

# Assessment of oil and gas activities in the Arctic - vulnerability

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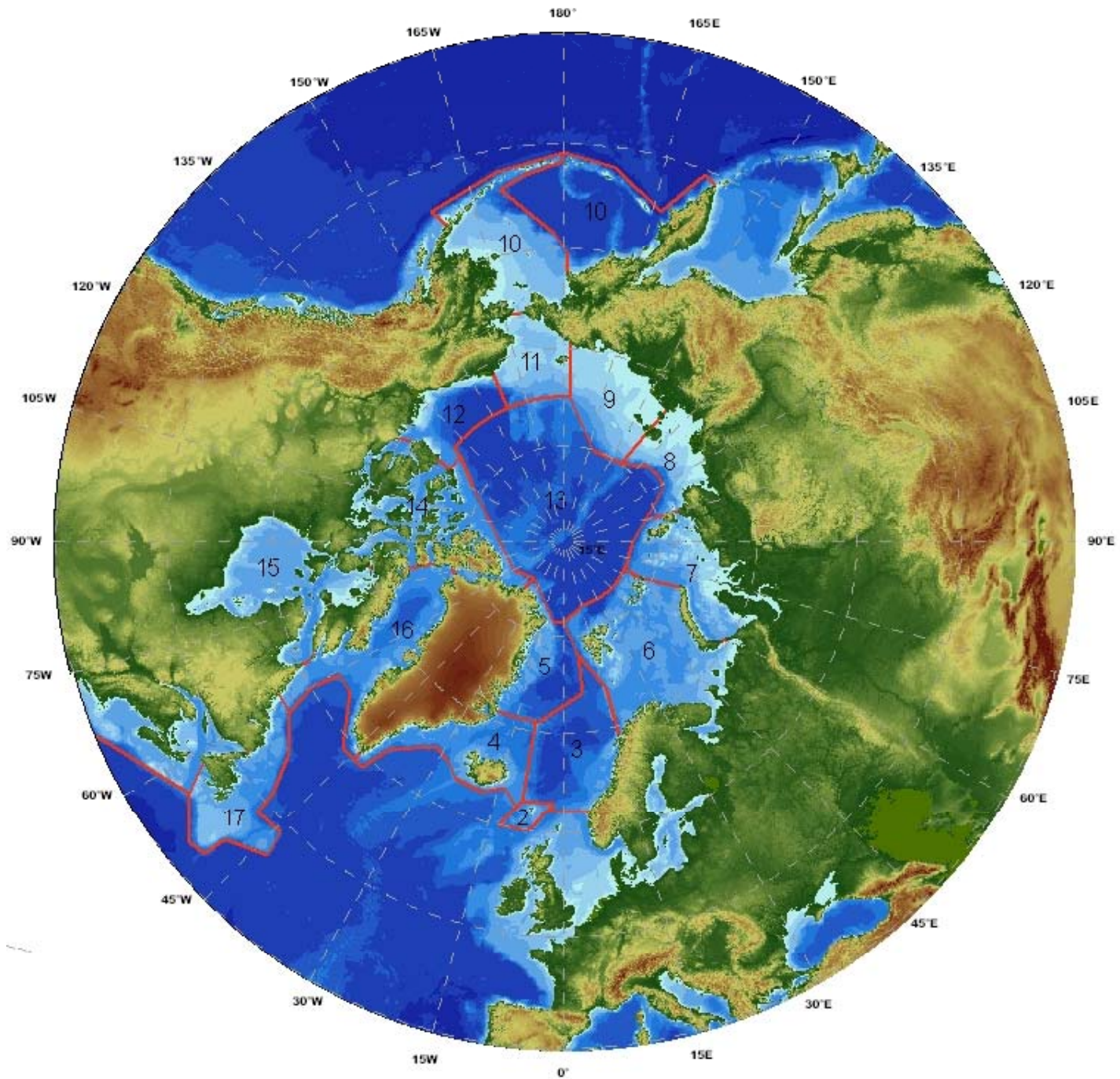
Assessment co-lead

Arctic Frontiers, Tromsø, 2008

# Three main messages ("Commandments")

1. Do not spill oil in ice
2. Use best practices
3. Do not pollute





# Arctic ecosystems

- Habitats
- Species
- Taiga – tundra – barren ground – wetlands
- Life at the edge
- Large seasonal variation
- Extensive migrations into and within the Arctic
- Birds, mammals, fishes

# Findings

- Wide distribution of species and closely related species
  - Similarity in ecosystem function
  - Knowledge is transferable
- Subspecies and populations – relevant for status and vulnerability
- Contribution to ecosystem approach

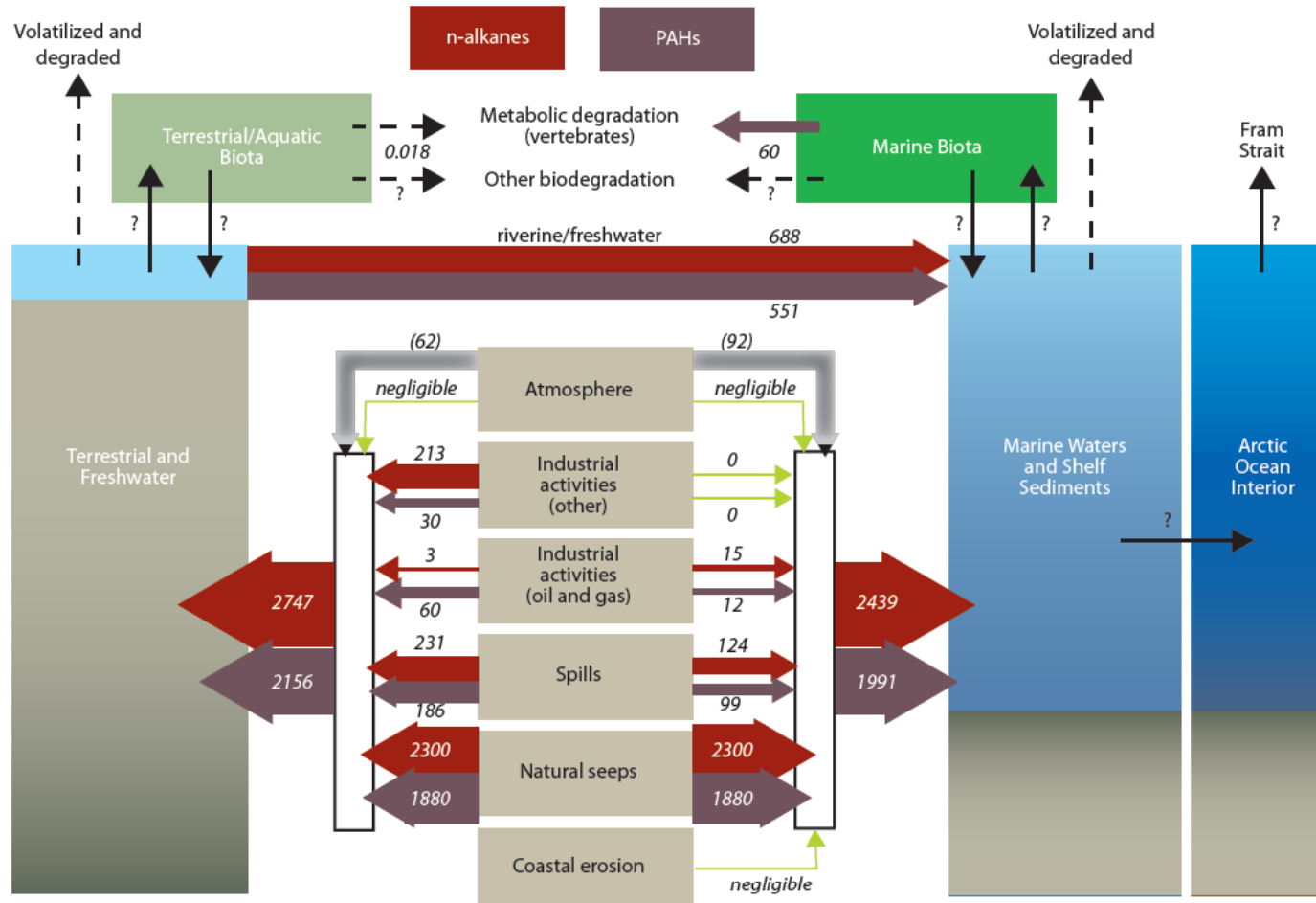
# Assessment of oil and gas activities

- Socio-economic effects
- Human health effects
- Pollution effects
- Physical impacts and disturbances

# Pollution – sources and concentrations

- Natural seeps are the largest source
- Oil and gas activities – relatively modest source
- Concentrations of oil hydrocarbons and PAHs are generally low – background
- Local areas are contaminated from spills and operational discharges

# A petroleum hydrocarbon budget



# Effects of contaminants

- Chapter 5 – Detailed review of literature
- In general: low concentrations – no effects
- Locally: sublethal effects – no clear effects on populations
- Arctic species – similar sensitivity to those at temperate latitudes (limited number of studies)
- Arctic conditions – oil more persistent and exposure longer

# Recommendations

- Better reporting procedures for waste treatment
- Point sources should be identified and amounts of released contaminants reported
- Sites of spills on land should be identified
- A selection of spill sites should be monitored
- Used for research on fate of oil and risk of effects to humans and wildlife

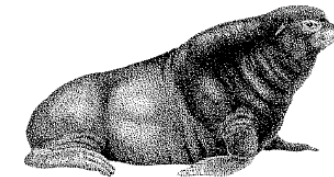
# Oil spills – greatest threat

- Many small spills – few large
- No major oil spill in Arctic marine area
- Lessons from Exxon Valdez and spill in Gulf of St. Lawrence



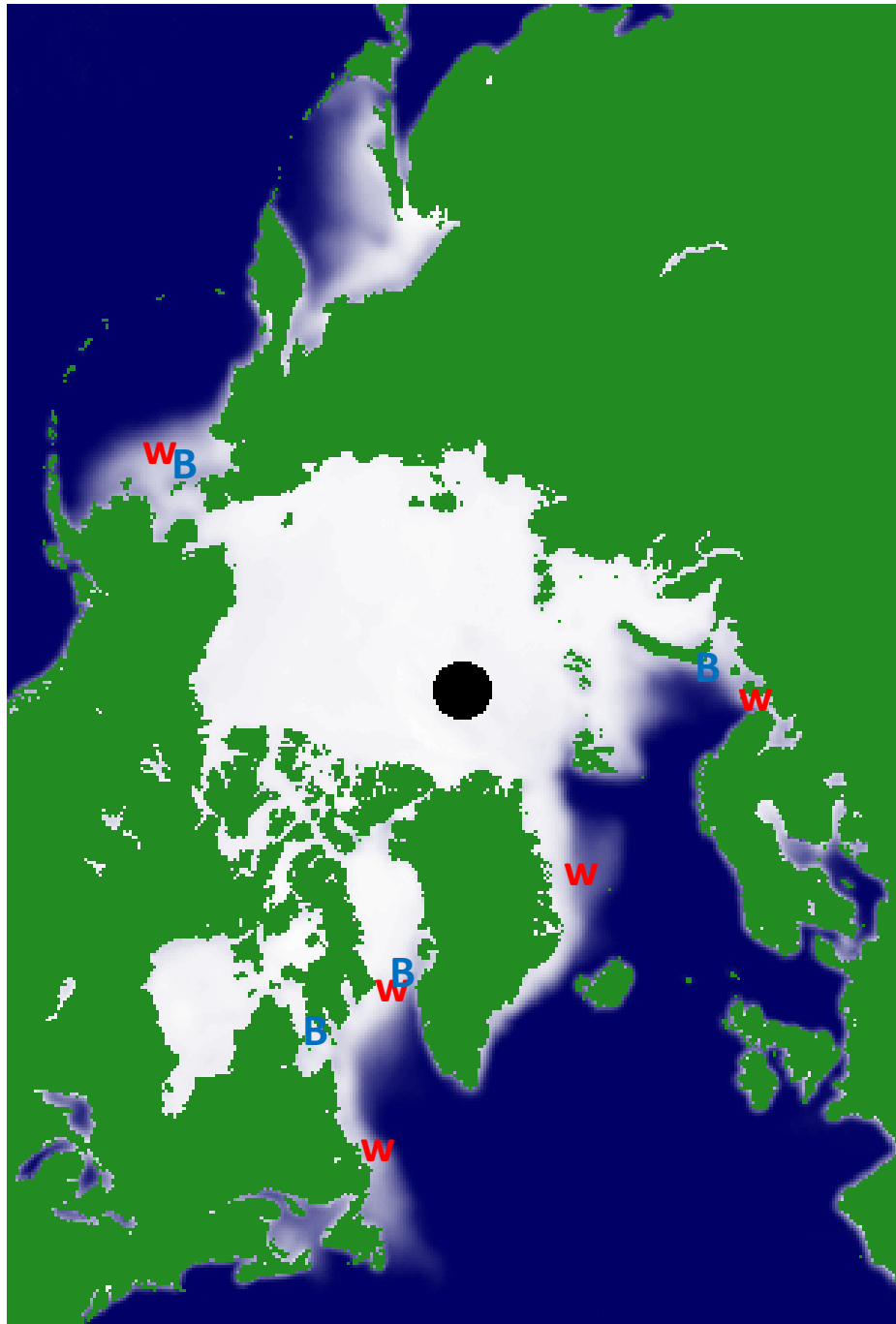
# Feathers and fur

- Seabirds
  - Colonies
  - Feeding in leads and polynyas
  - Molting areas (auks and seaducks)
- Waders and waterfowl
- Polar bear, sea otter, northern fur seal
- Seal pups



Northern Fur Seal *Callorhinus ursinus* 1.4-2.1 m





**W** - Whelping  
area seals



Harp Seal *Phoca groenlandica* 1.6-1.7 m

**B** – Wintering  
area Bowhead  
and/or beluga



# Bowhead

Whales – low vulnerability to oiling

More vulnerable when in sea-ice



# Oil spills in ice

- Animal aggregations
- Even a small spill could potentially affect many individuals
- Small cod-fishes – sensitive components – spawns under ice in winter
- Potentially large ecological impacts

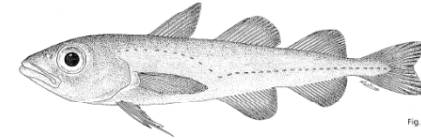


Fig. 60

25,000-30,000 kongeederfugle



# Recommendations

- Better knowledge and monitoring of animal populations
- Monitoring and research should allow distinction of effects from oil and gas activities from effects from other causes, including climate variability and change
- Integrated monitoring, coordinated in regional ecosystems



# Illustrative circumpolar vulnerability map

