

7.2 Fish biodiversity

by E. Eriksen and T. Prokhorova

7.2.1 Small non-target fish species

Despite the distribution and biology of the non-commercial fish species of the Barents Sea and their role in the ecosystem being investigated since mid-1990s (e.g. Dolgov, 1995; Wienerrother et al., 2011 etc), their abundance and biomass is largely unknown. Eriksen et al. (2012) calculated abundance and biomass of pelagically distributed juveniles of fish species from the families Agonidae, Ammodytidae, Cottidae, Liparidae, Myctophidae and Stichaeidae (called “small non-target fishes” here) for the period 1980-2009.

Earlier studies provided limited information about the biology and ecology these species. Furthermore, their identification is difficult and often uncertain, because these species were not the target for the survey, and therefore no complete manual for species identification of fry stage fishes in the Barents Sea. Hence, it was decided to combine the non-commercial species into larger groups (families).

The capture efficiency of the sampling trawl differs between species and decreases with the fish length (Godø et al. 1993; Hysten et al. 1995). Species specific catch correction functions dependent on length are established and used in the annual computations of 0-group abundances for cod, haddock, herring and capelin (Anon. 2004; Dingsør 2005; Eriksen et al. 2009). The species specific and length dependent catch efficiencies are unknown for all our study fishes. We assume that the small fish were only captured by the panels with less than 50 mm mesh size which was the last two panels and the cod end. The mouth opening of the 50 mm mesh panel is 4 meters, so this is the effective wingspread of trawl used here.

Abundance indices (AI) were calculated for the studied fish families by the standard procedures (equations 1, 2 and 3, below) used for commercial fish species. The stratified sample mean method described by Dingsør (2005) and Eriksen et al. (2009) was employed, using the Barents Sea 0-group strata system, consisting of 23 strata (see section 5.3.1).

First the fish density (p_s individuals per square nautical mile) at each station, s , was calculated from the following equation

$$p_s = \frac{n_s \cdot 1852}{wsp * (td_s / dl_s)} \quad (1)$$

where n_s is the observed number of fish at station s , wsp is the effective wingspread of the trawl (4 m), tds (nm) is the total distance trawled at station s , and dls is the number of depth layers at station s .

The average density y_i in stratum i was then calculated from

$$\bar{y}_i = \frac{1}{n_i} \sum_{s=1}^{n_i} p_s \quad (2)$$

where n_i is the number of stations in stratum i .

Finally, the abundance estimate (AI) was then calculated from

$$AI = \sum_{i=1}^N A_i \bar{y}_i \quad (3)$$

where N is the number of strata and A_i is the covered area in the i -th stratum.

Yearly estimates of the relative biomasses indices of Agonidae, Ammodytidae, Liparidae, Cottidae, Myctophidae and Stichaeidae were calculated as a product of the yearly relative abundance indices and average fish weight. Data on individual weight were however, scarce. Therefore, we pooled all available weights from pelagic hauls and calculated average individual weights across all years: Agonidae (0.30g), Ammodytidae (0.50g), Liparidae (0.35g), Cottidae (0.30g), Myctophidae (0.45g) and Stichaeidae (0.50g).

7.2.2. Bio-geographic groups

During the ecosystem survey all fishes have been recorded, and these species belong to the 3 zoogeographic groups: boreal, arctic and arcto-boreal. (Table 7.2.2.1.)

Family	Latin name/ English name	Distribution	Bio-geogr. groups	Habitat
Agonidae	<i>Leptagonus decagonus</i> / Atlantic poacher	Widely except southwest	Arcto-boreal	demersal
Ammodytidae	<i>Ammodytes marinus</i> / Lesser sandeel	widely except northern area	Boreal	demersal
	<i>Hyperoplus lanceolatus</i> / Greit sandeel	Norwegian coast	Boreal	demersal
	<i>Ammodytes tobianus</i> / Small sandeel	Norwegian coast	Boreal	demersal

Anarhichadidae	<i>Anarhichas denticulatus/</i> Northern wolffish	Central area	Boreal	demersal to benthopelagic
	<i>Anarhichas lupus/</i> Atlantic wolffish	deeper parts of southern and western areas	Boreal	demersal
	<i>Anarhichas minor/</i> Spotted wolffish	Central, southeast and around Svalbard	Boreal	demersal to benthopelagic
Argentinidae	<i>Argentina silus/</i> Greater argentine	southwest	Boreal	pelagic
Carangidae	<i>Trachurus trachurus/</i> Horse mackerel	southwest	Boreal	highly pelagic
Chimaeridae	<i>Chimaera monstrosa/</i> Rabbitfish	southwest		benthopelagic
Clupeidae	<i>Clupea harengus/</i> Atlantic herring	southern, western	Boreal	highly pelagic
	<i>Clupea harengus/</i> Kanin herring	southeast, White Sea	Boreal	pelagic
Cottidae	<i>Arctediellus atlanticus/</i> Atlantic hookear sculpin	widely	Boreal	demersal
	<i>Arctediellus scaber/</i> Rough hamecon	southeast	Arctic	demersal
	<i>Gymnocanthus tricuspis/</i> Arctic staghorn sculpin	along western part of Novaya Zemlya and around Svalbard	Arctic	demersal
	<i>Myoxocephalus scorpius/</i> Shorthorn sculpin	south for Svalbard, southern and eastern areas	Boreal	demersal
	<i>Triglops murrayi/</i> Moustache sculpin	widely	Boreal	demersal
	<i>Triglops nybelini/</i> Bigeye sculpin	Northern area	Arctic	demersal
	<i>Triglops pingelii/</i> Ribbed sculpin	Northern and eastern areas	Arcto- boreal	demersal
Cyclopteridae	<i>Cyclopterus lumpus/</i> Lumpsucker	Central and southern areas	Boreal	pelagic
	<i>Eumicrotremus derjugini/</i> Leatherfin lumpsucker	northern	Arctic	demersal
	<i>Eumicrotremus spinosus/</i> Atlantic spiny lumpsucker	northern and along Novaya Zemlya	Arctic	demersal
Gadidae	<i>Arctogadus glacialis/</i> Arctic cod	northern area	Arctic	cryopelagic
	<i>Boreogadus saida/</i> Polar cod	northern and eastern	Arctic	pelagic
	<i>Eleginus nawaga/</i> Atlantic navaga	southeast	Arctic	coastal
	<i>Gadiculus argenteus/</i> Silvery pout	southwestern area	Boreal	pelagic
	<i>Gadus morhua/</i> Atlantic	widely	Boreal	benthopelagic

	cod			
	Melanogrammus aeglefinus/ Haddock	western and central areas	Boreal	benthopelagic
	Merlangius merlangius/ Whiting	western areas	Boreal	benthopelagic
	Micromesistius poutassou/ Blue whiting	western and central areas	Boreal	neritic-pelagic
	Pollachius virens/ Saithe	western and central areas	Boreal	pelagic to benthopelagic
	Trisopterus esmarkii/ Norway pout	western and central areas	Boreal	neritic-pelagic and benthopelagic
Gasterosteidae	Gasterosteus aculeatus/ Three-spined stickleback	southern area	Boreal	neritic-pelagic
Liparidae	Liparis fabricii/ Gelatinous snailfish	northern	Arctic	benthopelagic
	Liparis tunicatus/ Kelp snailfish	central	Arctic	demersal
	Liparis bathybius/ Black sea snail	north of Svalbard	Arctic	benthopelagic
	Rhodichthys regina/Threadfin sea snails	north of Svalbard	Arctic	benthopelagic
Lophiidae	Lophius piscatorius/ Anglerfish	northern coast of Norway	Boreal	demersal
Lotinae	Brosme brosme/ Cusk	western	Boreal	demersal
	Molva molva/ Ling	western	Boreal	demersal
Myctophidae	Benthosea glaciale / Glacier lanternfish	around Svalbard	Boreal	mesopelagic
	Lampanyctus macdonaldi/ Rakery beaconlamp	west of Svalbard	Boreal	mesopelagic
Osmeridae	Mallotus villosus/ Capelin	central and northern areas/widely	Boreal	pelagic
	Osmerus eperlanus/ European smelt	southern, coast	Boreal	pelagic-neritic
Paralepididae	Arctozenus risso/ White barracudina	western, central and northwestern areas	Boreal	mesopelagic
Petromyzontidae	Lethenteron japonicum/ Arctic lamprey	from Finnmark to Novaya Zemlya	Boreal	anadromous
Pleuronectidae	Hippoglossoides platessoides/ Long rough dab	widely	Boreal	demersal
	Hippoglossus hippoglossus/ Atlantic halibut	coast of north Norway	Boreal	demersal to benthopelagic
	Limanda limanda/ Dab	along the Norwegian coast and southern area	Boreal	demersal
	Microstomus kitt/ Lemon	along the Norwegian	Boreal	demersal

	sole	and Russian coast		
	Pleuronectes glacialis/ Arctic flounder			
	Pleuronectes platessa/ European plaice	southern area	Boreal	demersal
	Reinhardtius hippoglossoides/ Greenland halibut	northern area/widely	Boreal	demersal to benthopelagic
Psychrolutidae	Cottunculus microps/ Polar sculpin	western and northwestern	Arctic	demersal
Rajidae	Amblyraja hyperborean/ Arctic skate	eastern and northern area	Arctic	demersal
	Amblyraja radiata/ Thorny skate	widely	Boreal	demersal
	Dipturus linteus/ Sailray	southwest	Boreal	demersal
	Rajella fyllae/ Round ray	western area	Boreal	demersal
Salmonidae	Salmo salar/ Atlantic salmon	central	Boreal	anadromous
Scombridae	Scomber scombrus/ Mackerel	southwestern area	Boreal	nerito-pelagic
Scorpaenidae	Sebastes marinus/ Golden redfish	western and central areas	Boreal	pelagic to bentopelagic
	Sebastes mentella/ Brecked redfish	widely except southern and eastern areas	Boreal	pelagic to bentopelagic
	Sebastes viviparus / Norway redfish	southwest	Boreal	demersal to benthopelagic
Squalidae	Somniosus microcephalus/ Greenland shark	northern area	Boreal	demersal
Sternoptychidae	Maurolicus muelleri/ Pearlside	western and central areas	Boreal	mesopelagic
Stichaeidae	Anisarchus medius/ Stout eelblenny	widely, except southwest	Arctic	demersal
	Leptoclinus maculatus/ Daubed shanny	widely	Arcto- boreal	demersal
	Lumpenus lampretaeformis/ Snake blenny	widely	Boreal	demersal
	Lumpenus fabricii/ Slender eelblenny	eastern	Arctic	demersal
Triglidae	Eutrigla gurnardus/ Grey gurnard	southwestern area	Boreal	benthic
Zoarcidae	Lycodes esmarkii/ Esmark's eelpout	western, northwestern areas	Boreal	demersal
	Lycodes eudipleurostictus/ Double line eelpout	central, northwestern areas	Arctic	demersal
	Lycodes gracilis/ Vahl's	widely except eastern	Boreal	demersal

	eelpout	area		
	<i>Lycodes luetkenii</i> / Lutken's eelpout	northwestern area	Arctic	demersal
	<i>Lycodes pallidus</i> / Pale eelpout	widely except southern and western areas	Arctic	demersal
	<i>Lycodes polaris</i> / Canadian eelpout	eastern area	Arctic	demersal
	<i>Lycodes reticulatus</i> / Arctic eelpout	northern area	Arctic	demersal
	<i>Lycodes rossi</i> / Threespot eelpout	northern area	Arctic	demersal
	<i>Lycodes seminudus</i> / Longear eelpout	northern area	Arctic	demersal
	<i>Lycodes squamiventer</i> / Scalebelly eelpout	northwestern area	Arctic	demersal
	<i>Lycodon flagellicauda</i> /	northwestern area	Arctic	demersal
	<i>Lycenchelys kolthoffi</i> / Checkered wolf eel	northern area	Arctic	demersal
	<i>Lychenchelus muraena</i> / Moray wolf eel	northwestern area	Arctic	demersal