



Regional ERA – ERA Acute

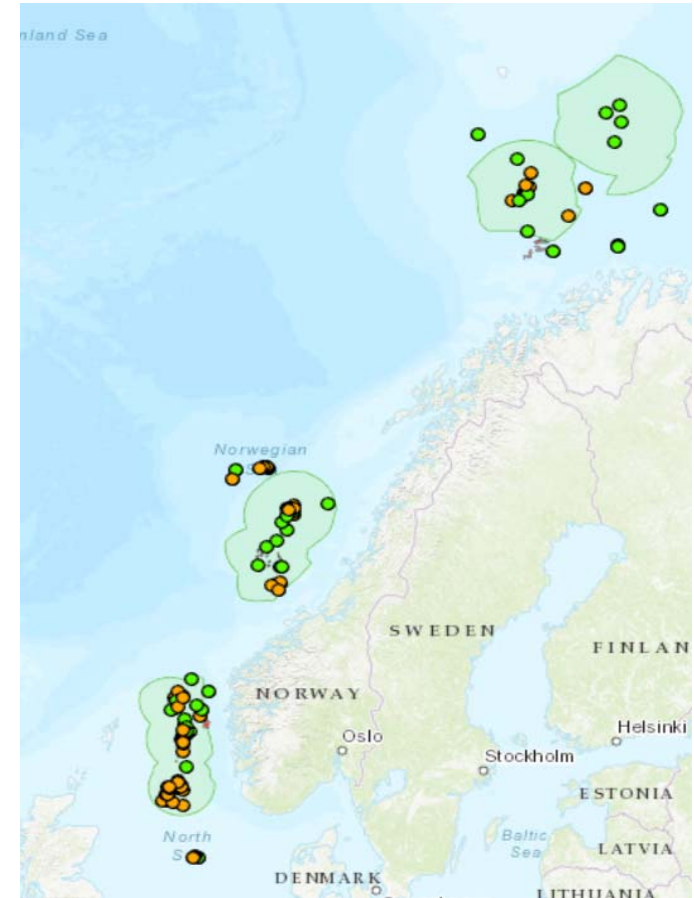
Beredskapsforum 09/04-2019

Hanne Greiff Johnsen

Leading Advisor Environmental Risk and Oil Spill Preparedness,

Background: Regional analysis of environmental risk assessment (ERA)

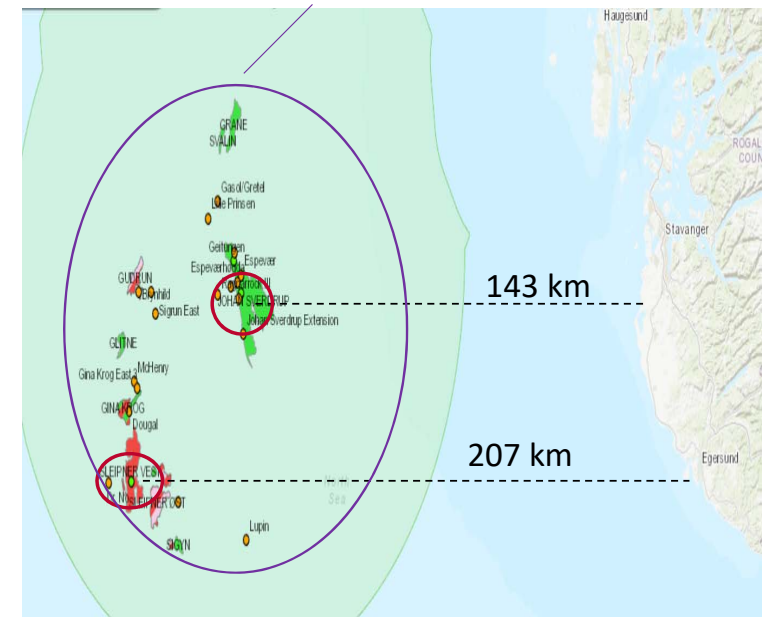
- Fit for purpose ERAs - follow up on «formålstjenelige risikoanalyser»
- Expected increase in environmental risk analysis - small tie-in's to existing field's and exploration drilling around existing infrastructure
- ERA standardisation, simplification and increased comparability of assessments
- ERA Acute tool: new possibilities for calculation and visualisation of results
- Use and test the ERA Acute method and software tool
 - Regional assessment covering an area with several exploration wells (DNV-GL)
 - Perform a regional ERA (test case) and NEBA for an area with ongoing exploration activity
 - Basis for discussions of use of regional analysis for selected areas
 - Concept discussed in NOROG and presented for MDir (January 2019)



Frames for study – regional ERA for exploration activity

- Regional analysis: A generic assessments for exploration wells in a defined area:
 - Several locations within a defined area
 - Several oil types/categories of oil
 - Range of rates and duration
- Criteria for regional analysis – to be further assessed:
 - When and which area to use regional analysis
 - How to set up analysis, evaluation and presentation of risk
 - Document validity of analysis (geographical range, seasons, etc)

Possible to determine geographical validity of analysis based on sensitivity analysis..



OIL & GAS

Regional ERA Acute analyses

Johan Sverdrup area

Anders Rudberg and Odd Willy Brude

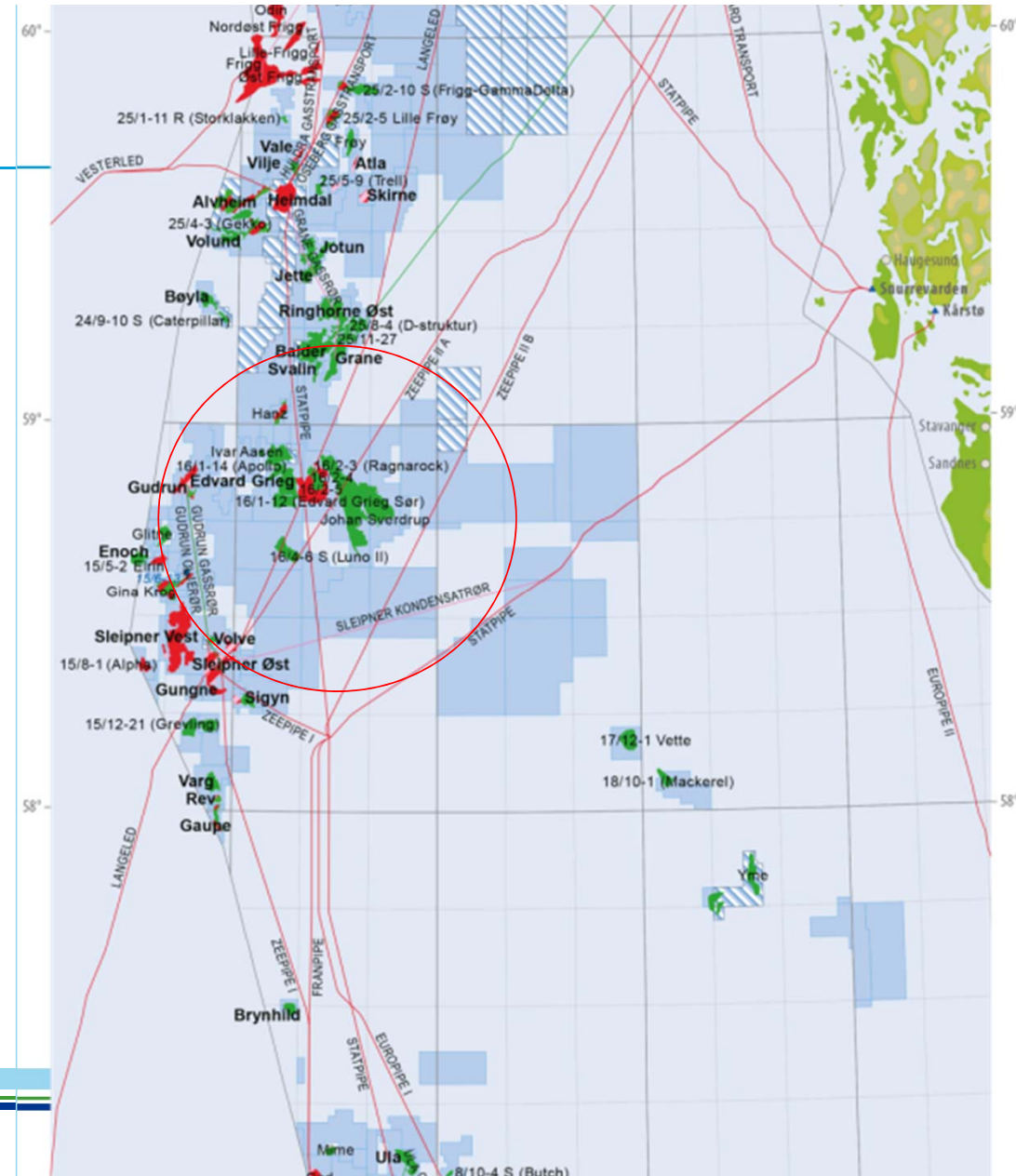
09 April 2019

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Limitations for regional analysis

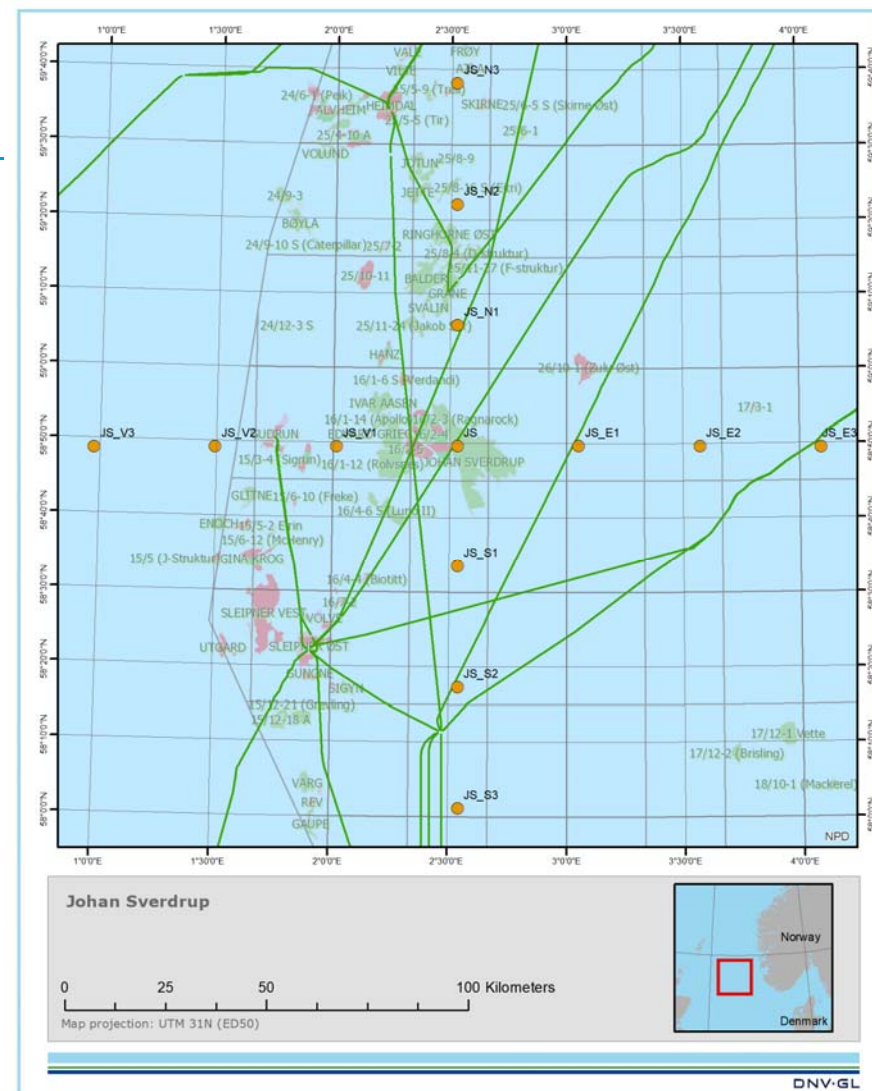
- Blowout rate and duration
 - Oil type (weathering)
 - Location
-
- Type of operation
 - Spill frequency
 - Time of year
 - Technical aspects of the well

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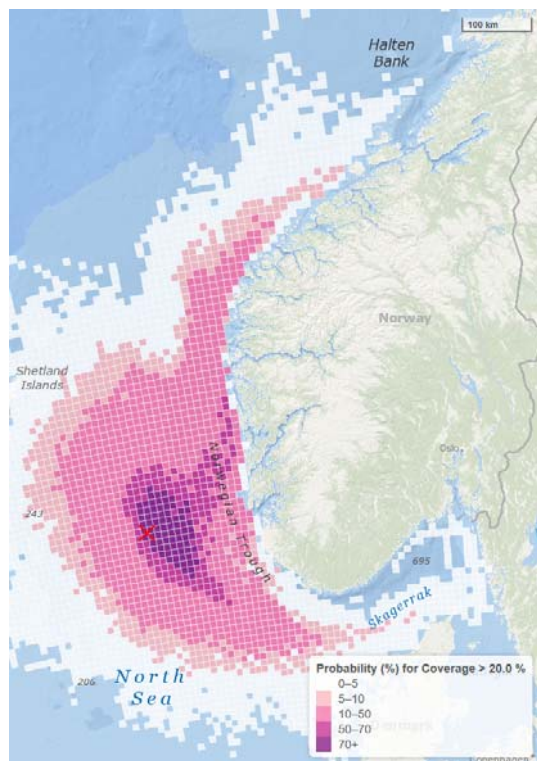
Sensitivity study

- Spill scenario:
 - Subsea blowout
 - 5000 m³/d for 15 days
 - Johan Sverdrup spill location (Sens0)
 - North (N), South(S), East (E) and West (V)
 - 30 km (1), 60 km (2) and 90 km (3)
- Avaldsnes oil type
- Sensitivity (in Sens0 location) on:
 - Ivar Aasen oil (Aasen)
 - Huldra condensate (Cond)
 - Topside vs subsea spill

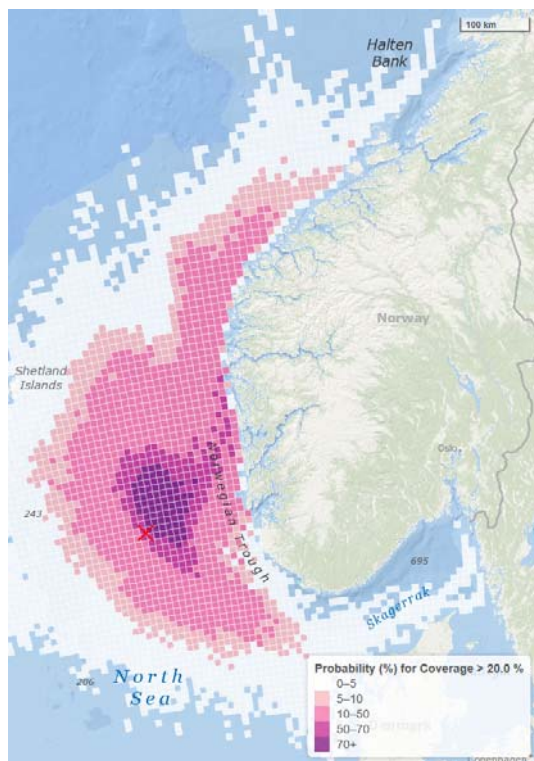


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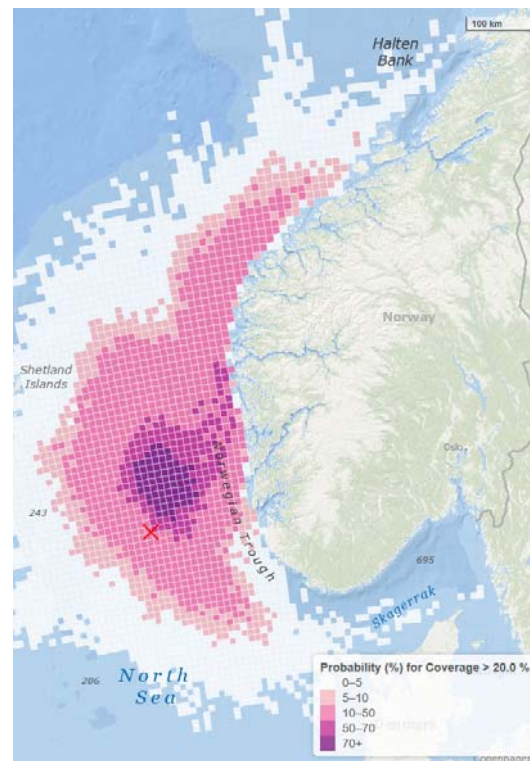
Move North – sea surface



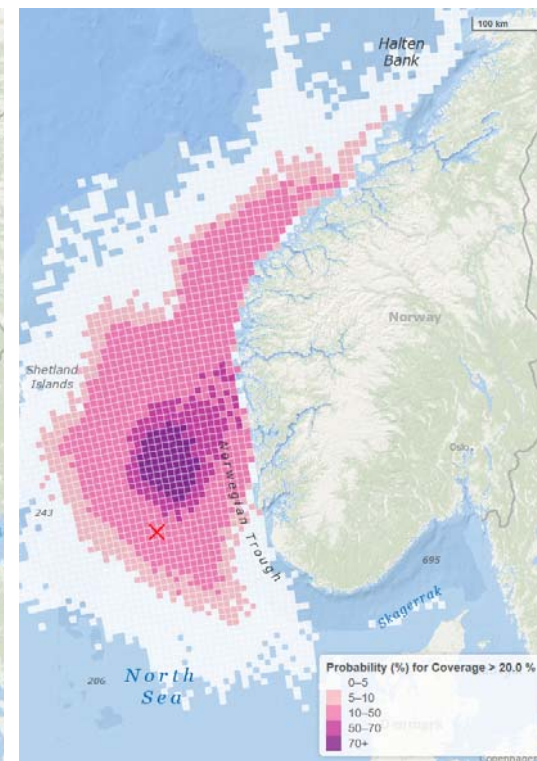
Sens0



SensN1 – 30 km



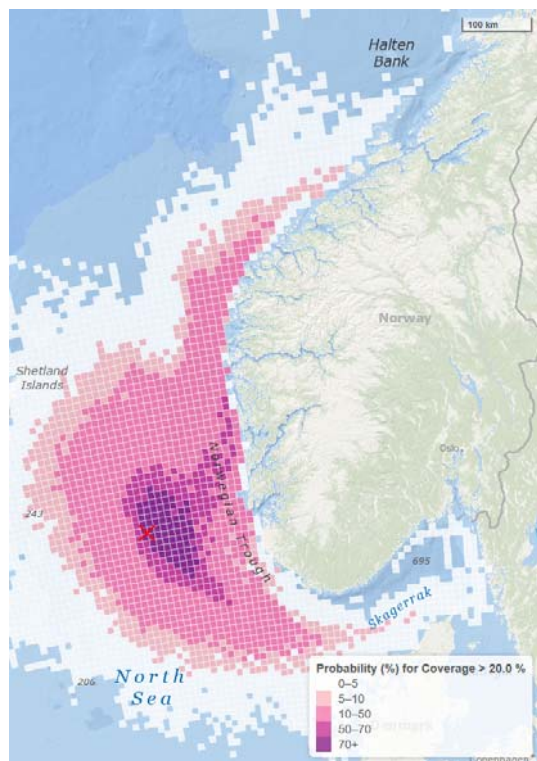
SensN2 – 60 km



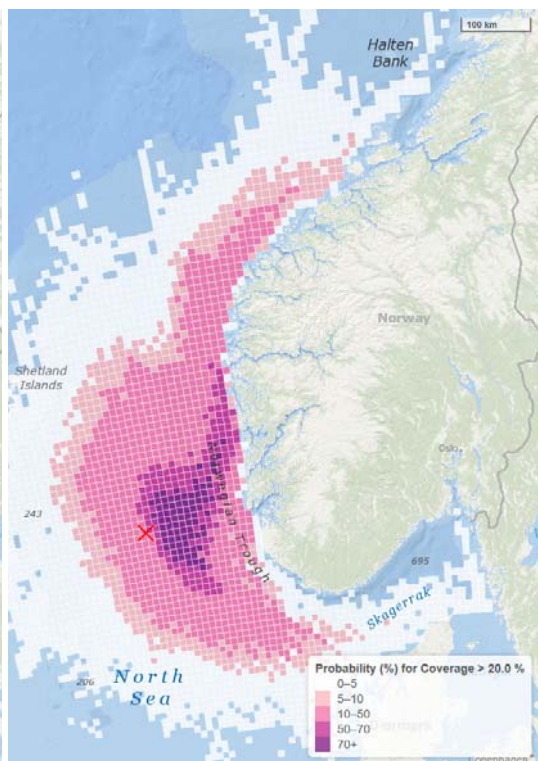
SensN3 – 90 km

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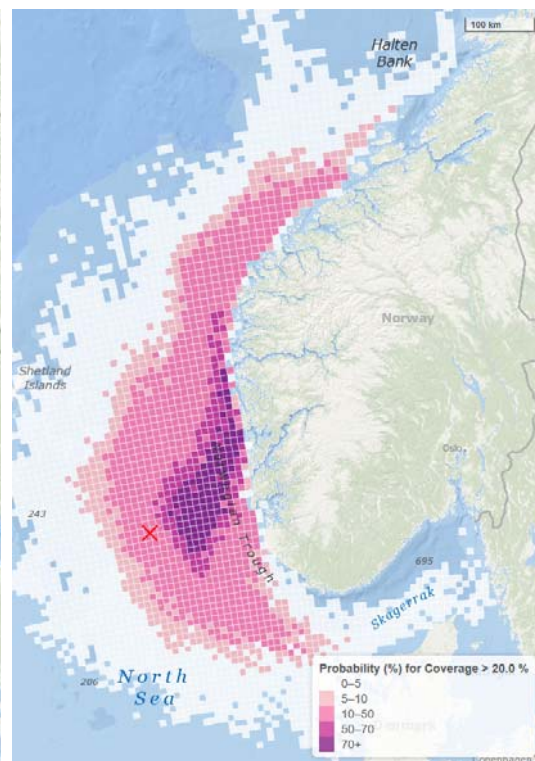
Move East – sea surface



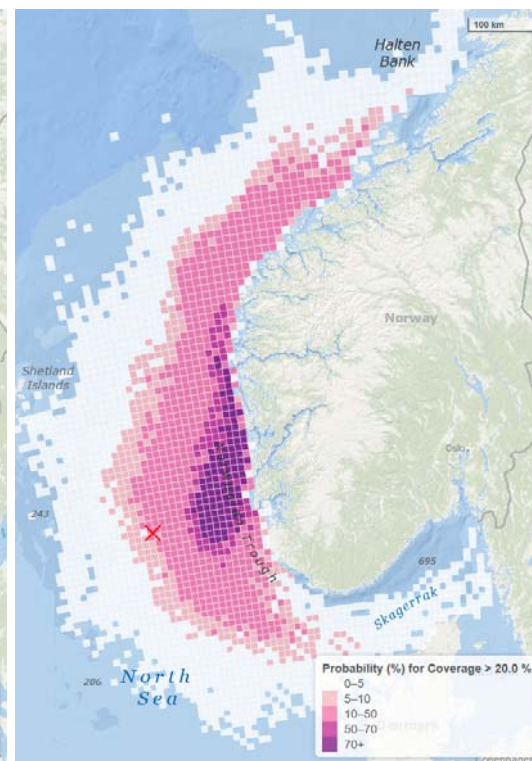
Sens0



SensE1 – 30 km



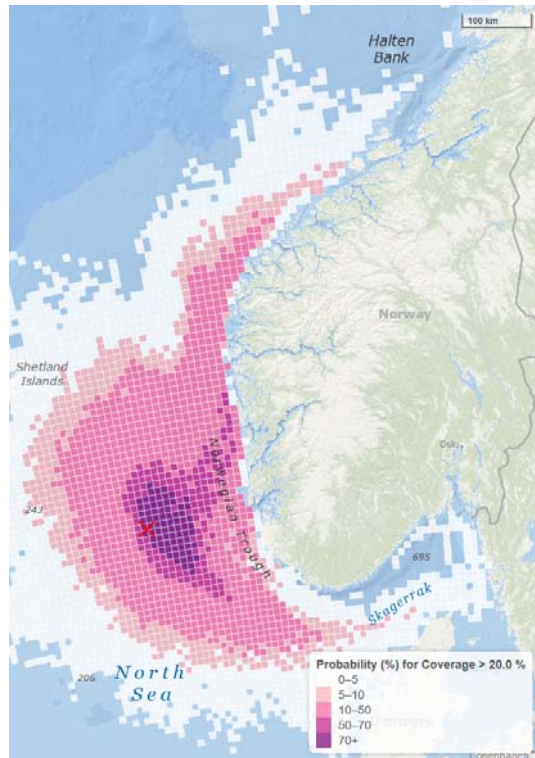
SensE2 – 60 km



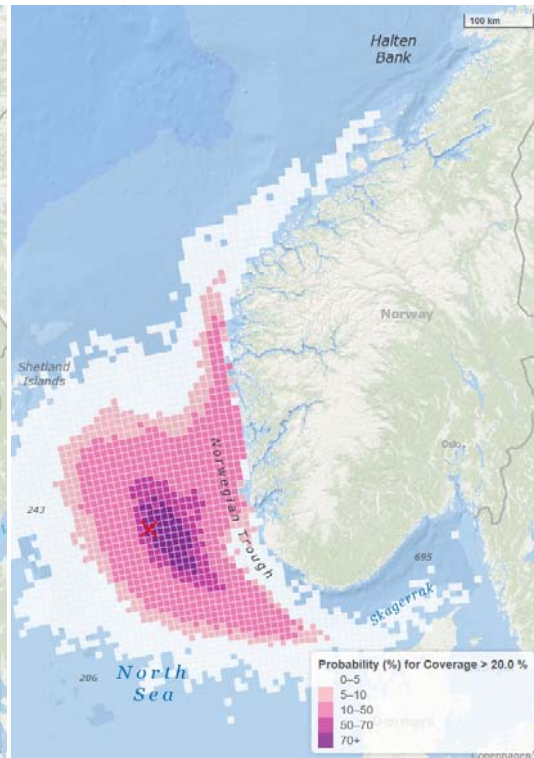
SensE3 – 90 km

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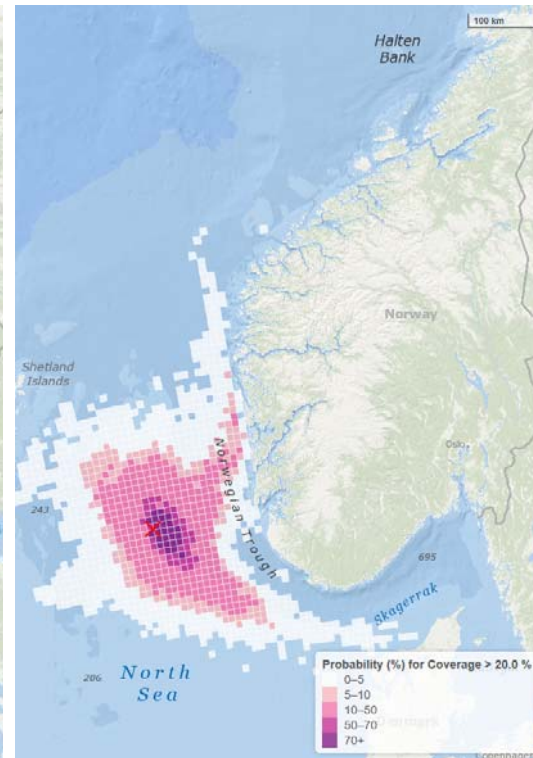
Oil Type & Top/Sub – sea surface



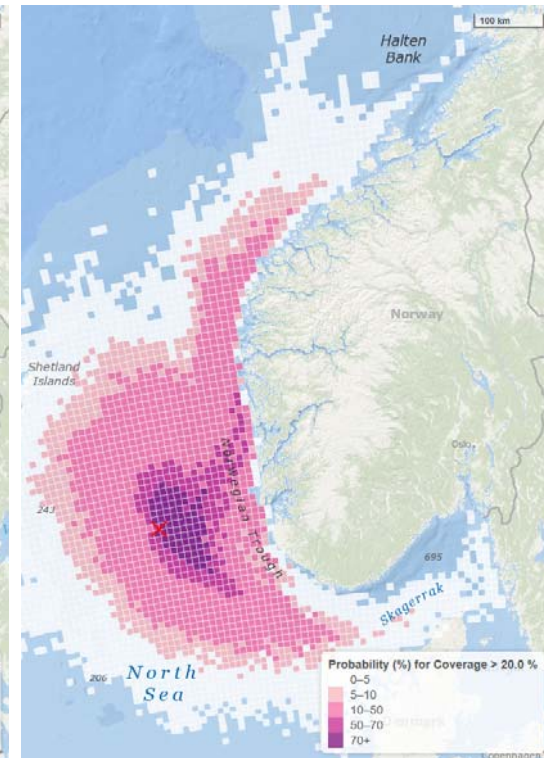
Sens0



Ivar Aasen crude



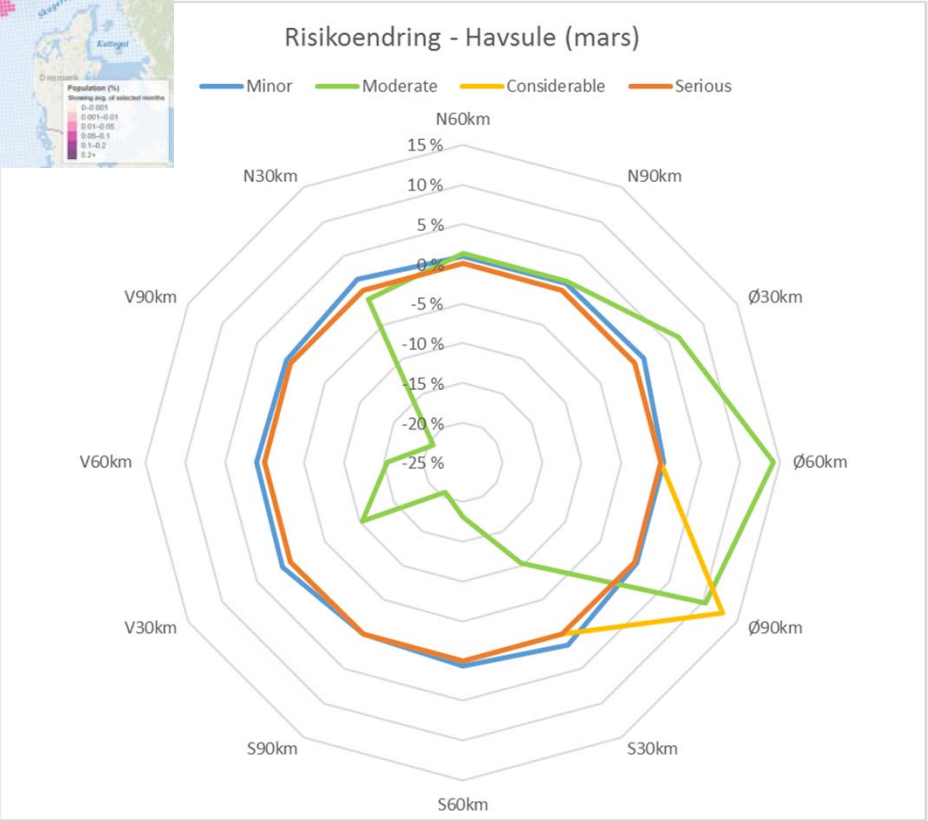
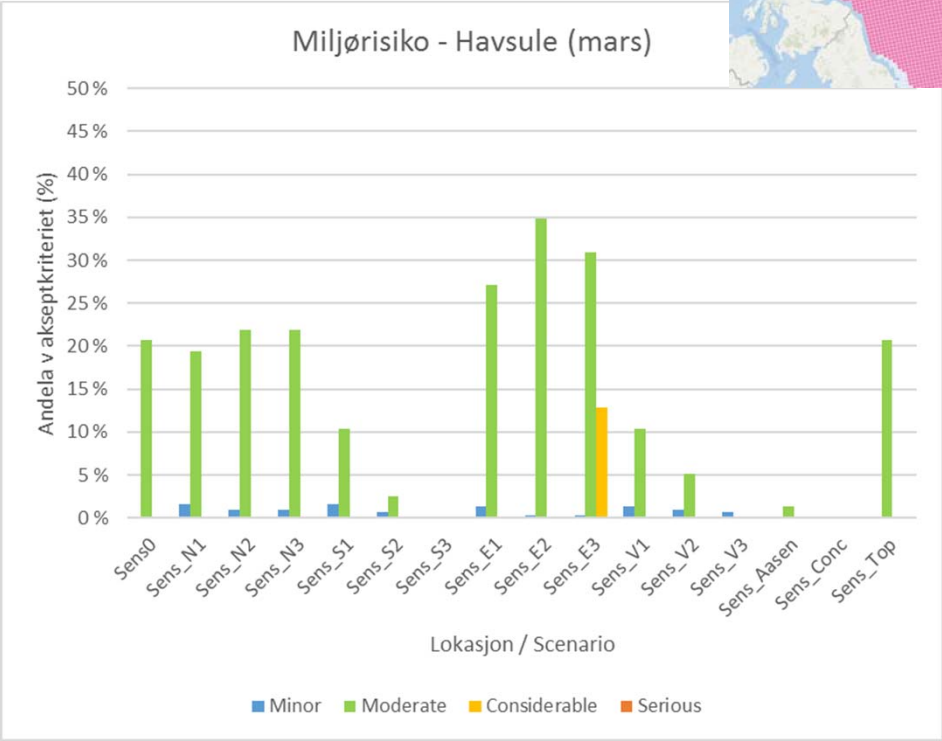
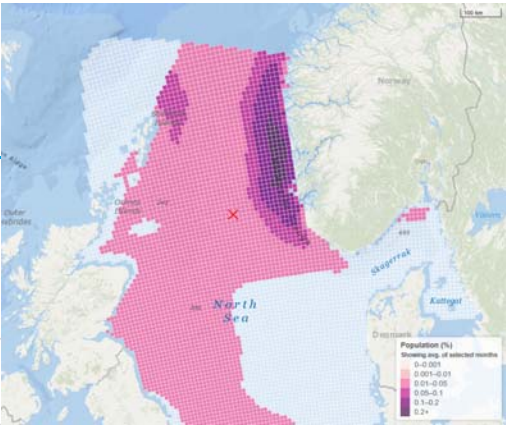
Huldra condensate



Topside0

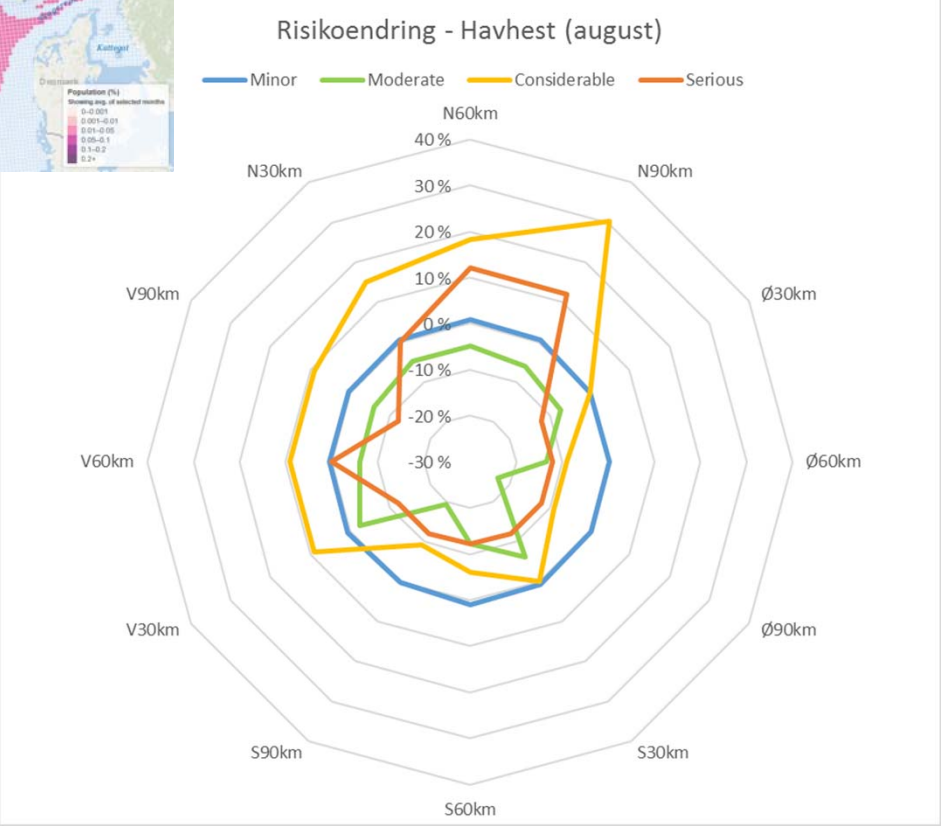
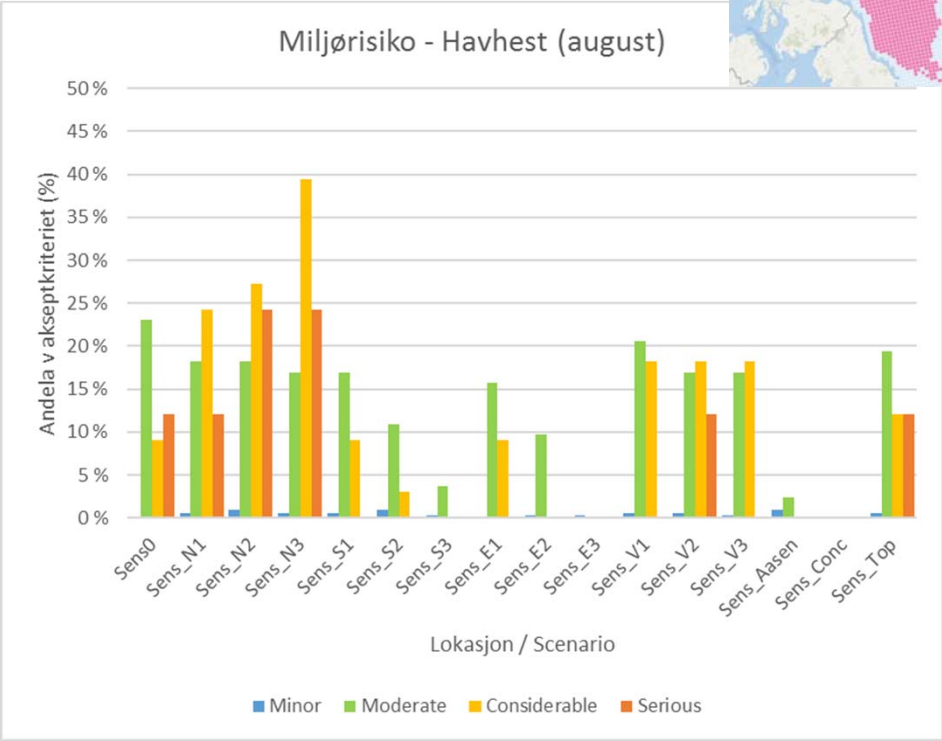
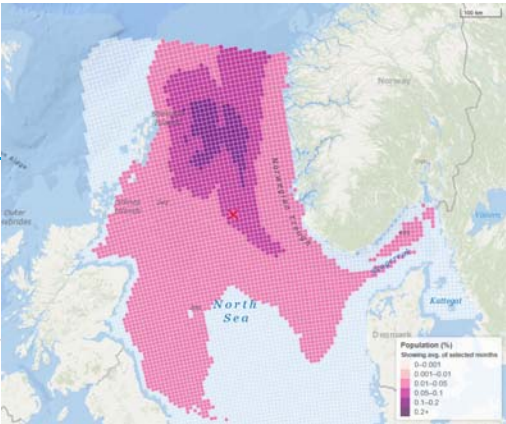
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Northern Gannet (havsule)



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Northern Fulmar (havhest)

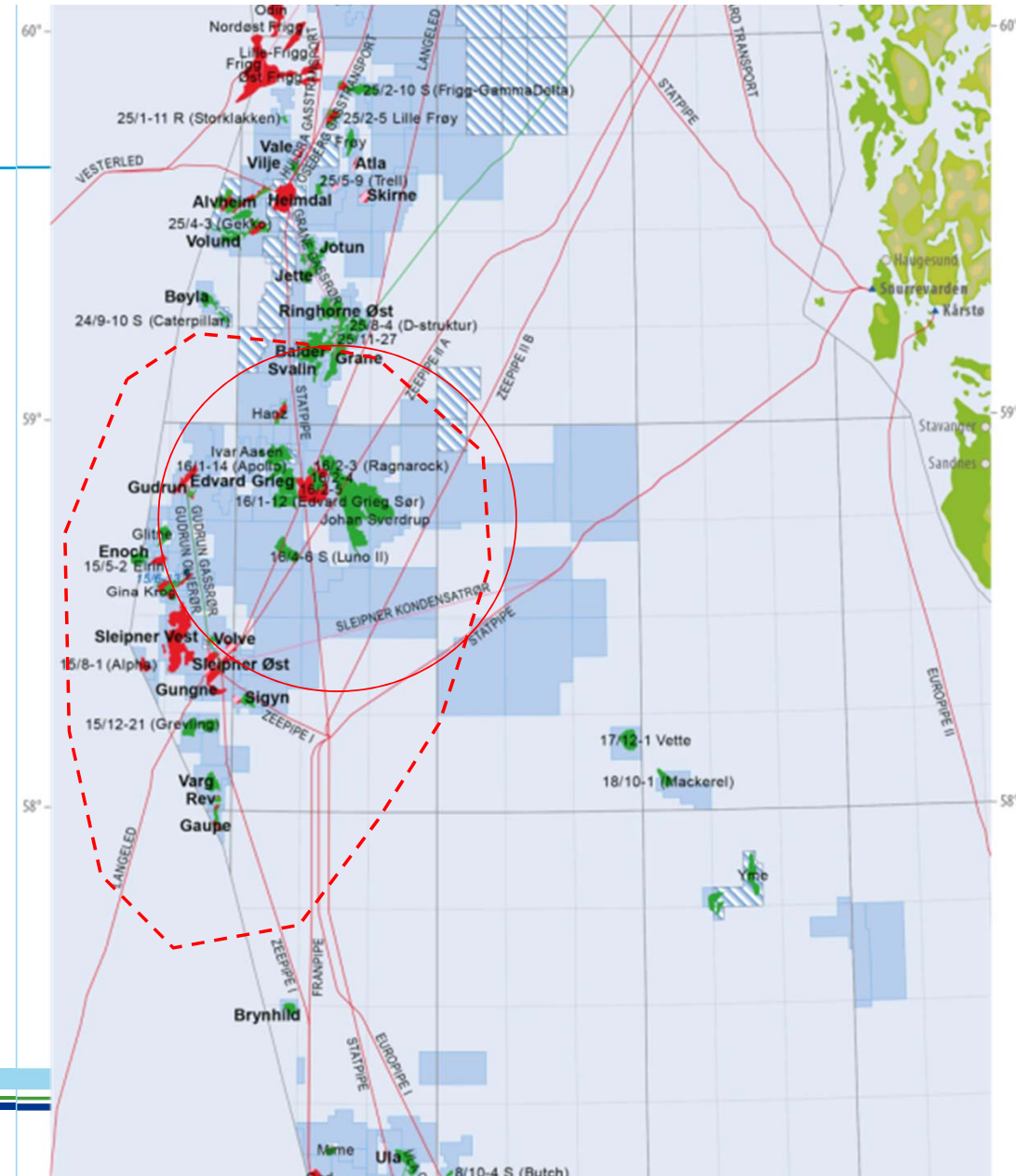


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Limitations for regional analysis

- Blowout rate and duration
 - Oil type (weathering)
 - Location
-
- Type of operation
 - Spill frequency
 - Time of year
 - Technical aspects of the well

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Case examples :

**Environmental risk assesment and
oil spill response modelling and risk reduction**

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Blowout rate / duration matrix to be modelled

- 9x7 matrix
- Avaldsnes oil
- Sverdrup location
- Subsea spill
- Response modelling for 3 spill rates

Rate m ³ / d	2d	5d	15d	30d	50d	70d	90d		
300									
1000									
3000									
5000									
7000									
9000									
11000									
15000									
20000									

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Risk calculation – 3 alternative rate / duration matrixes

■ Alternative 1

- weighted rate 5800 m³/d
- Longest duration 50 d

	varighet					
rater	2	5	15	30	50	P _r
1000	8.00 %	3.80 %	3.60 %	1.60 %	3.00 %	20 %
5000	16.00 %	7.60 %	7.20 %	3.20 %	6.00 %	40 %
9000	16.00 %	7.60 %	7.20 %	3.20 %	6.00 %	40 %
P _v	40 %	19 %	18 %	8 %	15 %	

■ Alternative 2

- weighted rate 5800 m³/d
- Longest duration 90 d

	varighet					
rater	2	5	15	30	90	P _r
1000	8.00 %	3.80 %	3.60 %	1.60 %	3.00 %	20 %
5000	16.00 %	7.60 %	7.20 %	3.20 %	6.00 %	40 %
9000	16.00 %	7.60 %	7.20 %	3.20 %	6.00 %	40 %
P _v	40 %	19 %	18 %	8 %	15 %	

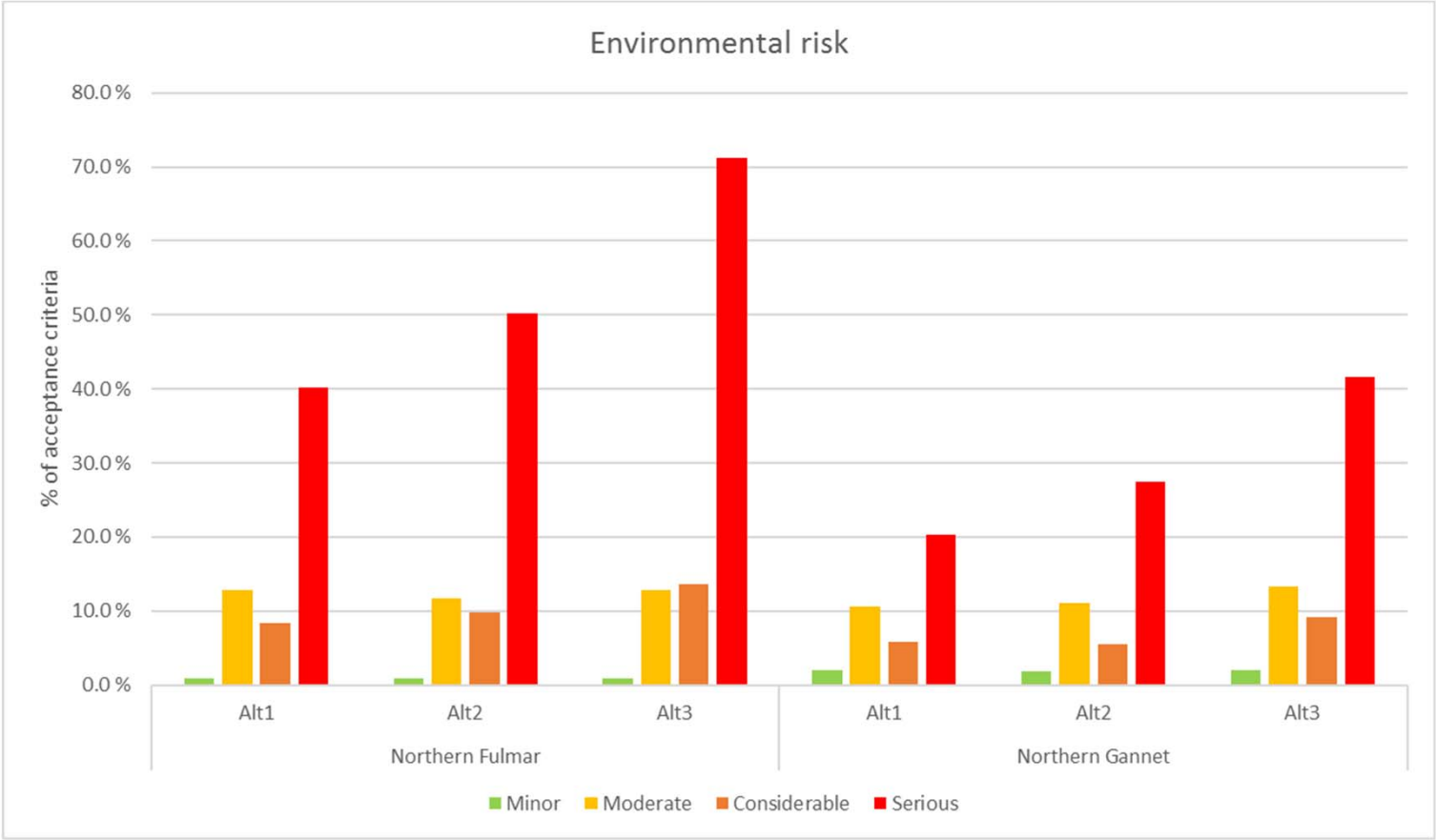
■ Alternative 3

- weighted rate 12200 m³/d
- Longest duration 90 d

	varighet					
rater	2	5	15	30	90	P _r
3000	8.00 %	3.80 %	3.60 %	1.60 %	3.00 %	20 %
9000	16.00 %	7.60 %	7.20 %	3.20 %	6.00 %	40 %
20000	16.00 %	7.60 %	7.20 %	3.20 %	6.00 %	40 %
P _v	40 %	19 %	18 %	8 %	15 %	

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Seabirds risk (yearly average)



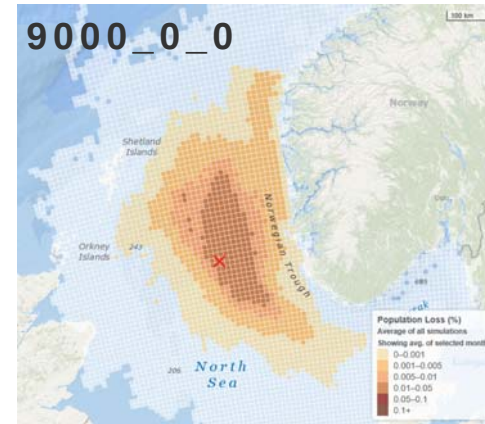
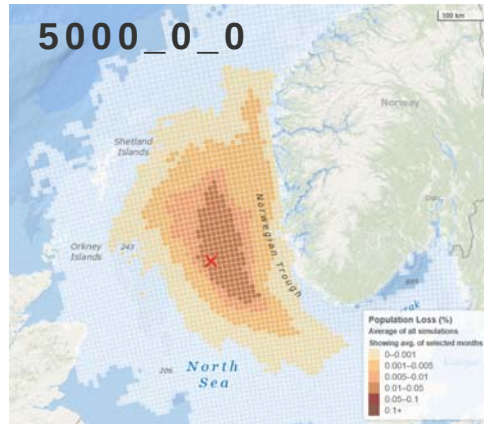
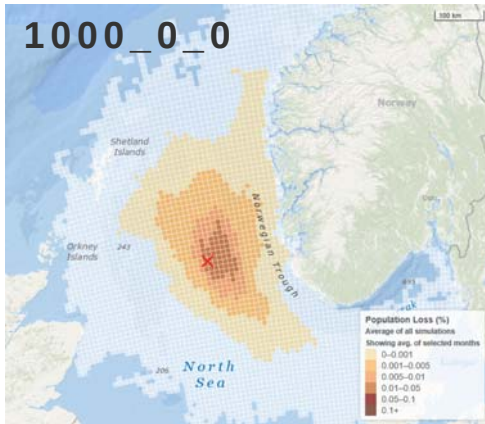
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Spill response modelling setup

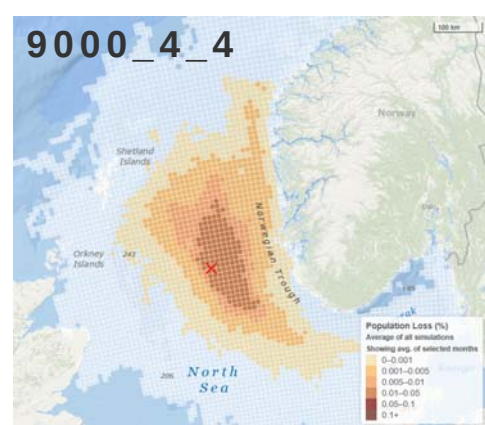
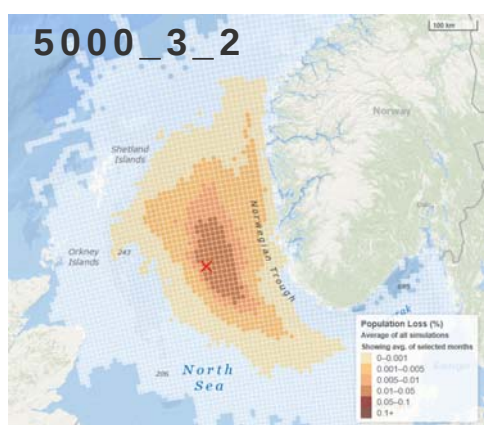
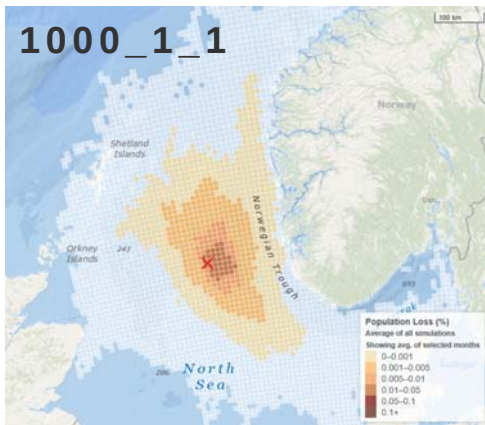
- 3 different spill rates, weighted duration 15 days
 - 1000, 5000 and 9000 m³/d
- Response setup – mechanical recovery
 - Rate 1000 m³/d – 2 NOFO systems (1+1) with response time 5h and 7h
 - Rate 5000 m³/d – 5 NOFO systems (3+2) with response time 5, 7, 9, 11 and 16h
 - Rate 9000 m³/d – 8 NOFO systems (4+4) with response time 5, 7, 9, 11, 16, 16, 24 and 24h

No response	With response
1000_0_0	1000_1_1
5000_0_0	5000_3_2
9000_0_0	9000_4_4

Example: Impact area – Northern fulmar (September)



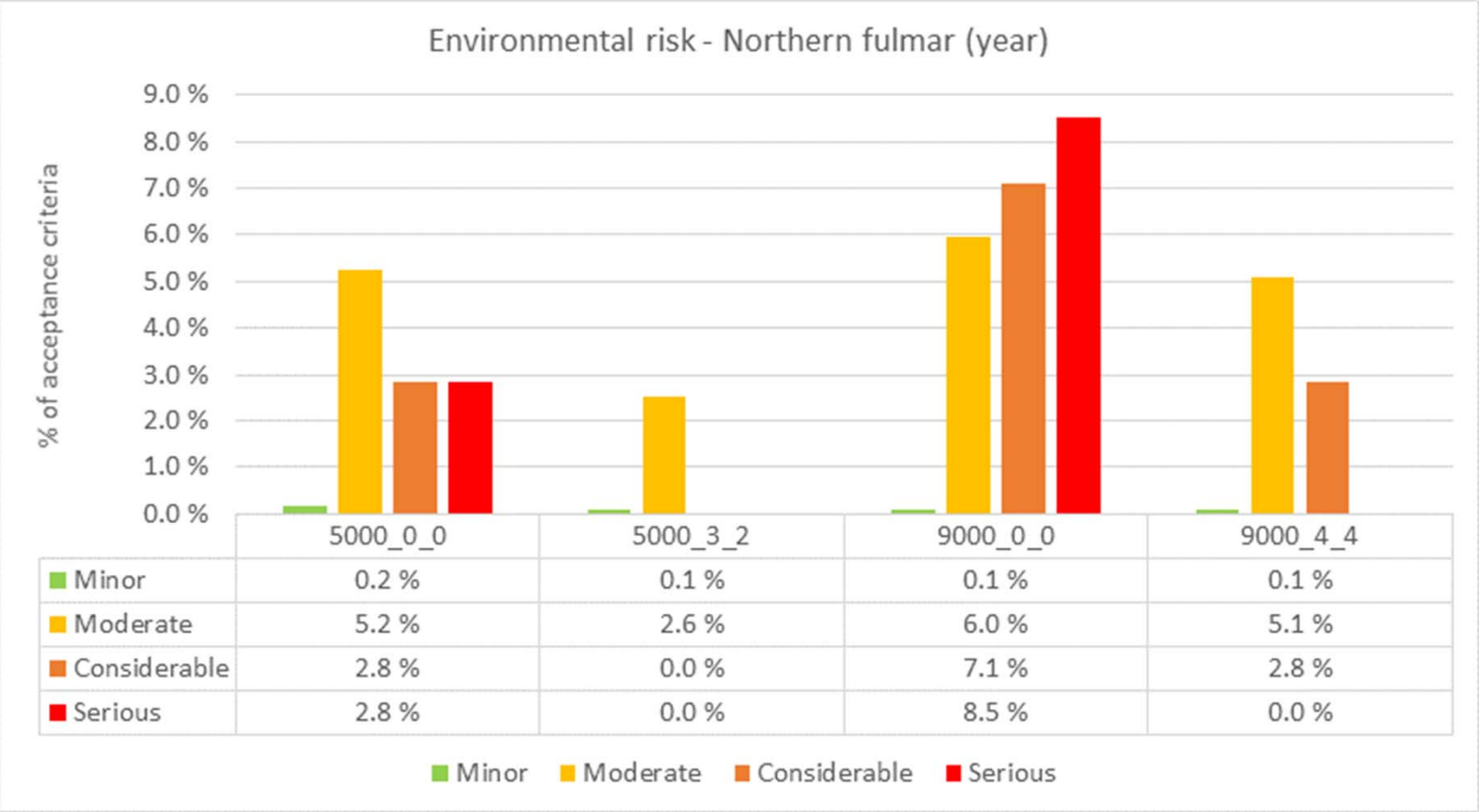
Without response



With response

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Risk reduction with response options – Northern fulmar



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Takk for oppmerksomheten!

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SAFER, SMARTER, GREENER

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