

Fish bycatch in the Antarctic Krill Fishery

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Introduction

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) currently manages the spatial efforts of the krill fishery. Despite having management measures in place, much uncertainty remains about the impacts of the fishery on the ichthyoplankton community.

The increased commercial interest in Antarctic krill (*Euphausia superba*) over the past two decades has driven significant increases in catches in Area 48 (southwest Atlantic sector, Southern Ocean), where *E. superba* is actively fished over three statistical subareas (48.1 to 48.3). Annual catches of *E. superba* have attained more than 300,000 tonnes over the last decade, making this the largest volume fishery in the Southern Ocean. Larval and juvenile fish are frequently taken as bycatch in the krill fishery. Concerns as to the extent and detrimental impacts on fish populations call for sound management tools supported by fisheries-independent scientific research.

This research project addresses key questions in krill fisheries management related to the interactions between early life history stages of fish and the fisheries, and the development of improved mechanisms for identifying fish bycatch to enhance reporting to CCAMLR. Utilising the comprehensive archive at British Antarctic Survey (BAS), spanning over three decades of ichthyoplankton research, we are employing an integrative taxonomy approach (morphological and molecular methods) to develop enhanced identification guides to improve reporting on by catch for the krill's fishery.

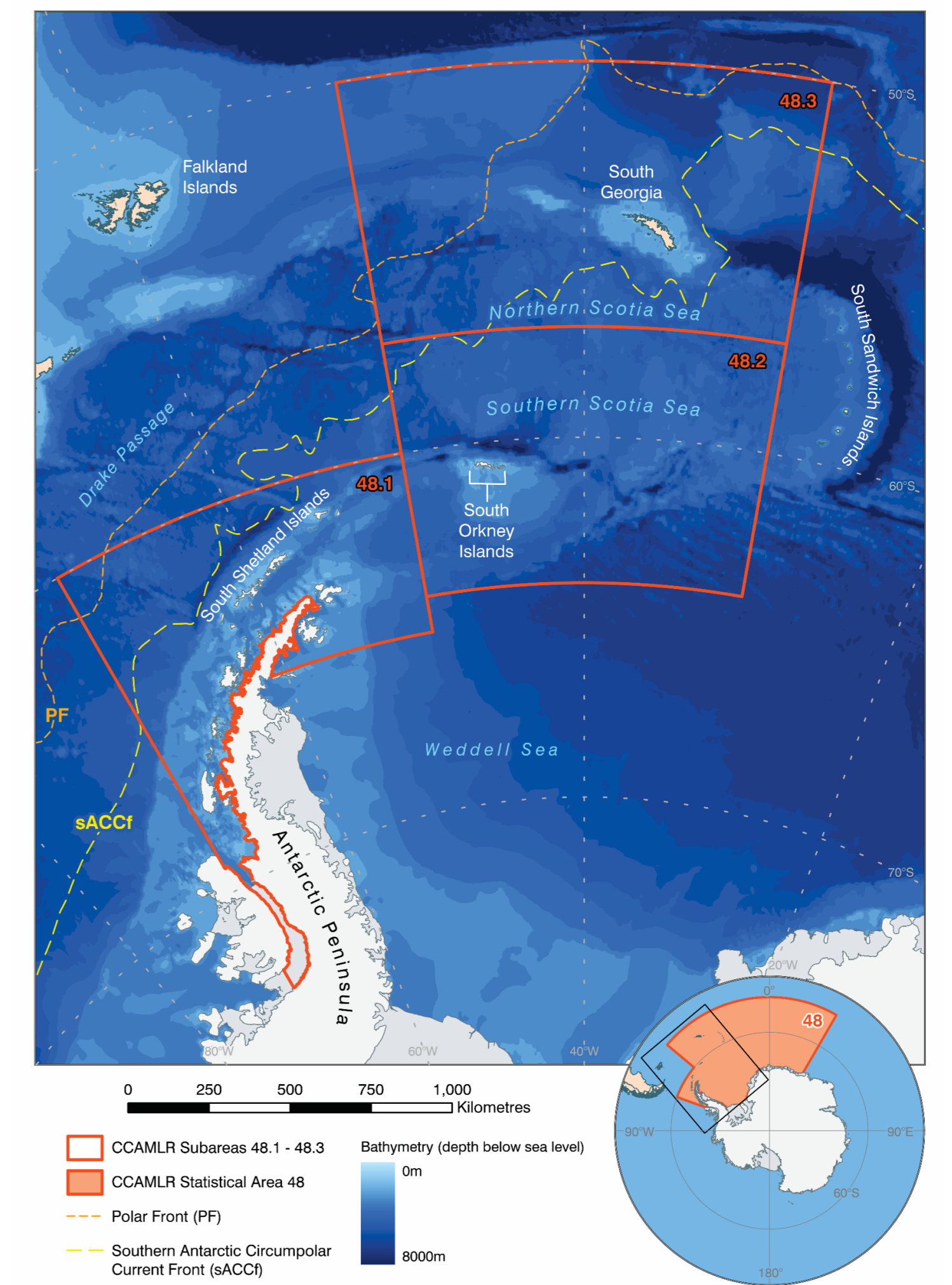


Fig.1: CCAMLR Statistical Area 48 showing statistical subareas where the krill fishery operates. Produced by the Mapping and Geographic Information Centre, © British Antarctic Survey, UK Research and Innovation, 2023.

Where, when and which fish are caught?

Baseline assessment of fish bycatch in the krill fishery in space and time

- Integrative taxonomy: morphological and molecular identification of bycatch species (~1000 samples will be examined)
- Review current information on early life history stages: Hatching times, egg duration, dispersal and larval duration, larval growth rate.

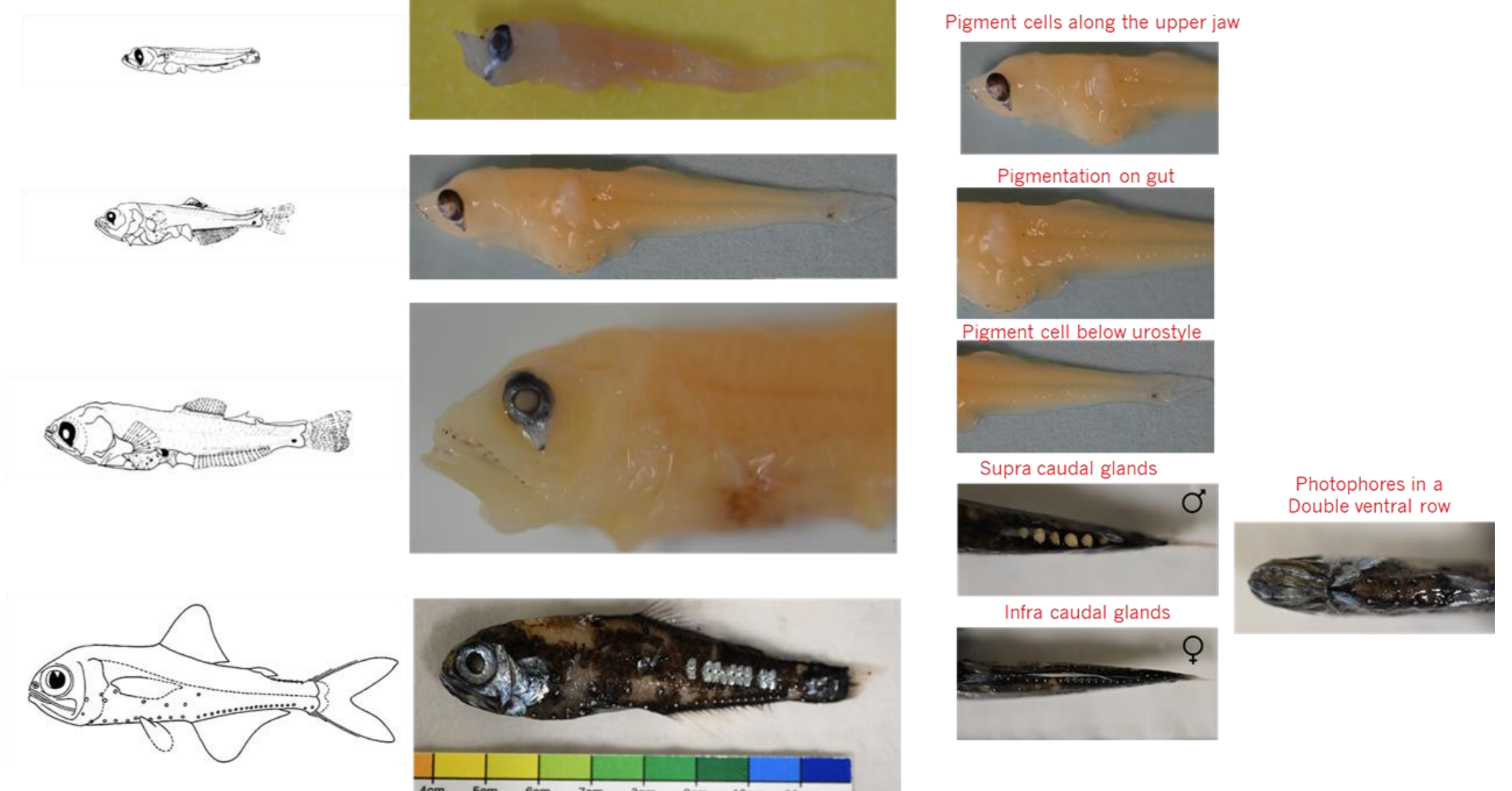
Improved understanding of spatial and temporal distribution of species caught

- Statistical analysis of bycatch data
- Assessment of overlap between fish life history stages and krill fishing operations.

Improved species monitoring practices

- Establish a baseline assessment for fish bycatch
- Identification and training tools for international fisheries observers.

Electrona antarctica (Günther, 1878)



BAS Ichthyoplankton Catalogue	Storage type		
	ETOH/HCHO	-20 °C	-80 °C
Total no. of samples	97	92	82
Analysed samples	26	8	5
Identified fish	30,427	662	96
Subsampled for DNA	N/A	137	68

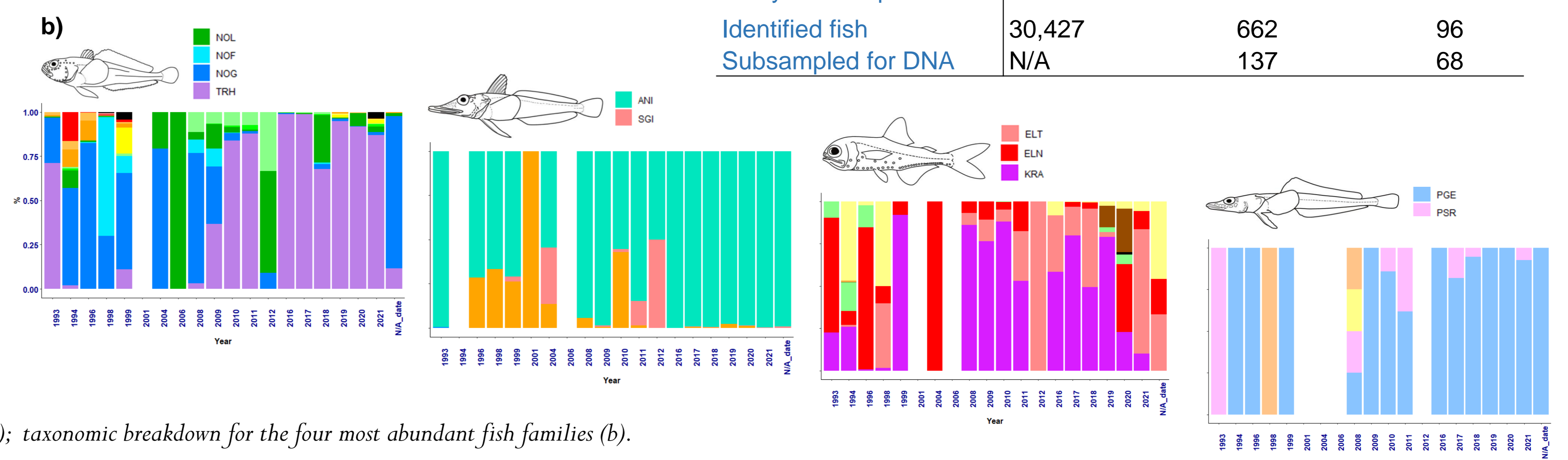
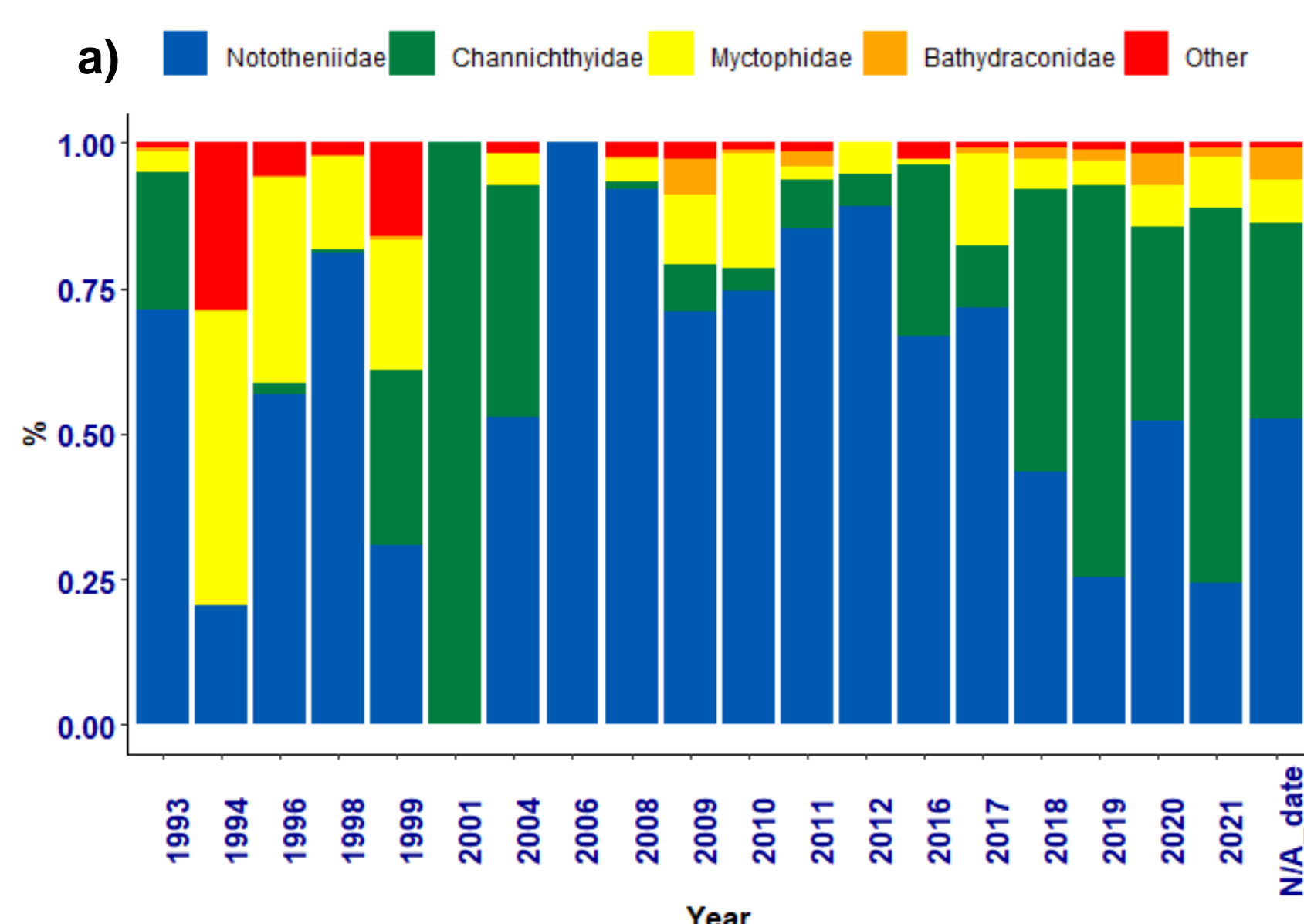


Fig.2: Percentage abundance of fish families found at BAS archives (a); taxonomic breakdown for the four most abundant fish families (b).

Where are we now?

- A list of 70 most common bycatch species was assembled and was used as the starting point for compiling information on development and life history stages, as well as for prioritising laboratory work, primer design and barcoding of species
- 30,427 fish identified, covering 24 families, 44 genera and 74 species
- 23 specific primers (COX1 and D-loop) have been developed and tested on 24 species thus far
- First draft of the literature review is in progress, and we are now performing quality control on the data extracted from published and grey literature.

Concluding remarks

Answering the questions where, when and which fish are caught during the fishing for Antarctic krill will support an ecosystem-based management by understanding which fish life history stages interact with the fisheries, as well as greatly improving taxonomic reporting from fisheries observers.

