

Forvaltning under usikkerhet:

Hvordan forholder vi oss til usikkerhet i grunnlagsmateriale, og hva slags følger bør usikkerhet ha for forvaltning vi velger?

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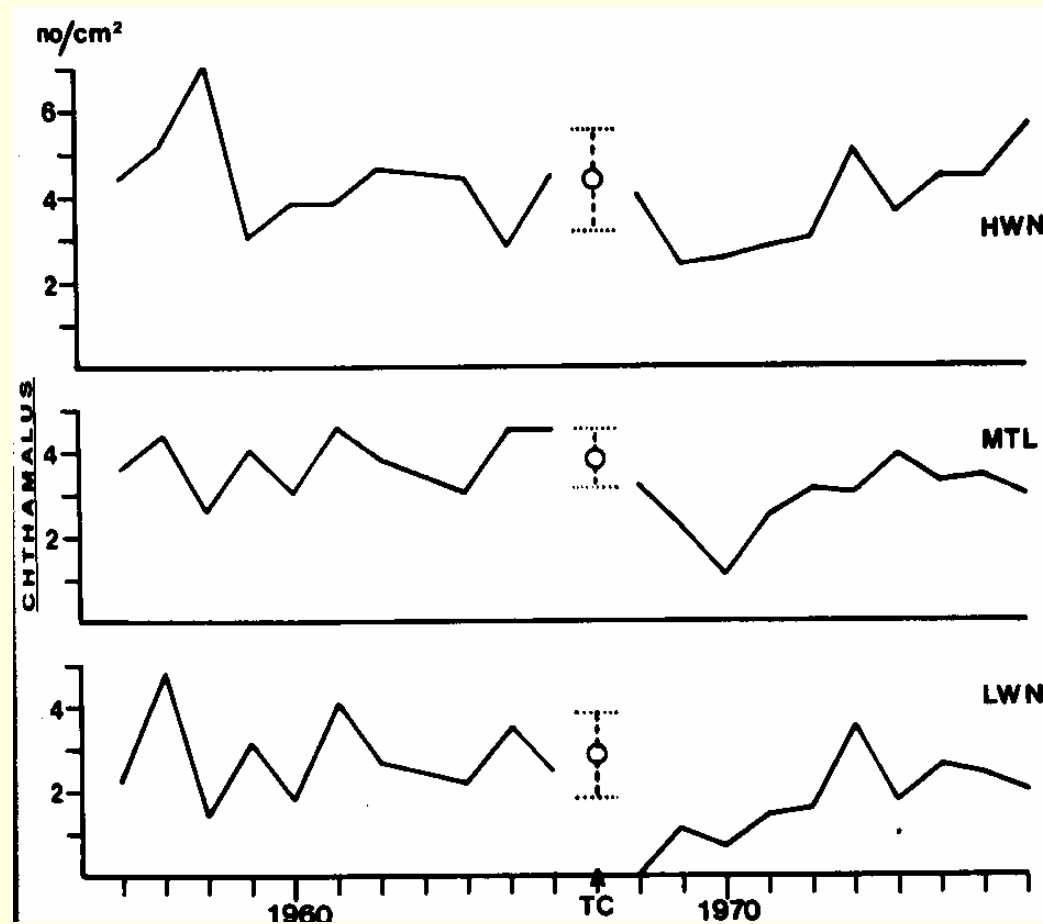
What we know



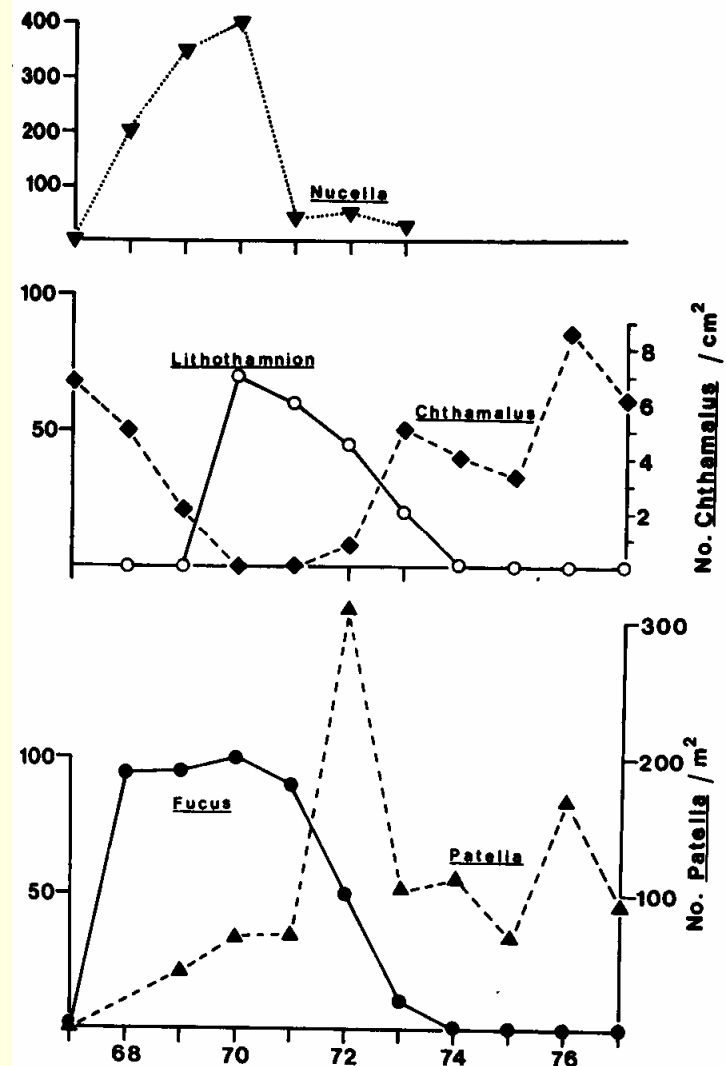
Resilience to oil spills



Resilience of barnacles “Torrey Canyon” oil spill (Southward & Southward 1978)



Algae after “Torrey Canyon” oil spill (Southward & Southward, 1978)



Effects of “Torrey Canyon” spill

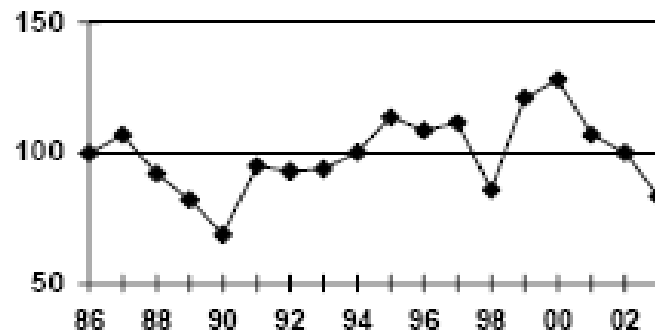
- Were largely due to use of clean up chemical detergents, which were toxic.
- Oil left alone had very limited effects
- Effects on exposed rocky shores lasted from 3 - 10 years depending on exposure
- Sheltered bays took longer to recover.

Resilience of seabird populations

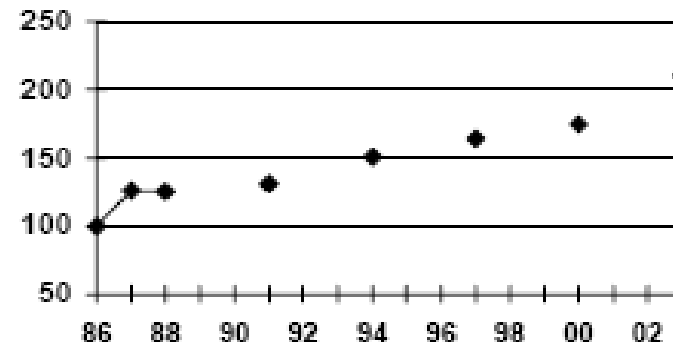


Razorbills in UK over time

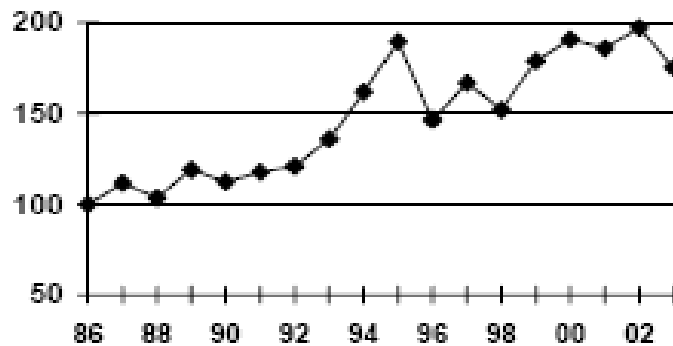
Shetland (plots)
+0.7% p.a. n.s.



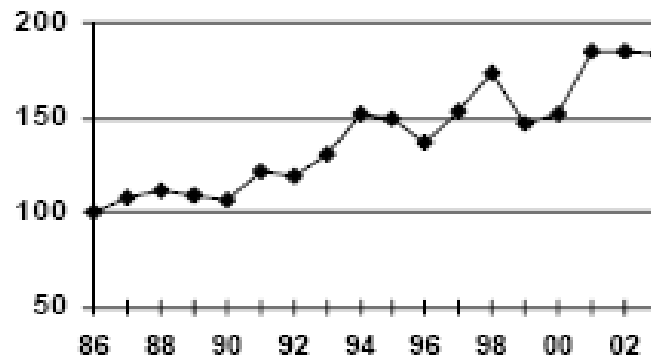
Orkney (plots)
+3.7% p.a. ***



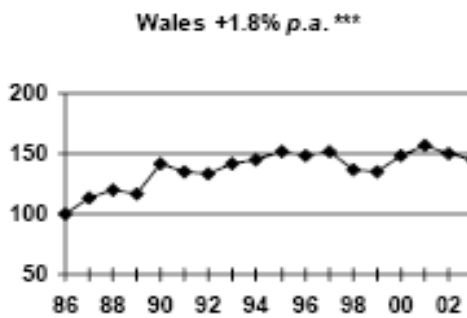
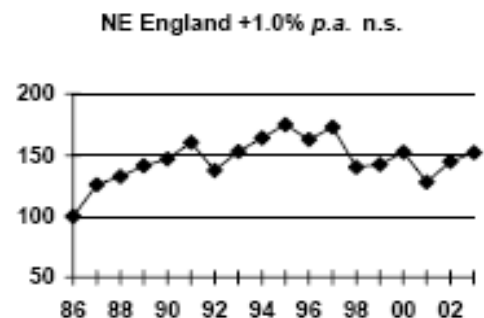
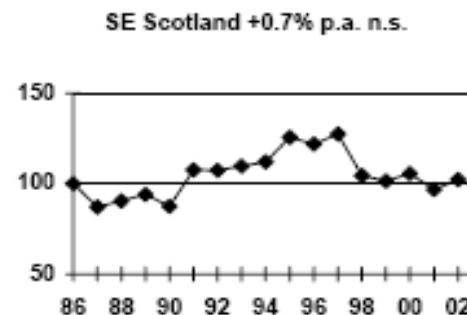
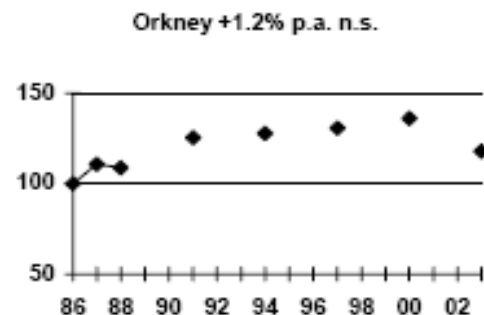
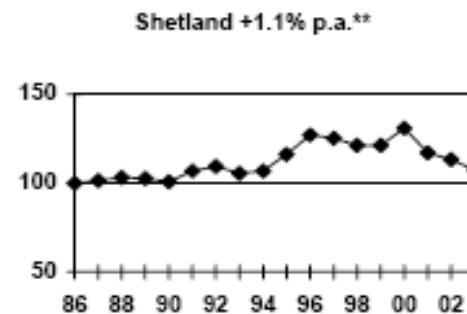
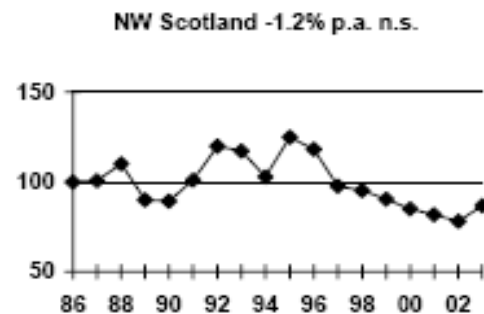
South-east Scotland
(plots) +4.1% p.a. ***



Wales (plots)
+3.8% p.a. ***



Fulmars in UK over time



Aftenposten 18.12.2005

Ni av ti lomvier utryddet

■ Borte fra flere fuglefjell

Antall lomvi i fuglefjell i Nord-Norge er redusert med 98-99% de siste 20 årene. Bellona mener Regjeringen må stoppe alle planer om kystnær oljeboring.

kommune i Lofoten. Antall lomvi i år er det laveste som er registrert noen sinne. Hekkebestanden er knapt to prosent av hva den var tidlig på 1980-tallet.

Også på Runde utenfor Ålesund er nedgangen stor. Ved fuglefjellet i Hornøy i Vest-Finnmark har imidlertid forskerne observert en positiv trend.

Forskerne har hull i kun-

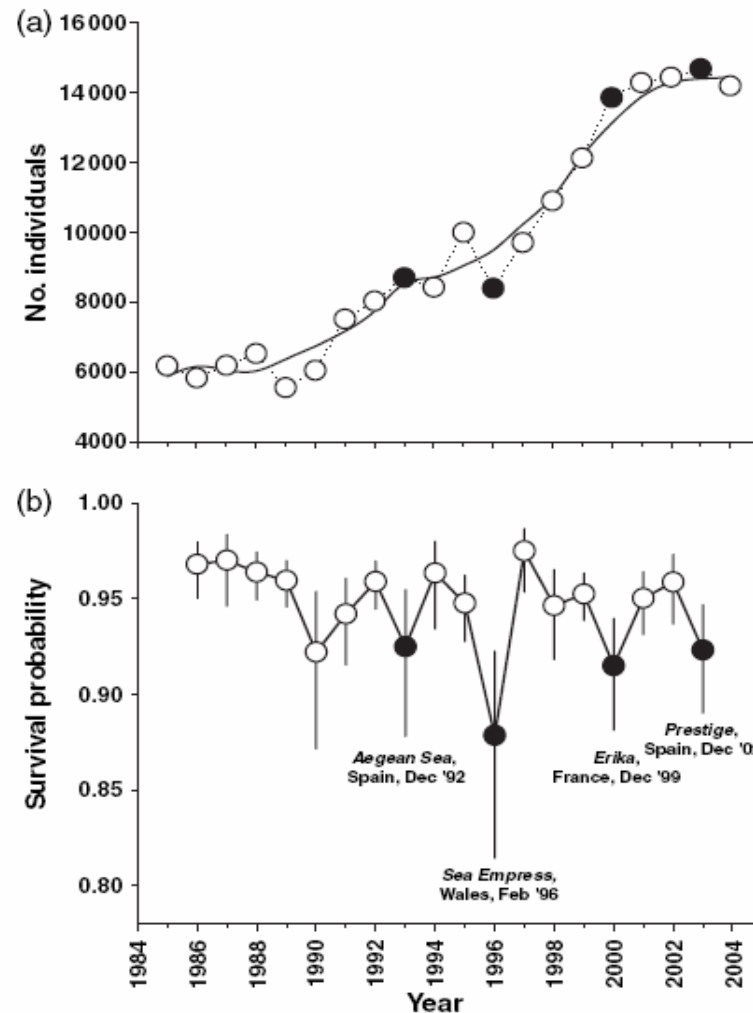


Aftenposten 19.12.2005

Forskerne har hull i kunnskapen om hvorfor bestandene er så redusert. Tidligere har det vært fokus på mindre fisk i havet. De siste årene har den økende havørnbestanden fått noe av skylden. Nå frykter miljøorganisasjonene at oljeaktivitet i nord kan bli den siste spikeren i kisten for lomvi og andre pressede sjøfugler.



Guillemots and long-term changes: Skomer Island UK (Votier et al. 2005)



Summary on trends in seabirds

(Source JNCC UK 2005)

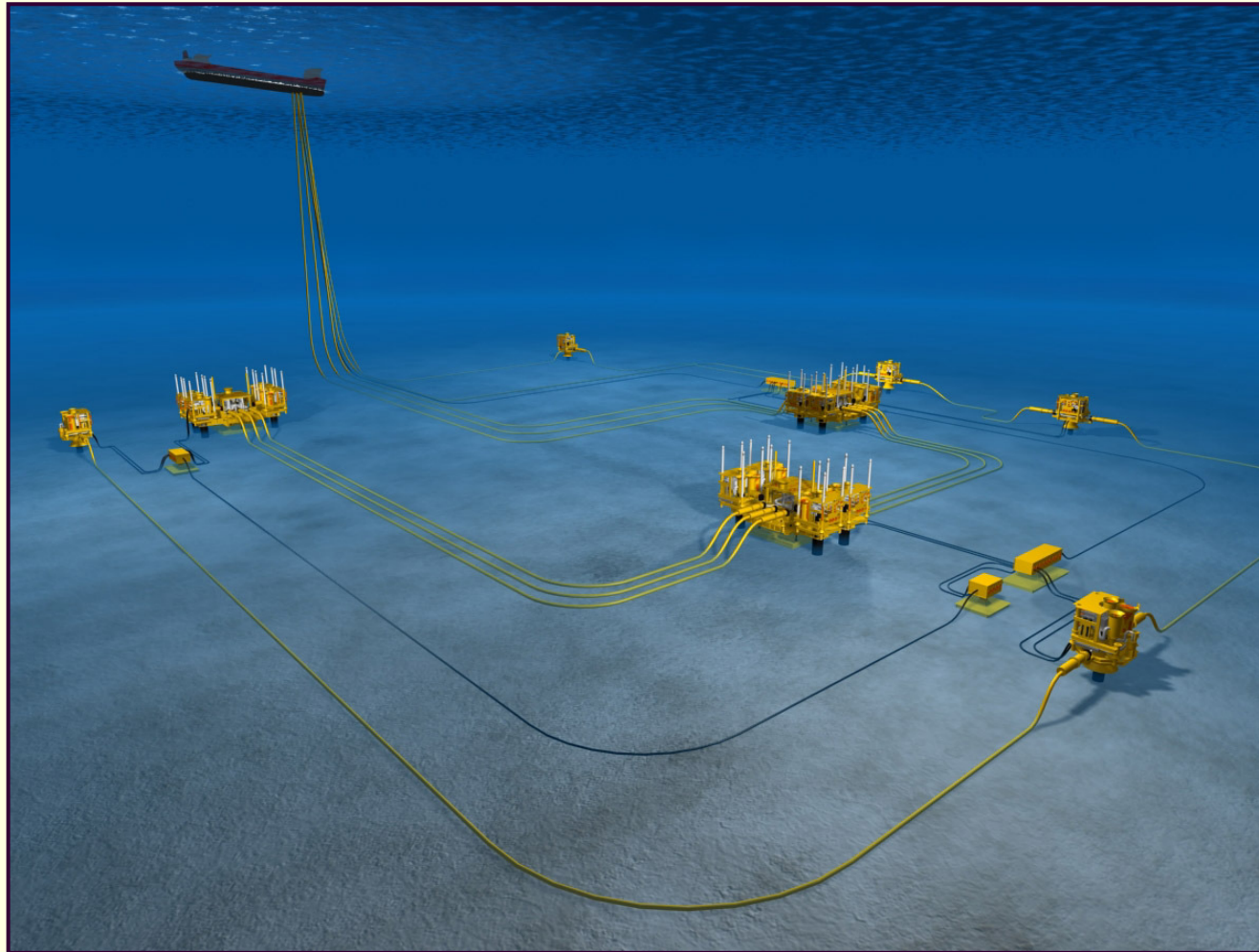
“It should be noted that seabird populations are quite resilient to occasional years of poor breeding success – they are long-lived and can afford a few years of non-breeding in their lifetime. However, if the food shortages that occurred in 2004 and other recent years were to become sustained, then breeding populations will start to decline, as has already been seen in the kittiwake.”



The new technologies



Modern sub-sea oil production



The Risks



Risk analysis for Barents Sea



TEKNISK RAPPORT

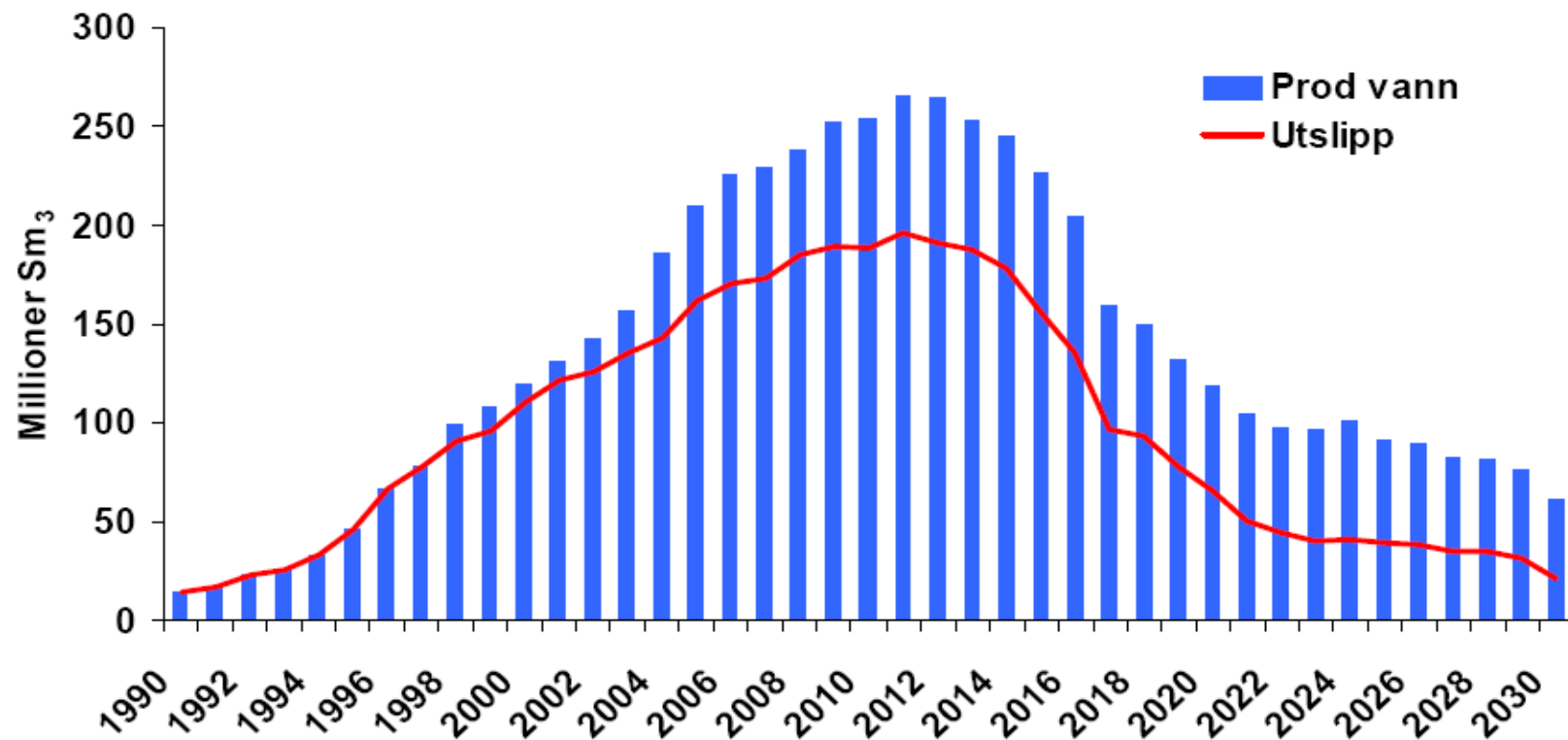
RISIKOINDIKATORER FOR HELHETLIG
MILJØRISIKOANALYSE I BARENTSHAVET



Risiko for akutt oljeforurensning i Barentshavet og Lofoten, (DnV)

1. Basert på en kvalitativ tilnærming ...skipsfarten representerer en vesentlig høyere miljørisiko med hensyn til akutte oljeutslipp enn petroleumsvirksomheten, både i dag og i forhold til det aktivitetsnivået som er lagt til grunn i 2020.
2. Samlet risikonivå for de to sektorene vil relativt sett være lavt sammenliknet med den risikoen andre områder lenger sør på norskekysten eksponeres for.

Production water – a new problem?



Kilde: OD



Report on Institute of Marine Research's webpage

Risk Assessment of reproductive effects of alkyl phenols in produced water on fish stocks in the North Sea

Report AM-2004/018



Conclusions

- “The simulations show that there is **no significant risk of reproductive effects on the population levels of cod, saithe and haddock in the North Sea as a result of alkyl phenol discharges in produced water.**
- In our judgement the overall assumptions made for the assessment seems sound and reasonable.”



Water Column Monitoring 2004

Summary Report

- Mussels accumulated PAHs, with levels following the expected gradient with distance from the platform.
- There was no clear signal from the biological effects, possibly with the exception of micronucleus formation in mussel haemocytes.
- Concentrations of PAH-metabolites in bile of caged cod and feral saithe were both low, suggesting low exposure levels.
- There were no differences between locations in the levels of hepatic DNA adducts in the saithe, but there were individuals at each of the locations that had elevated levels of adducts.
- There were no obviously contaminant-related effects on liver histology in the saithe.



What does the forvaltningsplan for Barentshavet actually say?

Section 5.3.3 side 63

”Samlet sett anses derfor påvirkningen på havbunnen i Barentshavet som følge av petroleumsvirksomhet som ubetydelig”



What does the forvaltningsplan for Barentshavet actually say?

Section 5.7.6 Samlet risiko

”-at samlet miljørisiko knyttet til de to sektorene (sjøtransport og petroleumsvirksomhet) fortsatt vil være lavere i det aktuelle havområdet enn den risiko andre områder langs norskekysten eksponeres for”

What does the forvaltningsplan for Barentshavet actually say?

5.6.3 Samlet påvirkning på bunndyrsamfunn

”Ut fra dagens kunnskap har det blitt anslått at 30-50% av kjente norkse korallrev utenfor kysten er skadet eller ødelagt, sannsynligvis som følge av bunntraling.”

The damaging effects of bottom-trawling



Trawling Gulf of Maine: Before

(From Watling & Norse 1998 Cons. Biol. 12: 1178-1180)



Trawling: After



Trawling MW Shelf, Australia:

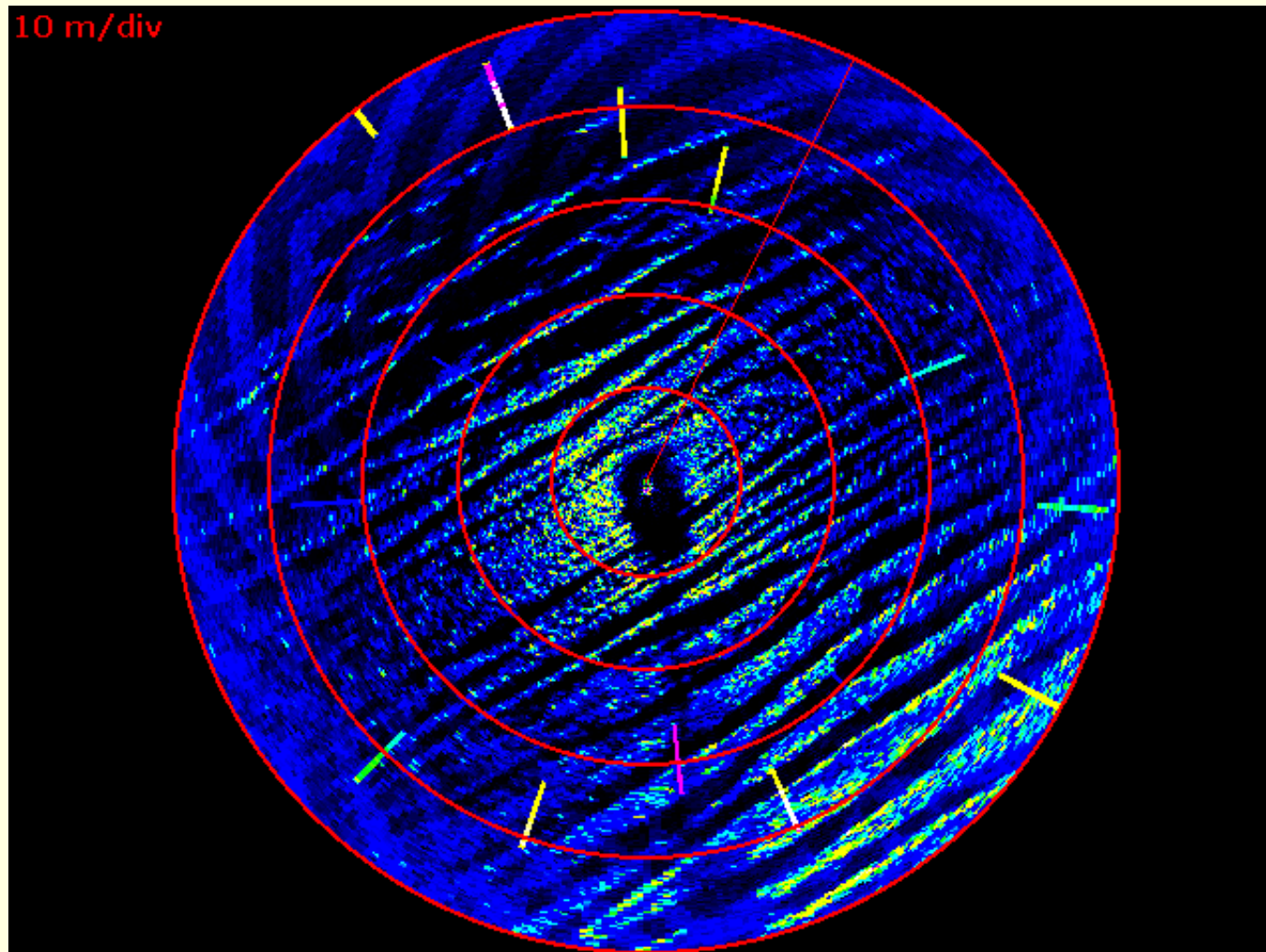
Before From Watling & Norse 1998 Cons. Biol. 12: 1178-1180)



Trawling: After



Trawl marks in Oslofjord



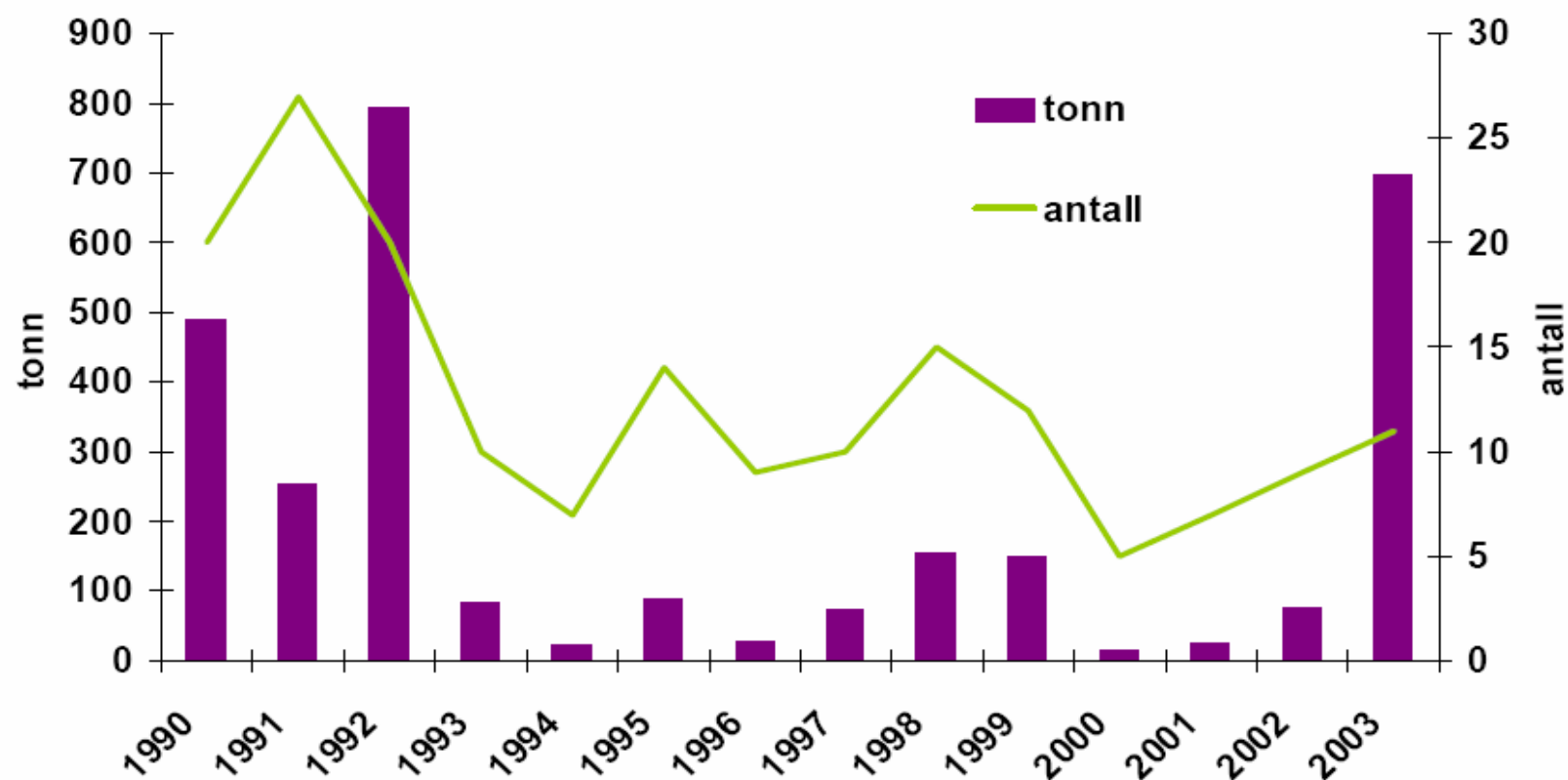
HIs påstand

- HI's bilag i Aftenposten 25.04.06: "En simulering av oljeutslipp i Lofoten viser at 30% av torskeyngel kan stryke med"
- Hva var betingelsene? (Oljetype, vær, vind, strøm osv)
- Hvor mange ganger gjentok man simuleringen?
- HVOR ER RISIKOANALYSEN?

Bellona's påstand

- That there have been a large number of accidents in the Barents Sea already and therefore that the industry is not to be trusted

Acute oil discharges on Norwegian continental shelf



Kilde: Environment Web



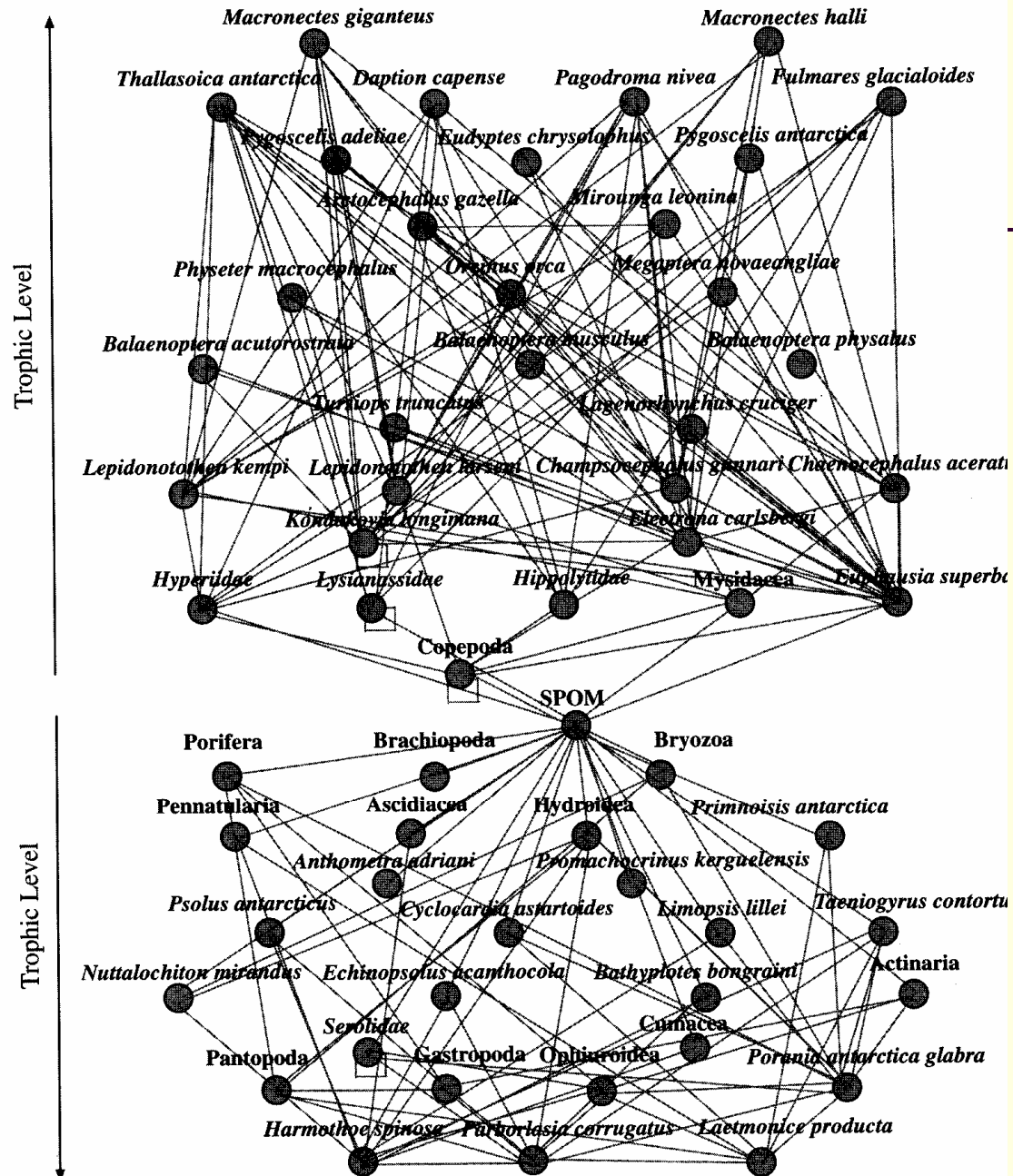
But what were the effects of the spills on the ecosystem of the Barents Sea?

No effects at all have been reported, either in international journals nor in national Norwegian reports



Bellona's påstand

- That the Barents Sea ecosystem is simple with short food chains and therefore highly vulnerable to disturbance such as by the oil industry.
- BUT WHERE IS THE EVIDENCE?



Food web Bouvet Island

Jacob et al 2006 Polar
Biol. 29:106-113



Lack of knowledge of Barents Sea systems

- Much has been made in the Norwegian press of the claims for holes in our knowledge
- The report authored by Norwegian Polar Institute and Institute of Marine Research has **not one single** reference to international research papers.
- Instead 8 papers are listed **ALL** from the Norwegian grey literature
- The document is therefore not based on peer-reviewed science



Sate-of-the art: What do we know?

- It is simply not good enough to say more research is needed!
- A state-of-the-art review is needed based on international research
- Then priorities should be set.



What are the goals and threats in the “forvaltningsplan for Barentshavet?”

Goal: To protect the biological environment of the Barents Sea for future generations

Threats (in **MY** order of importance):

1. Climate change
2. Fisheries (over-fishing and bottom trawling)
3. Long-distance transported contaminants
4. Oil transport
5. Oil and gas exploration and extraction

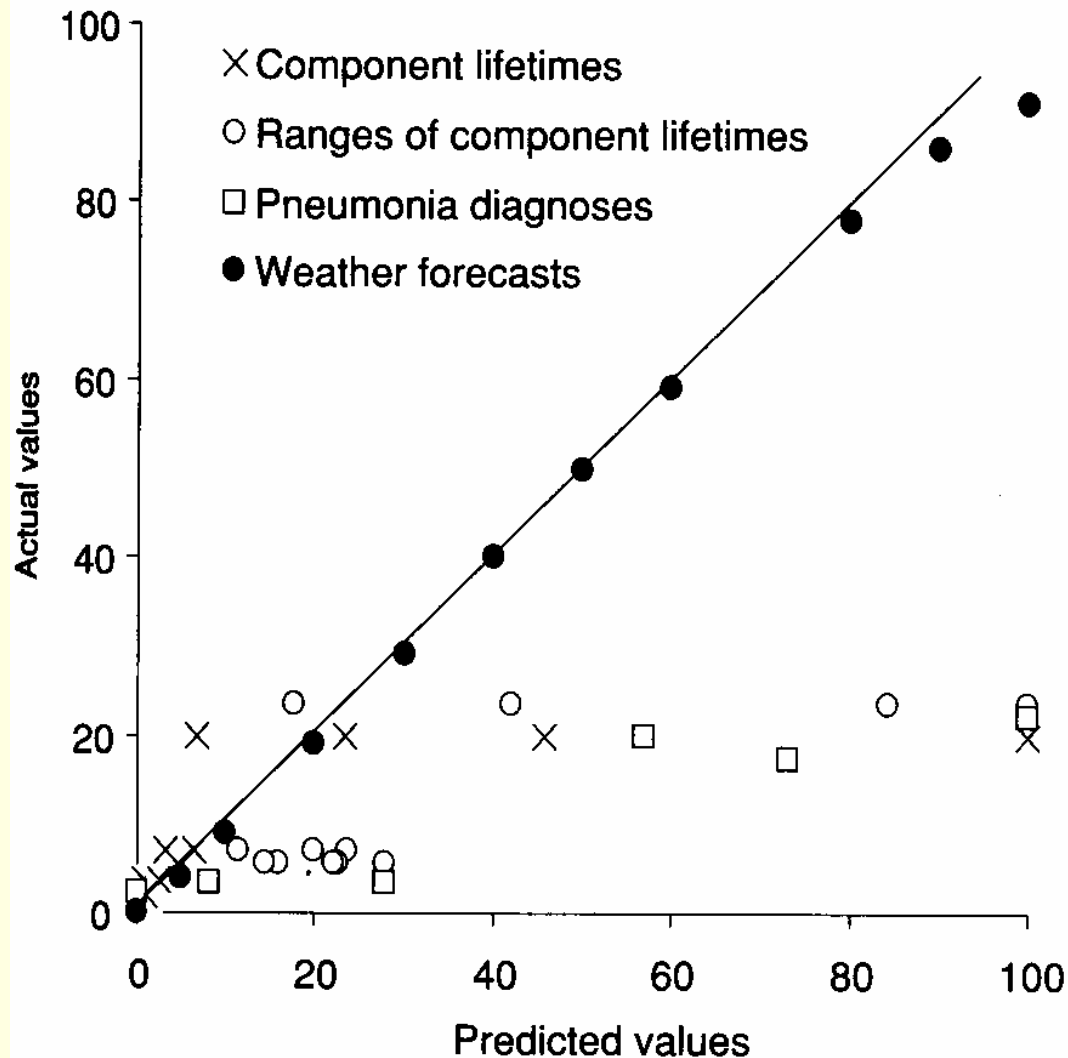


What are the known risks to the Barents Sea?

Threat to ecosystem	Probability of major effect on ecosystem
Fishing and especially trawling	0.90
Russian oil-tanker or cruise-ship grounding	0.09
Oil and gas exploration and production	0.01

But experts are often wrong!

(From: Bergman 2005 Risks and decisions for conservation and environmental management CUP)



Key research issues where universities can help are:

- Structure and function of the microbial system which utilises ca. 50% of the produced carbon
- Effects of acidification of sea-water due to atmospheric CO₂ discharges
- Effects of trawling on structure and function of benthic systems
- Mapping and estimating the biodiversity (using DNA barcoding) and its functions, (e.g. to what extent are species redundant?)

Conclusion

- 1. Since the proclaimed goal is to protect and conserve biological systems of the Barents Sea then tackle the major issues, rather than the minor ones.**
- 2. The major issues are climate change and fisheries related issues NOT oil exploration and extraction**
- 3. If this is done then there may be food for seabirds, mammals and other components of the ecosystem and the major habitats such as sponge systems and cold-water corals will be conserved!**

