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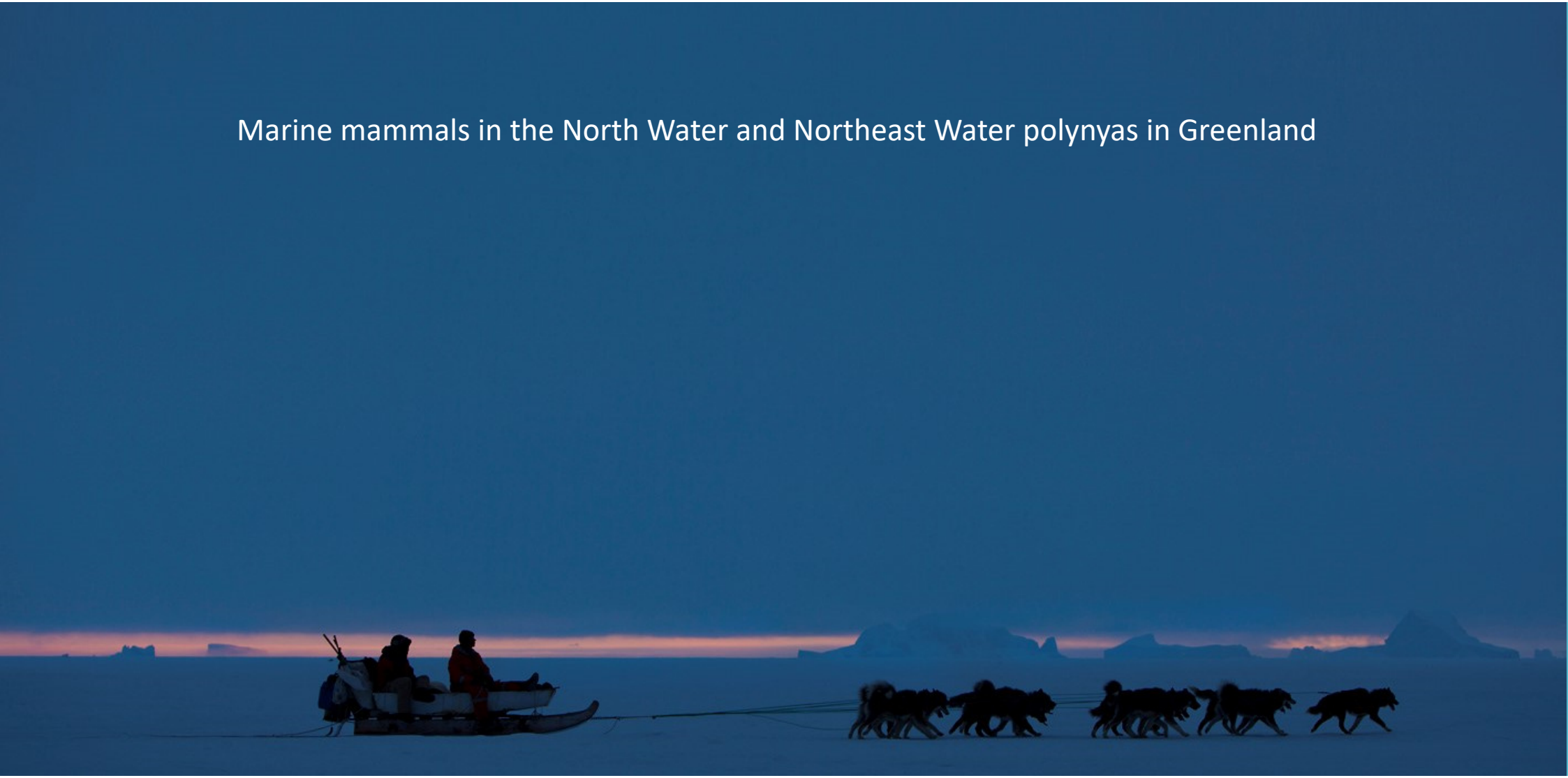
Grønlands Naturinstitut

Marine mammals in the North Water and Northeast Water polynyas in Greenland



Study area

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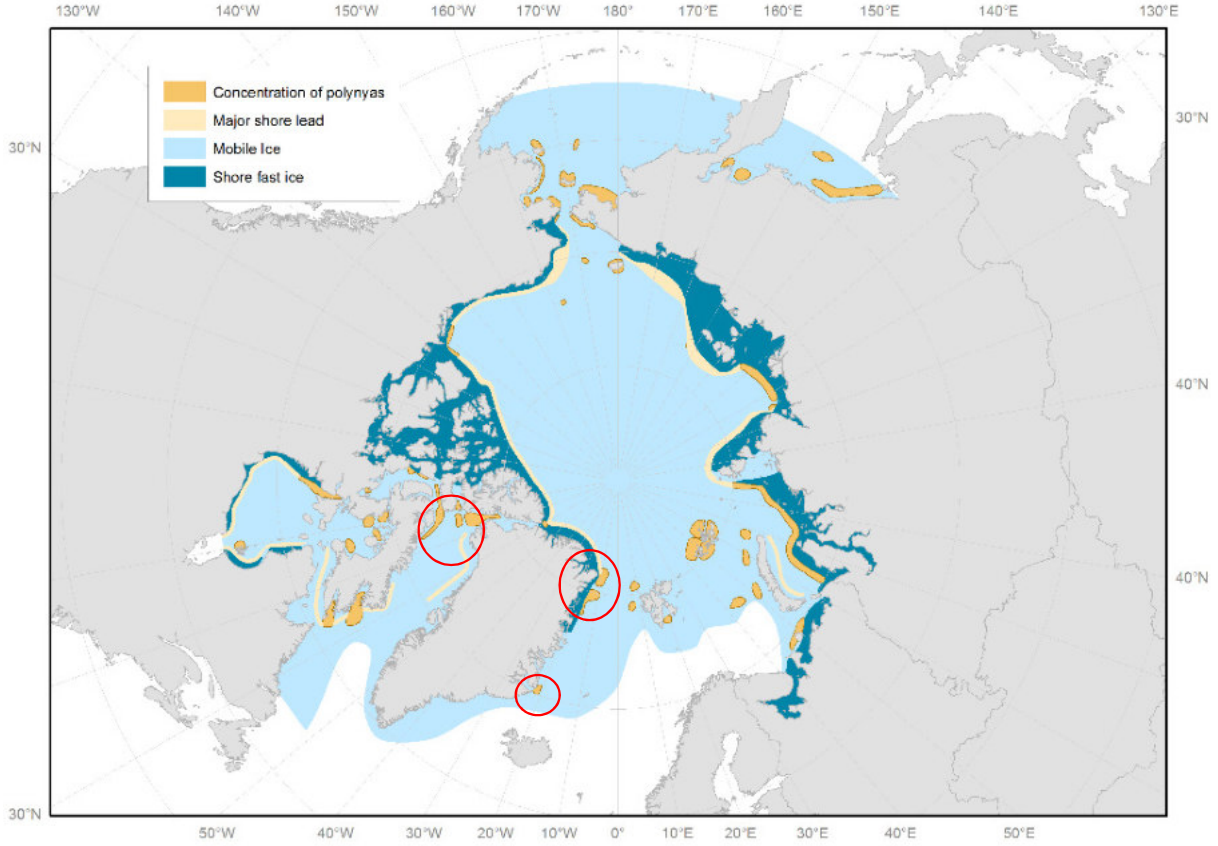
Circumpolar maps of known polynyas

3 known polynyas in Greenland

North water

Northeast water

Scoresby Sound



Source:
CAFF (Conservation of Arctic Flora and Fauna)

Study area

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Polynyas at 75-85°N

Major wintering areas for ice-associated marine mammals

NOW - North Water

Continental waters <200m

Deep waters >200m

The most productive ecosystem North of the Arctic circle

Aerial survey April 2014

Satellite tracking of bowhead and walrus

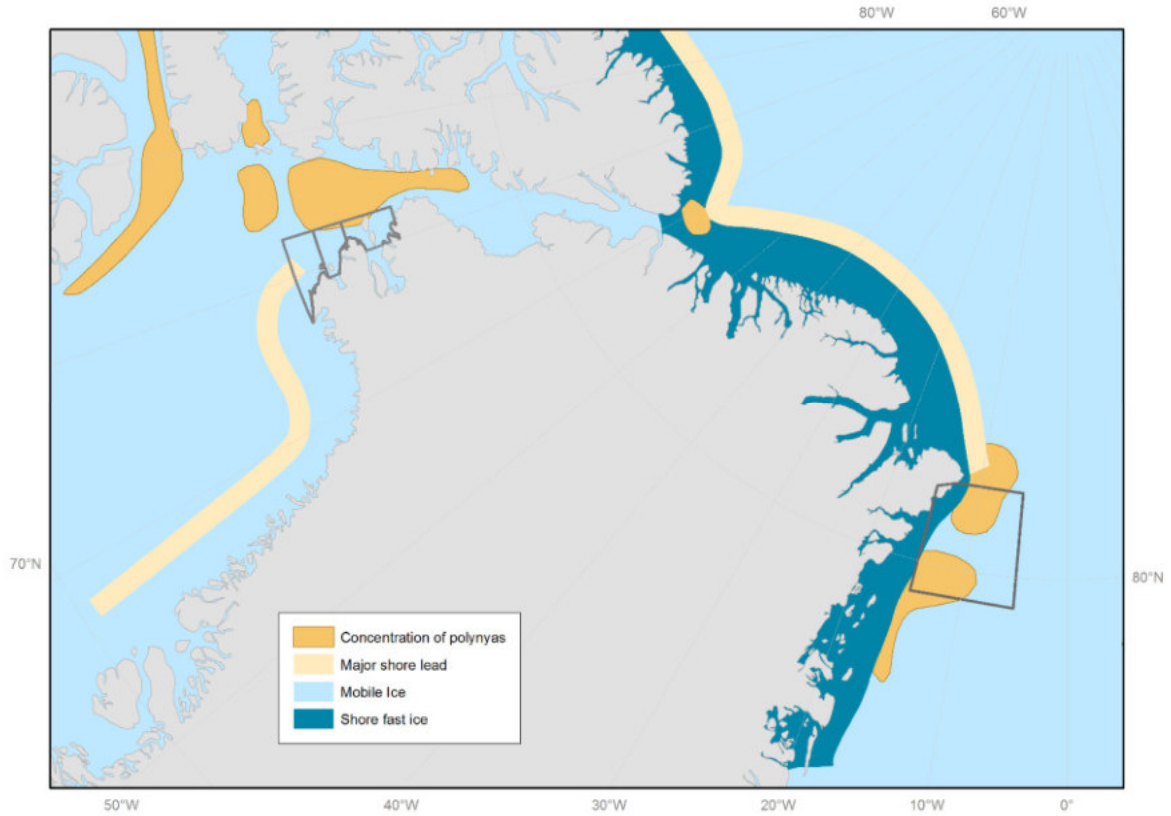
NEW - Northeast Water

Continental waters <200m

Highly variable in size

Aerial survey April 2017

Satellite tracking of bowhead and walrus



Areal survey

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Long history of aerial surveys at the Greenland Institute of Natural Resources
Cover large area
Not dependent on sea and ice conditions

Photo: F. Ugarte

Areal survey

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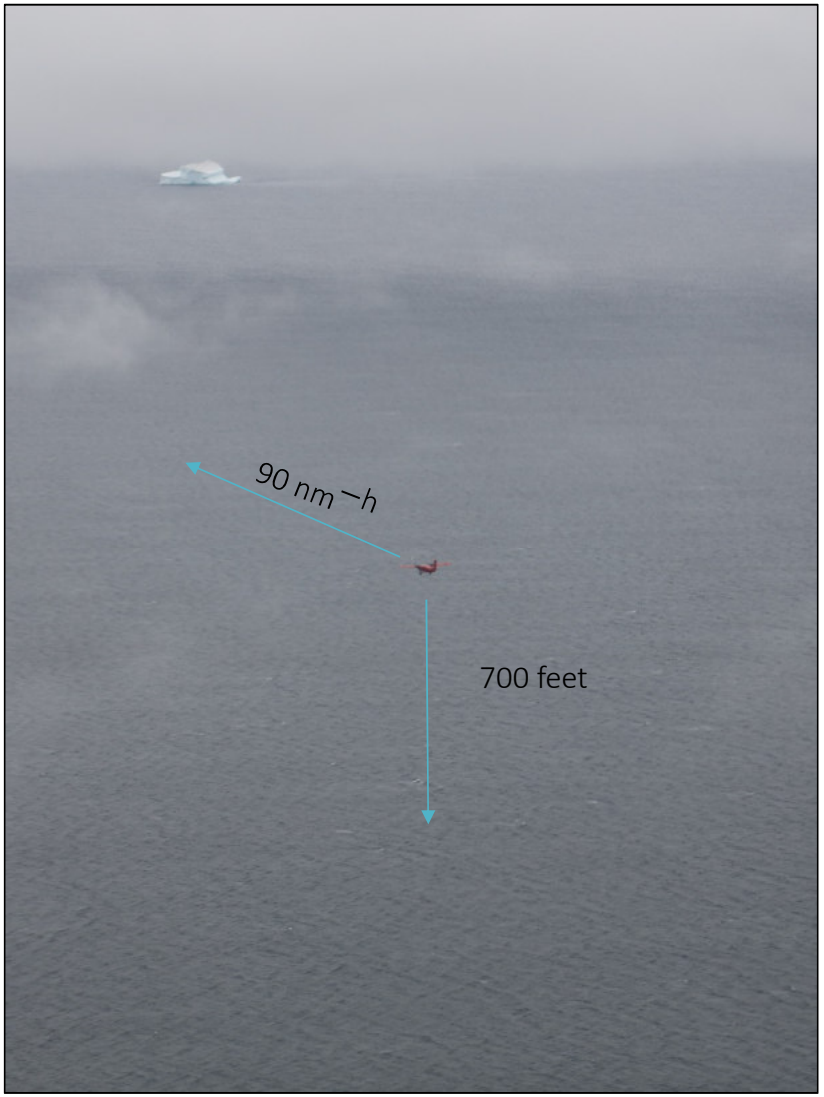

Abundance

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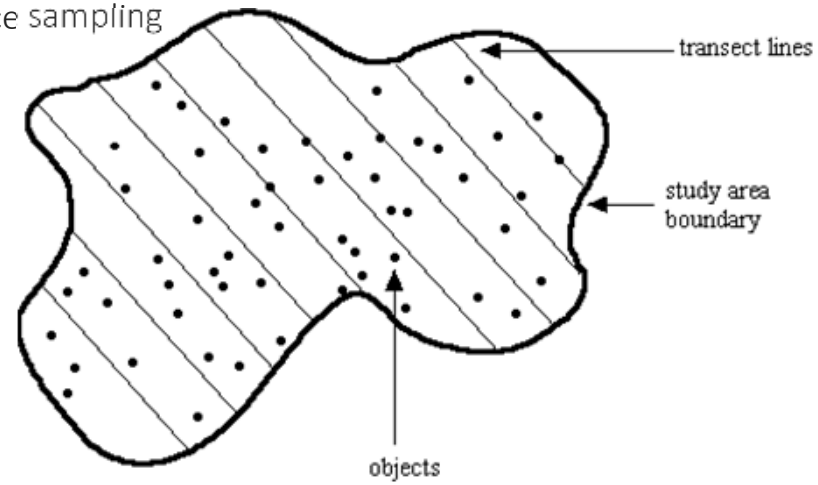
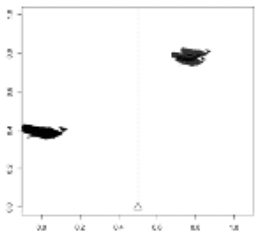
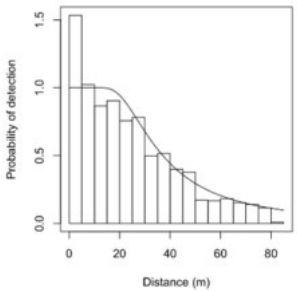
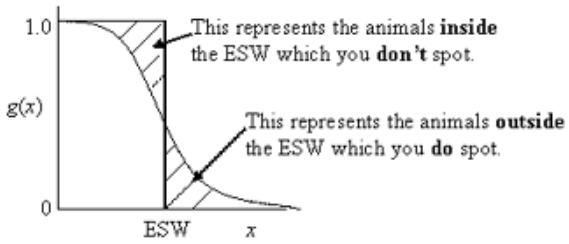
Distance sampling









Mark-recapture abundance estimate

- *Double-observer configuration*
- *Distance sampling*
- *Perception bias*
- *Availability bias*

Chapman estimate

- *Double-observer configuration*
- *Strip census (equal detection)*
- *Perception bias*

Assessment model

- *Abundance estimate*
- *Hunt statistics*
- *Life history traits*

-> annual level of removals

NOW and NEW

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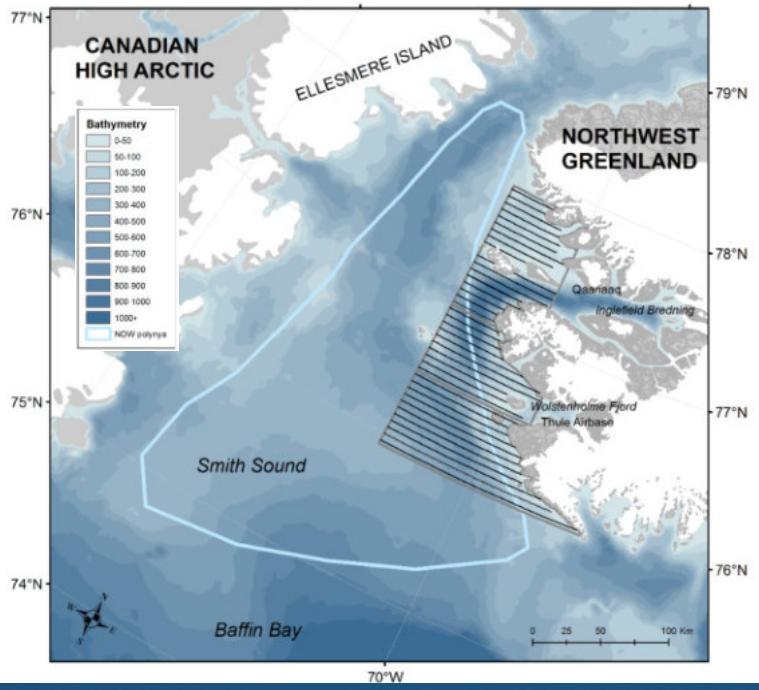
North Water Polonya

Eastern part of NOW

16,000 km2

~1400 km on effort



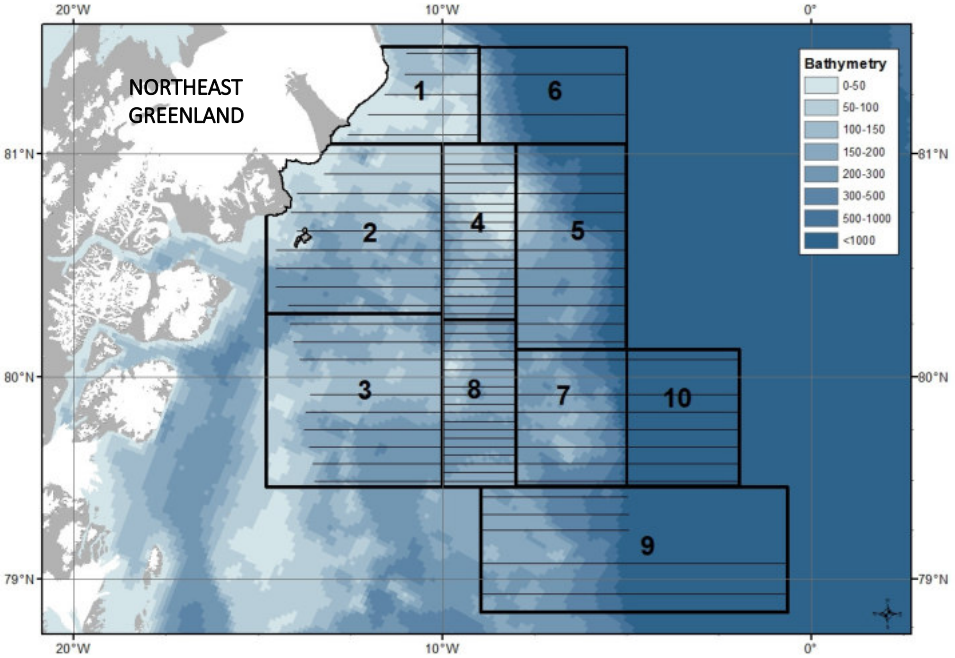
- *Water depths <100m*
  - *Walrus habitat*
  - *Ice floes for haul out*
- *Water depths 100-1000m*
  - *Occupied by cetaceans*

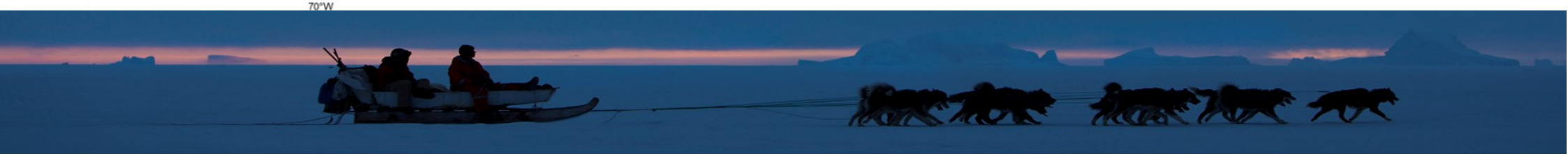
Northeast Water Polonya

Covered whole polynya

39,000 km2

~4500 km on effort





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Walrus

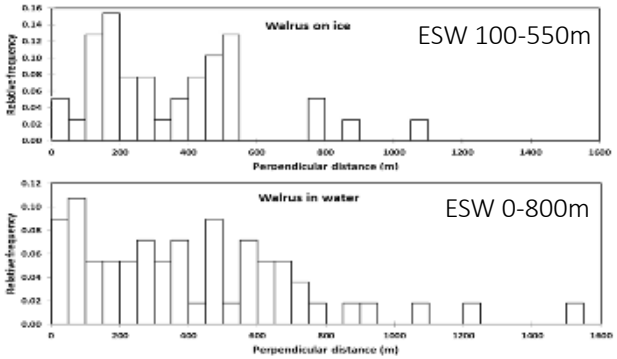
Abundance estimate

95 observations

Mark-recapture abundance estimates for walrus in water

Availability bias – spend 37%time at depths 0-2m

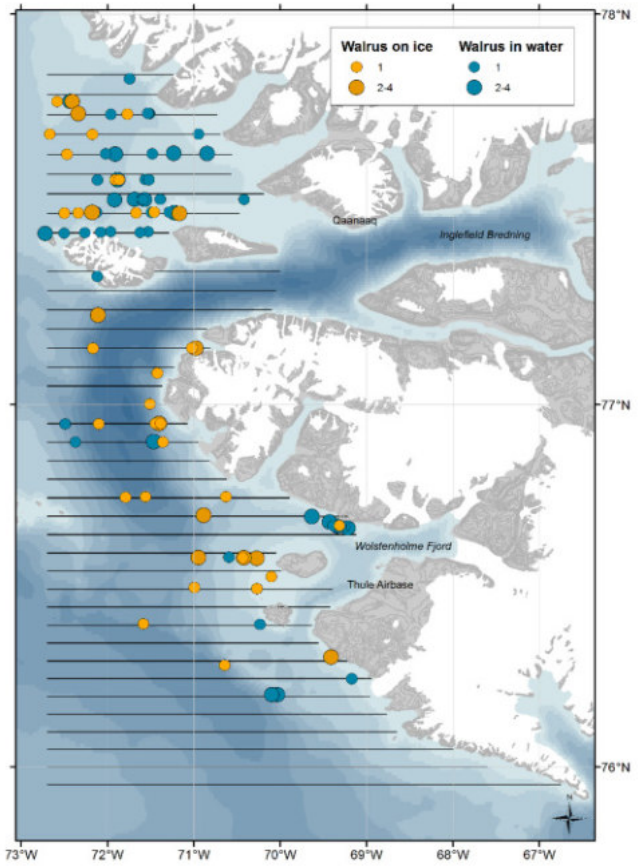
Strip census estimate for walrus on ice



604 walrus

1904 walrus

~2500 individuals in survey region



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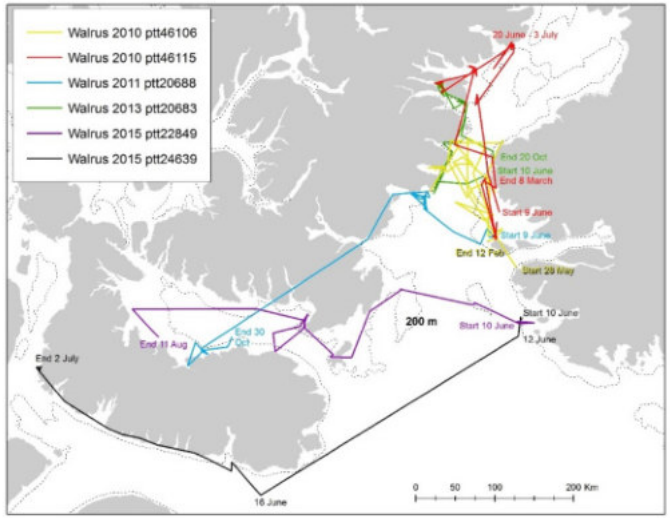
Walrus

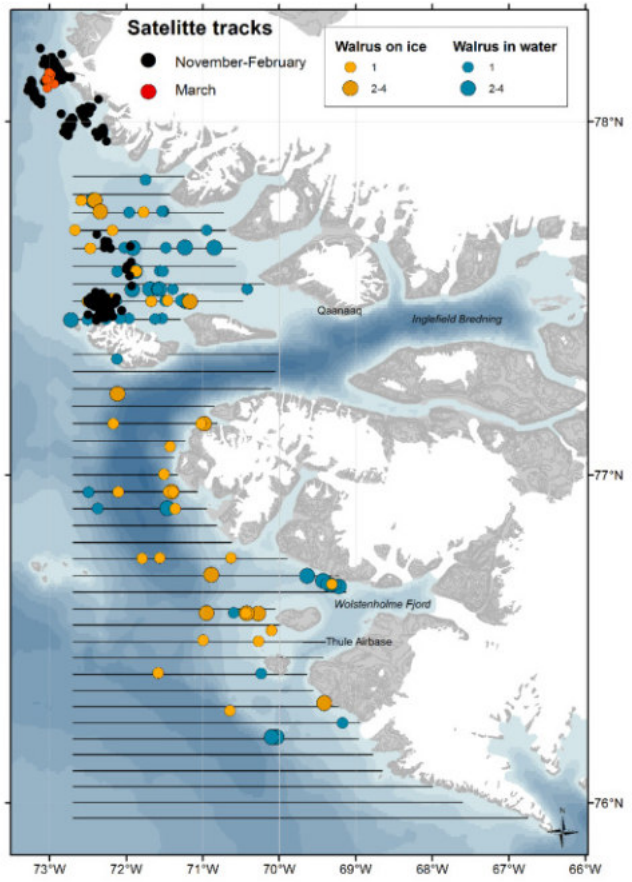
Satellite tracks

3 tagging locations in May

Walrus occupy the shallow water area close to the Greenlandic coast in winter (October-mid May)

Summer is spend in Canada





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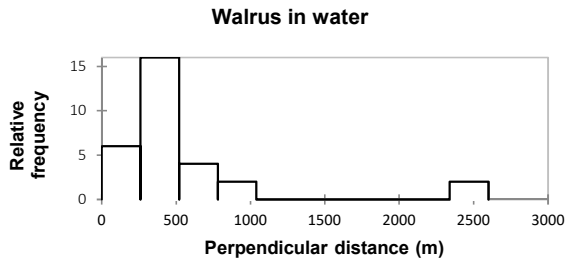
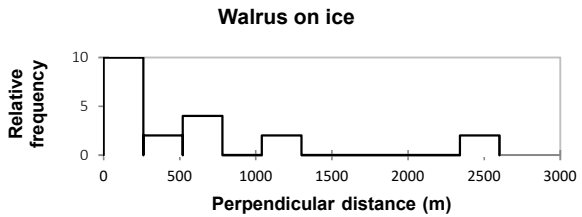
Walrus

14 observations

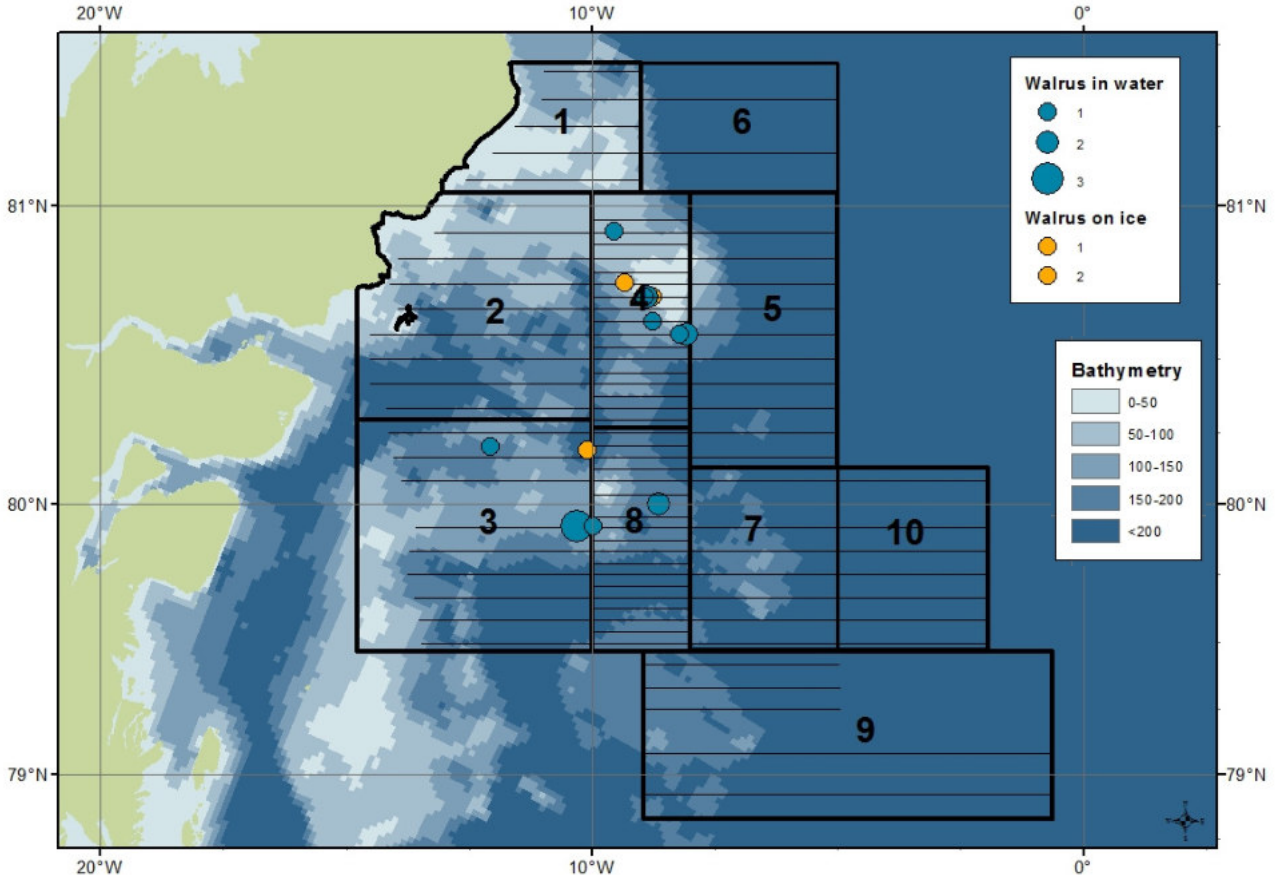
- *75% in water*





Chapman estimate from 2017 =279 animals (cv=0.34)

Estimate from 2009 ~500 animals (Born et al. 2005)



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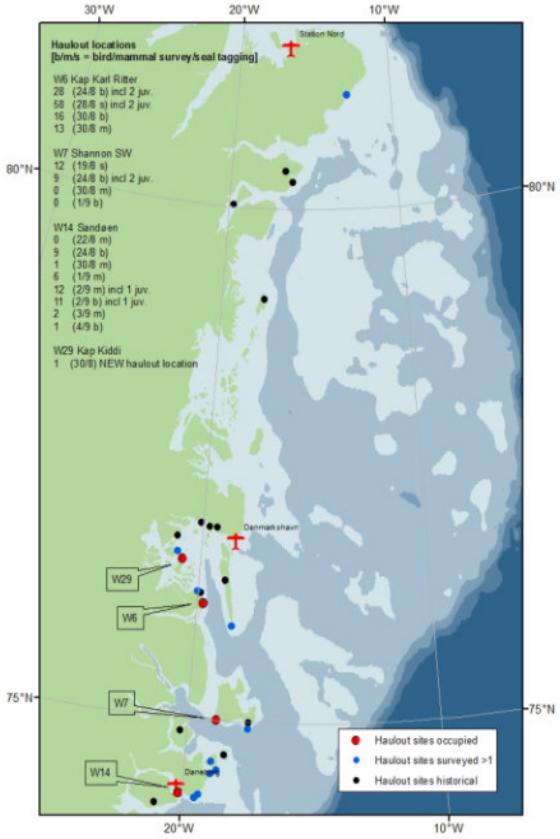
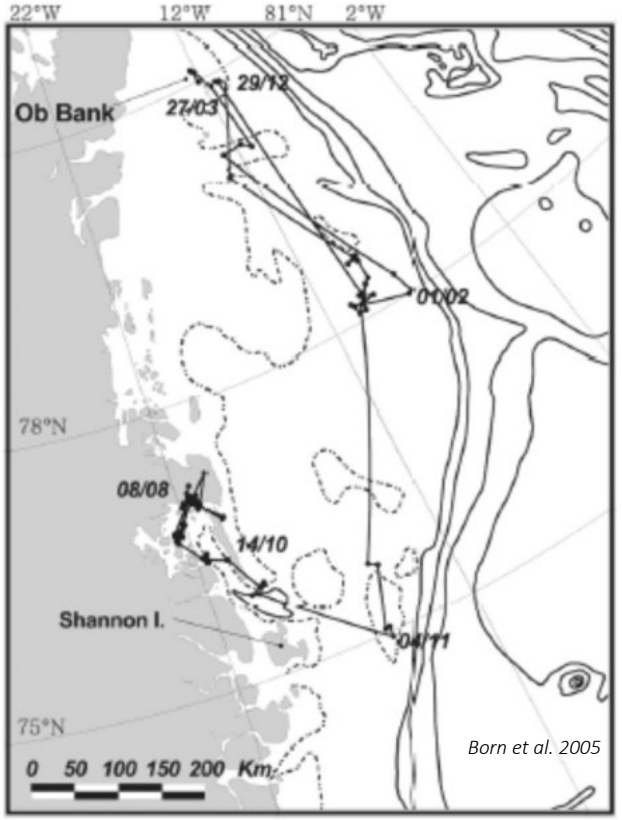
Walrus

Terrestrial summer haul outs

Satellite tagging same male in 1989, 1990, 2000, 2001





Born et al. 2005

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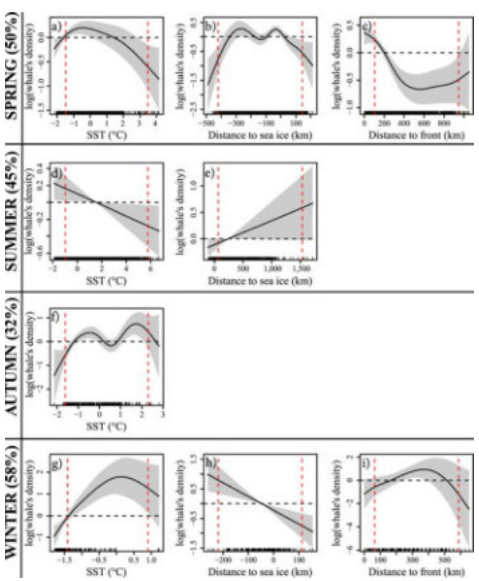
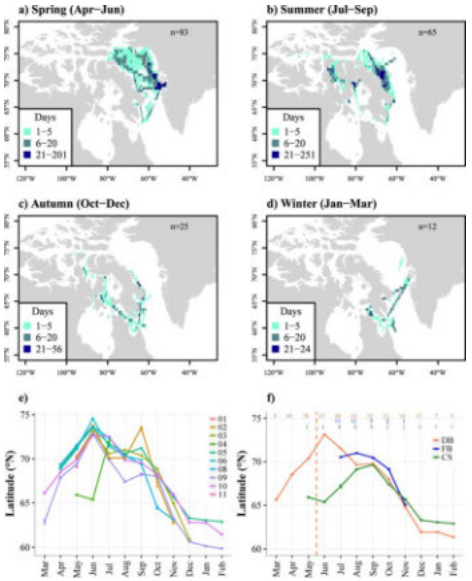
Bowhead whale

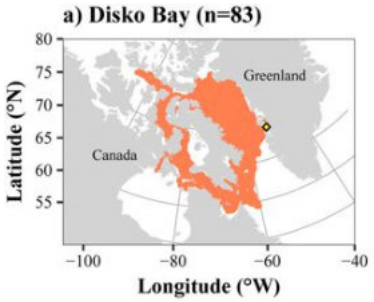
Only one observation was made during survey

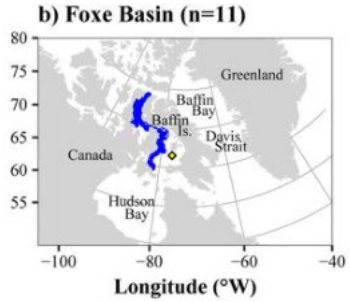
Satellite tracks show little use of NOW in winter

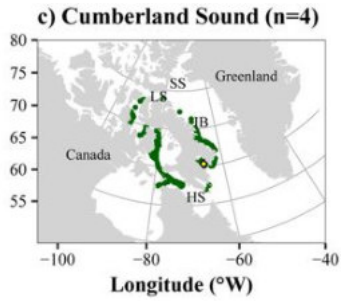
Predictive movement of bowhead whales, Chambault et al. 2018

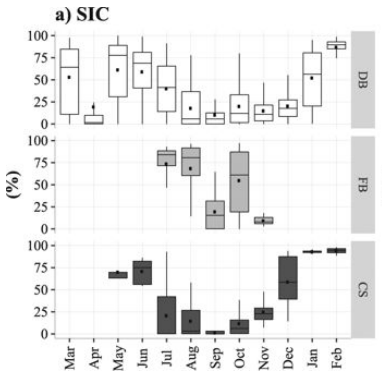


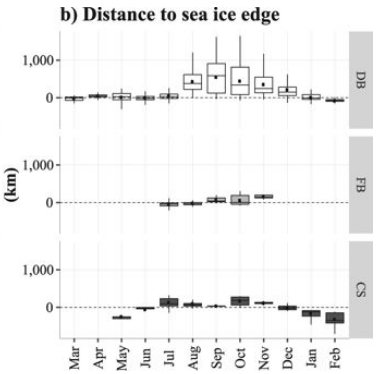












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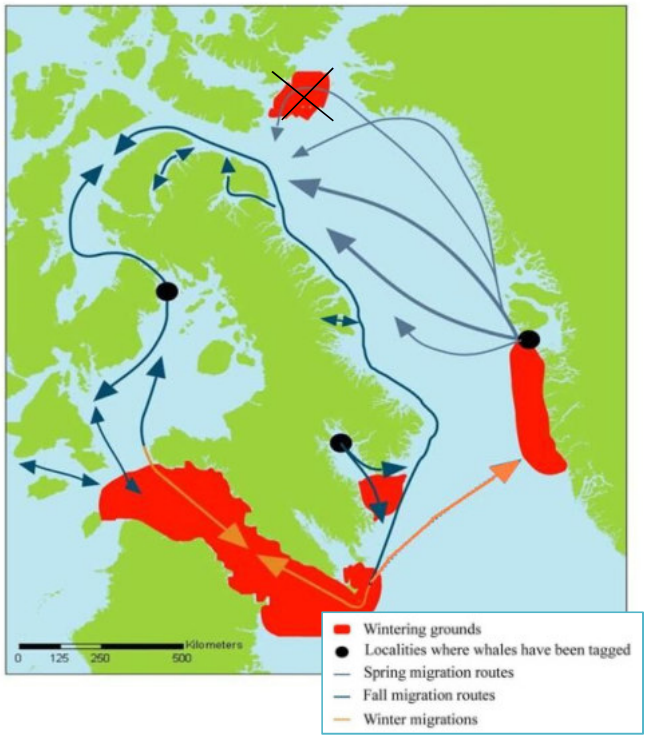
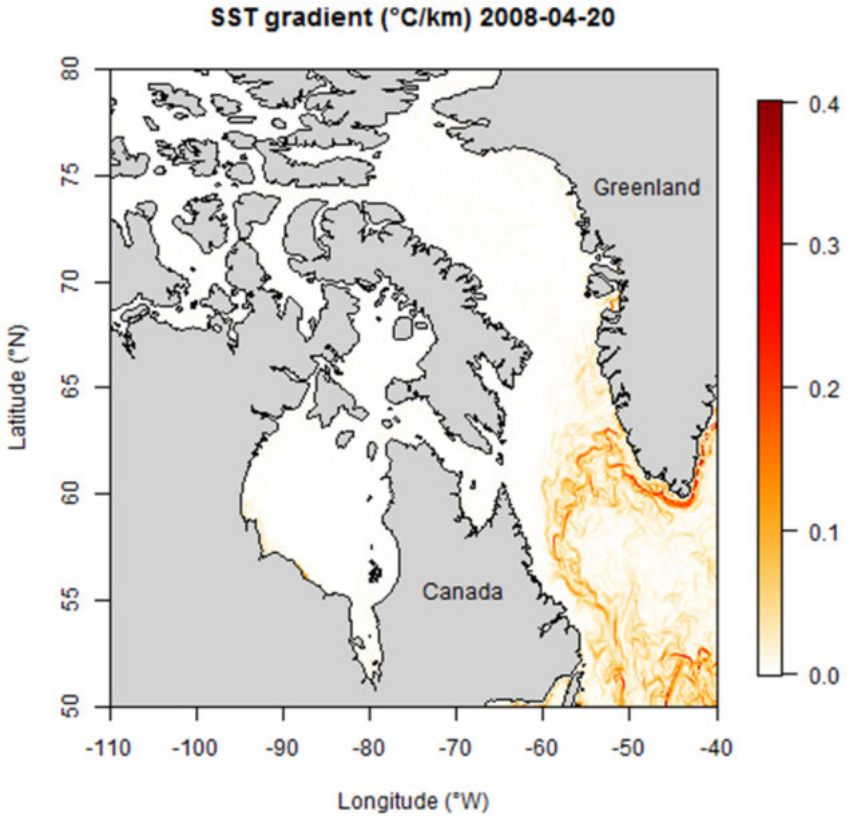
Bowhead whale





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Bowhead whale

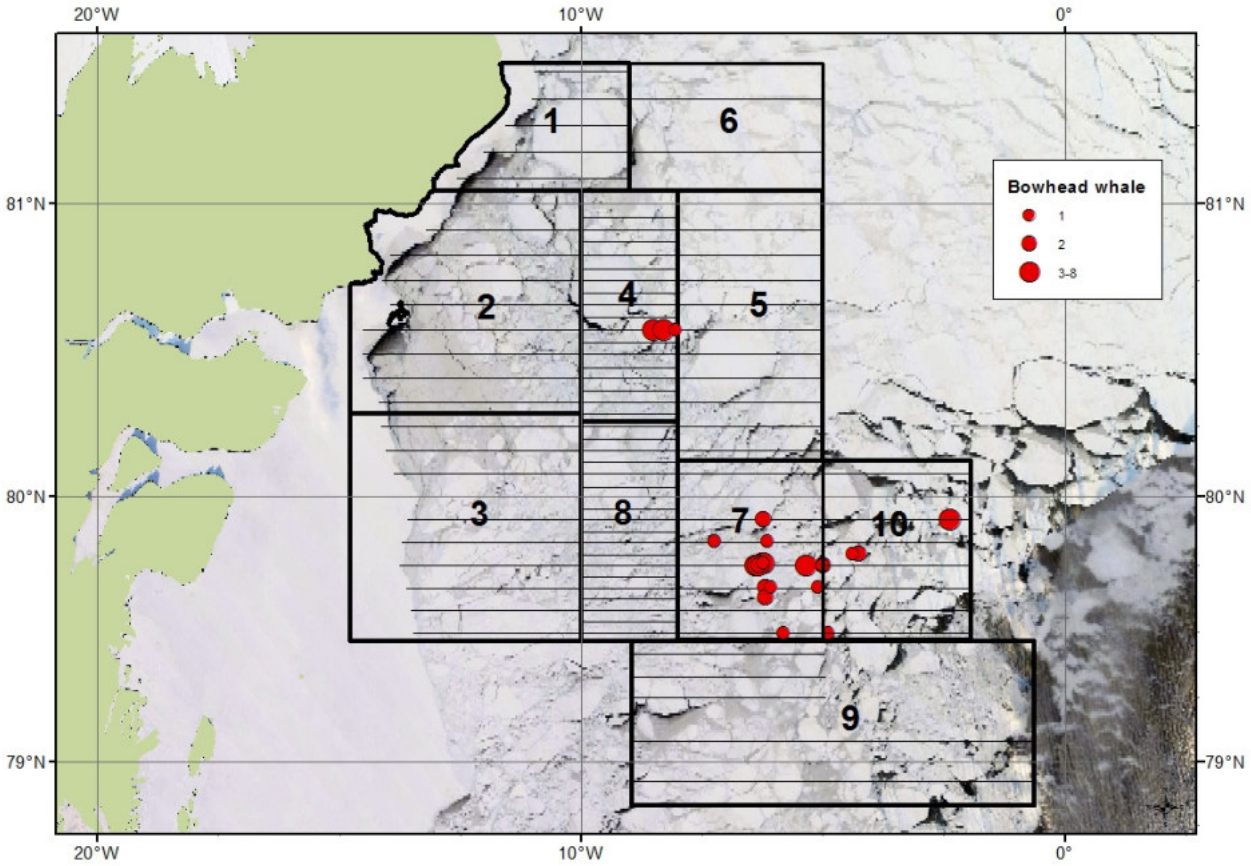
Year-round acoustic presence
25 observations
Mating activity

Chapman estimate
Corrections
· Perception bias
*· Availability bias**
· Time-in-view

N= 103 whales
N= 264 (cv=0.51);*
CI= 102-681

**Dive data from satellite-tagged whales from Disko Bay*

Abundance estimate ~100 animals (2009)*
**Boertmann et al. 2015*



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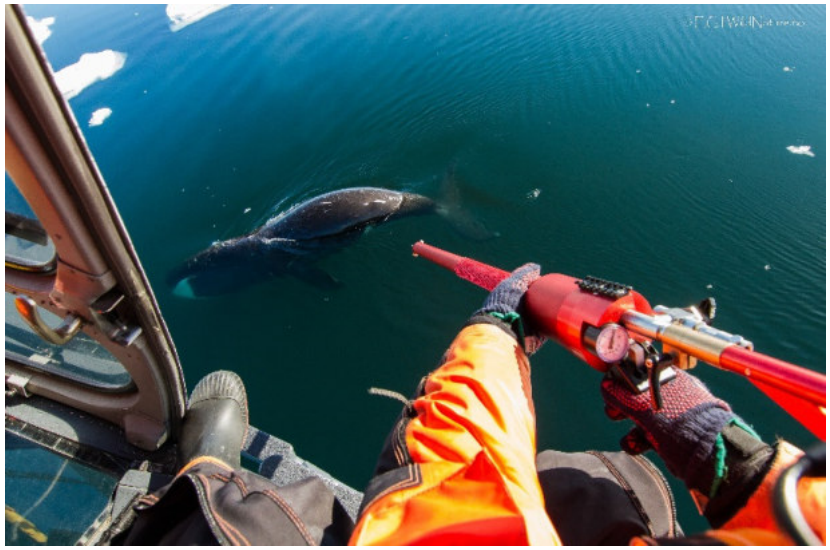
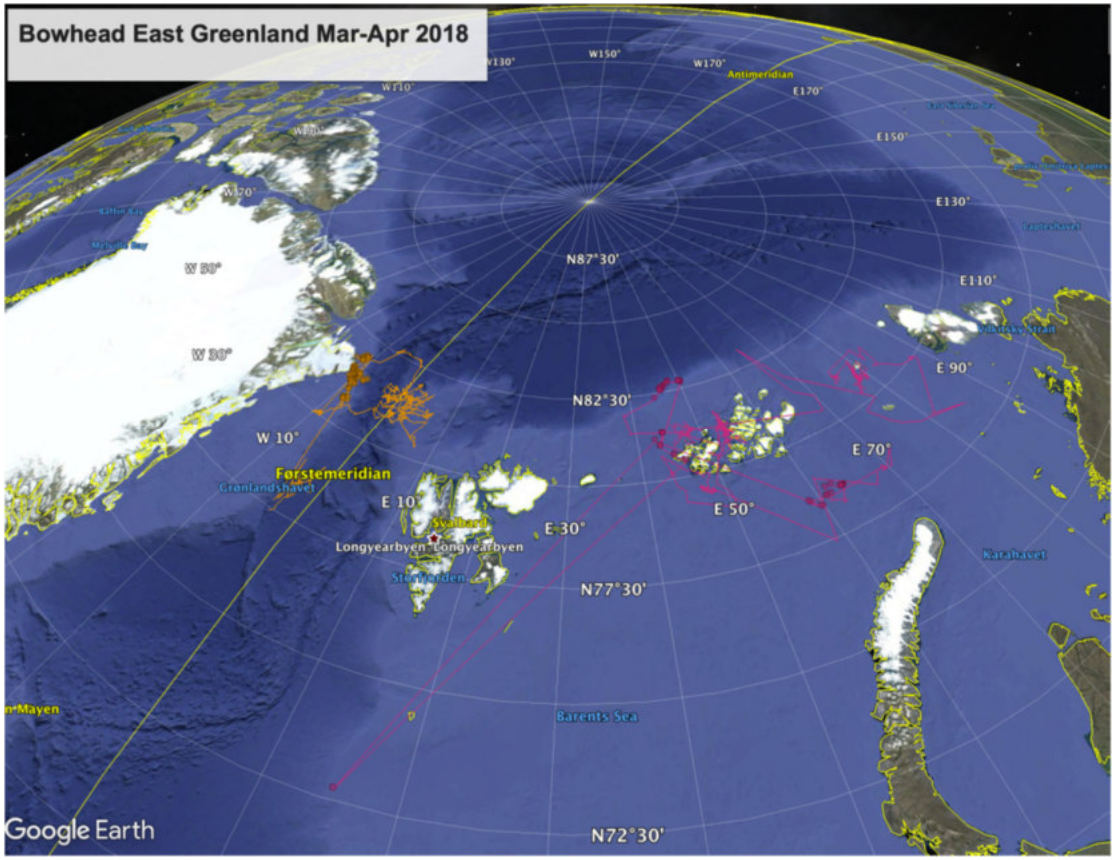
Bowhead

June 2017

16 animals tagged with satellite transmitter





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Narwhal and beluga

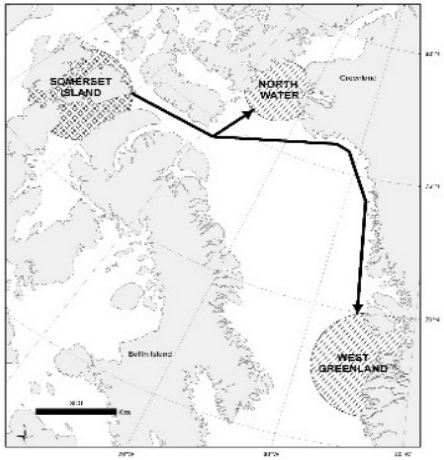
Occupy waters at depths 100-1000m

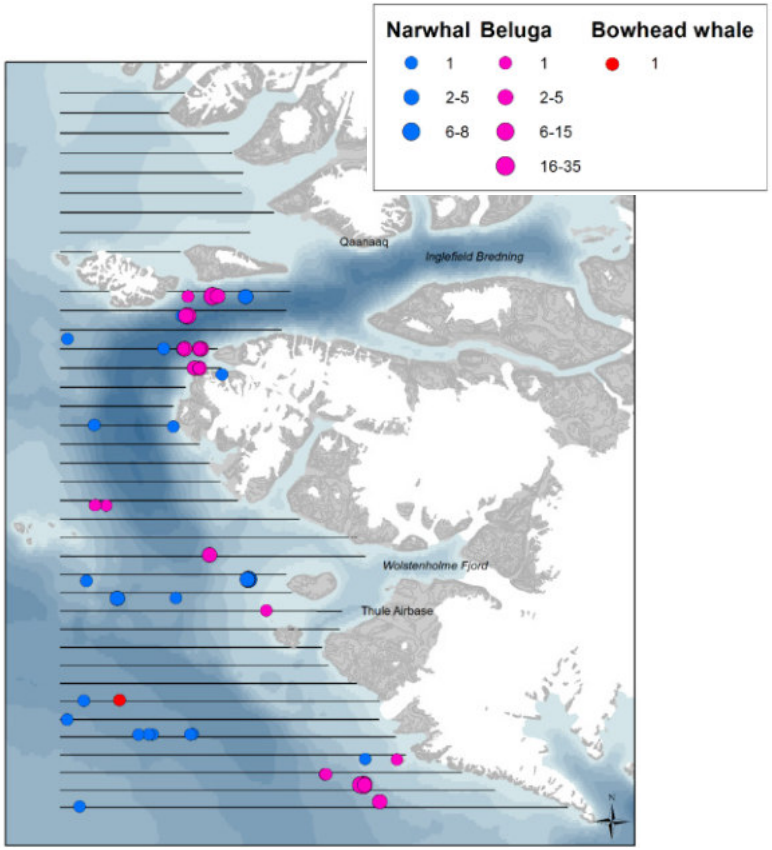
Abundant numbers in a small area

Narwhals

- *Deeper waters*
- *Possibly feed on halibut and polar cod*

Beluga





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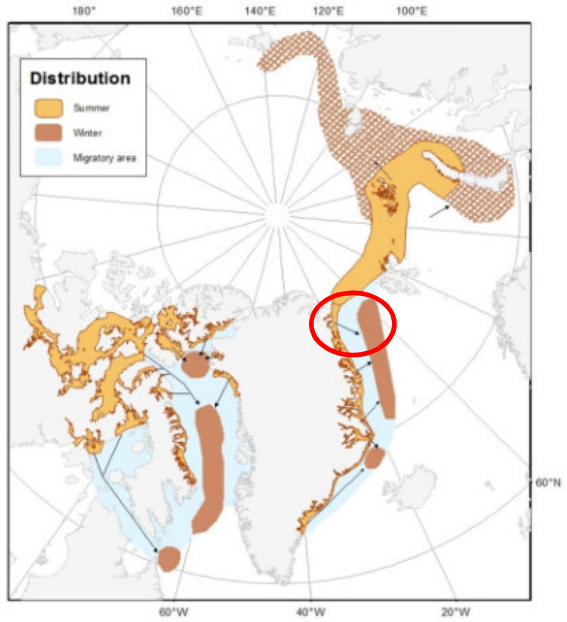
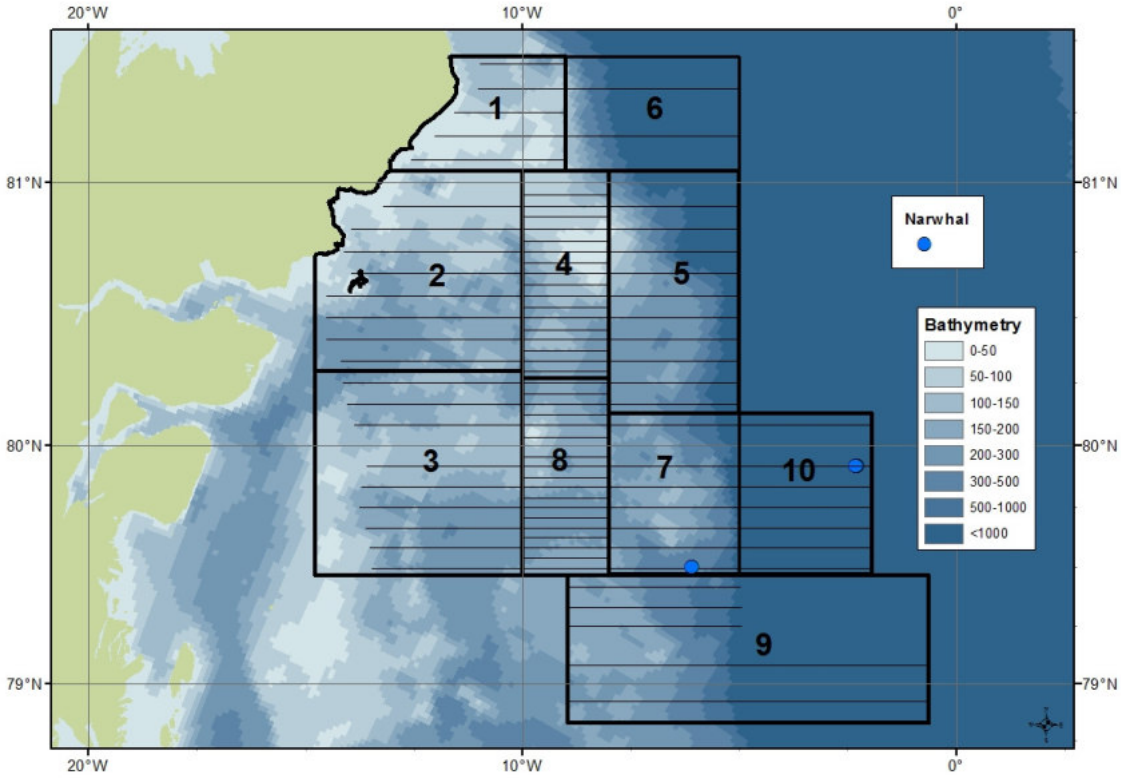
Narwhal

2 observations of narwhal

- *Where do narwhals winter?*





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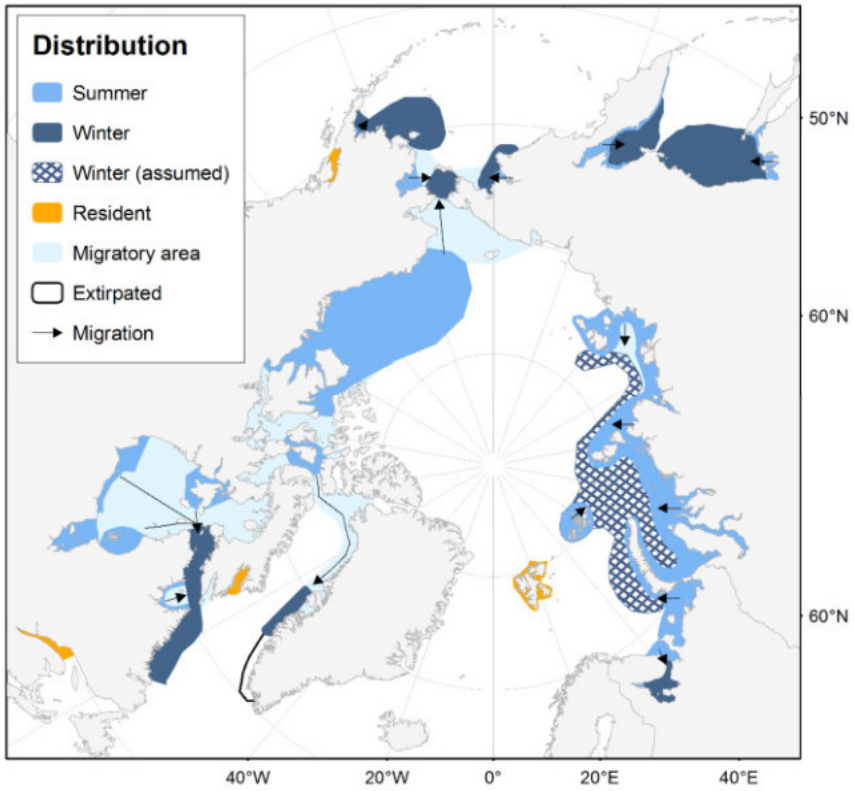
Beluga

No belugas

- *Separate stock around Svalbard*



Comparison

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	NOW	NEW
Polynya	Stable	Variable
Productivity	**High**	Low
Stratum area	16,000 km2	39,000 km2
Transects on effort	1400 km	4500 km
Walrus	**2500**	500 -> 300
Bowhead whale	Few	**260**
Narwhal	**3000**	Few
Beluga	**2300**	No

The NEW survey was funded by EAMRA (Greenland Government)