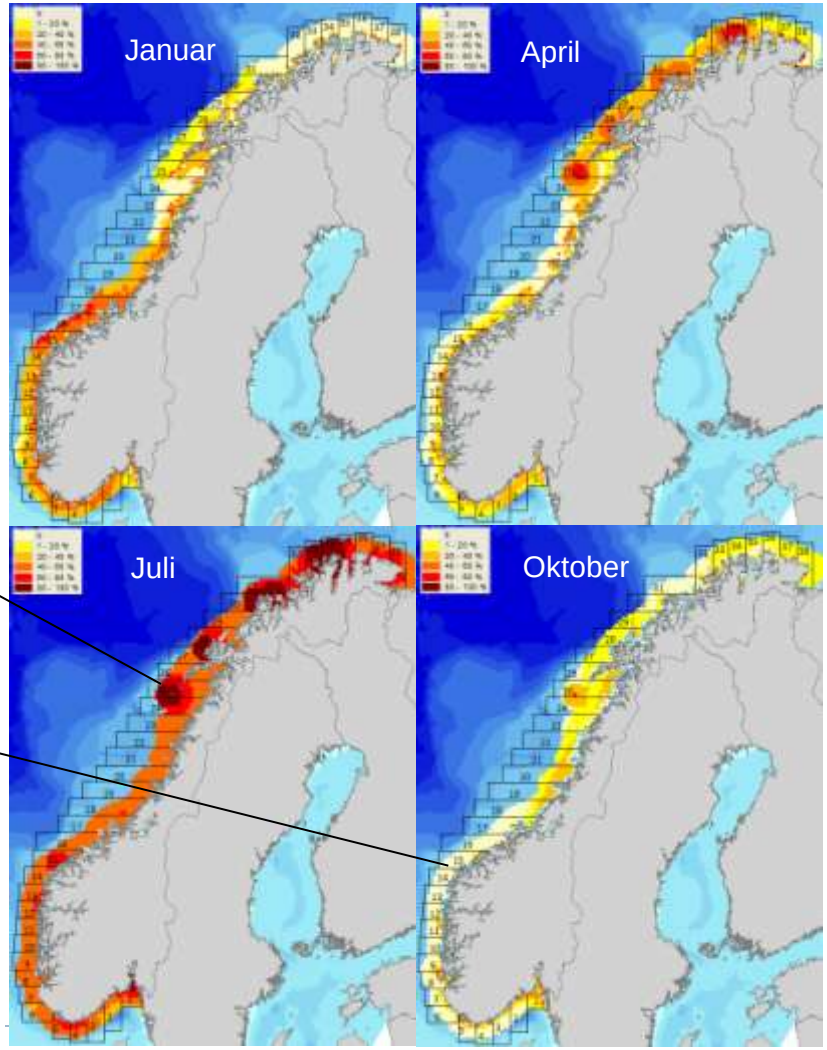
Environmental sensitivity

Adjust potential damage with environmental sensitivity to conclude on consequence

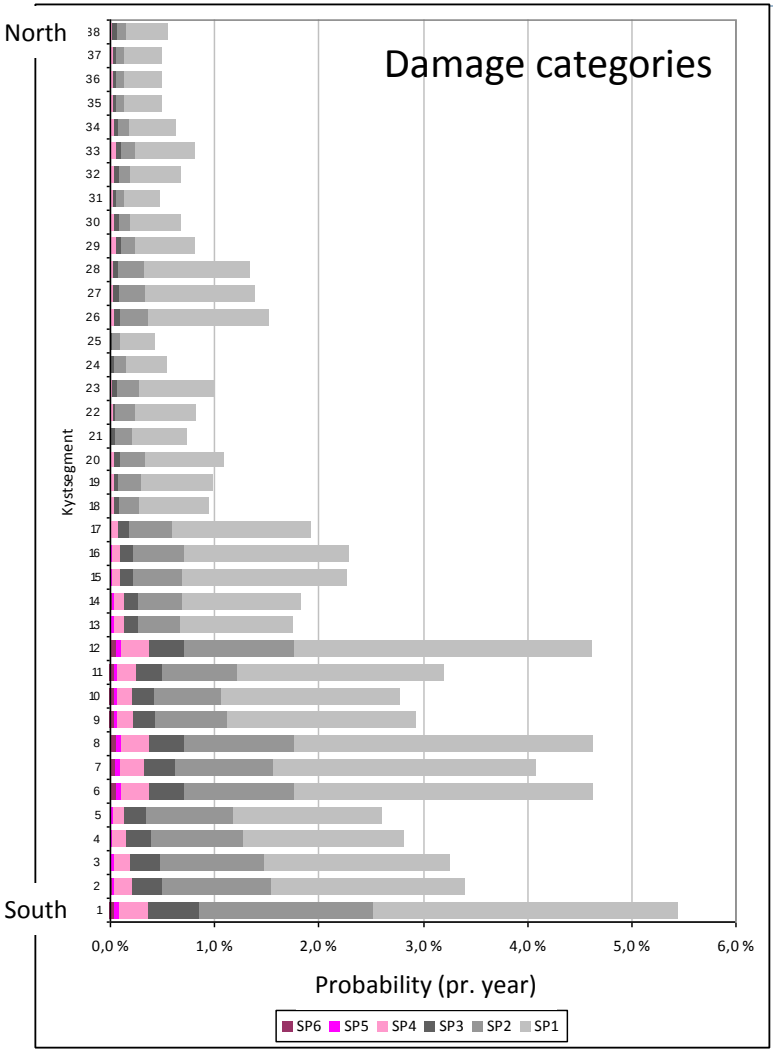
Higher consequence
(ex. Damage potential cat 3 goes to Consequence category 4)

Lower consequence
(EX. DP3 goes to C2)

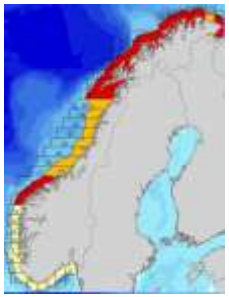
Seabird vulnerability maps

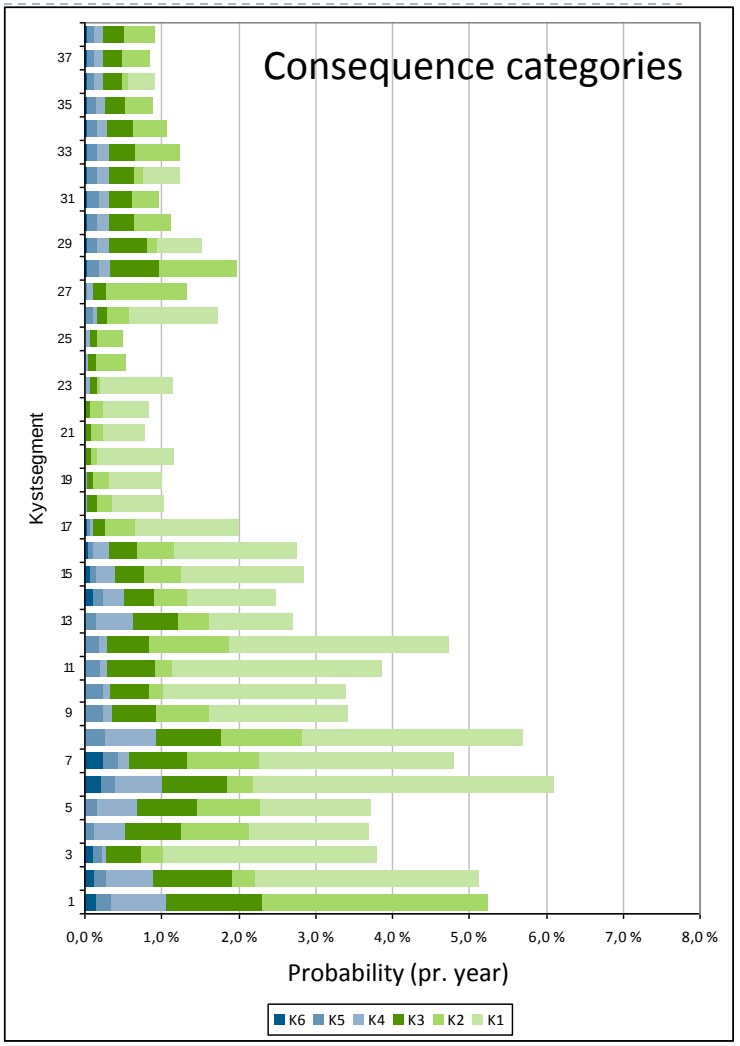


From damage potential to environmental risk

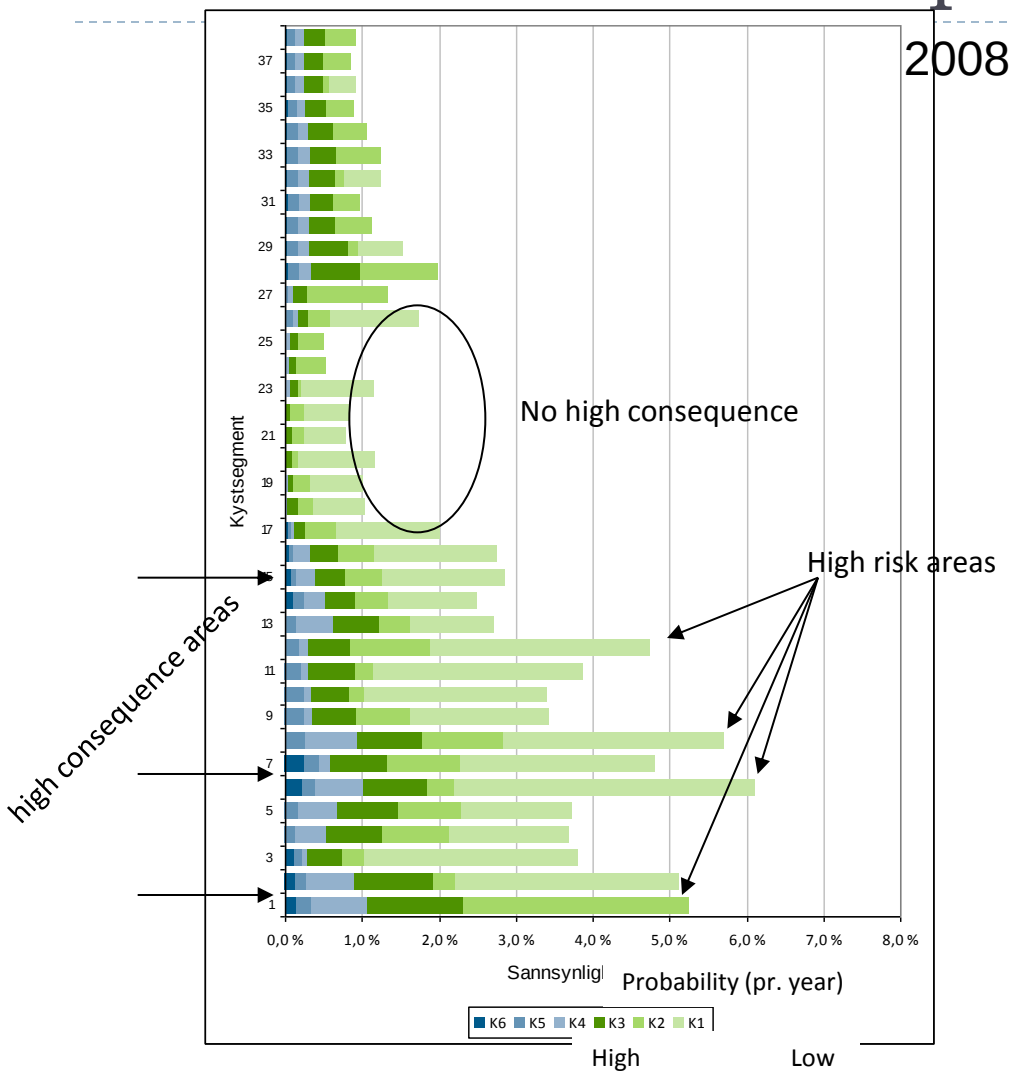


Environmental sensitivity adjustment



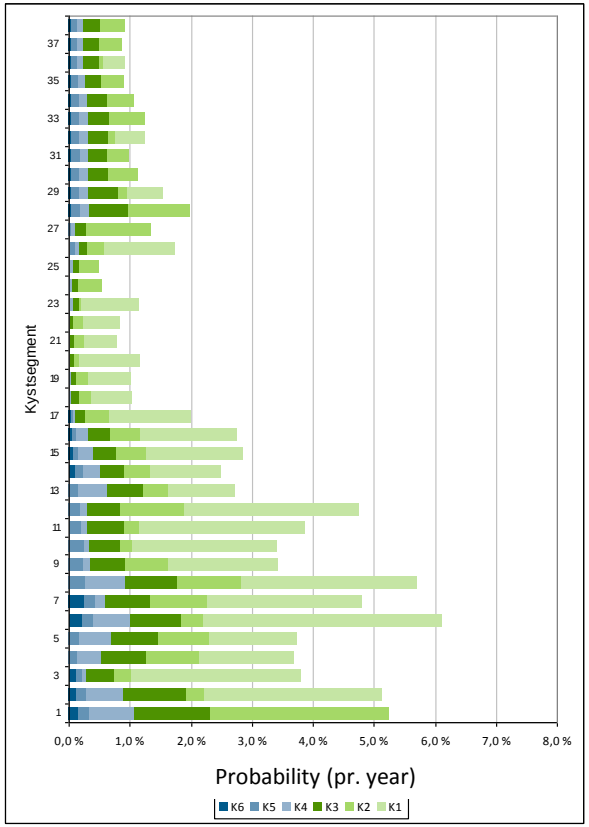


Environmental risk picture

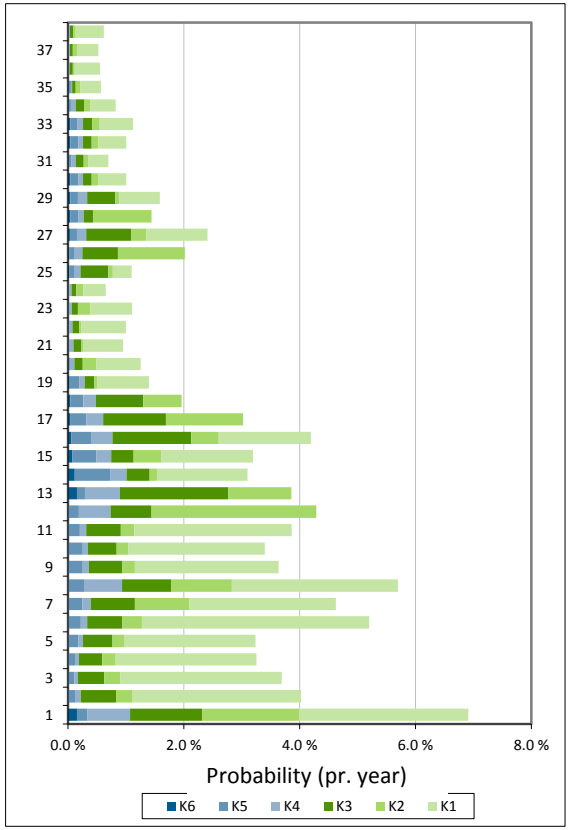


Risk picture for different kind of environmental resources

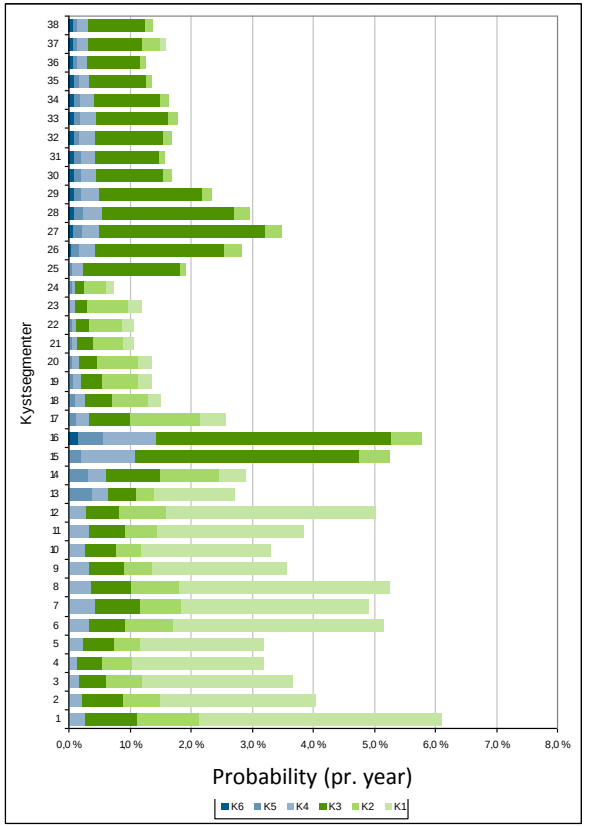
Seabirds



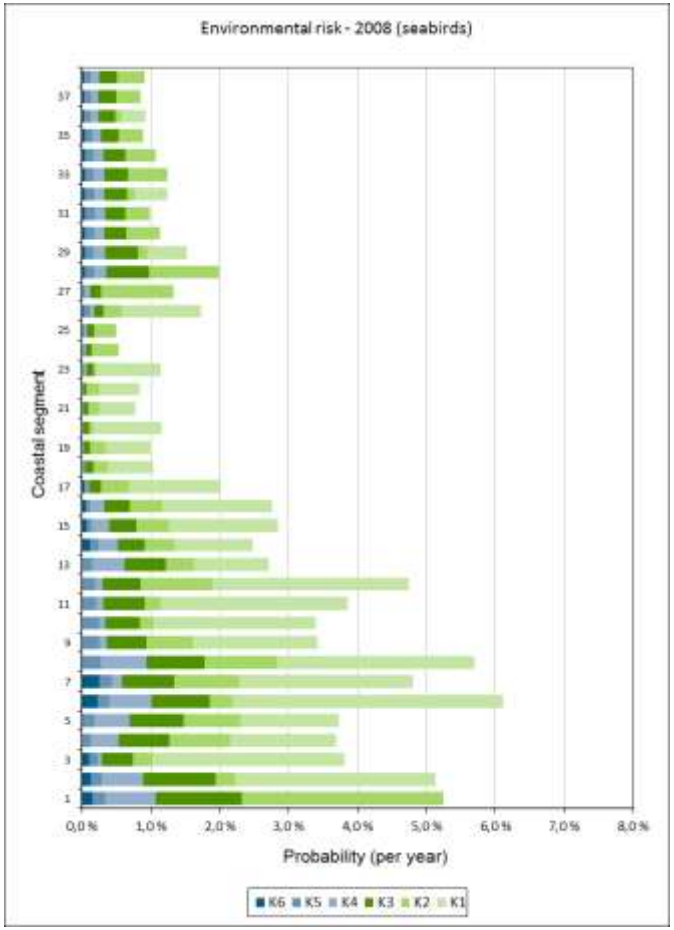
Marine Mammals

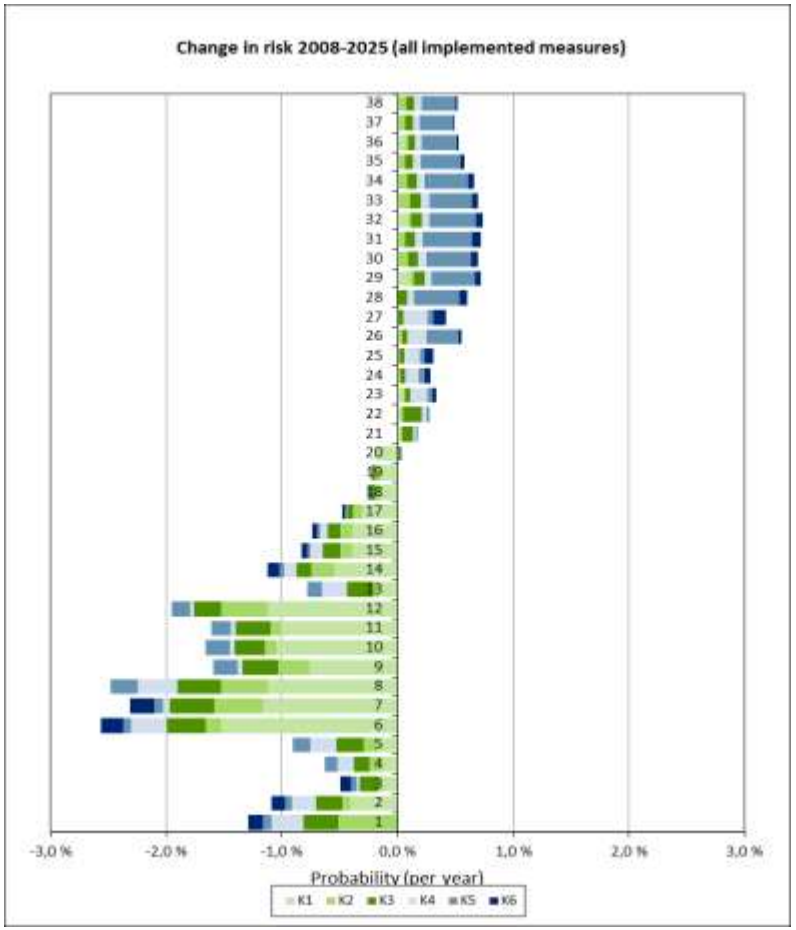


Fish



Good metodology for future forcasting





Environmental Risk from ship traffic along the Norwegian Coast

Thank you ☺