



Ecosystem survey 2019 R/V Johan Hjort

Report generated by: Johanna Fall

17/09/2020

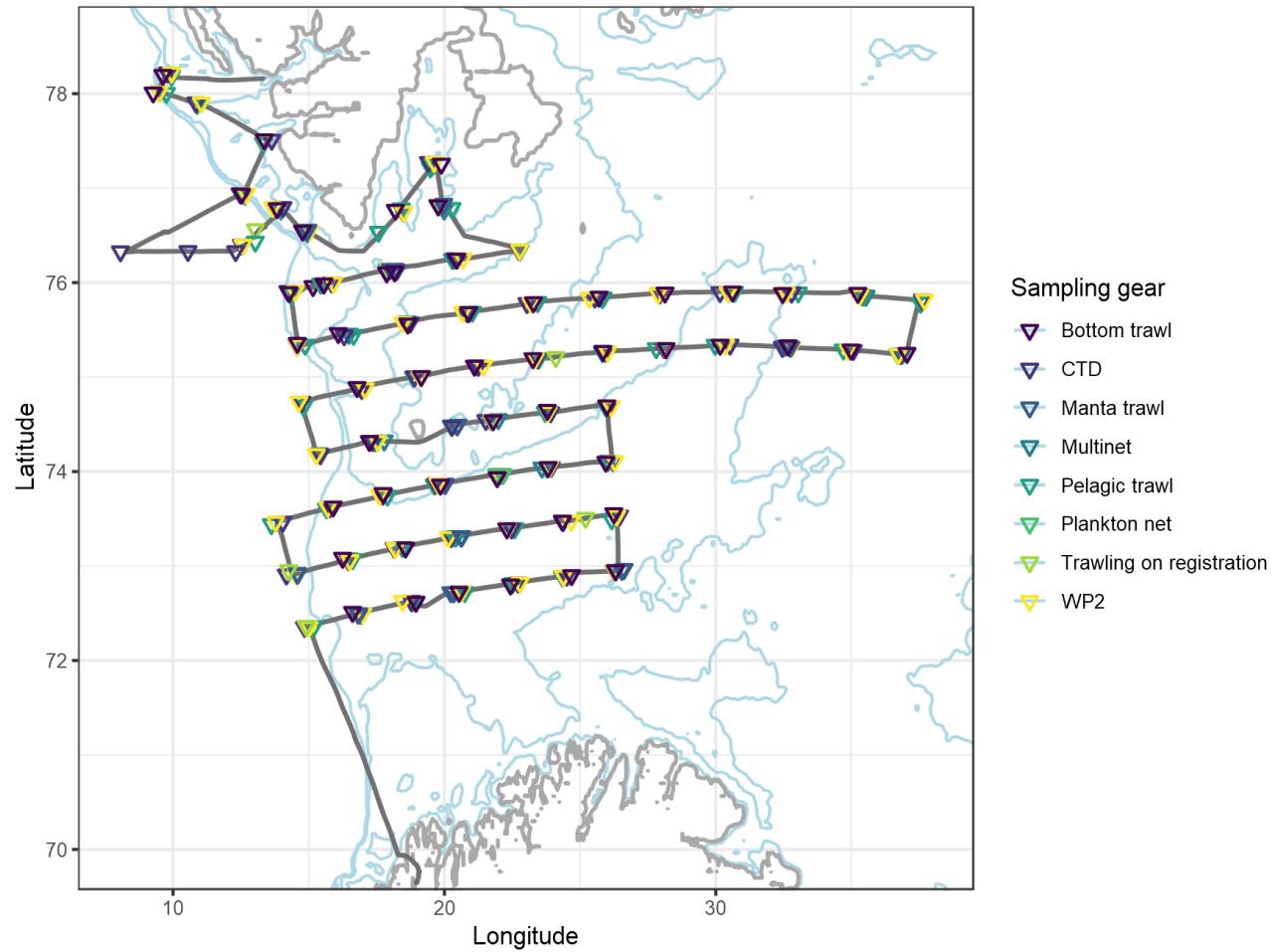
Contents

Cruise tracks and stations	3
Sampling depth for trawl hauls	4
Mean bottom depth during trawl hauls	4
Mean fishing depth during trawl hauls (excluding pelagic hauls)	5
Catch rates - biomass and number per nautical mile trawled for species registered in Sea2Data	6
Species diversity	6
Number of species identified versus the number of stations sampled	6
Average catch rate by species for the 20 species with highest catch rates	7
Bottom trawl	7
Pelagic trawl	8
Spatial variation in catches of common species	9
Length distributions	13
Length-weight relationships	16
Length-age relationships	18
Acoustic registrations	19
Example echograms	20

Depth-integrated acoustic backscatter	20
Total backscatter	20
Pelagic species	21
Demersal species	22
Acoustic backscatter in depth channels	23
Distance from the surface to weighted depth of acoustic registrations	23
Distance from the seafloor (or max scrutinized depth) to weighted depth of acoustic registrations	25
CTD	27
Summary of measurements	27
Variation in temperature and salinity with bathymetry and geographical location	28
Density in the water column	29
Light in the water column	30
Whales	31
Positions of sightings by species	31
Number of individuals	32
Seabirds (non ship followers)	33
Summary of observations	33
Spatial distribution of observations	34

Cruise tracks and stations

Cruise tracks from the position log with points indicating start positions for different sampling gear. The points are jittered slightly for better visual representation:



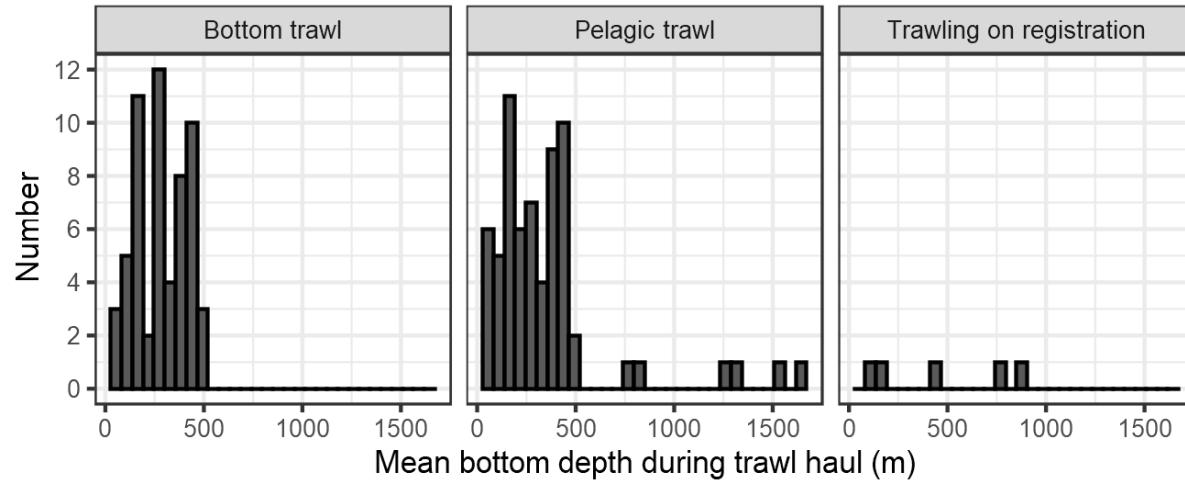
```
## Warning: The `i` argument of ``[<-`()` can't be a matrix as of tibble 3.0.0.  
## Convert to a vector.  
## This warning is displayed once every 8 hours.  
## Call `lifecycle::last_warnings()` to see where this warning was generated.
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Sampling depth for trawl hauls

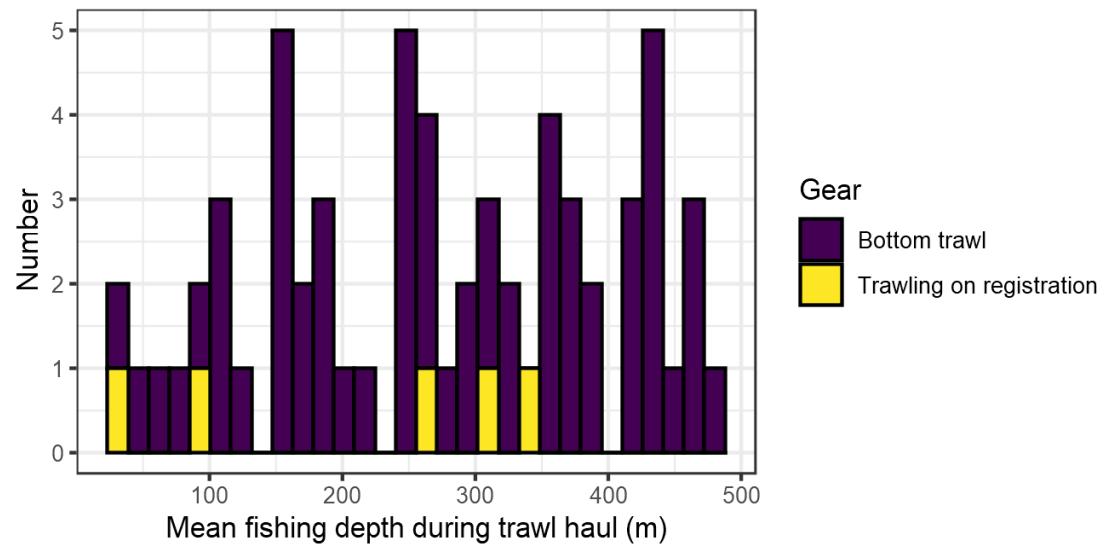
128 trawl hauls were taken during the survey, of which 58 were bottom trawl, 66 pelagic trawl, and 5 were trawling on registration. The trawl hauls covered a total distance of 323.3 km (174.6 nmi).

The sampling stations were located in areas with bottom depths from 43.3 m to 1633.3 m, and the fishing depth varied from 10 m to 473.3 m.

Mean bottom depth during trawl hauls



Mean fishing depth during trawl hauls (excluding pelagic hauls)

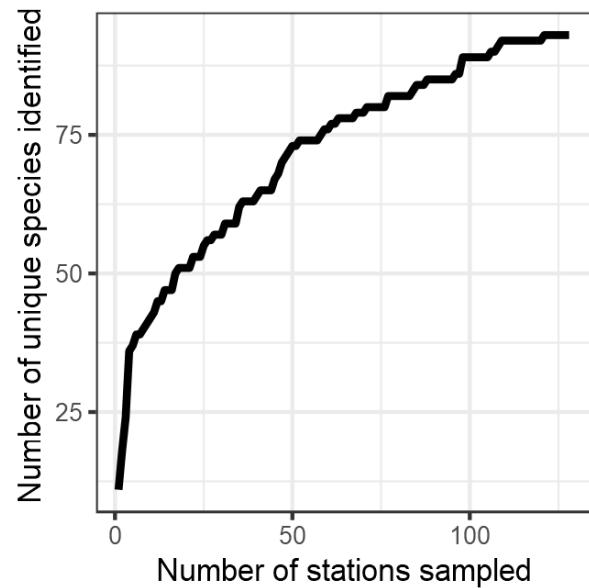


Catch rates - biomass and number per nautical mile trawled for species registered in Sea2Data

Species diversity

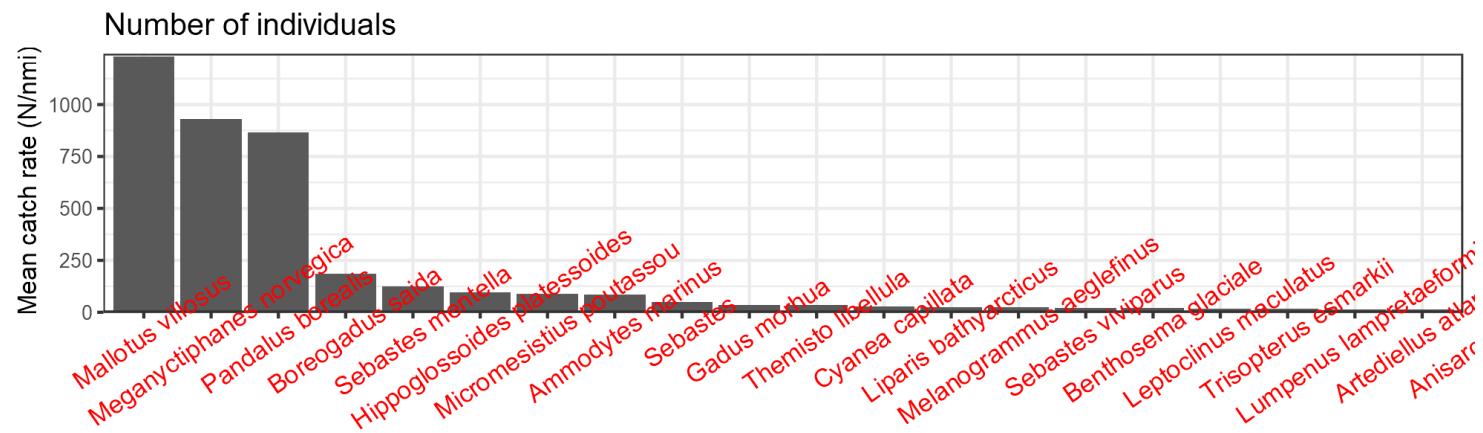
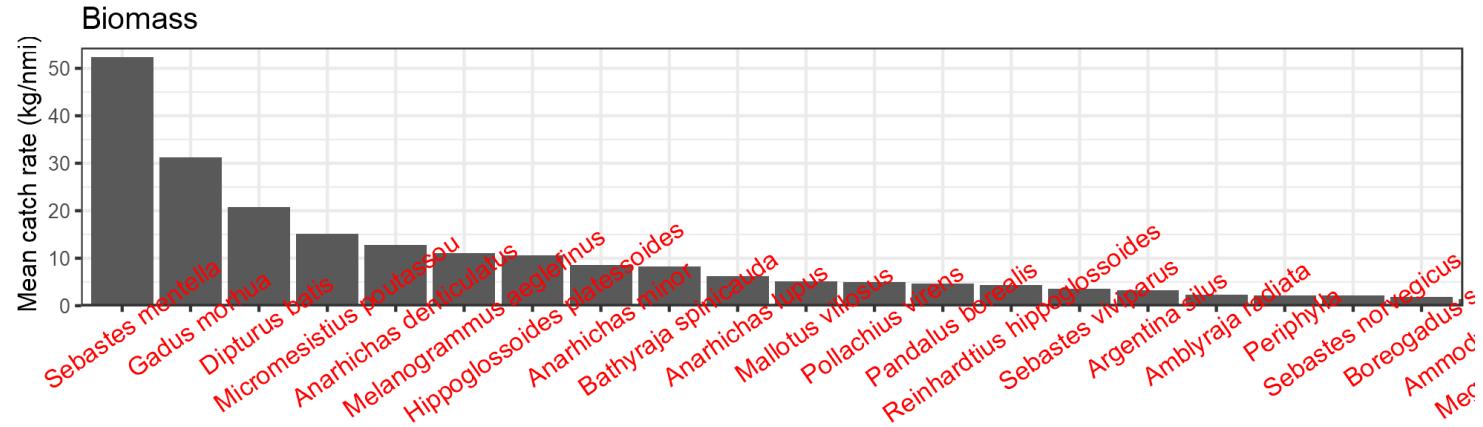
A total of 93 species were registered in Sea2Data during the survey.

Number of species identified versus the number of stations sampled

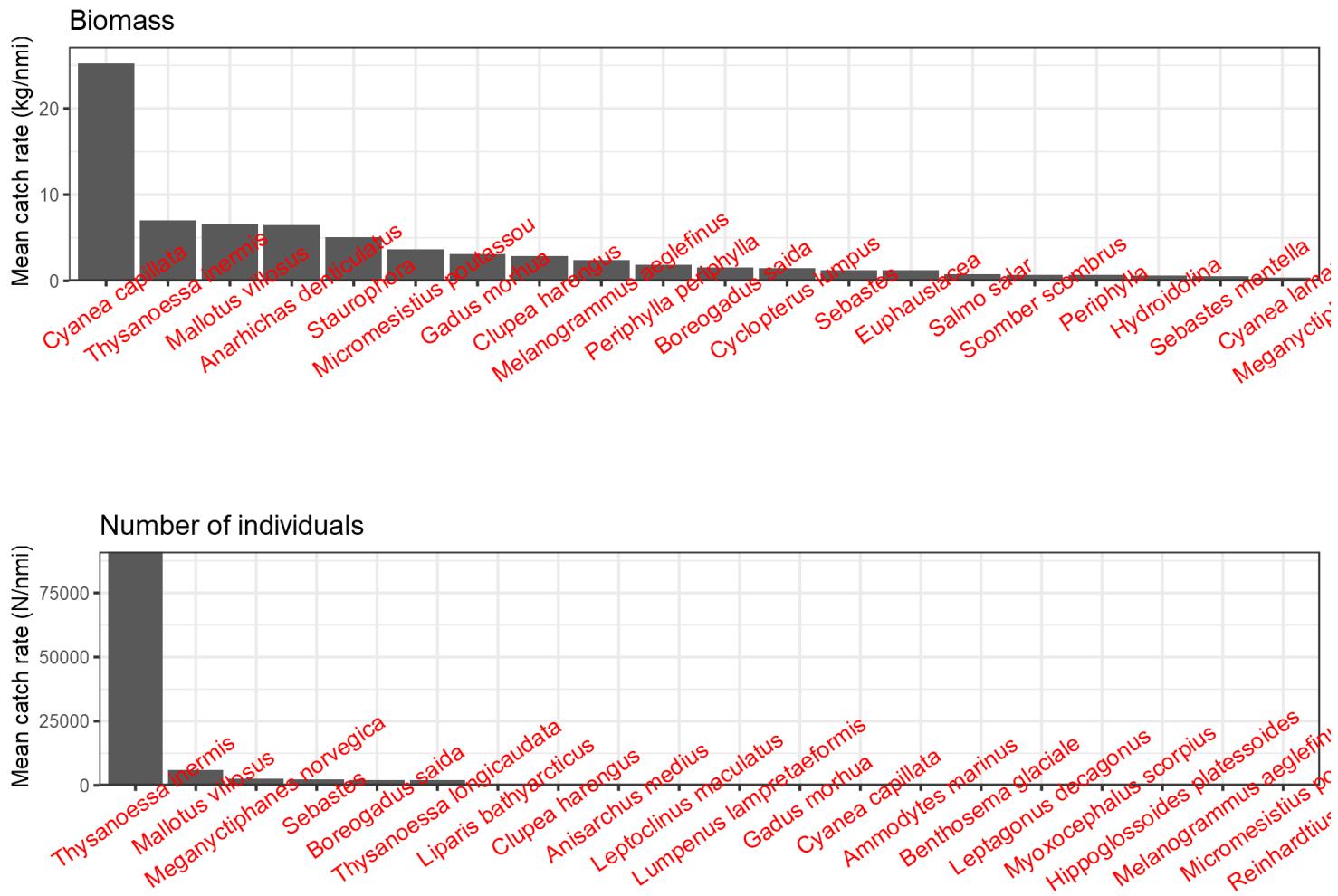


Average catch rate by species for the 20 species with highest catch rates

Bottom trawl

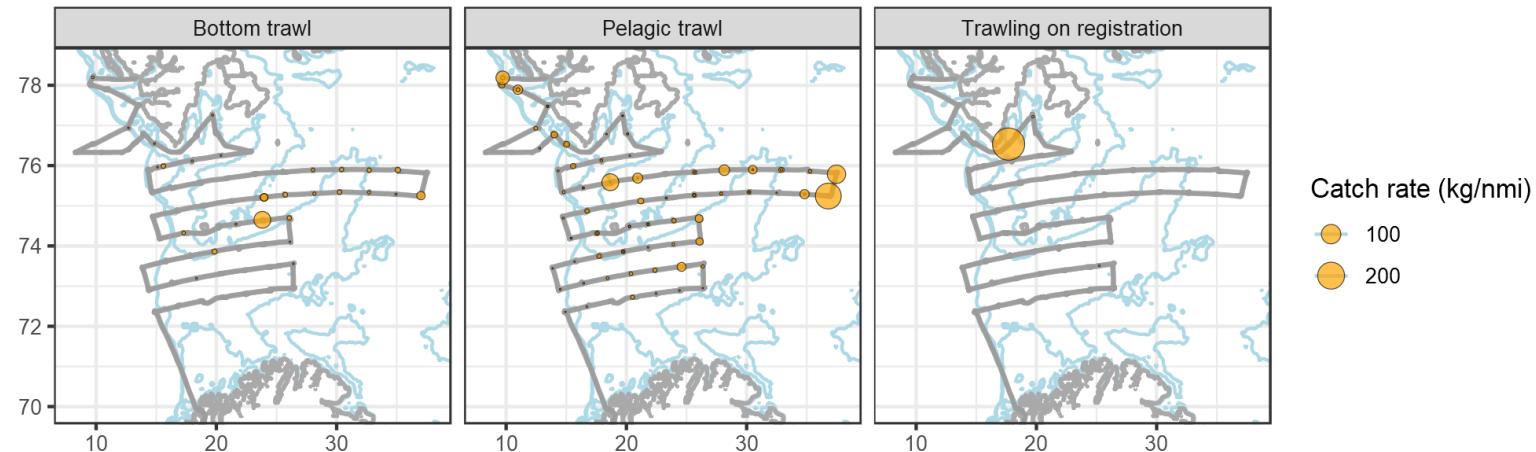


Pelagic trawl

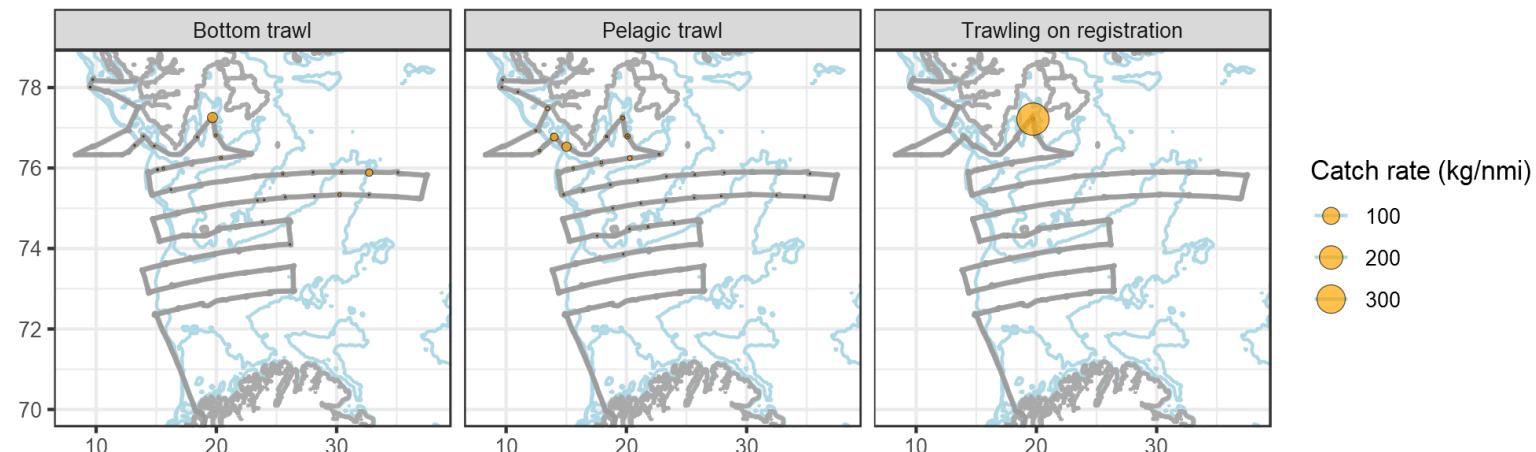


Spatial variation in catches of common species

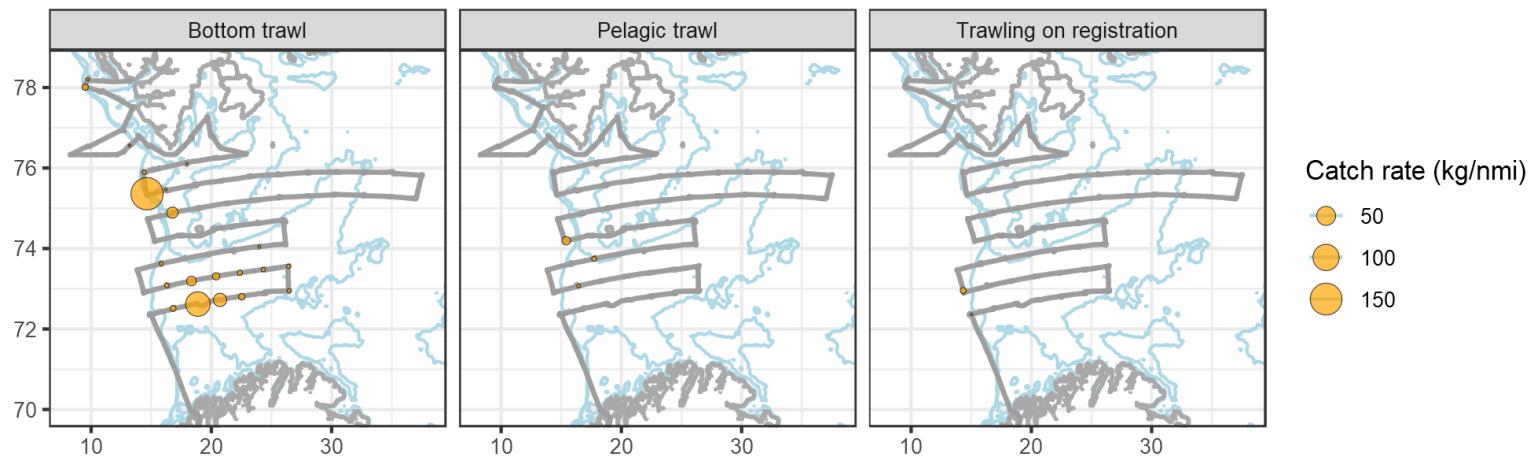
Catch rate (biomass) | 2020 | *Mallotus villosus*



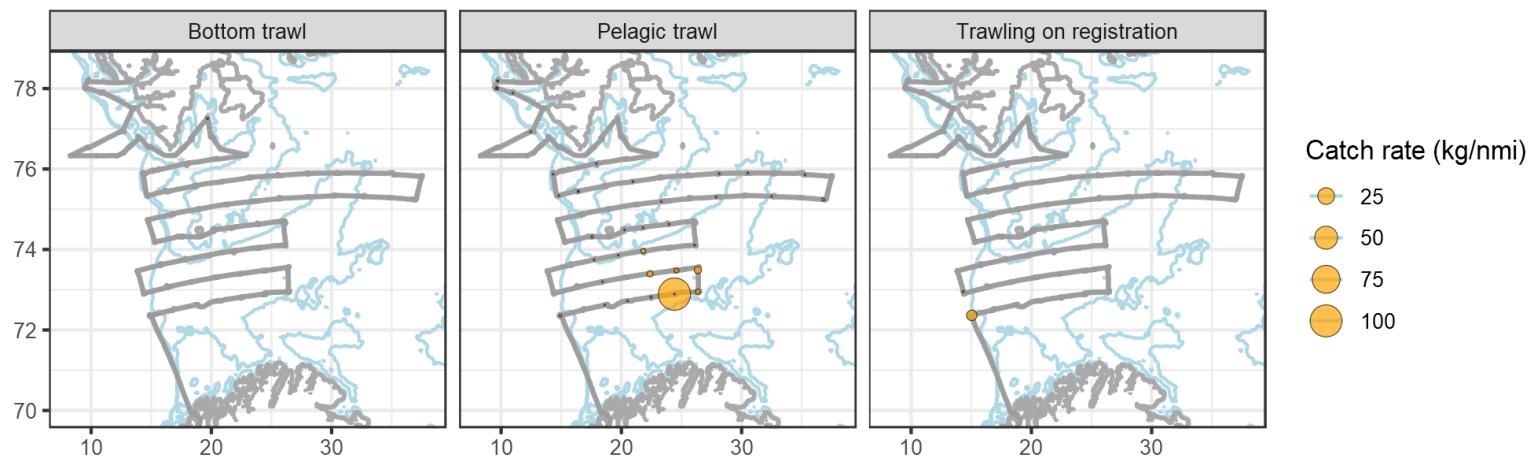
Catch rate (biomass) | 2020 | *Boreogadus saida*



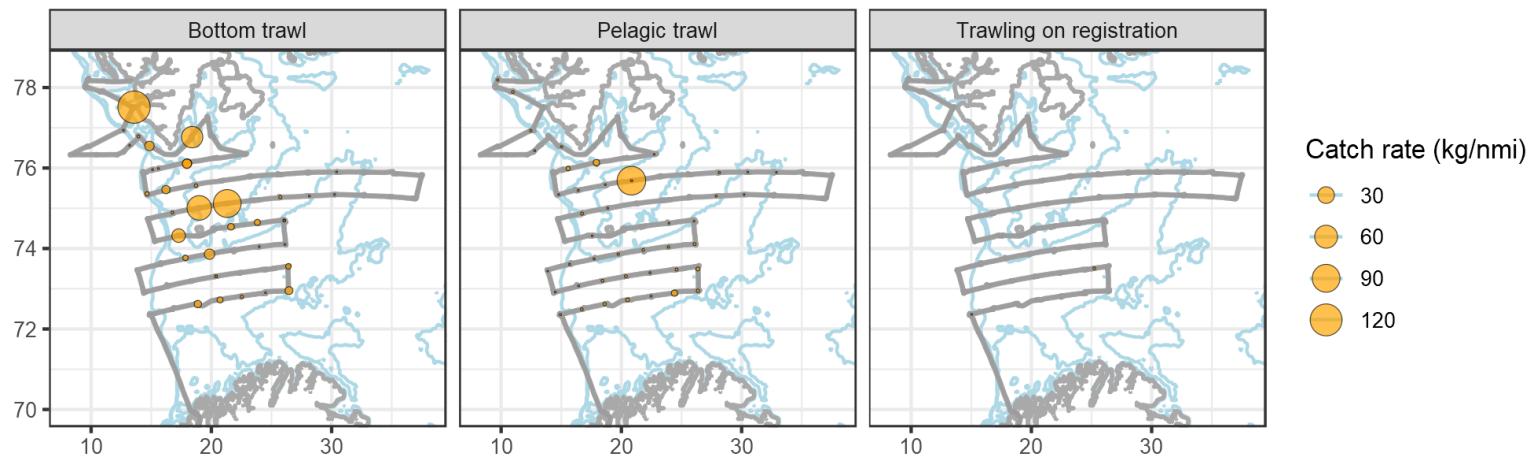
Catch rate (biomass) | 2020 | *Micromesistius poutassou*



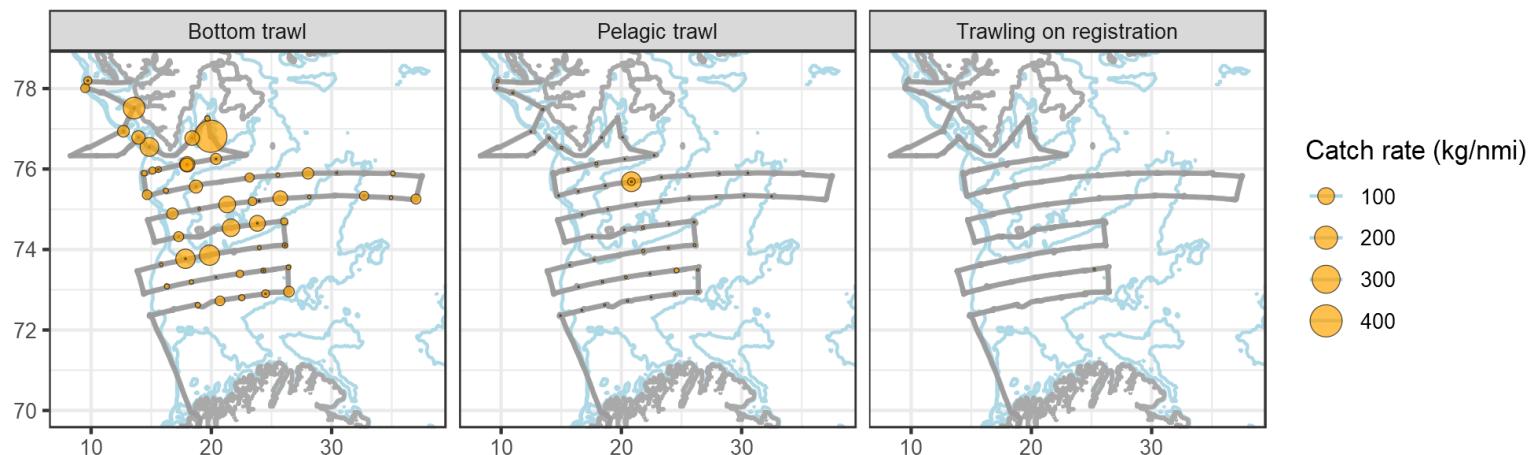
Catch rate (biomass) | 2020 | *Clupea harengus*



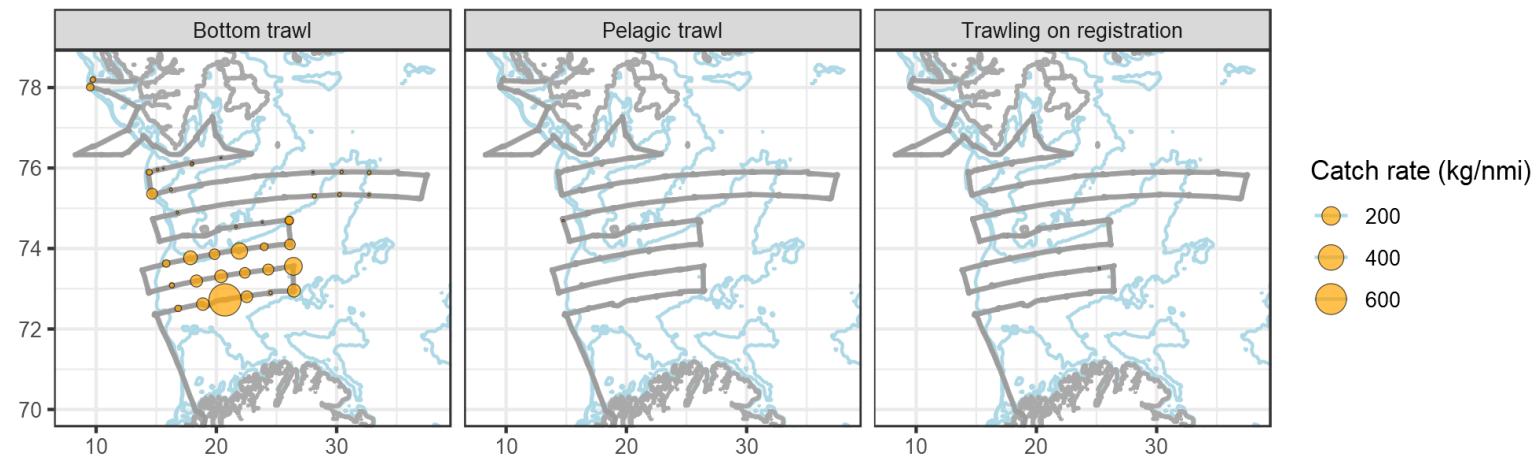
Catch rate (biomass) | 2020 | *Melanogrammus aeglefinus*



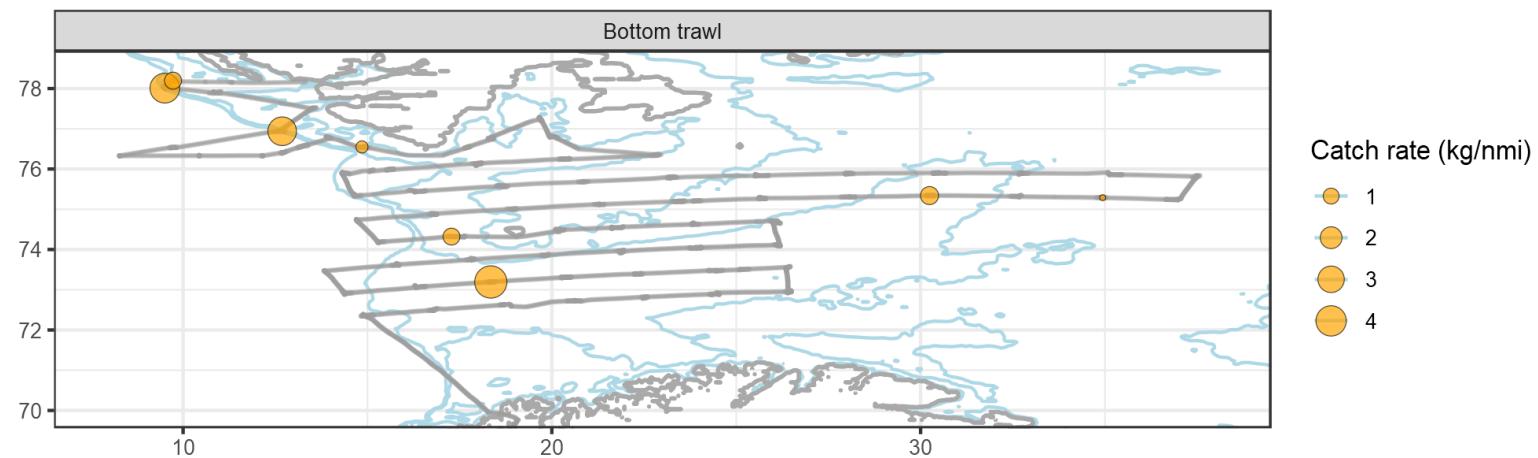
Catch rate (biomass) | 2020 | *Gadus morhua*



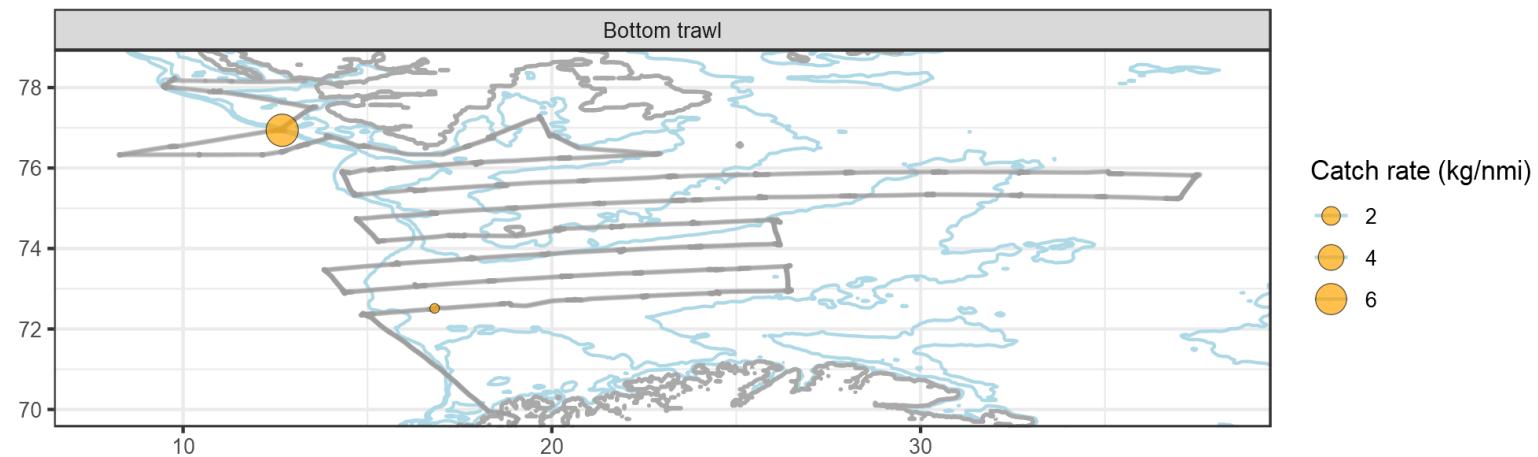
Catch rate (biomass) | 2020 | *Sebastes mentella*



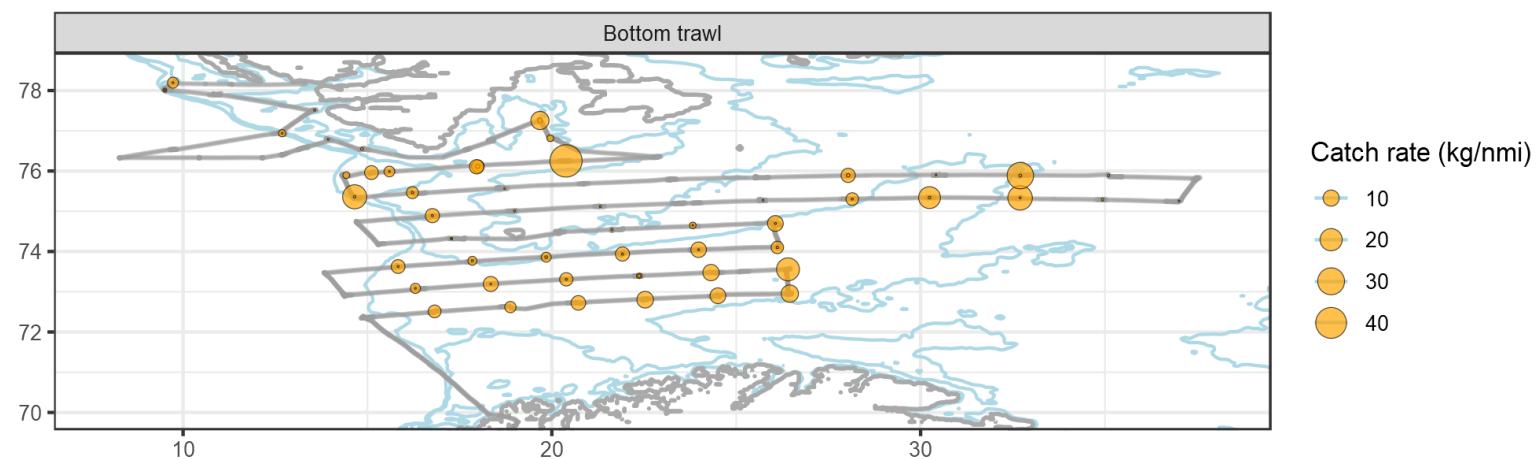
Catch rate (biomass) | 2020 | *Sebastes norvegicus*



Catch rate (biomass) | 2020 | *Sebastes viviparus*



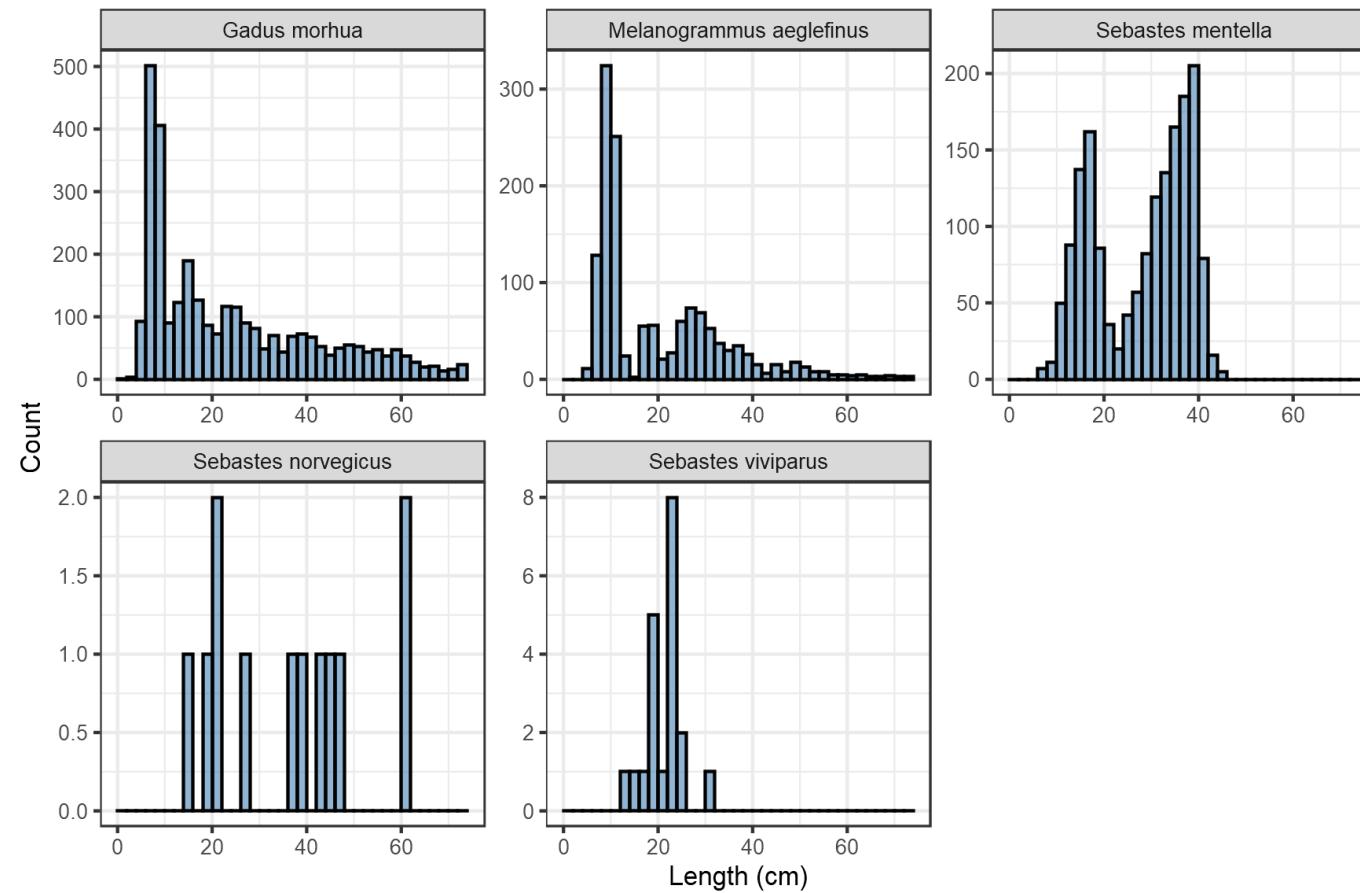
Catch rate (biomass) | 2020 | *Pandalus borealis*



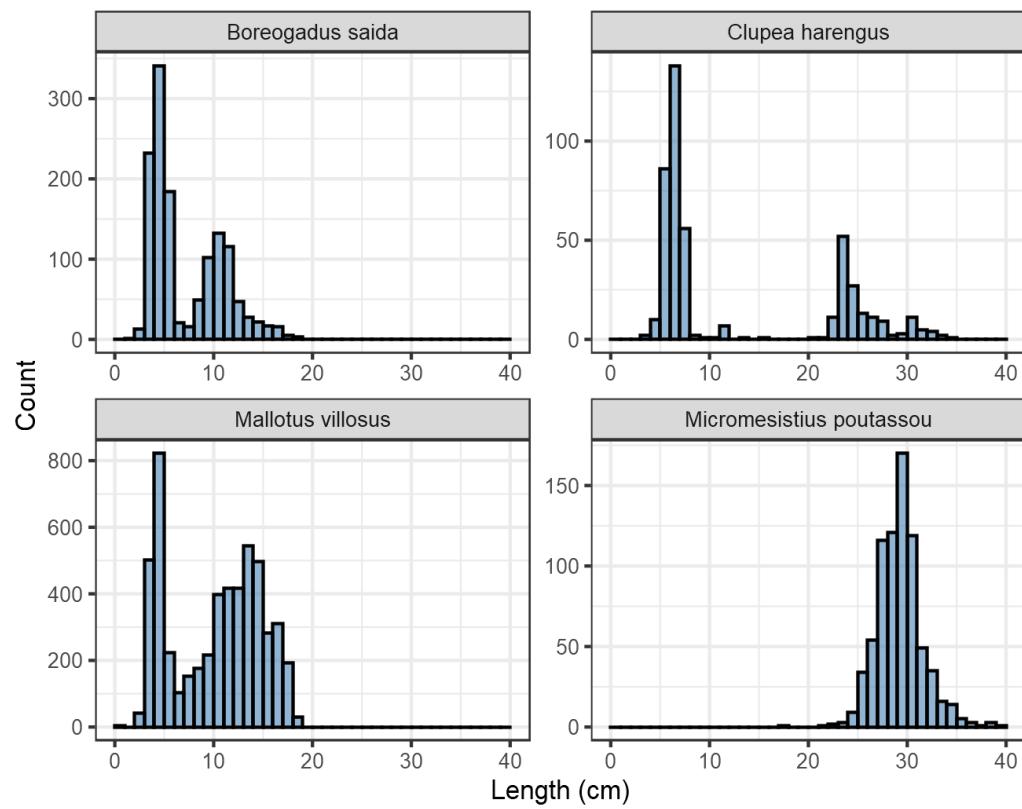
Length distributions

The following figures shows the length distribution of individuals sampled during the survey.

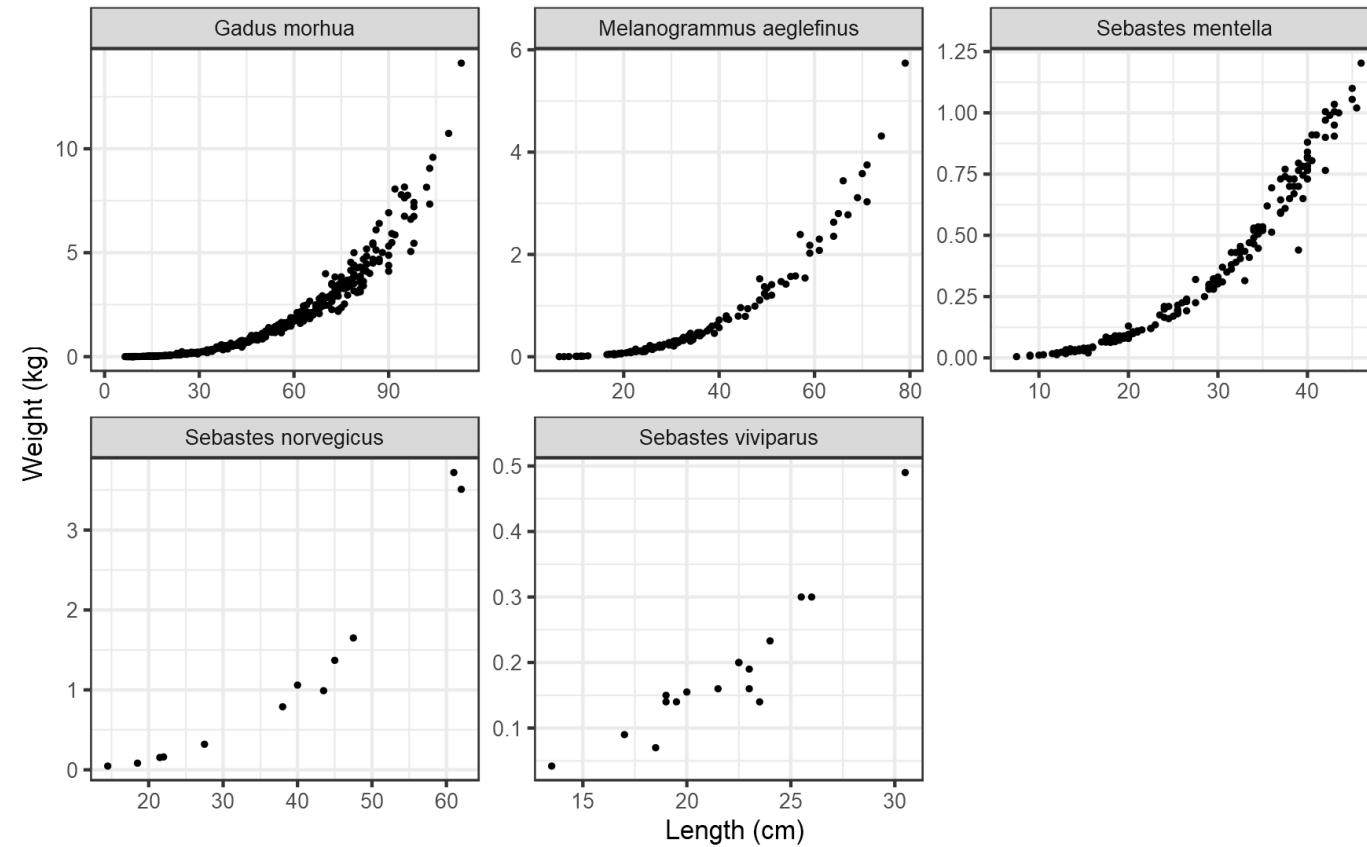
Histogram of length

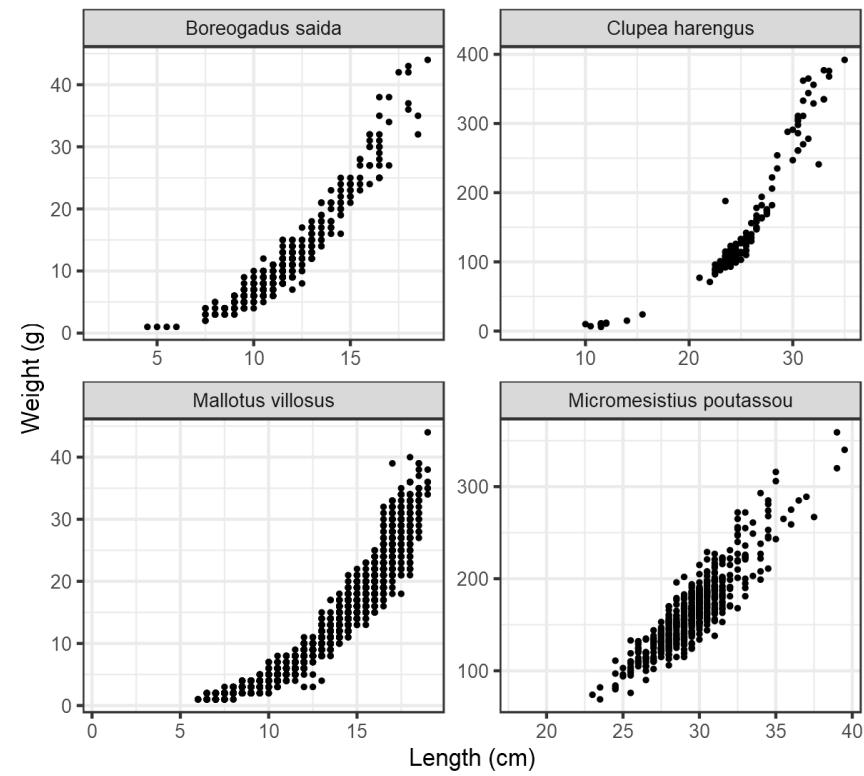


Histogram of length

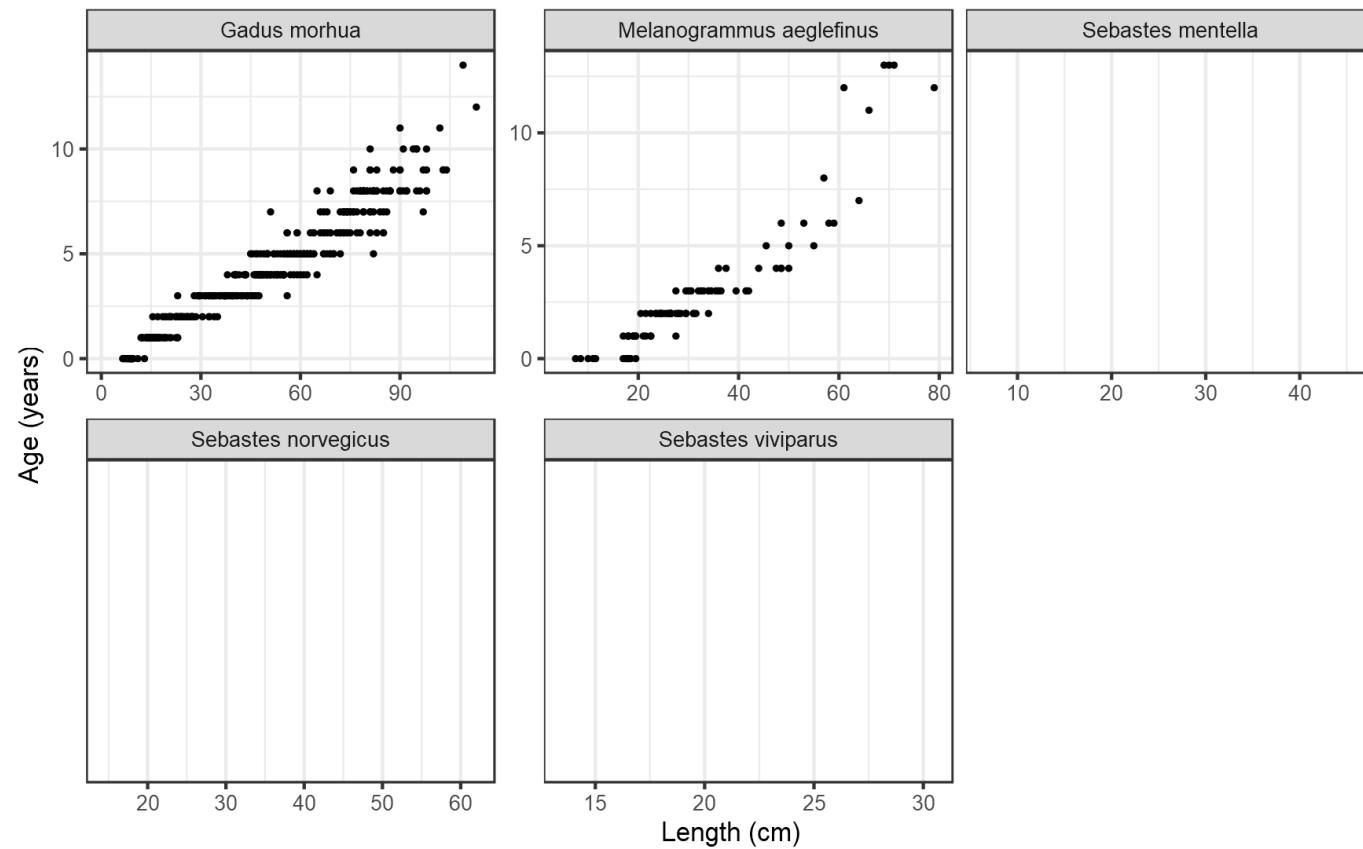


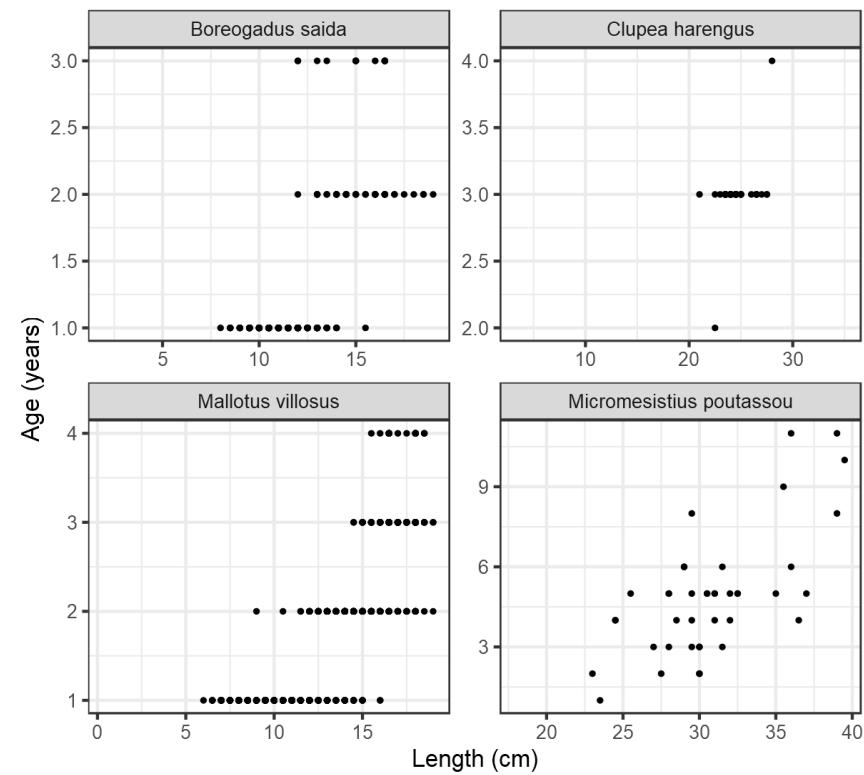
Length-weight relationships





Length-age relationships





Acoustic registrations

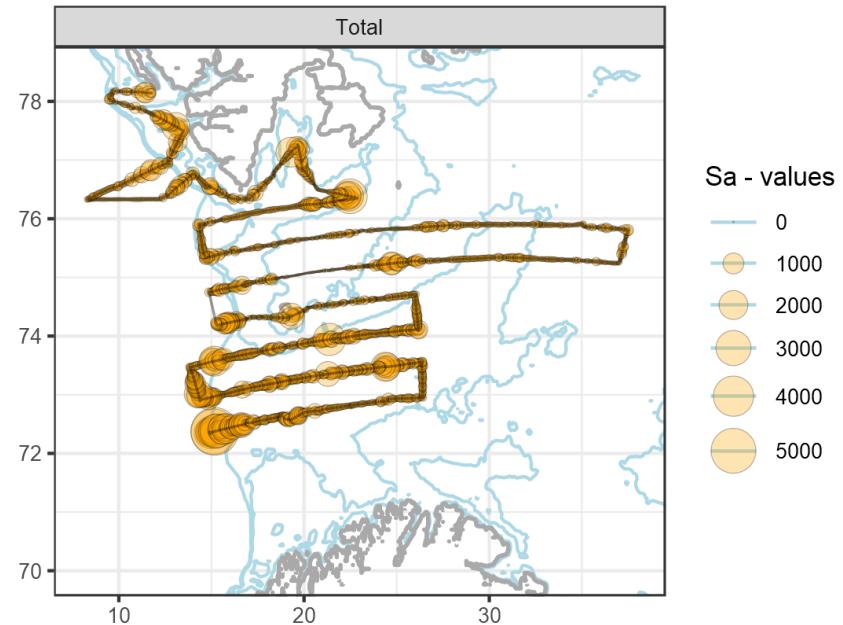
A total of 4365.164 km (2357 nmi) of acoustic transects were scrutinized.

Example echograms

Depth-integrated acoustic backscatter

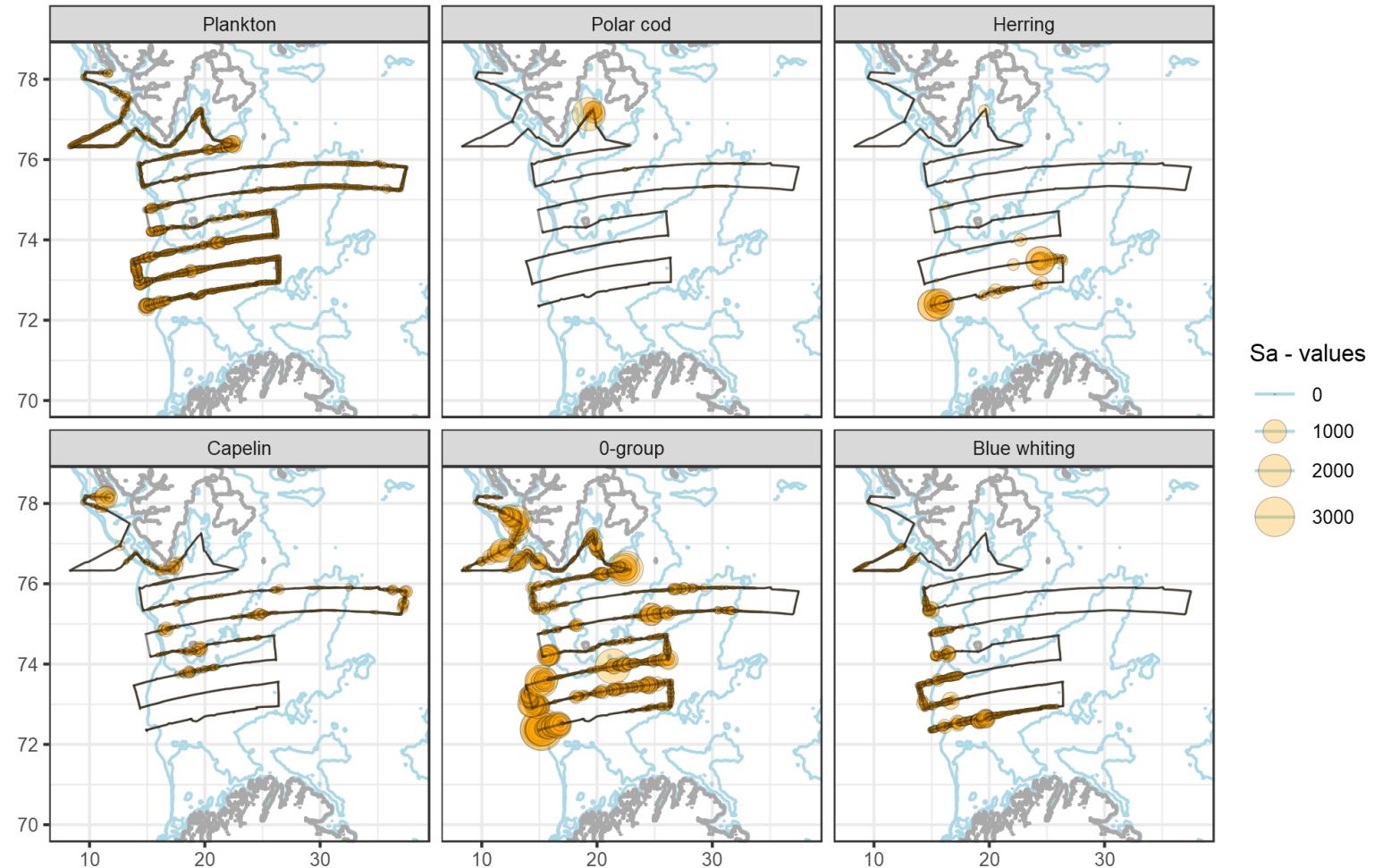
Total backscatter

Ecosystem survey Johan Hjort | 2019 | 38 kHz



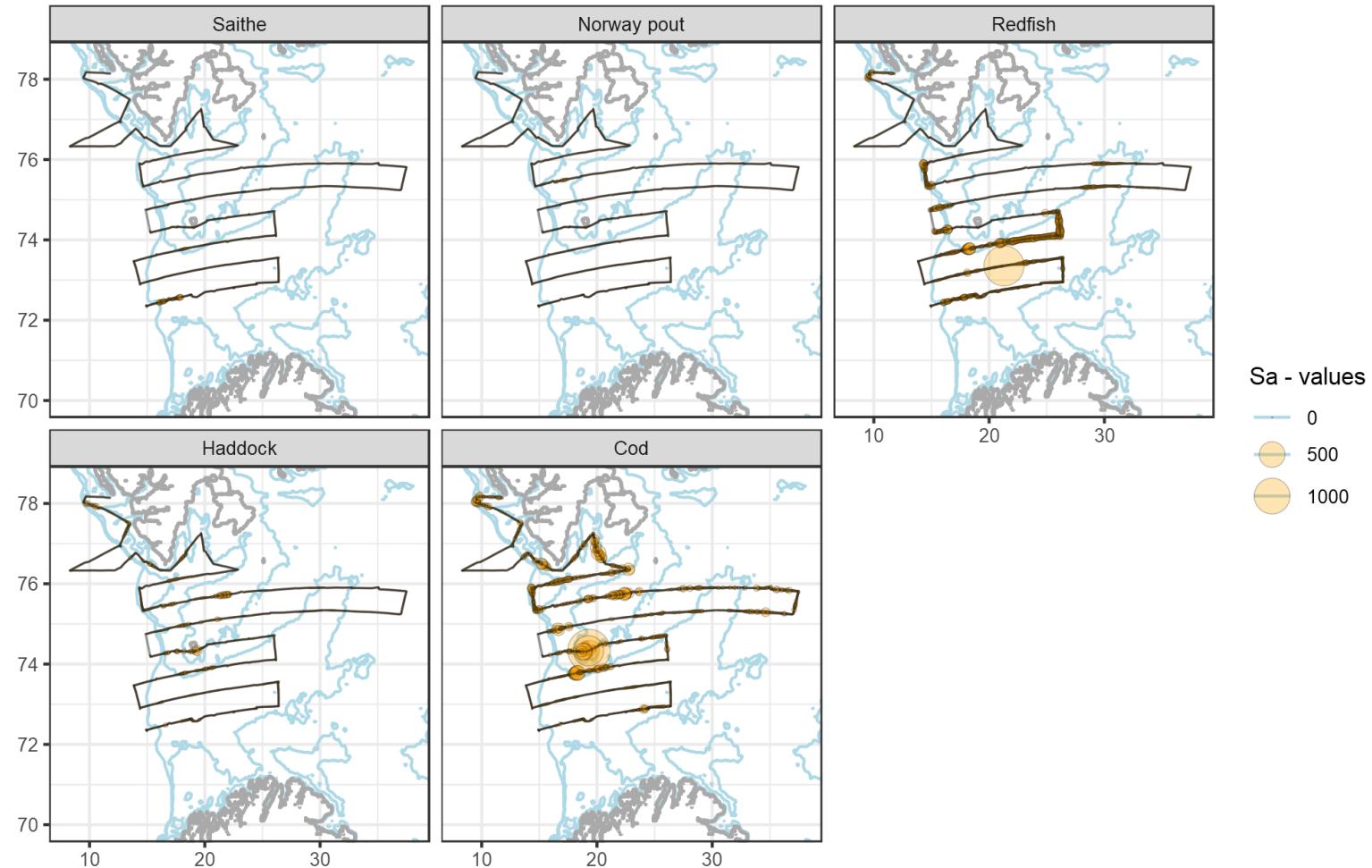
Pelagic species

Ecosystem survey Johan Hjort | 2019 | 38 kHz



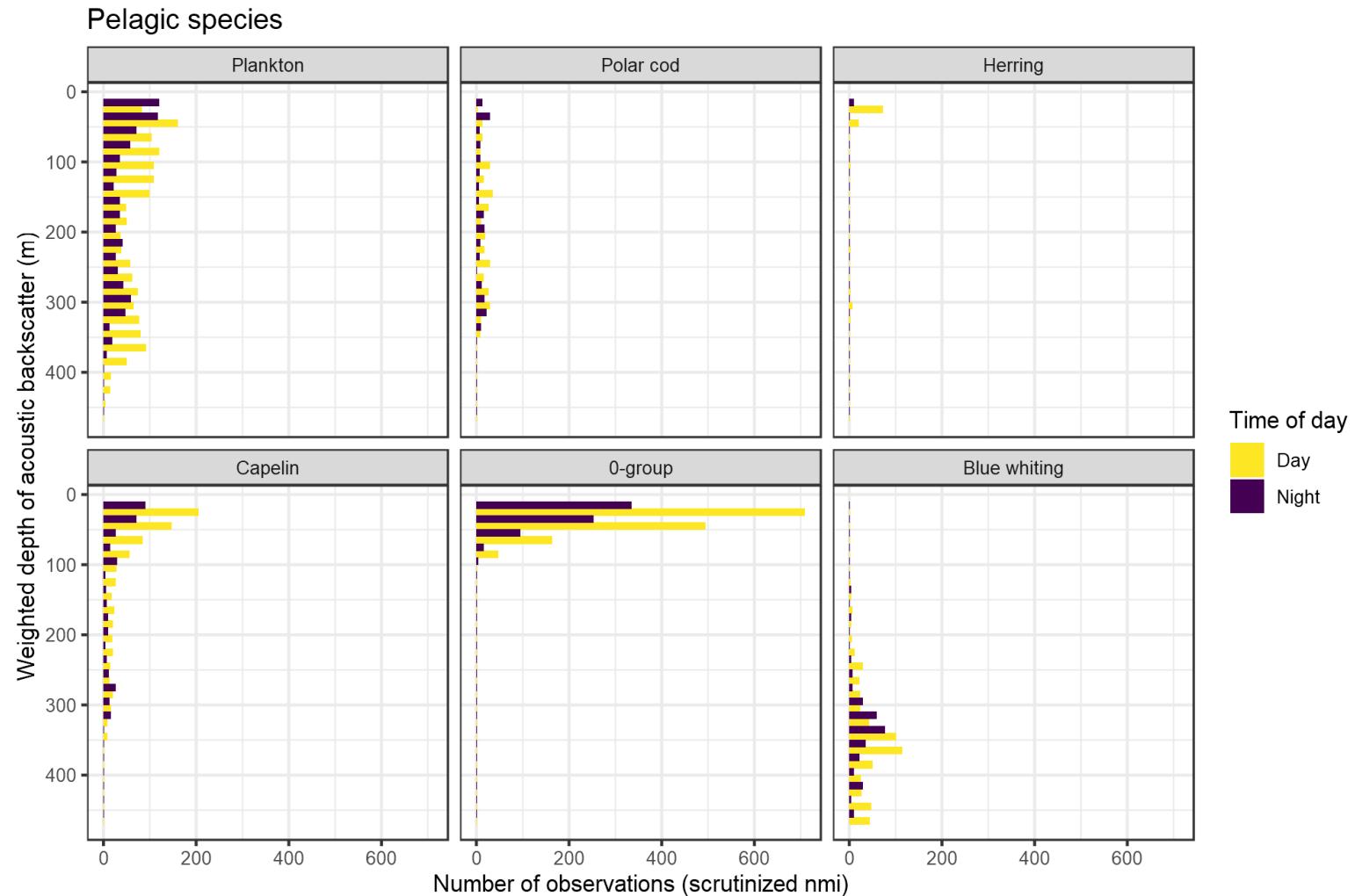
Demersal species

Ecosystem survey Johan Hjort | 2019 | 38 kHz

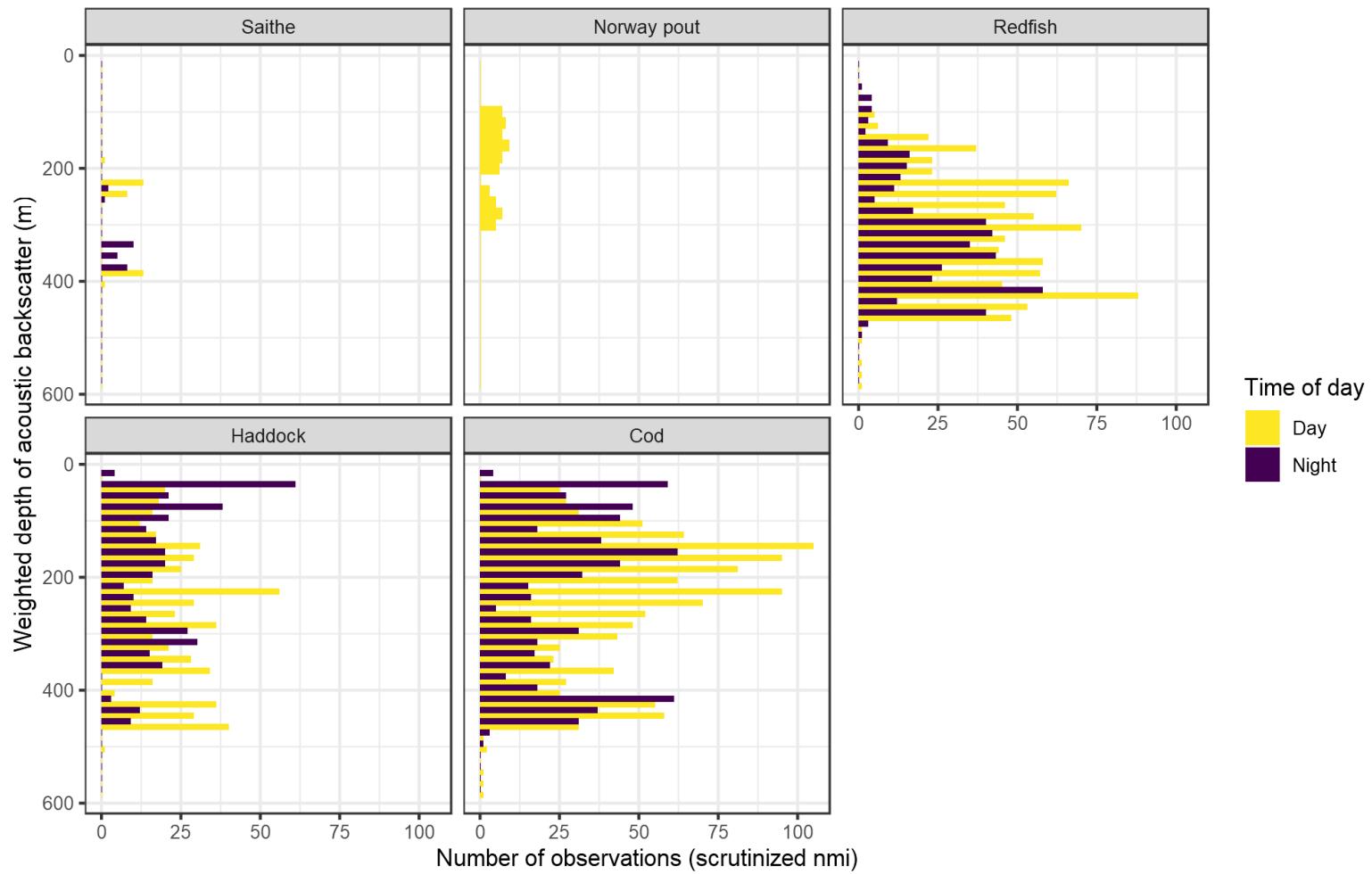


Acoustic backscatter in depth channels

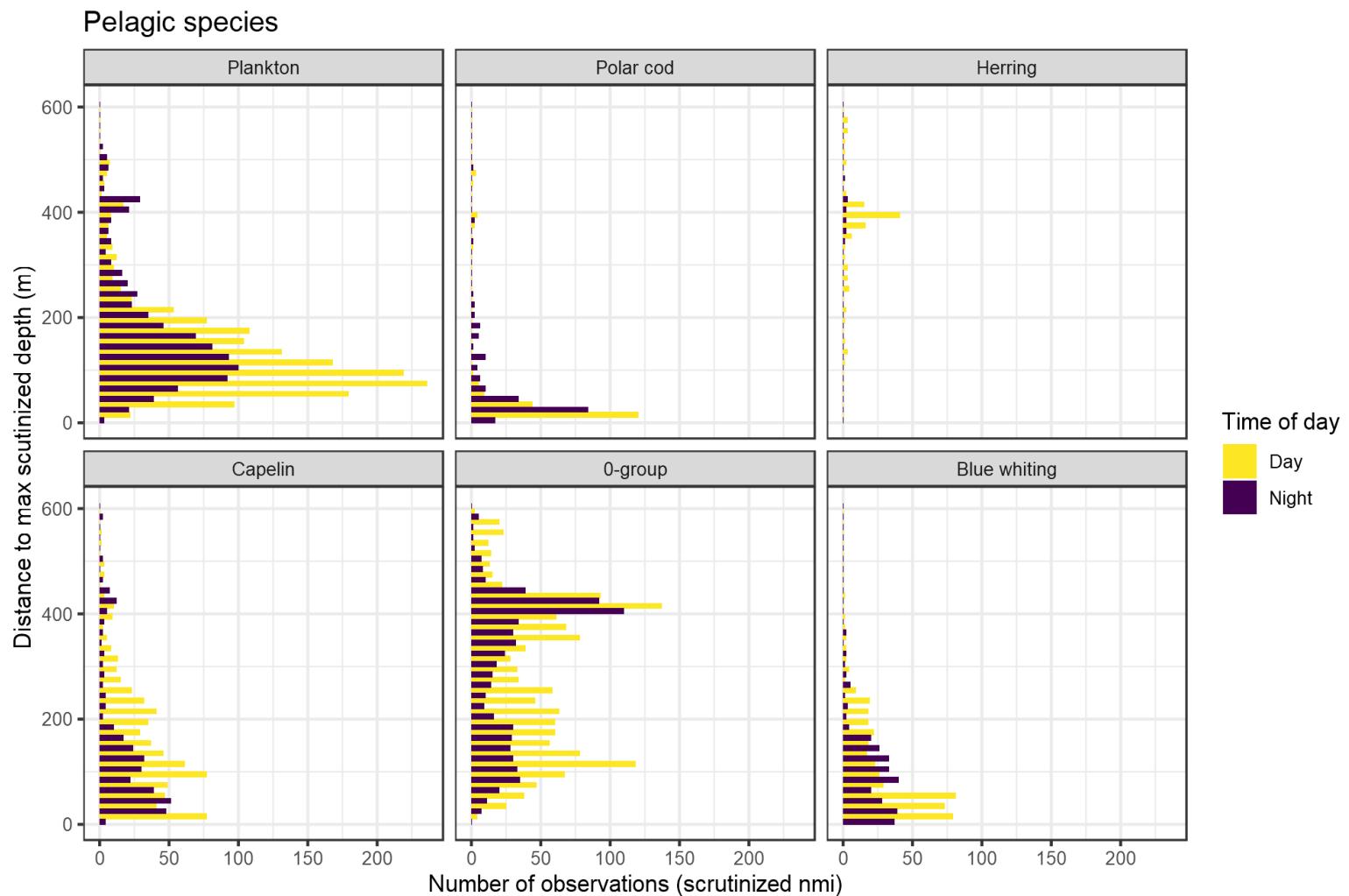
Distance from the surface to weighted depth of acoustic registrations



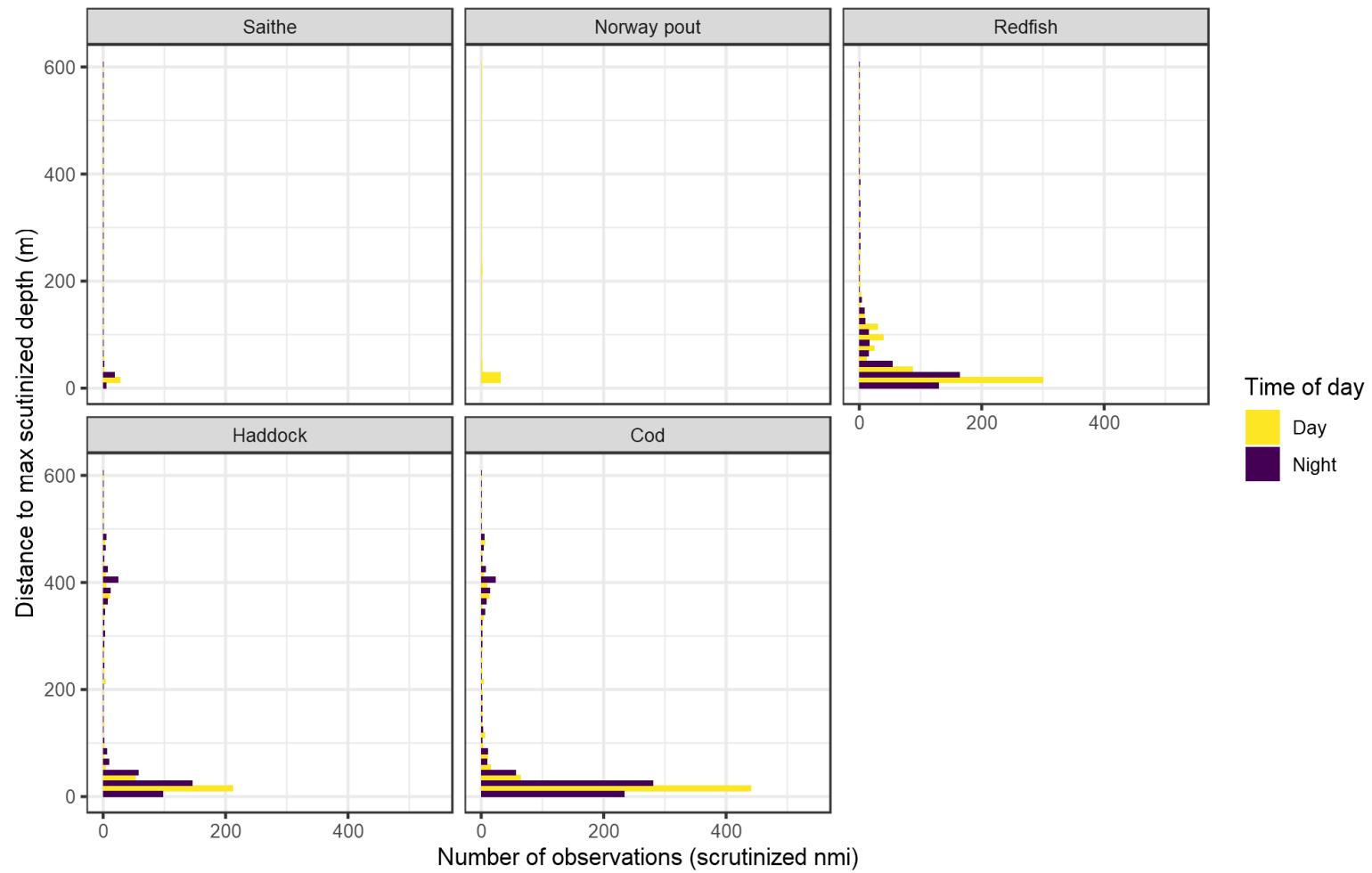
Demersal species



Distance from the seafloor (or max scrutinized depth) to weighted depth of acoustic registrations



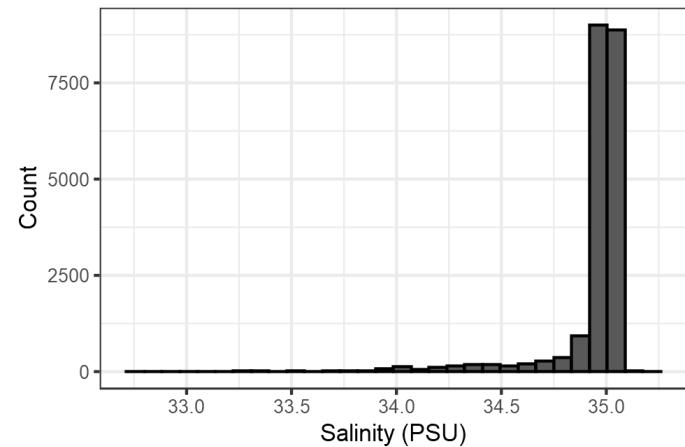
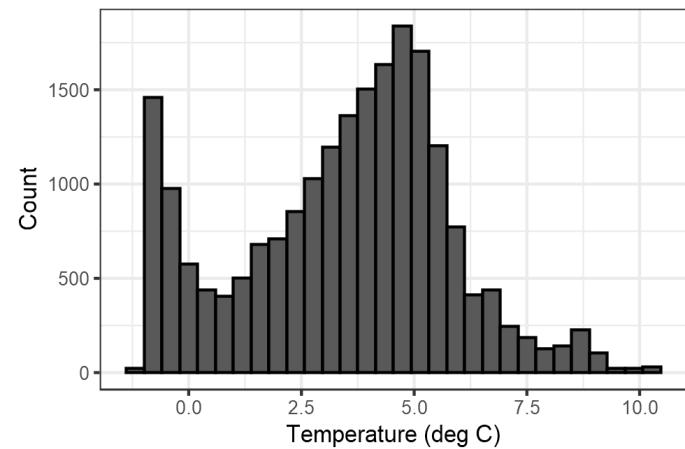
Demersal species



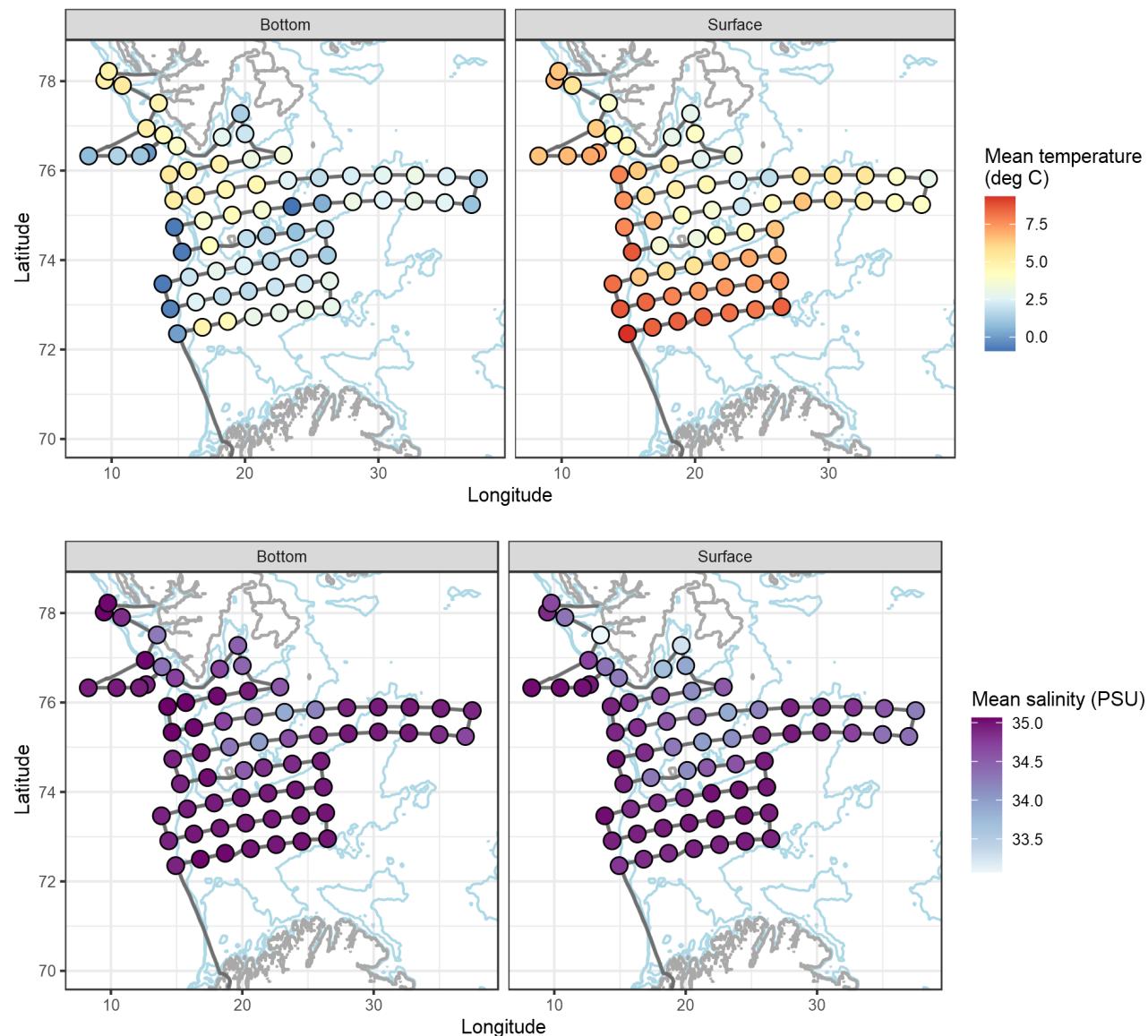
CTD

Summary of measurements

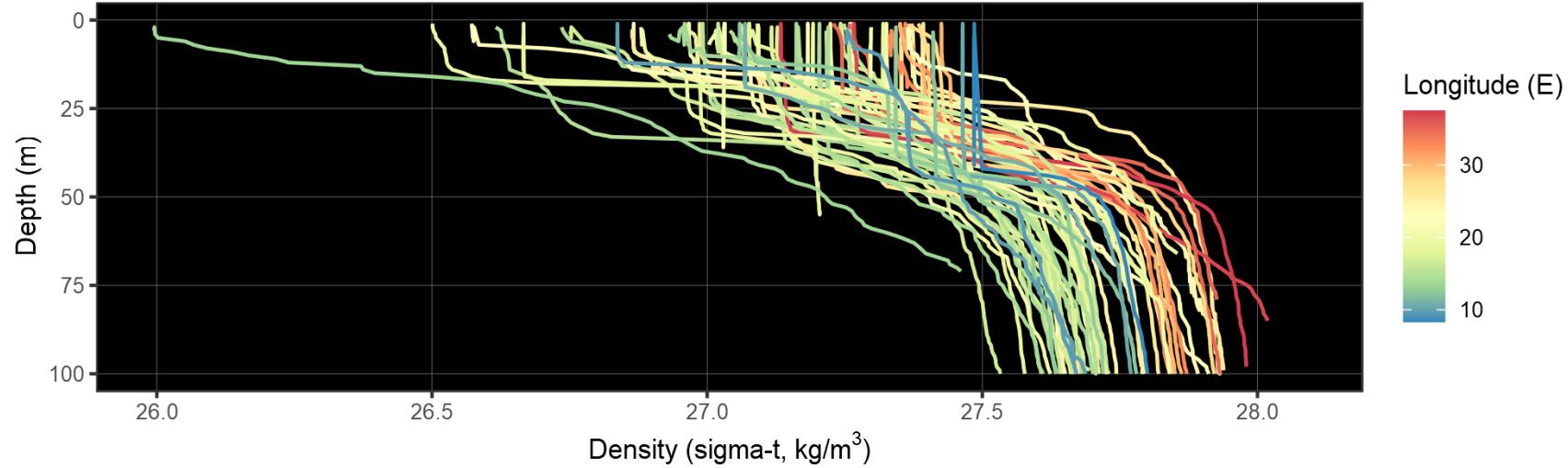
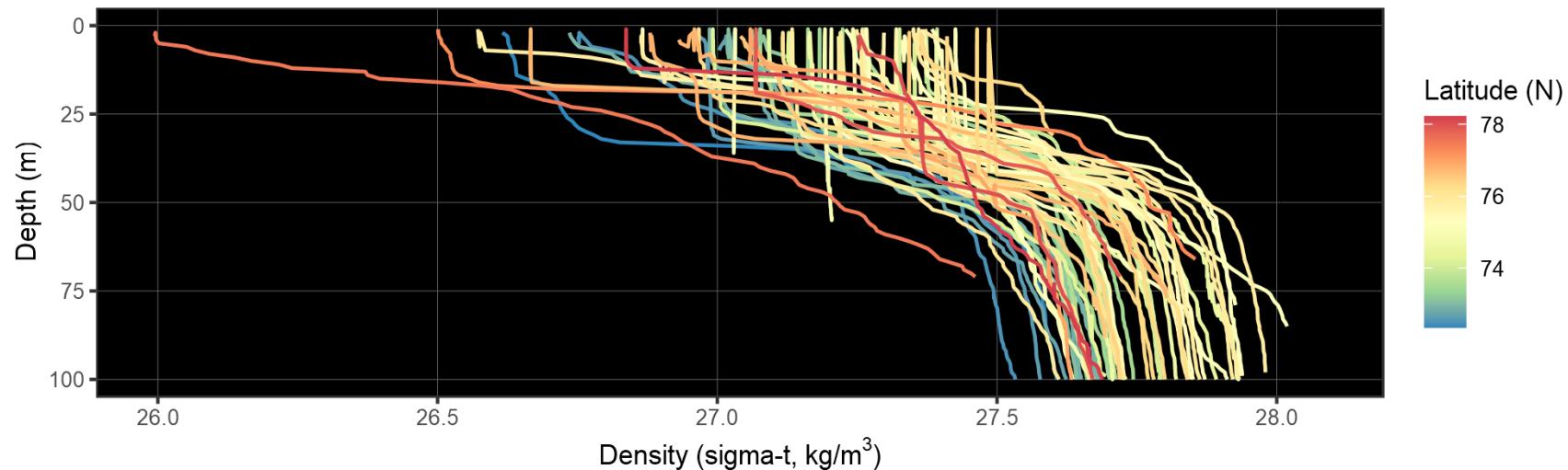
68 CTD casts were done during the survey, covering a total depth of 20.6 km.



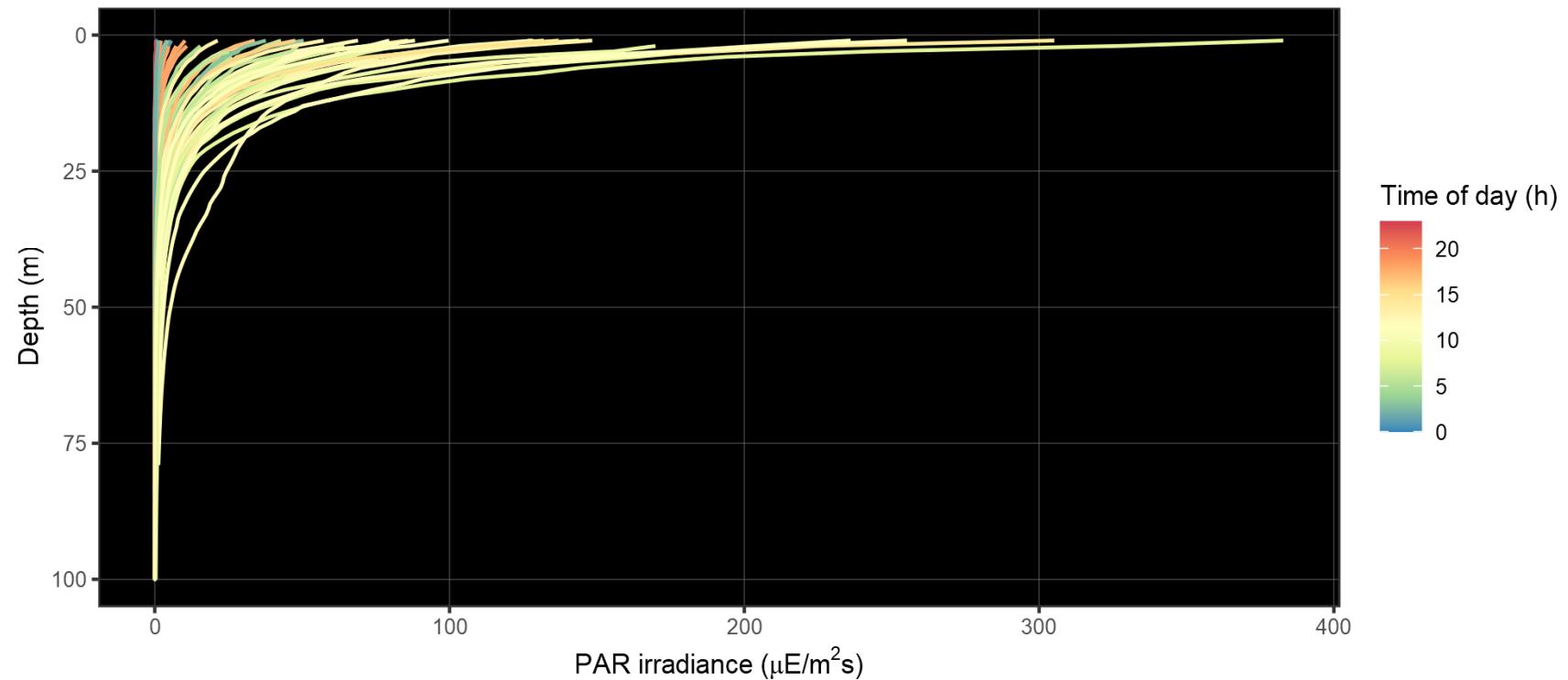
Variation in temperature and salinity with bathymetry and geographical location



Density in the water column



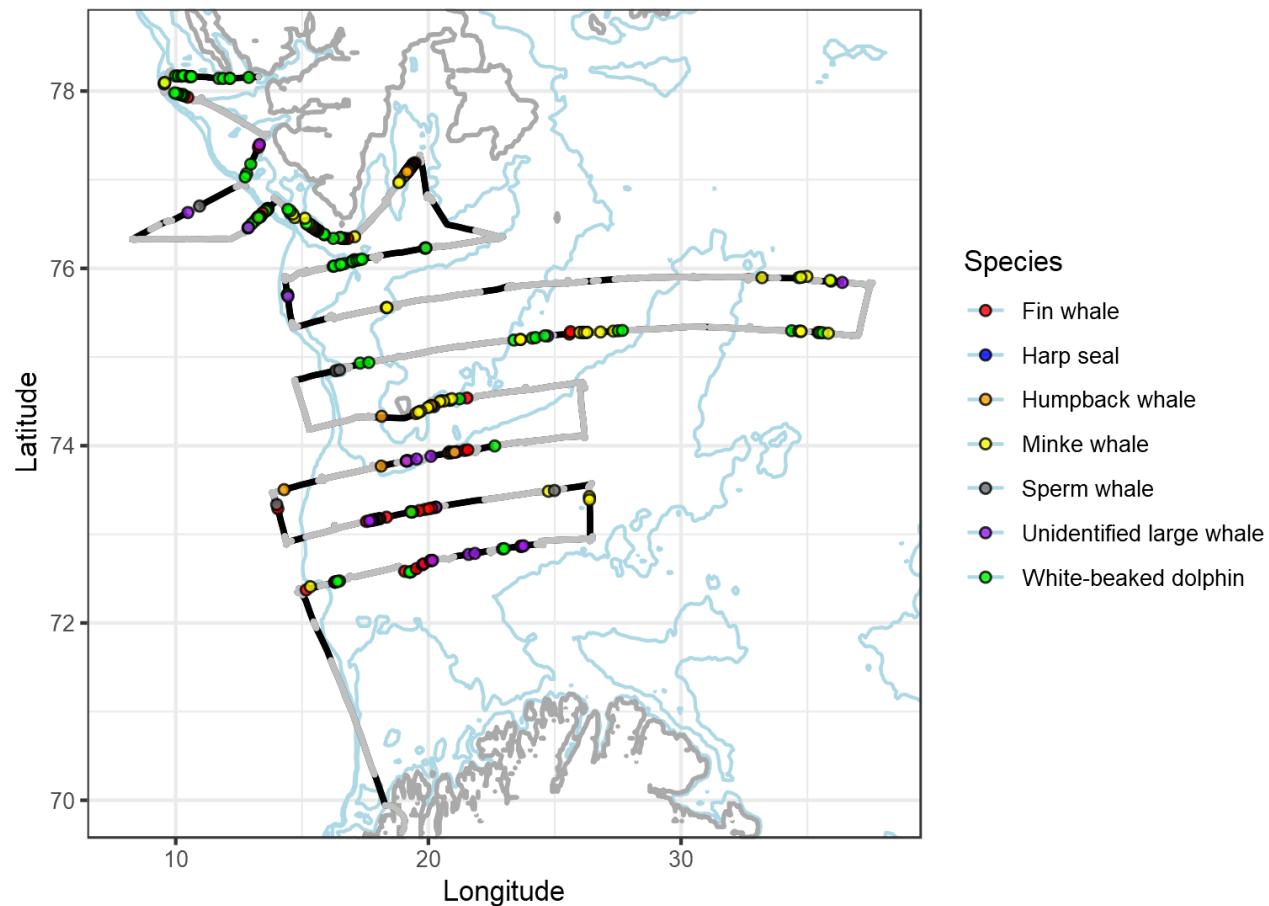
Light in the water column



Whales

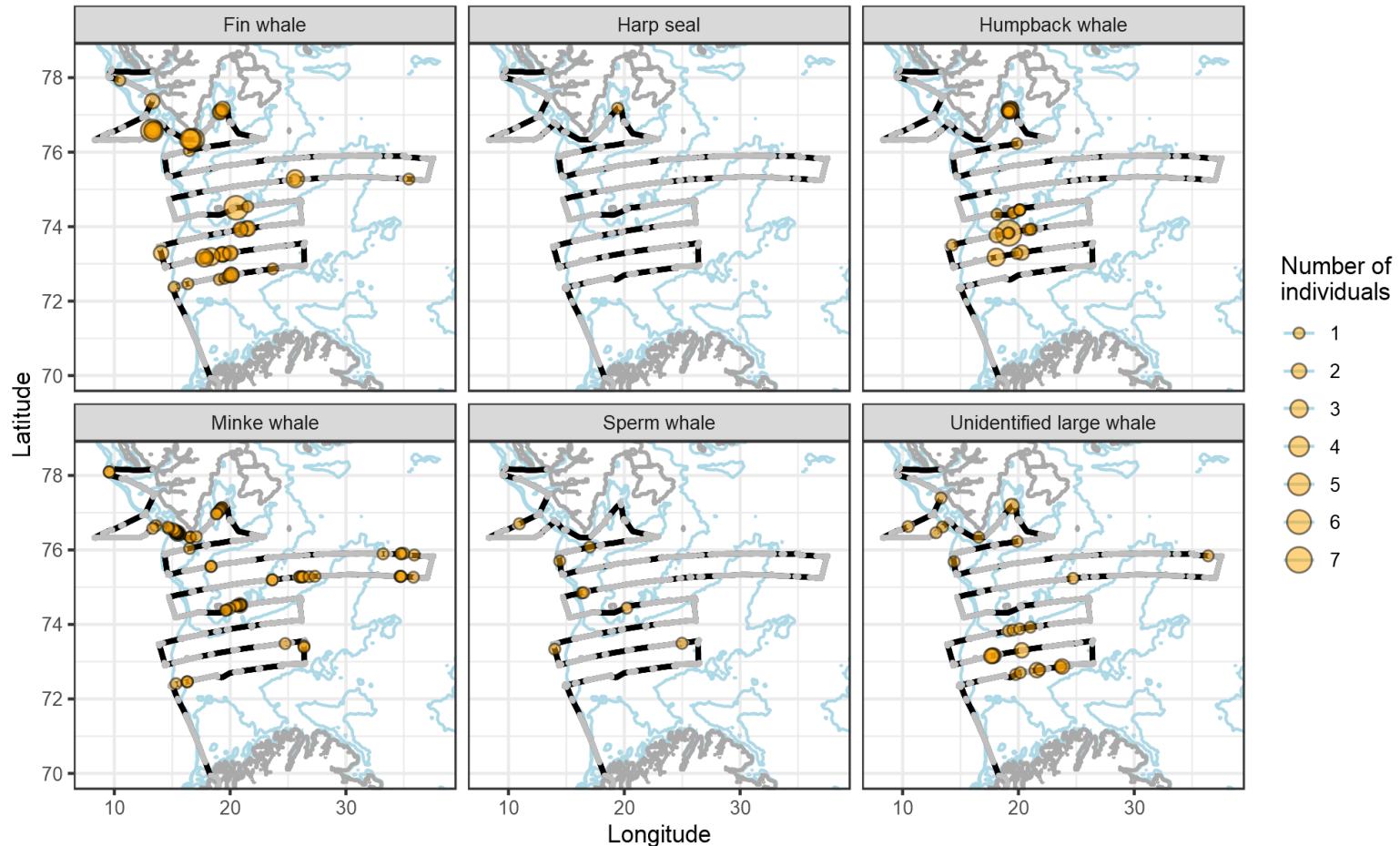
Positions of sightings by species

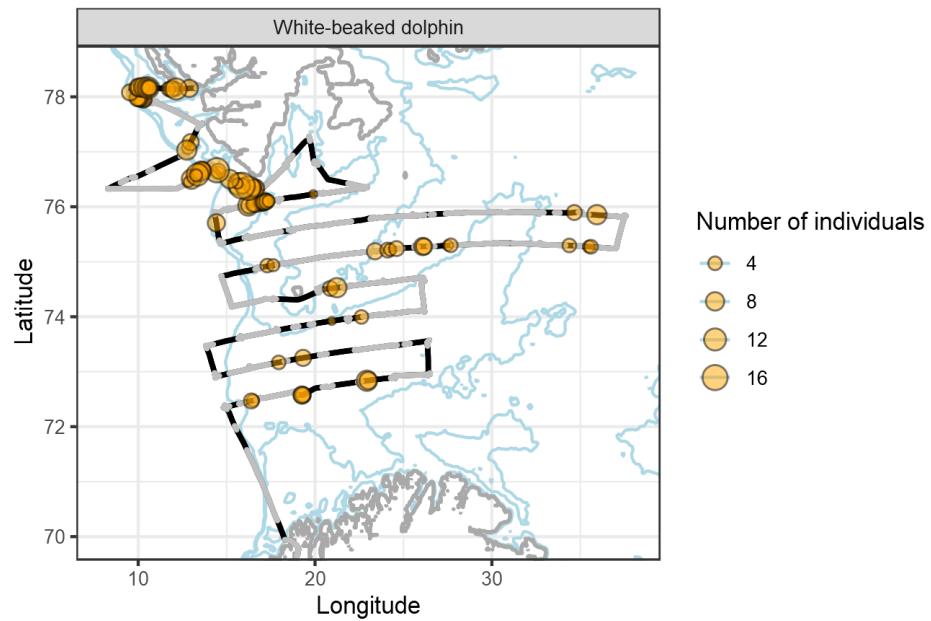
This figure shows presence/absence sightings of whales and seals along the cruise track. The cruise track colour indicates whether the observers have been on watch (black) or off watch (grey).



Number of individuals

Here the circles are proportional to the number of individuals observed at the location. The cruise track colour indicates whether the observers have been on watch (black) or off watch (grey).





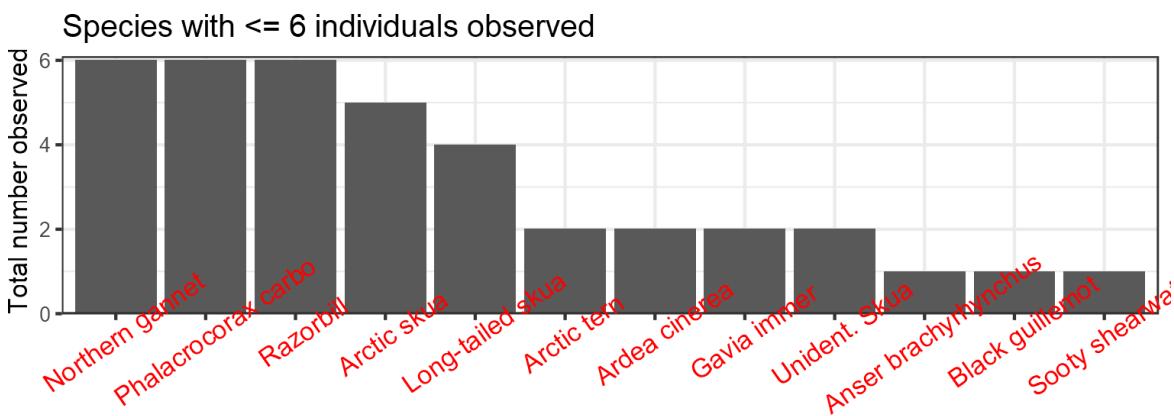
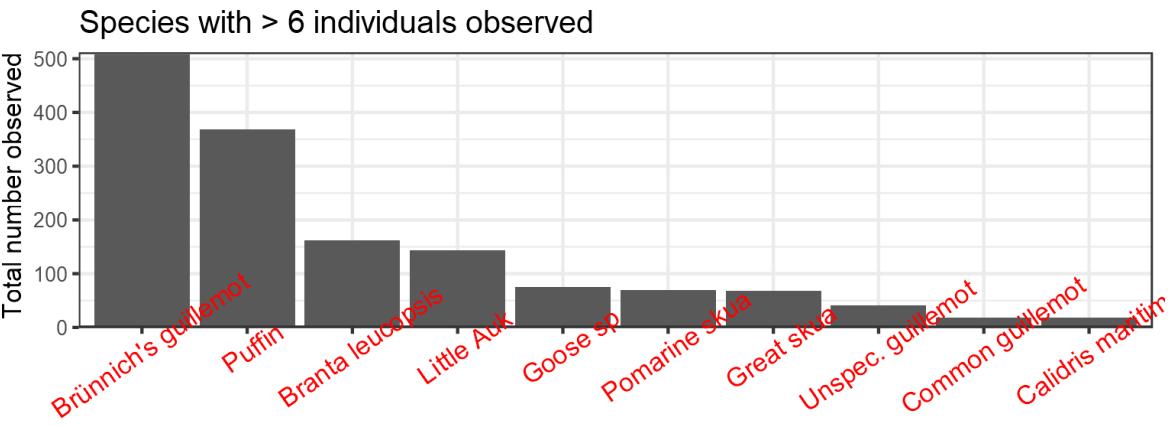
Seabirds (non ship followers)

- NB work to generalise this code -

Summary of observations

The most frequently observed seabird species was Puffin, while the species with highest group numbers (number of individuals in a single sighting) was *Branta leucopsis*. Brünnich's guillemot, Puffin, and *Branta leucopsis* were the species with the three highest total number of observations.

6 species were observed only once: *Anser brachyrhynchus*, Arctic tern, *Ardea cinerea*, Black guillemot, Goose sp, Sooty shearwater.



Spatial distribution of observations

The cruise track colour indicates whether the whale observers have been on watch (black) or off watch (grey). -NB update with bird effort-

