Norwegian-Russian Symposium, Polar Environmental Center, Tromsø, 25-26 August 2008

The NE Atlantic seal resources, their management and their role in the ecosystem

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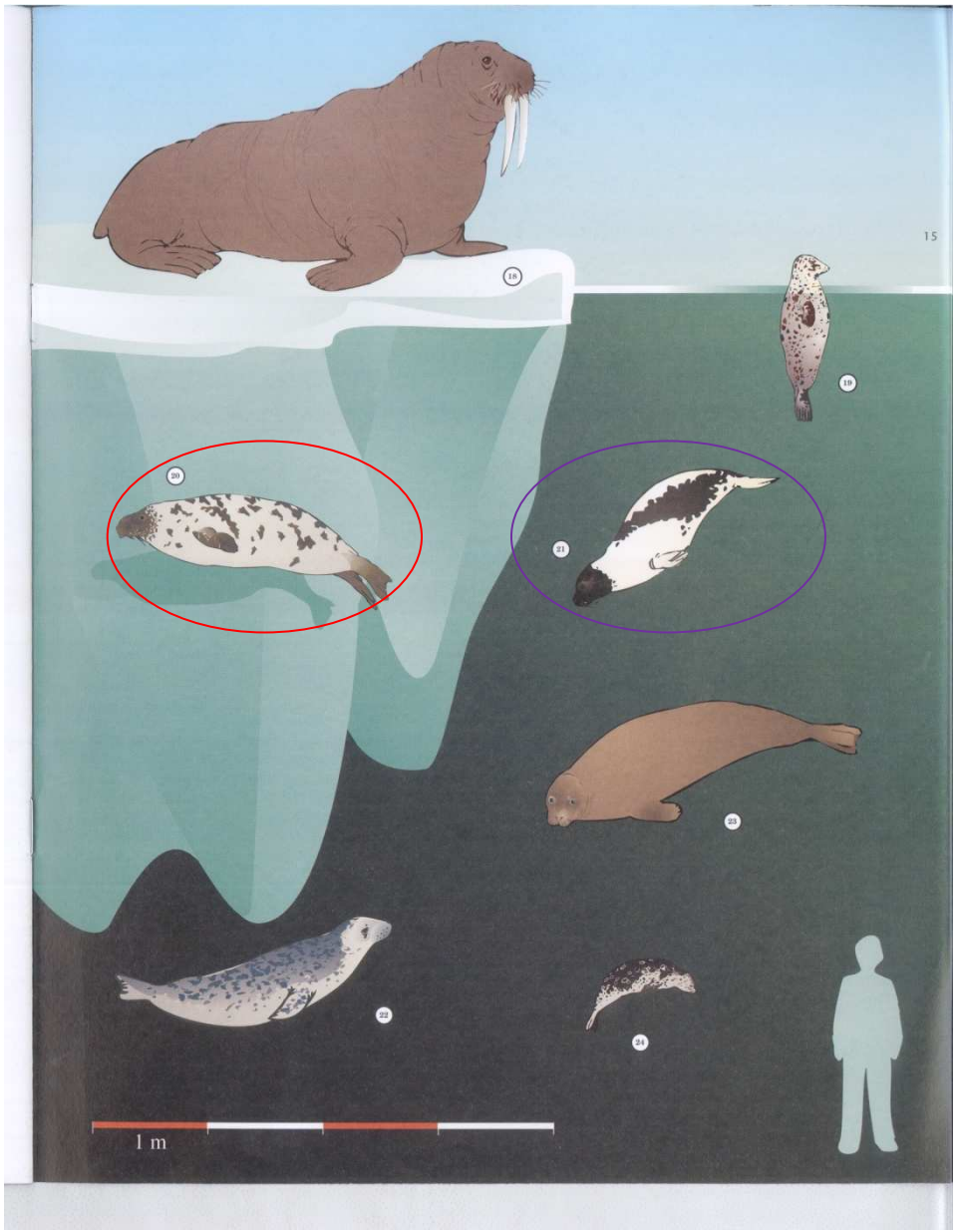
7 seal species in NE Atlantic waters

Only two species have been of interest for the commerciel hunt:

Harp seals

Hooded seals

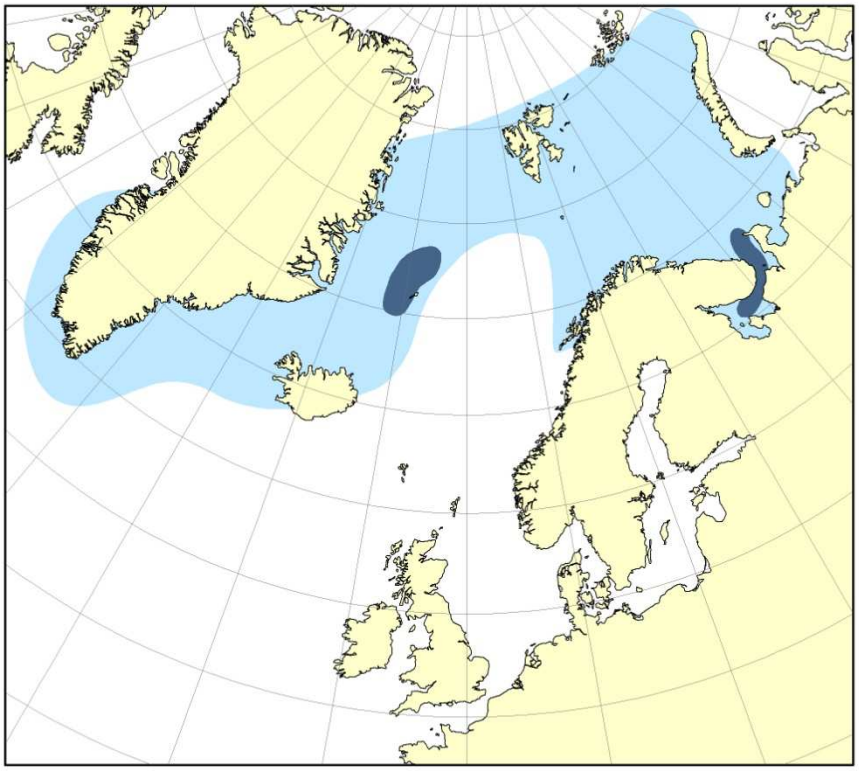


HARP SEALS – prime target for Norwegian and Russian sealers in the White, Barents and Greenland Seas

March-May:
Breeding and moulting on ice

Rest of the year:
Out fishing!

Harp seal distribution in the Northeast Atlantic
Feeding areas (light blue) and breeding/moulting areas (dark blue)



From whitecoats to beaters

Harp seal whitecoats undergo substantial growth and morphological changes during their first 2-3 weeks of life

They are weaned and permanently left by their mothers after 12 days

Prime target for the hunt: ”Beater” – weaned harp seal pup.

Secondary target for the hunt: Adult (1+) harp seal

Unpermitted to hunt: Breeding females and unweaned pups of harp seals

Hooded seals – another important target for the seal hunt

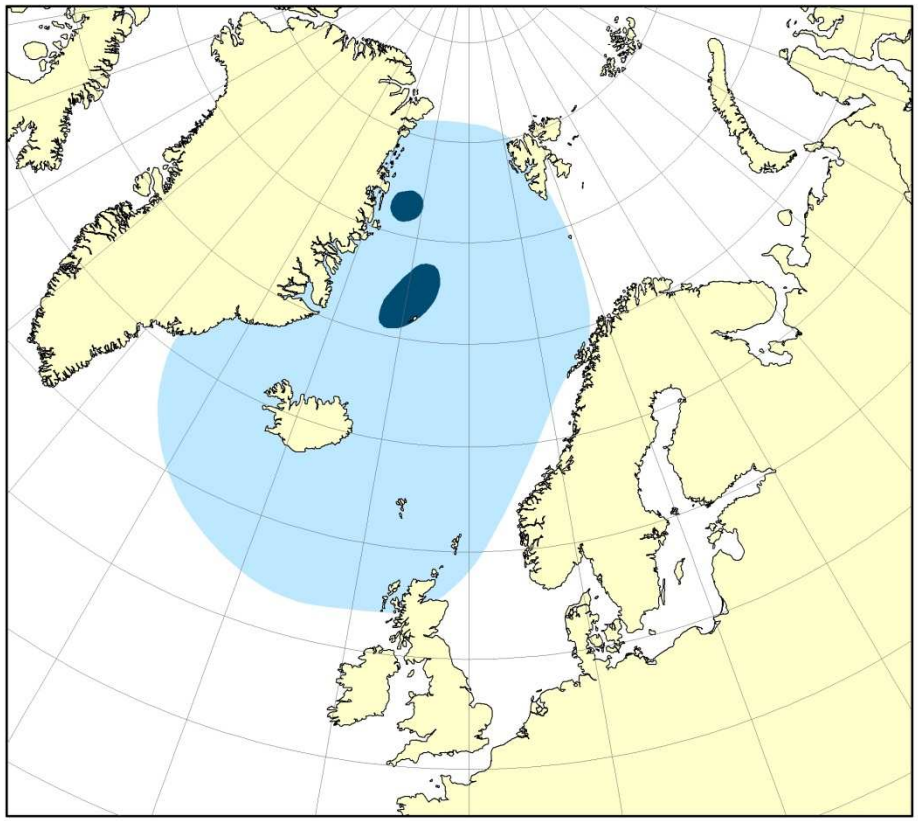
March: Breeding

June/July: Moulting

Rest of the year: Out fishing!

NB: Preliminary protected from 2007!

Hooded seal distribution in the Northeast Atlantic: feeding (light blue) and breeding/moulting (dark blue) areas



”Blueback” – the weaned hooded seal pup used to be a main target for Norwegian sealers

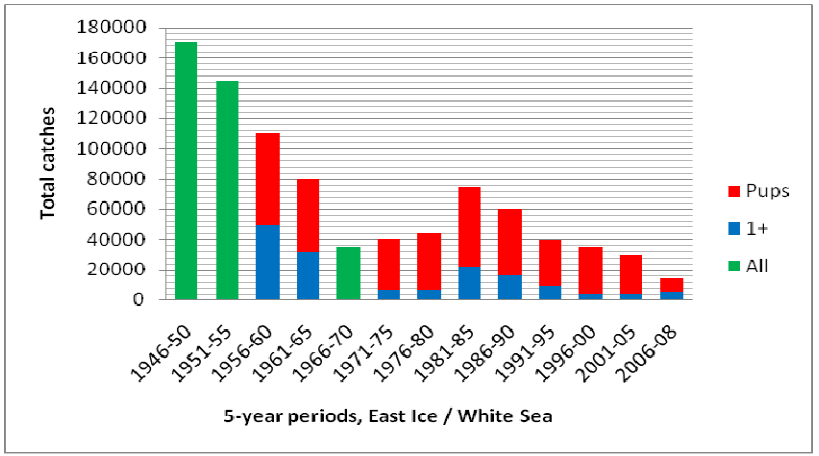
Norwegian and Russian sealing in the past 60 years

AVERAGE NO. OF ANIMALS IN 5-YEAR PERIODS

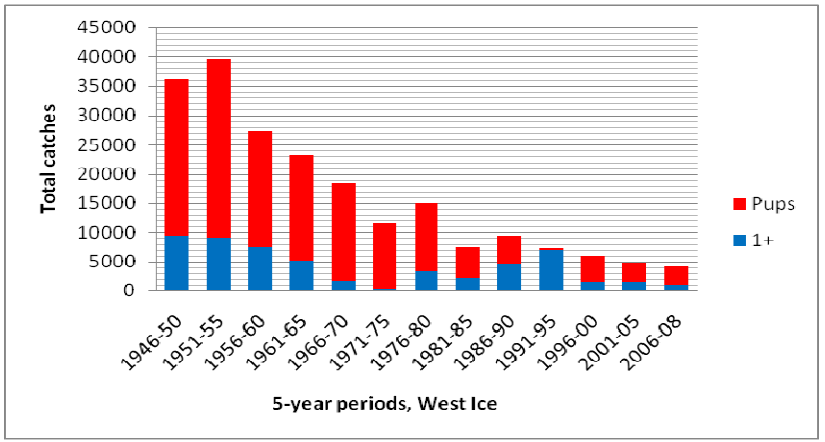
A: Harp seals in the East Ice (SE Barents Sea and White Sea

B: Harp seals in the West Ice (Greenland Sea)

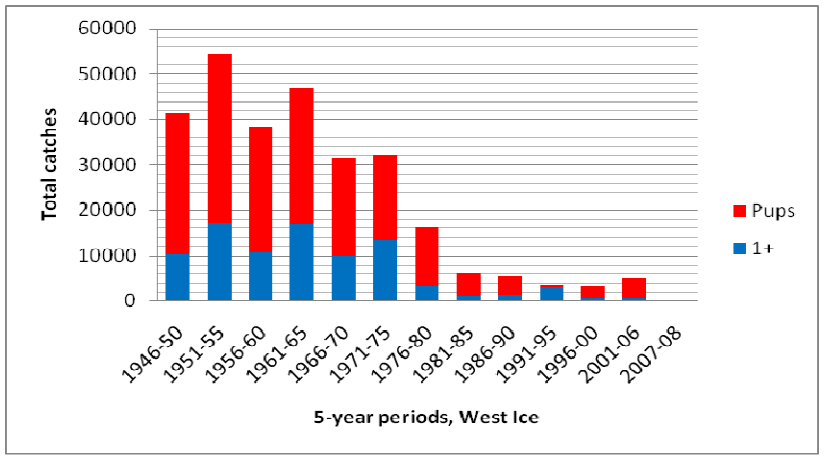
C: Hooded seals in the West Ice (Greenland Sea)



A

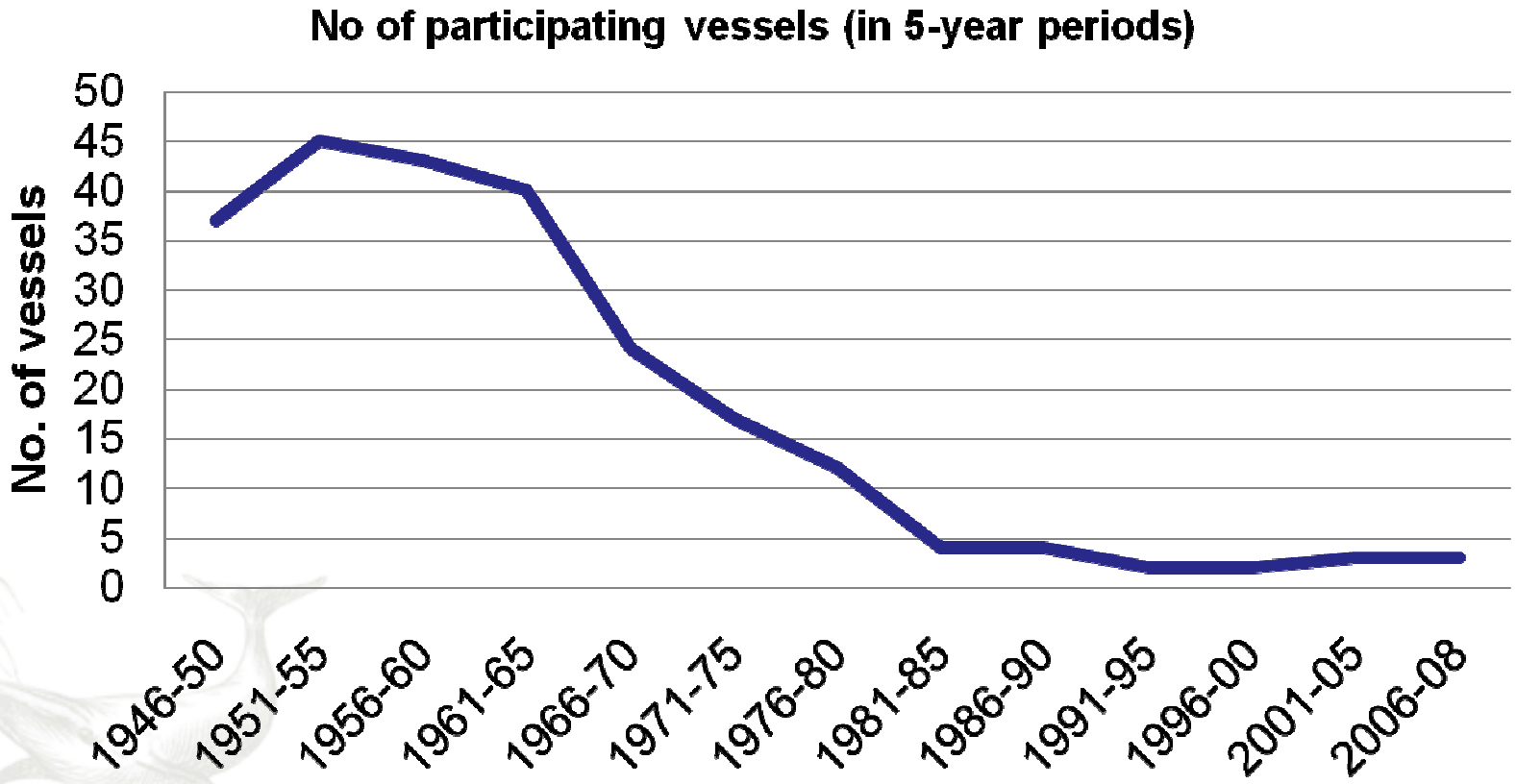


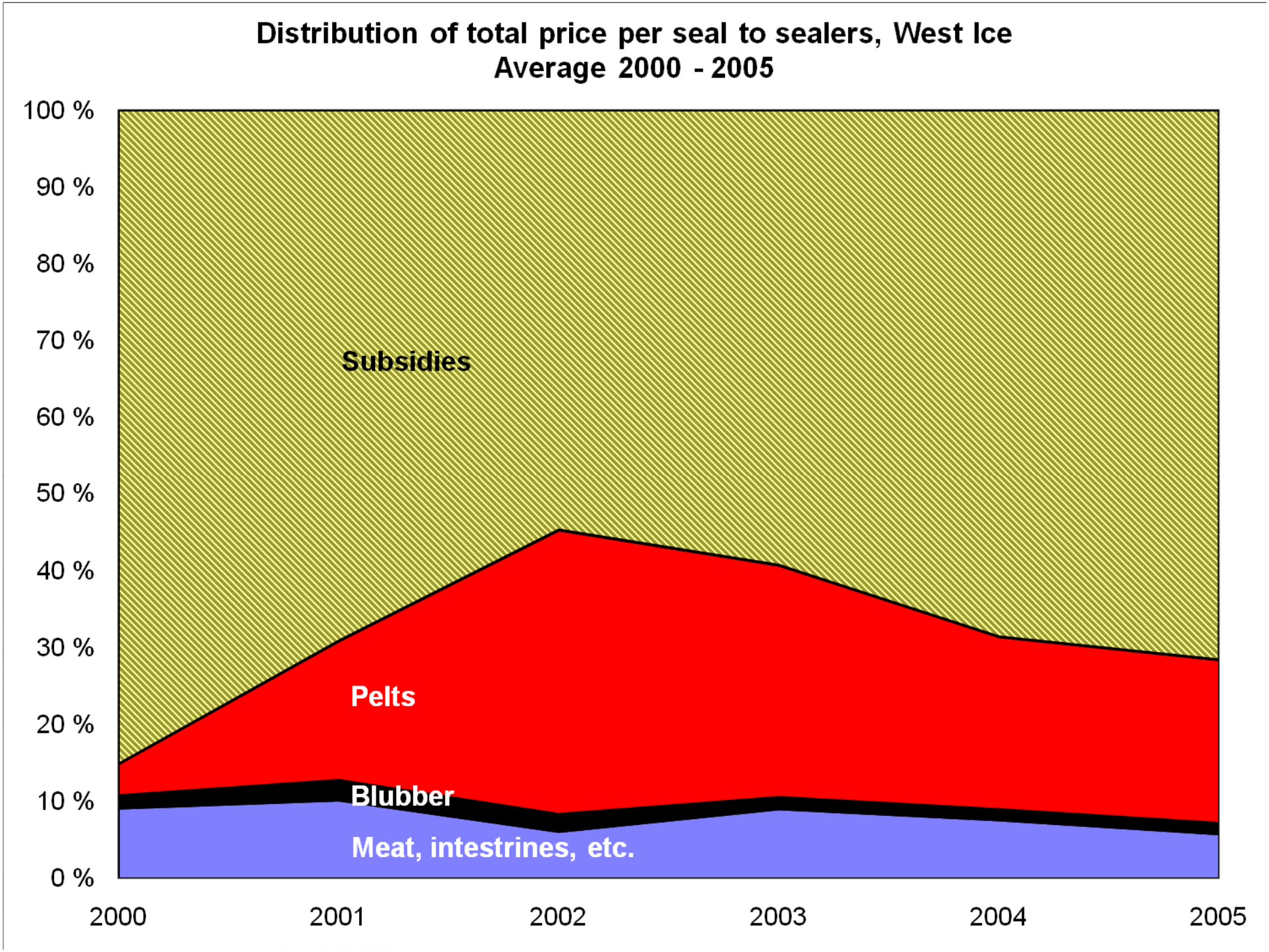
B



C

Reduced Norwegian sealing effort in the West Ice in the past 60 years




Distribution of total price per seal to sealers, West Ice
Average 2000 - 2005
100 %
90 %
80 %
70 %
60 %
50 %
40 %
30 %
20 %
10 %
0 %
Subsidies
Pelts
Blubber
Meat, intestrines, etc.
2000
2001
2002
2003
2004
2005

MANAGEMENT OF HARPS & HOODS in the NE Atlantic

- **ADVICE: FROM ICES & NAMMCO**

- **Based on analyses of all available data by:**
  - **Joint ICES/NAFO Working Group on Harp and Hooded Seals (WGHARP)**
  - **NAMMCO Scientific Committee**

- **Agreement on TACs and quota sharing among Norway and Russia:**
  - **Joint Norwegian-Russian Fisheries Commission**

- **Advice to Norwegian management on how to organize hunt:**
  - **Marine Mammal Advisory Board (Sjøpattedyrrådet)**

- **Norwegian management**
  - **Ministry of Fisheries & Coastal Affairs**
    - **Directorate of Fisheries**

ICES request: Abundance estimates must be up-dated c. every 5-8 year to provide advice

Available estimates:

Hooded seals, Greenland Sea:

Norwegian pup production estimates in 1997, 2005, 2007

Harp seals, Greenland Sea:

Norwegian pup production estimates in 1991, 2002, 2007

(plus 1983-1991 from mark-recaptures)

Harp seals, Barents/White Sea:

Russian pup production estimates in 1998, 2000, 2002, 2003, 2004, 2005, 2006, 2007, 2008

Seal counting: Pups on the ice are counted from helicopter (visual) and/or aeroplanes (photos)

We count the pups and use the pup production estimate to calculate the size of the entire population

The model also use number of animals removed in catches and information about mortality and reproductive potential

Harp seals in the Greenland Sea

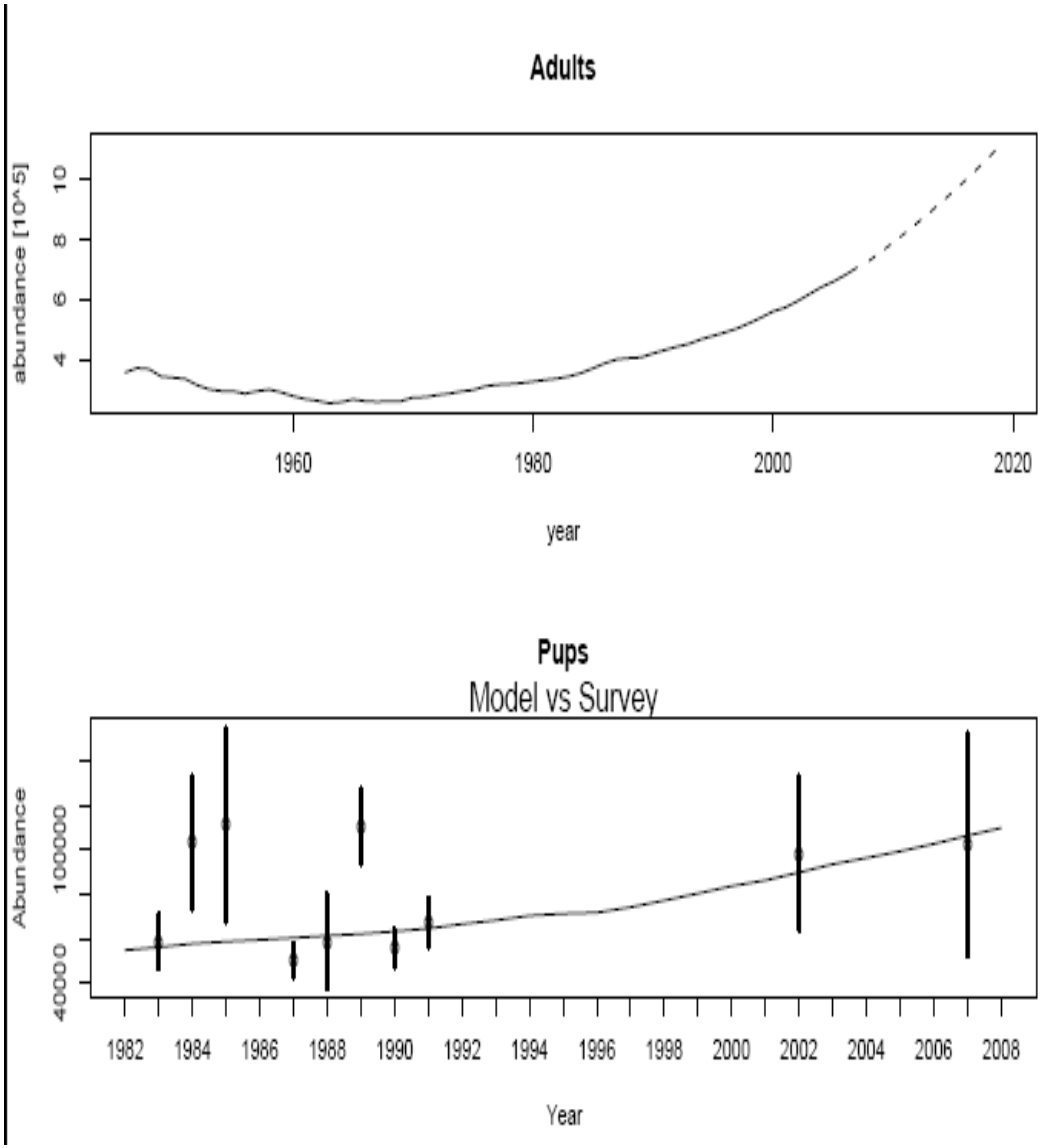
Modelled development in population 1946-2007, plus 10 years prediction

Above

Development of the adult population in 2007-2017 (dotted line is prediction)

Below

Model fit to pup production estimates in 1983-1991 (mark-recaptures) and 2002 and 2007 (aerial surveys)



ICES-based MANAGEMENT: Harp seals, Greenland Sea
(NB: advice will be formulated in mid September 2008)

STOCK STATUS 2007

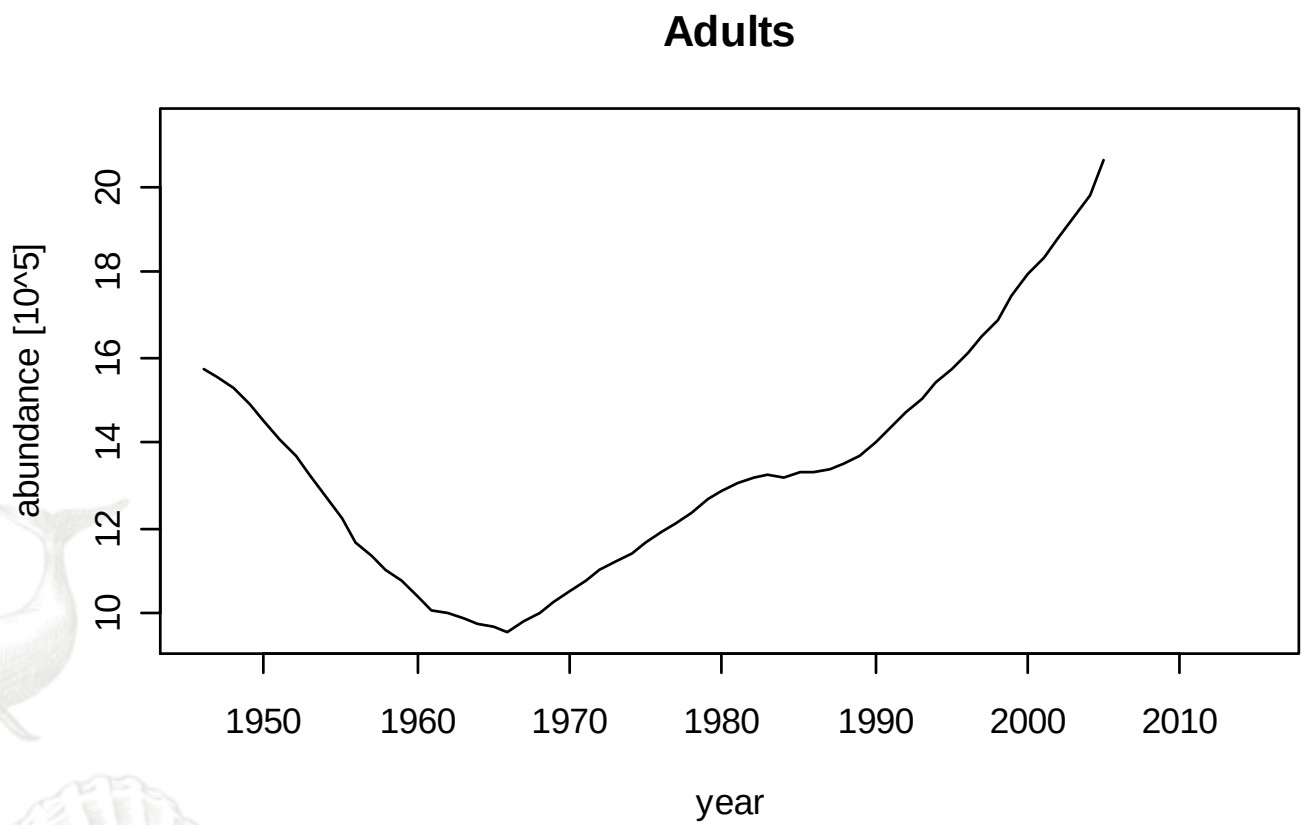
Pup production ~ 106 000

1+ seals ~707 000

SUSTAINABLE REMOVALS

29 300 1+ (2 pups per 1+)

Harp seals in the Barents Sea / White Sea – modelled population development in the past 60 years



ICES-based MANAGEMENT: Harp seals, Barents Sea/White Sea (NB: New advice will be formulated in mid September 2008)

STOCK STATUS 2005

Pup production ~ 361 000

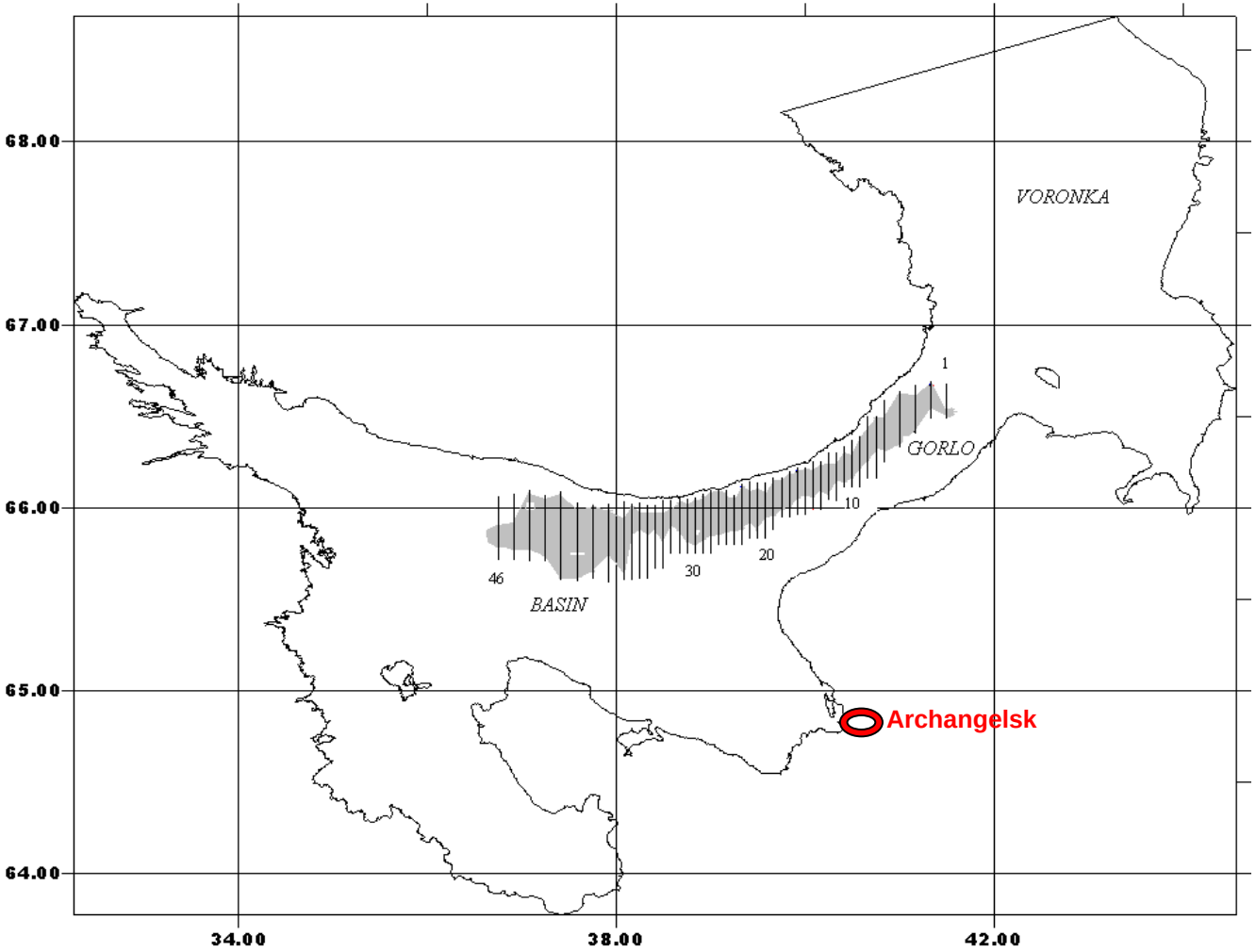
1+ seals ~2 065 000

SUSTAINABLE REMOVALS

78 200 1+ (2.5 pups per 1+)

NB: Reduced TAC due to concern for reduced pup production (2004-2007)

55 000 1+

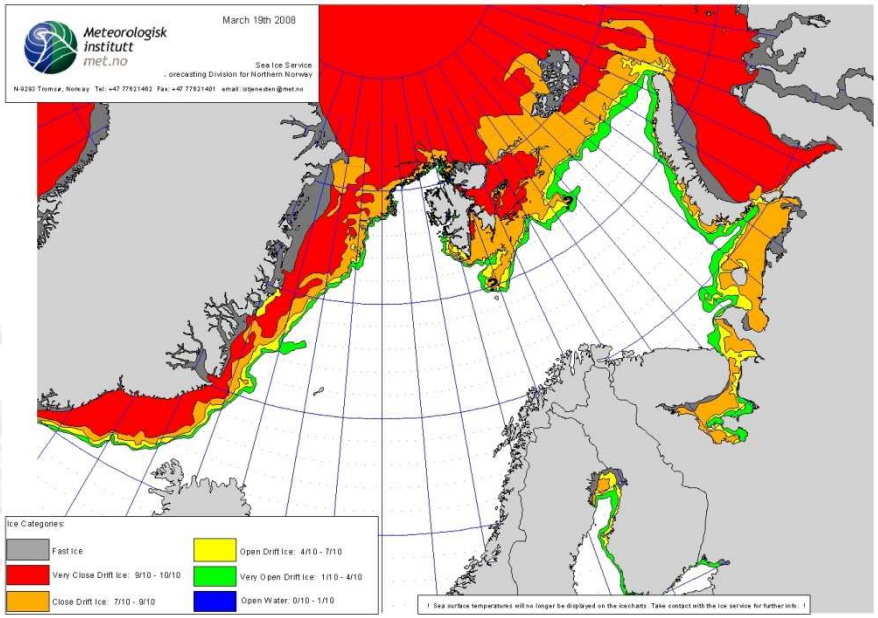


RUSSIAN HARP SEAL PUP PRODUCTION SURVEYS IN THE WHITE SEA

Complete coverage: 1998, 2000, 2002, 2003, 2005, 2008; Incomplete: 2004, 2006, 2007

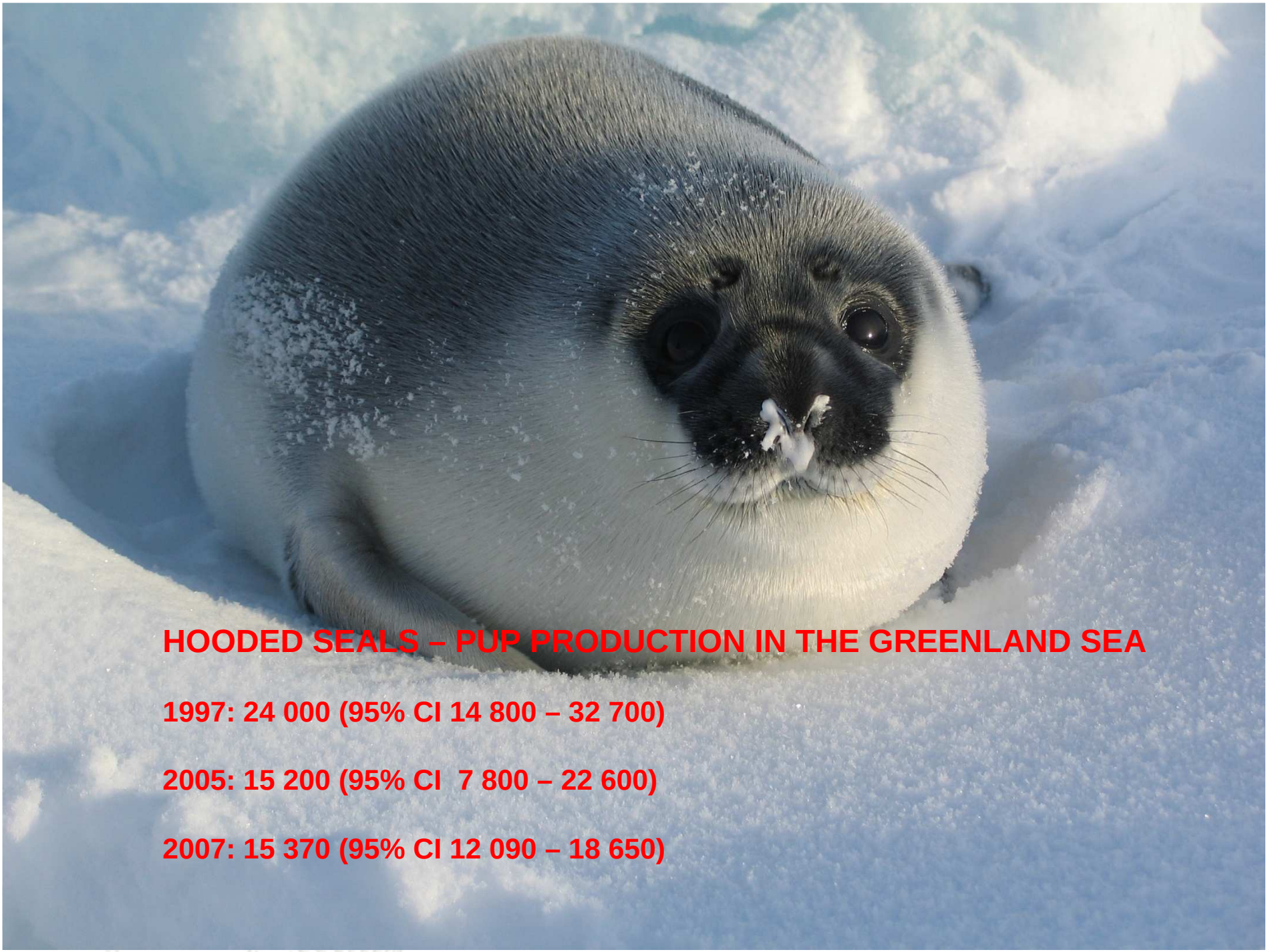
Reduced pup production in the White Sea?

Reconnaissance area in 2008 include White Sea and SE Barents Sea (ice map from 19 March 2008)



White Sea pup production 1998-2008

Year	Numbers of pup production numbers including commercial catch/error (pieces)
1998	286 260/43 000
2000	339 710/30 000
2002	330 000/45 000
2003	327 000/41 000
2004	239 000/36 000
2005	122 658/19 900
2008	123 104/28 341



HOODED SEALS – PUP PRODUCTION IN THE GREENLAND SEA

1997: 24 000 (95% CI 14 800 – 32 700)

2005: 15 200 (95% CI 7 800 – 22 600)

2007: 15 370 (95% CI 12 090 – 18 650)

Hooded seals in the Greenland Sea

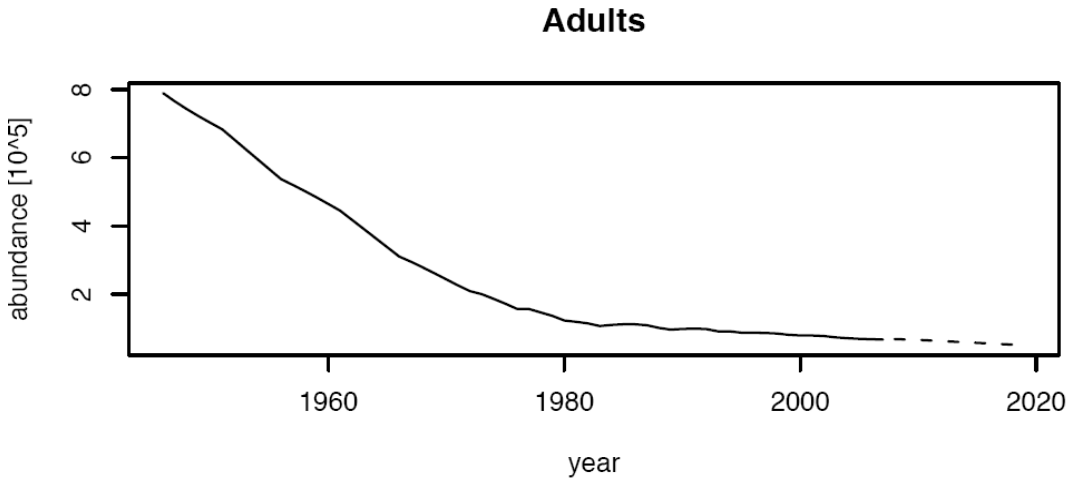
Modelled development in the population 1946-2007 plus 10 years prediction

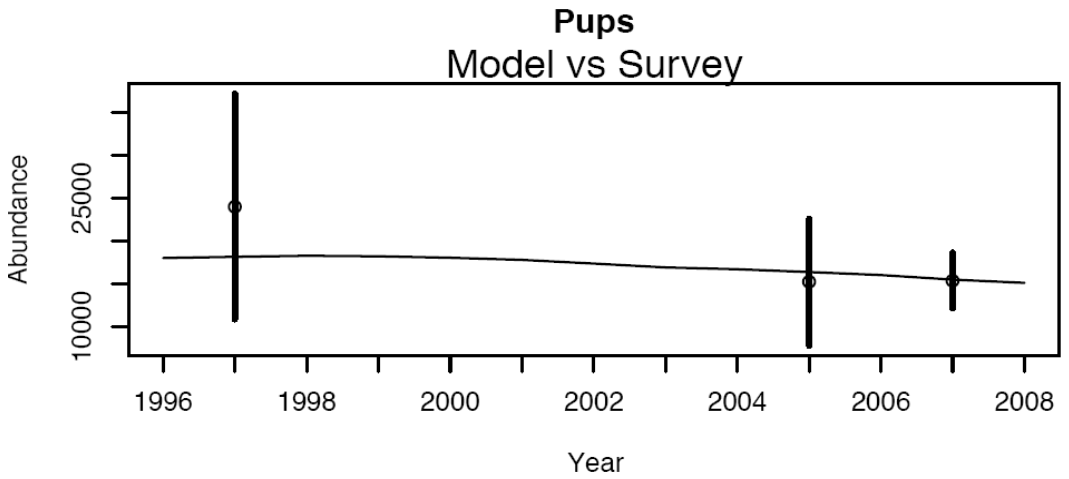
Above

Development of the adult population, assuming PBR removals (~2200 seals per year) in 2007-2017 (dotted line is prediction)

Below

Model fit to pup production estimates in 1997, 2005 and 2007





HOODED SEALS IN THE GREENLAND SEA

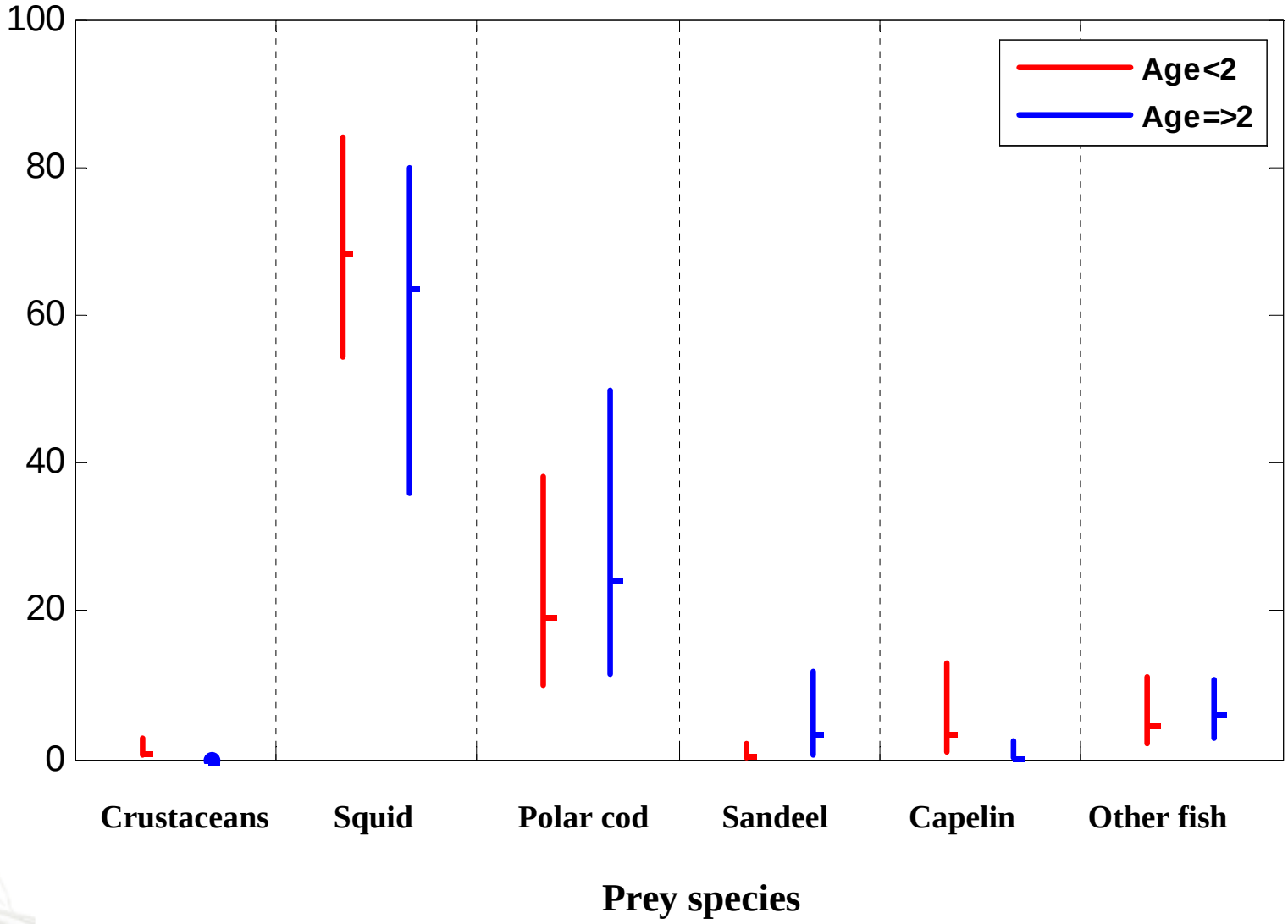
Stock status 2007

Pup production ~ 15 400

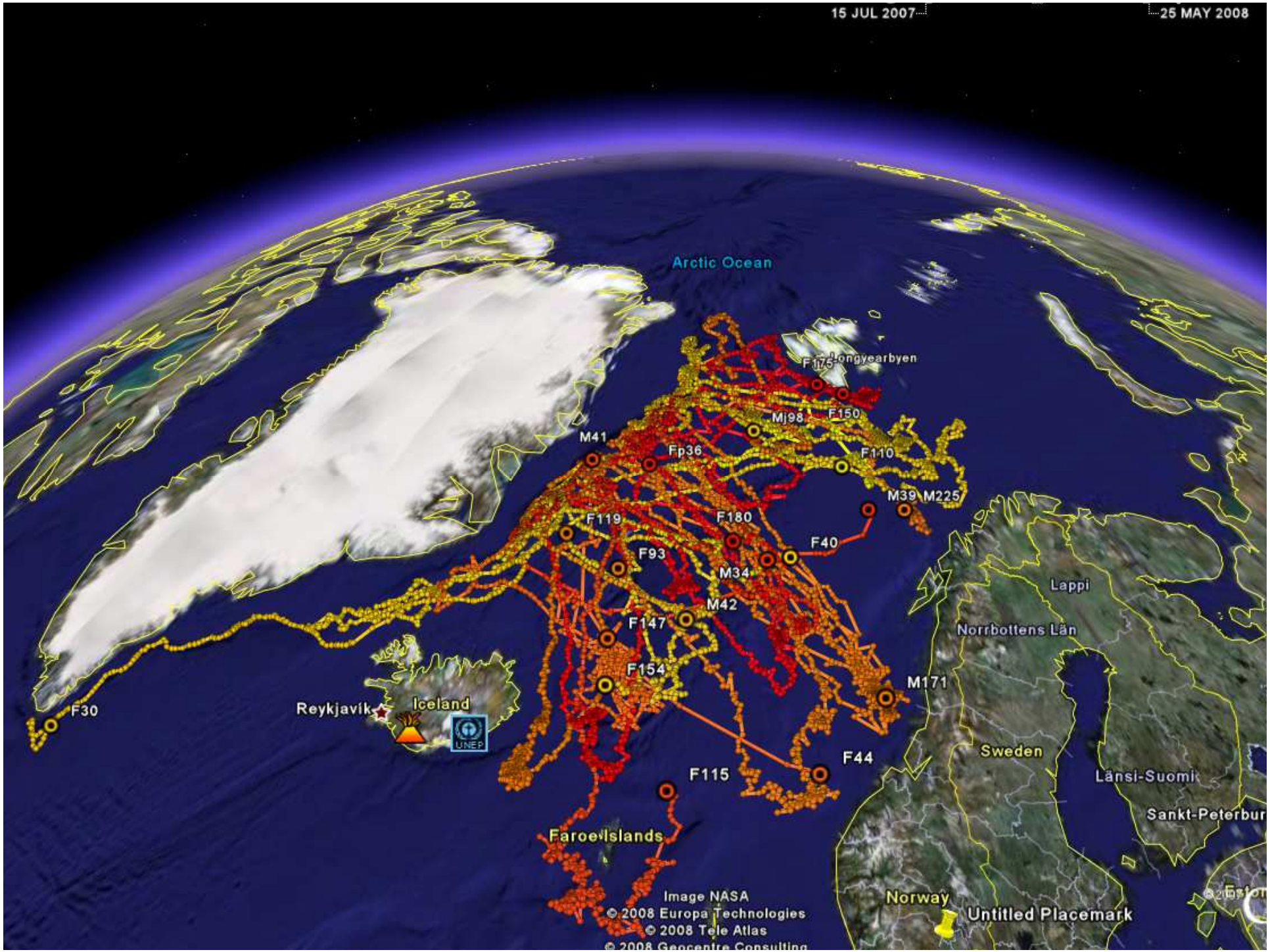
1+ stock ~ 66 900

Catch options:

- ***Declining stock 1946-1980 – subsequent stabilisation at low level (10-15% of 1946-level)***
- ***ICES recommends that the harvest should be stopped – limited research catches should be allowed***
- ***Increase research to assess reasons for poor stock status***



Relative prey importance (percentage) in diets of yong and older hooded seals east of Greenland in the period 1999-2003.


15 JUL 2007
25 MAY 2008
Arctic Ocean
Longyearbyen
F175
Mj98
F150
M41
Fp36
F110
M39
M225
F119
F180
F40
F93
M34
M42
F147
F154
M171
F30
Reykjavik
Iceland
UNEP
F44
F115
Faroe Islands
Lappi
Norrbottens Län
Sweden
Länsi-Suomi
Sankt-Peterbur
Norway
Untitled Placemark
Image NASA
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WHAT DO THE HOODED SEALS EAT WHEN THEY LEAVE THE DRIFT ICE?

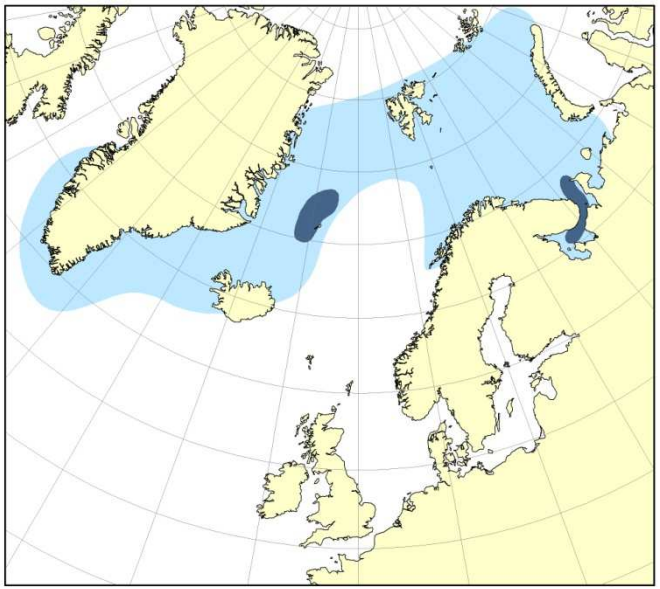
- Less squid.
- More demersal fish species, particularly:

Greenland halibut

Redfish

Some other fishes

Harp seal – a predator of potential concern in management of cod, haddock and other fish stocks in the Barents Sea ??



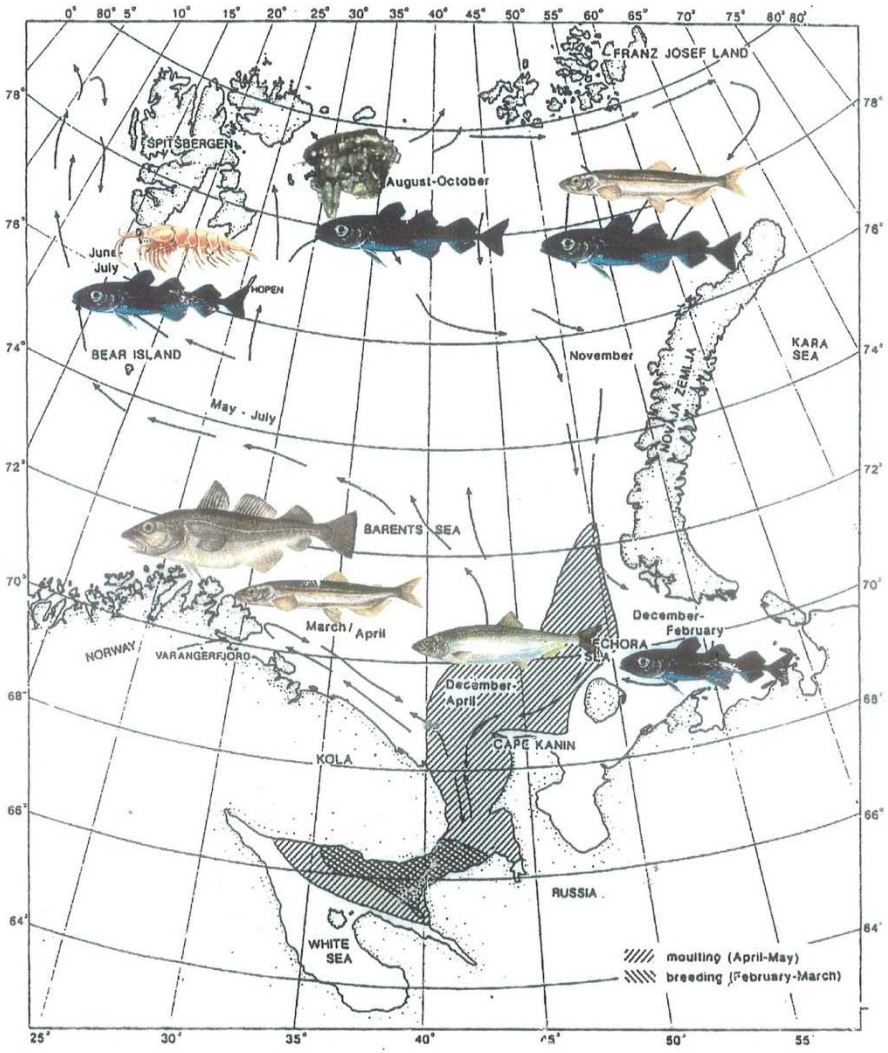
HARP SEALS in the Barents and White Seas

Annual migration route

Feeding habits along the road

Intensive feeding in the north
(krill, amphipods, polar cod, capelin)

More relaxed feeding in the south
(polar cod, capelin, herring, gadoids)



Annual consumption by some top predators in the Barents Sea in the 1990s

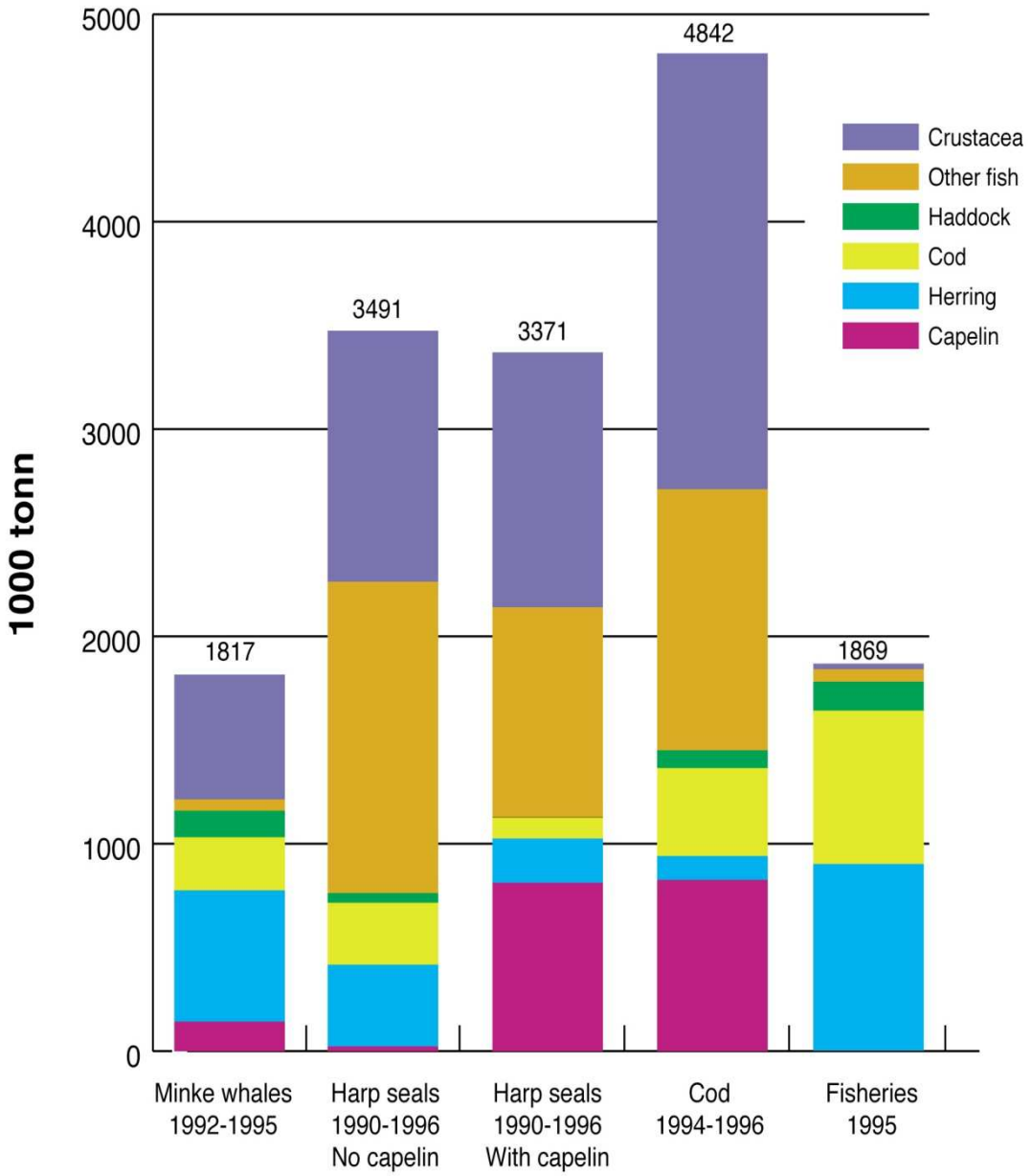
Minke whales 1.8 mill tonnes

Harp seals 3.5 mill tonnes

Cod 4.8 mill tonnes

Fisheries 1.8 mill tonnes

Note: Harp seals given with and without capelin in the ecosystem



Harp seal ecology research program

To secure that necessary data is available for assessment of the importance and role of harp seals in the Barents Sea ecosystem, a

Joint Norwegian-Russian Research Program on Harp Seal Ecology

has been established within the framework of the Joint Norwegian-Russian Fisheries Commission.

The focus of the harp seal ecology research program will be to:

- assess the spatial distribution of harp seals throughout the year (telemetrics)
- assess and quantify overlap between harp seals and potential prey organisms on hot-spot feeding grounds (data from ecosystem surveys)
- identify relative composition of harp seal diets in areas and periods of particular intensive feeding (sampling of seals)
- secure the availability of data necessary for estimation of population size of harp seals
- estimate the total consumption by harp seals in the Barents Sea
- implement harp seal predation in assessment models for other relevant resources

THANK YOU!