

OCCURRENCE OF CHONDRICHTHYAN FISHES IN THE ARCTIC OCEAN AND ADJACENT SEAS

INTRODUCTION

The sea ice cover decreases and human activity increases in Arctic waters. Fisheries (by-catch issues), shipping and petroleum exploitation (pollution issues) make it imperative to establish biological baselines for the marine fishes inhabiting the Arctic Ocean and adjacent seas (AOAS).

As a first step towards credible conservation actions for the Arctic marine fish fauna, we examine the species-richness of chondrichthyan fishes (class Chondrichthyes) pertaining to 16 regions within the AOAS: chimaeras, sharks and skates.

MATERIALS AND METHODS

- Voucher specimens from Natural History Collections
- Annotated checklists (see selected references)
- The CAFF Database on Arctic marine fishes (Christiansen et al., in progress)

Only presence and absence data are considered, as reliable abundance data lack for most species. Occurrences known only from floating or beach-cast carcasses, such as Pacific sleeper shark (no. 17) and Alaska skate (no. 29) in the Chukchi Sea, are not considered conclusive evidence of presence and are not included.



CHIMAERIFORMES

Chimaeridae - ratfishes

- 1 *Chimaera monstrosa* Linnaeus 1758 - Rabbit fish

LAMNIFORMES

Alopiidae - thresher sharks

- 2 *Alopias vulpinus* (Bonnaterre 1788) - Thresher shark

Cetorhinidae - basking sharks

- 3 *Cetorhinus maximus* (Gunnerus 1765) - Basking shark

Lamnidae - mackerel sharks

- 4 *Lamna ditropis* Hubbs & Follett 1947 - Salmon shark
- 5 *Lamna nasus* (Bonnaterre 1788) - Porbeagle

CARCHARHINIFORMES

Scyliorhinidae - cat sharks

- 6 *Galeus melastomus* Rafinesque 1810 - Blackmouth catshark
- 7 *Scyliorhinus canicula* (Linnaeus 1758) - Small-spotted catshark

Triakidae - hound sharks

- 8 *Galeorhinus galeus* (Linnaeus 1758) - Tope shark

Carcharhinidae - requiem sharks

- 9 *Prionace glauca* (Linnaeus 1758) - Blue shark

HEXANCHIFORMES

Chlamydoselachidae - frill sharks

- 10 *Chlamydoselachus anguineus* Garman 1884 - Frilled shark

Hexanchidae - cow sharks

- 11 *Hexanchus griseus* (Bonnaterre 1788) - Bluntnose sixgill shark

SQUALIFORMES

Squalidae - dogfish sharks

- 12 *Squalus acanthias* Linnaeus 1758 - Spiny dogfish
- 13 *Squalus suckleyi* (Girard 1855) - Spotted spiny dogfish

Centrophoridae - gulper sharks

- 14 *Deania calceus* (Lowe 1839) - Birdbeak dogfish

Somniosidae - sleeper sharks

- 15 *Centroscyms coelolepis* Barbosa du Bocage & de Brito Capello 1864 - Portuguese dogfish
- 16 *Somniosus microcephalus* (Bloch & Schneider 1801) - Greenland shark
- 17 *Somniosus pacificus* Bigelow & Schroeder 1944 - Pacific sleeper shark

Dalatiidae - kitefin sharks

- 18 *Etmopterus spinax* (Linnaeus 1758) - Velvet belly

RAJIFORMES

Rajidae - skates

- 19 *Amblyraja badia* (Garman 1899) - Broad skate
- 20 *Amblyraja hyperborea* (Collett 1879) - Arctic skate
- 21 *Amblyraja radiata* (Donovan 1808) - Starry ray
- 22 *Bathyraja abyssicola* (Gilbert 1896) - Deepsea skate
- 23 *Bathyraja aleutica* (Gilbert 1896) - Aleutian skate
- 24 *Bathyraja interrupta* (Gill & Townsend 1897) - Sandpaper skate
- 25 *Bathyraja lindbergi* Ishiyama & Ishihara 1977 - Commander skate
- 26 *Bathyraja maculata* Ishiyama & Ishihara 1977 - Whiteblotched skate
- 27 *Bathyraja mariposa* Stevenson, Orr, Hoff & McEachran 2004 - Butterfly skate
- 28 *Bathyraja minispinosa* Ishiyama & Ishihara 1977 - Smallthorn skate
- 29 *Bathyraja parmifera* (Bean 1881) - Alaska skate
- 30 *Bathyraja panthera* Orr, Stevenson, Hoff, Spies & McEachran - Leopard skate

- 31 *Bathyraja spinicauda* (Jensen 1914) - Spintail ray
- 32 *Bathyraja taranetzi* (Dolganov 1983) - Mud skate
- 33 *Bathyraja trachura* (Gilbert 1892) - Roughtail skate
- 34 *Bathyraja violacea* (Suvorov 1935) - Okhotsk skate
- 35 *Dipturus batis* complex (Linnaeus 1758) - Blue skate
- 36 *Dipturus linteus* (Fries 1838) - Sailray
- 37 *Dipturus nidarosiensis* (Storm 1881) - Norwegian skate
- 38 *Dipturus oxyrinchus* (Linnaeus 1758) - Longnosed skate
- 39 *Leucoraja circularis* (Couch 1838) - Sandy ray
- 40 *Leucoraja fullonica* (Linnaeus 1758) - Shagreen ray
- 41 *Raja binoculata* Girard 1855 - Big skate
- 42 *Raja clavata* Linnaeus 1758 - Thornback ray
- 43 *Raja rhina* Jordan & Gilbert 1880 - Longnose skate
- 44 *Rajella bathyphila* (Holt & Byrne 1908) - Abyssal ray
- 45 *Rajella fyllae* (Lütken 1887) - Round ray

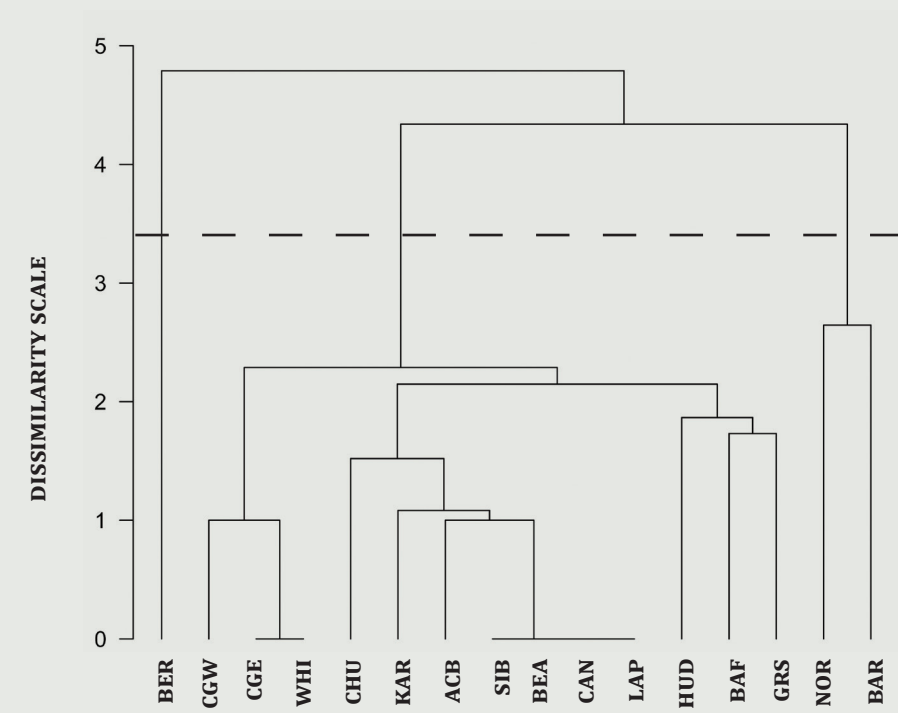


Fig. 2. Cluster analysis (UPGMA) of the 16 AOAS regions. Three distinct clusters appear: the Bering Sea with a high endemicity, the species-rich Norwegian and Barents Seas, and the remaining species-poor high Arctic regions. All regions except for the Bering and Chukchi Seas are inhabited by Atlantic species.

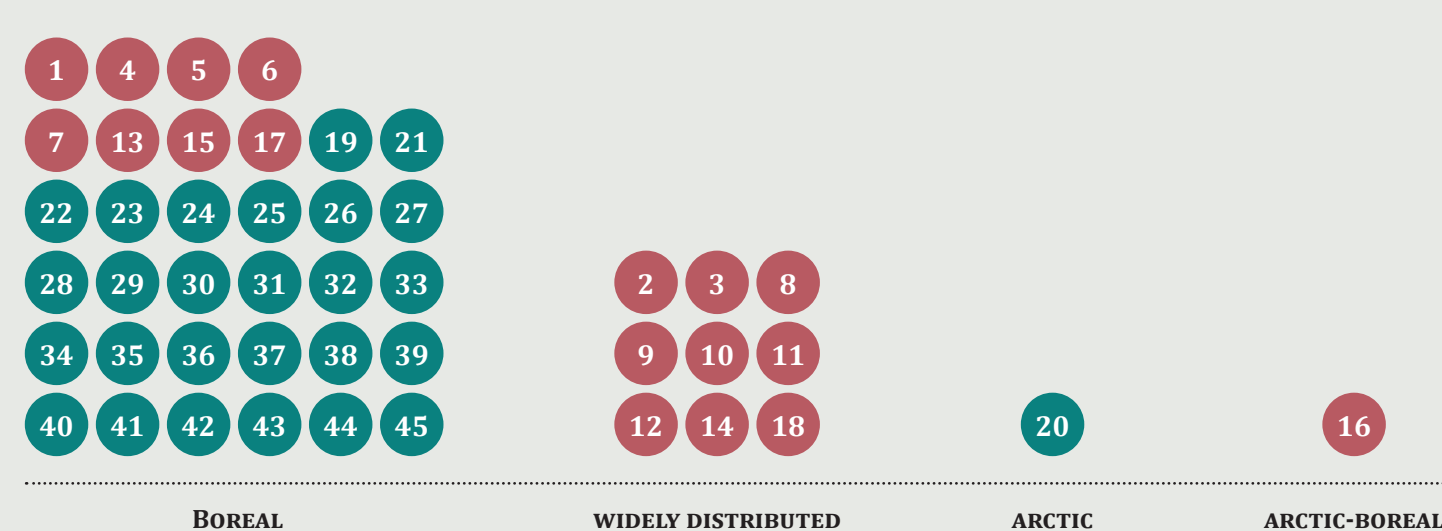


Fig. 3. Zoogeographic categories. 'Boreal' and 'Widely Distributed' species spawn at positive temperatures. 'Boreal' species comprise mostly skates but only sharks are 'Widely Distributed'. 'Arctic-Boreal' species spawn at sub-zero or positive temperatures and 'Arctic' species solely at sub-zero temperatures.

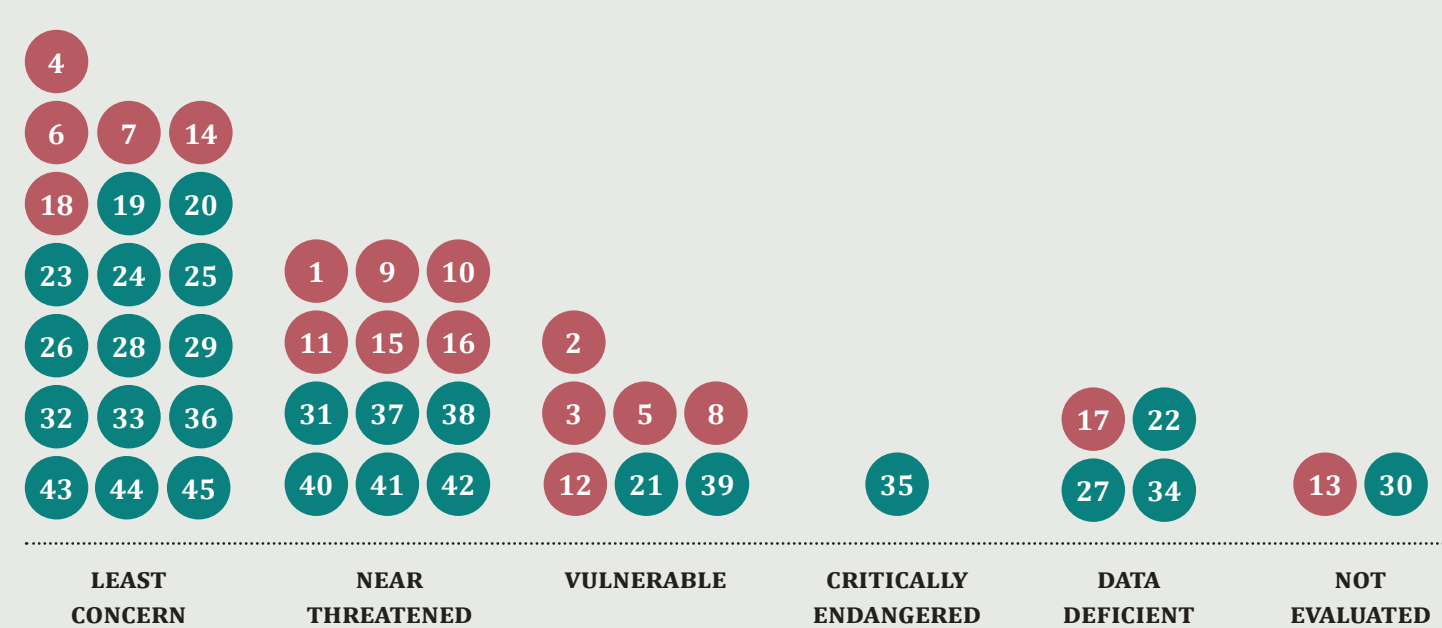


Fig. 4. Number of AOAS chondrichthyan species in IUCN Red List categories. The 'Least Concern' category is assigned to species thought to have a depth refuge. However, quantitative data lack for most of these species.

MAIN CONCLUSIONS

- A total of 45 chondrichthyan species occur within the AOAS: 1 chimaera, 17 shark and 27 skate species.
- The Norwegian, Barents and the Bering Seas are particularly species-rich and skates comprise roughly 50–80% of the chondrichthyan species.
- The high Arctic regions are depauperate with merely 1 or 2 species each.
- The Chukchi Sea is practically devoid of chondrichthyan except for a single specimen of spotted spiny dogfish (no. 13). The shallow and narrow Bering Strait appears to form an effective barrier against the exchange of chondrichthyan between the Bering and Chukchi Seas.

Fig. 1. Occurrence of chondrichthyan species in the 16 AOAS regions. Note the dominance of skates (green dots) compared to sharks (red dots) in the Bering Sea. The Arctic skate (no. 20) is present in most regions and it is the only species in the Arctic zoogeographic category (Fig. 3).

