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# Soft bottom macrofauna of an All Taxa Biodiversity Site: Hornsund (77°N, Svalbard)

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**Abstract**: Hornsund, an Arctic fjord in the west coast of Spitsbergen (Svalbard), was selected as All Taxa Biodiversity Inventory (ATBI) site under EU 5th Framework Concerted Action BIOMARE (2000–2002), especially due to its pristine, undisturbed natural character. On the base of large material (89 stations located throughout the fjord and 129 Van Veen grab samples) collected during cruises of RV *Oceania* in July in 2002, 2003, 2005 and 2007 and literature search a comprehensive list of species recorded within Hornsund area, on the soft bottom with depth range of 30–250 m is provided. Over 220 species were identified including 93 species of Polychaeta, 62 species of Mollusca and 58 species of Crustacea. Species list is supported by information on the zoogeographical status, body length and biological traits of dominant species. Need for further research on Hornsund soft bottom fauna with more sampling effort is highlighted.

Key words: Arctic, Spitsbergen, Hornsund, macrobenthos, biodiversity, inventory.

## Introduction

Arctic habitats are now facing rapid transformations mainly due to the global changes such as increasing temperatures (ACIA 2005). The broad scale of human activities is also a threat to the marine biodiversity. Importance of biodiversity, on the species level and further extended to communities and ecosystems, is now

widely accepted and questions raising the issue of species number on the earth are still far from answer (Boero and Bonsdorff 2007). Therefore studies on the species occurrence in particular areas and habitats are of large value.

As it is clearly not possible to produce comprehensive inventories of marine biodiversity throughout Europe at a large number of locations which would cover the full range of taxa at all hierarchical levels of biodiversity, EU 5th Framework Concerted Action BIOMARE (2000–2002) came up with idea of a nested approach. The aim was to initiate and intensify studies at a small number of reference sites and combine them with extensive studies at a larger number of sites. It resulted in selecting net of European Marine Biodiversity Sites (EMBS) of which some were chosen as All Taxa Biodiversity Inventory (ATBI) sites. The idea of ATBI sites included direct assessment of biodiversity in limited protected areas and species inventory. The idea was later continued by Marine Biodiversity and Ecosystem Functioning EU Network of Excellence MarBEF. Following especially the criteria of pristineness (as free as possible from anthropogenic and atypical for the region natural stressors), Hornsund, an Arctic fjord in west coast of Spitsbergen (Svalbard), within the borders of national park (Sorspitsbergen Nasjonalpark), was selected as ATBI site (Warwick *et al.* 2003).

The main aim of this article is to present an updated list of macrofauna species occurring in Hornsund area, on the soft bottom with depth range of 30–250 m along with the information on their zoogeographic status. Furthermore, data on species length and biological traits are provided as they are useful background parameters that allow description of growth rates, energy consumption and breeding strategies in marine invertebrates (Parry *et al.* 1999; White *et al.* 2007).

## Material and methods

**Fjord characteristics**. — Hornsund is a medium size Arctic fjord (30 km length, 12–15 km wide) in the west coast of Spitsbergen island of Svalbard archipelago, with a maximum depth of 260 m and weak sill in the entrance. Fjord is heavily influenced by cold Sorkapp Current carrying Arctic waters from the eastern part of Svalbard archipelago while occasional intrusions of Atlantic waters are observed from the West Spitsbergen Current carrying relatively warm waters. The fjord opening is exposed to coastal Barents Sea waters, warmer and more saline Atlantic waters, and inner fjord basin is filled with supercooled winter water of temperature below zero all the year round (Swerpel 1985; Węsławski *et al.* 1991, 1995). There are eight major tidal glaciers located in the central and inner parts. Tidal glaciers form large part of the inner fjord basin coastline and the banks of the inner basin, Brepollen, are almost entirely formed by cliffs of tidal glaciers. The subtidal sediments in the fjord are composed mostly of silt and clay (Włodarska-Kowalczuk and Węsławski 2008). The sediment accumulation rate in Brepollen

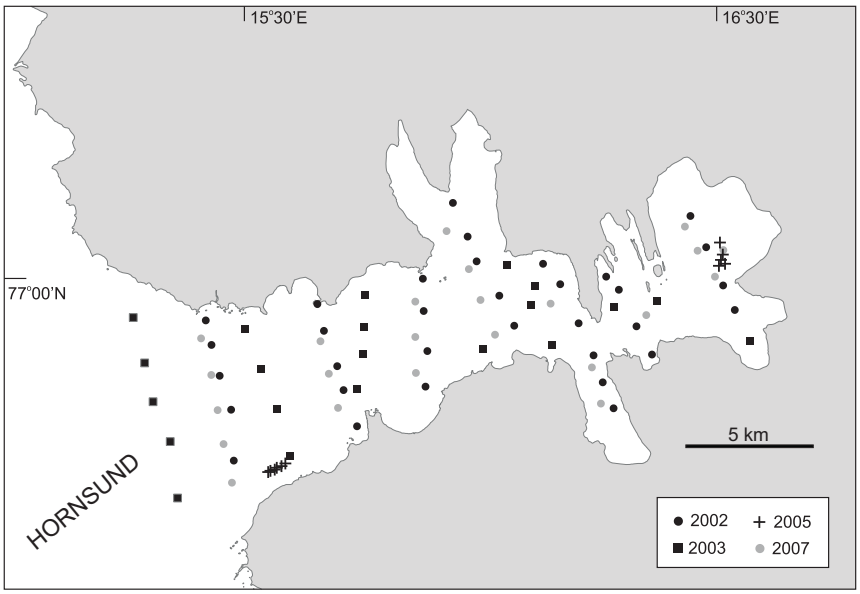


Fig. 1. Location of sampling stations in Hornsund.

may reach 35 cm year$^{-1}$, while in the outer parts of Hornsund it is as low as 0.1 cm year$^{-1}$ (Görlich *et al.* 1987). Winter fast ice is present between December and June, while ice pack advected from Barents Sea occurs from May to July (Görlich *et al.* 1987). Primary production is high, estimated up to 120 gCm$^{-2}$year$^{-1}$ (Eilertsen *et al.* 1989; Piwosz *et al.* 2009). The Polish *Siedlecki* Station in Hornsund is the only permanently inhabited site in the area.

**Sampling**. — Material was collected during cruises of RV *Oceania* in July in 2002, 2003, 2005, and 2007. 89 stations located throughout the fjord at depths varying from 27 to 237 m were sampled. At each station one Van Veen grab (0.1 m$^2$) sample was taken except from the cruise in 2005 when 12 stations with four replicates Van Veen grab samples per each station were taken. Altogether 129 Van Veen samples were collected (Fig. 1, Table 1). Material was sieved onboard through 0.5 mm mesh and fixed in buffered 4% formaldehyde. Macrofauna was sorted,

Table 1

Sampling effort and basic information on samples used in the present study

| Sampling years | Depths of sampling | Number of sampled stations | Number of collected samples |
|---|---|---|---|
| 2002 | 25–203 | 33 | 33 |
| 2003 | 49–237 | 21 | 21 |
| 2005 | 100–120 | 12 | 48 |
| 2007 | 102–206 | 23 | 27 |
| Total: | | 89 | 129 |

counted and identified to the lowest possible taxonomic level. Identification of species as well as their zoogeographical ranges were based on the following literature for: Polychaeta: Holthe (1986), Hartmann-Schröder (1996), Jirkov (2001), Crustacea: Sars (1890), Gajewska (1948), Gurjanova (1951), Klekowski and Węsławski (1991), Mollusca: Gajewska (1948), Coan *et al.* (2000), Sipuncula: Cutler (1994), Kędra and Murina (2008), Priapulida: van der Land (1970), Echinodermata: D'yakonov (1967, 1968, 1969) and the taxonomic nomenclature is after ERMS (http://www.marbef.org/data/erms.php). Other groups were identified to the lowest possible level. Full list of taxa is presented (Table 2).

Table 2

List of soft bottom species that occurred in Hornsund at depth range from 27 to 237 m * – this study, [1] – Gromisz (1992), [2] – Jażdżewski *et al.* (1995), [3] – Węsławski (1990), [4] – Legeżyńska *et al*. (2000)

**Polychatea**

*Aglaophamus malmgreni* (Théel, 1879) *, [1]
*Ampharete acutifrons* (Grube, 1860)*
*Ampharete goesi* Malmgren, 1866 *
*Ampharete finmarchica* (M. Sars, 1864) *
*Amphicteis gunneri* (M. Sars, 1835) *
*Anaitides citrina* (Malmgren, 1865) [1]
*Anaitides groenlandica* (Oersted, 1842) [1, 4]
*Anobothrus gracilis* (Malmgren, 1866) *
*Aphelochaeta marioni* (de Saint Joseph, 1894) *
*Aphelochaeta* spp.*
*Ampharete* sp. [1]
*Amphitrite cirrata* *, [1]
*Apistobranchus tullbergi* (Théel, 1879) *
*Aricia* (*Allia*) *suecica* Eliason, 1920 *
*Artacama proboscidea* Malmgren, 1866 *
*Brada inhabilis* (Rathke, 1843) *
*Brada rugosa* (Hansen, 1882) *
*Brada villosa* (Rathke, 1843) *, [1]
*Bushiella* (*Jugaria*) *quadrangularis* (Stimpson, 1854)*
*Bylgides elegans* (Théel, 1879) *
*Bylgides sarsi* (Malmgren, 1866) [1]
*Capitella capitata* agg. (Fabricius, 1780) *, [1]
*Chaetozone christiei* agg. Chambers 2000 *
*Chaetozone setosa* agg. Malmgren, 1867 *, [1]
*Chaetozone* cf. *jubata* Chambers *et* Woodham, 2003*
*Chaetozone* spp. *
*Chone duneri* Malmgren, 1867*, [1]
*Chone fauveli* McIntosh,1916*
*Chone* cf. *paucibranchiata* (Krøyer, 1856)*
*Cirratulus* cf. *caudatus* Levinsen, 1893*
*Cirratulus cirratus* (O. F. Müller, 1776)*
*Cossura longocirrata* Webster *et* Benedict, 1887*, [1]
*Cossura pygodactylata* Jones, 1956*
*Diplocirrus longisetosus* (Marenzeller,1890)*
*Dipolydora quadrilobata* (Jacobi, 1883)[1]
*Enipo (Nemidia) torelli* Malmgren,1865*
*Erinaceusyllis erinaceus* (Claparéde, 1863)*
*Eteone barbata* Malmgren, 1865 [1]
*Eteone flava* (Fabricius, 1780) *, [1]
*Eteone longa* (Fabricius, 1780) *,[1]
*Eteone spetsbergensis* Malmgren, 1865 *, [1]
*Euchone analis* (Krøyer, 1856) *
*Euchone papillosa* (M. Sars, 1851) [1]
*Euchone* spp. *
*Eunoe nodosa* (M. Sars, 1861) [1]
*Microclymene* sp. / *Clymenura polaris* *
*Exogone naidina* Oersted, 1845 *
*Fabricia sabella* (Ehrenberg, 1836) [1]
*Flabelligera affinis* M. Sars, 1829 [1]
*Galathowenia oculata* (Zaks, 1922) *
*Gattyana cirrhosa* (Pallas, 1766) *, [1]
*Harmothoe imbricata* (Linnaeus, 1767) *, [1]
*Harmothoe* cf. *viridis* *
*Harmothoe* sp. *
*Heteromastus filiformis* (Claparéde, 1864) *
*Lanassa nordenskioeldi* Malmgren, 1866 *
*Laonice cirrata* (M. Sars, 1851) *
*Laonice bahusiensis* Söderström, 1920 *
*Laonome kroeyeri* Malmgren, 1866 *, [1]
*Laphania boecki* Malmgren, 1866 *
*Leaena ebranchiata* (M. Sars, 1865) *
*Leitoscoloplos mammosus* Mackie, 1987 *
*Levinsenia gracilis* (Tauber, 1879) *
*Levinsenia* sp. *
*Lumbrineris* cf. *mixochaeta* Oug, 1998 *
*Lumbrineris fragilis* (O.F. Müller, 1766) [1]
*Lumbrineris* sp. *
*Lysippe labiata* Malmgren, 1866 *, [1]
*Maldane sarsi* Malmgren, 1865 *, [1]
*Malmgreniella glabra* (Malmgren, 1866) [1]
*Melinna cristata* (M. Sars, 1851) *
*Melinna elisabethae* McIntosh, 1918 *
*Microphthalmus sczelkowii* Metschnikow, 1865 *
*Myriochele heeri* Malmgren, 1867 *
*Nephtys ciliata* (O.F. Müller, 1776) *,[1]
*Nephtys hombergii* Savigny in Lamarck, 1818 [1]

Table 2 – *continued*.

*Nephtys incisa* Malmgren, 1865 [*]
*Nereimyra punctata* (O.F. Müller, 1788) [*,1]
*Nereis pelagica* Linnaeus, 1758 [1]
*Nereis* sp. [*]
*Nicomache minor* Arwidsson, 1906 [*]
*Nothria conchylega* (M. Sars, 1835) [1]
*Ophelina acuminata* Oersted, 1843 [*, 1]
*Ophiodromus* sp. [*]
*Owenia fusiformis* Delle Chiaje, 1844 [*, 1]
*Paraonella nordica* Strelzov, 1973 [*]
*Paronella* sp. [*]
*Pectinaria* (*Cistenides*) *hyperborea* (Malmgren, 1866)[*]
*Pholoe assimilis* Oersted, 1845 [*]
*Pholoe minuta* (Fabricius, 1780) [1]
*Phyllodoce groenlandica* Oersted, 1842 [*]
*Phyllodoce maculata* (Linnaeus, 1767) [*]
*Pista* sp. [1]
*Pygospio elegans* Claparède, 1863 [1]
*Polycirrus arcticus* M. Sars, 1865 [*]
*Polycirrus medusa* Grube, 1850 [*]
*Polydora* sp. [*]
*Praxillella gracilis* (M. Sars, 1861) [*]
*Prionospio cirrifera* Wirén, 1883 [*]
*Proceraea cornuta* (Agassiz, 1884) [*]
*Proclea malmgreni* (Solowiew, 1899) [*]
*Sabellides borealis* M. Sars, 1856 [*]
*Sabellides octocirrata* (M. Sars, 1835) [1]
*Scalibregma inflatum* Rathke, 1843 [*]
*Scoletoma fragilis* (O.F. Müller, 1776) [*]
*Scoloplos* (*Scoloplos*) *armiger* (Müller, 1776) [1]
*Sphaerodoropsis* sp. [*]
*Spio filicornis* (Müller, 1776) [1]
*Spio* spp. [*]
*Spiochaetopterus typicus* M. Sars, 1856 [*]
*Spiophanes kroeyeri* Grube, 1860 [*]
*Spirorbis spirillum* (Linnaeus, 1758) [1]
*Syllides* sp. [*]
*Syllidia armata* Quatrefages, 1866 [*]
*Syllis* (*Ehlersia*) *cornuta* Rathke, 1843 [*, 1]
*Terebellides stroemi* agg. M. Sars, 1835 [*, 1]
*Travisia forbesii* Johnston, 1840 [1]

**Crustacea**

*Acanthostepheia malmgreni* (Goes, 1866) [2]
*Aceroides latipes* (G.O. Sars, 1883) [*]
*Ampelisca eschrichtii* Krøyer, 1842 [*, 2, 3]
*Anonyx laticoxae* Gurjanova, 1962 [2, 4]
*Anonyx nugax* (Phipps, 1774) [*, 2, 3, 4]
*Anonyx sarsi* Steele *et* Brunel, 1968 [2, 3, 4]
*Anonyx* spp. [4]
*Apherusa glacialis* (Hansen, 1888) [2]
*Apherusa sarsi* Shoemaker, 1930 [2]
*Arrhis phyllonyx* (M. Sars, 1858) [*, 2, 3]
*Atylus carinatus* (Fabricius, 1793) [2]
*Balanus balanus* (Linnaeus, 1758)[*]
*Byblis gaimardi* (Krøyer, 1846) [*, 2]
*Calliopius laeviusculus* (Krøyer, 1838) [2, 3, 4]
*Caprella septentrionalis* Krøyer, 1838 [2, 4]
*Campylaspis rubicunda* (Liljeborg, 1855) [*]
*Diastylis* cf. *rathkei* (Krøyer, 1841) [*]
*Diastylis goodsiri* (Bell, 1855) [*]
*Diastylis lucifera* (Krøyer, 1837) [*]
*Diastylis scorpioides* (Lepechin, 1780) [*]
*Diastylis* sp. [*]
*Eualus gaimardii* (H. Milne-Edwards, 1837) [4]
*Eudorella emarginata* (Krøyer, 1846) [*]
*Gammarellus homari* (Fabricius 1779) [2, 3, 4]
*Gammarus oceanicus* Segerstråle, 1947 [2, 3, 4]
*Gammarus setosus* Dementieva, 1931 [2, 3, 4]
*Gammarus wilkitzkii* Birula, 1897 [2]
*Goesia depressa* (Goes, 1866) [*, 2, 3]
*Halirages fulvocincta* (M. Sars, 1858) [2]
*Haploops tubicola* Liljeborg, 1855[*, 2, 3]
*Harpinia serrata* Sars, 1878 [2]
*Hemilamprops cristatus* (G.O. Sars, 1870) [*]
*Hyas araneus* (Linnaeus, 1758) [*, 4]
*Hyperia galba* (Montagu, 1815) [2]
*Hyperoche medusarum* (Krøyer, 1838) [2]
*Ischyrocerus anguipes* Krøyer, 1838 [2, 3, 4]
*Ischyrocerus megalops* G.O. Sars, 1894 [*]
*Lepidepecreum umbo* (Goes, 1866) [*, 2, 3]
*Leptognathia* sp. [*]
*Leucon* (*Leucon*) *fulvus* Sars, 1865 [*]
*Leucon* (*Leucon*) *nasica* (Krøyer, 1841) [*]
*Leucon* (*Leucon*) *nathorsti* Ohlin, 1901 [*]
*Leucon* (*Alytoleucon*) *pallidus* G.O. Sars, 1865 [*]
*Leucon* sp. [*]
*Melita formosa* Murdoch, 1866 [*, 2]
*Melita dentata* (Krøyer, 1842) [2]
*Melphidippa goesi* Stebbing, 1899 [2]
*Menigrates obtusifrons* (Boeck, 1861) [*, 2, 3]
*Metopa boeckii* G.O. Sars, 1892 [*]
*Metopa bruzelii* (Goes, 1866) [2]
*Metopa* sp. [*]
*Monoculodes borealis* Boeck, 1871 [2]
*Monoculodes packardi* Boeck, 1871 [*, 2]
*Monoculopsis longicornis* (Boeck, 1871) [*, 2]
*Mysis oculata* (Fabricius, 1780) [4]
*Munnopsis typica* M. Sars, 1861[*]
*Neohela monstrosa* (Boeck, 1861) [*, 2]
*Neopleustes pulchellus* (Krøyer, 1846) [2]
*Odius carinatus* (Bate 1862) [2]
*Onisimus brevicaudatus* Hansen, 1886 [2, 3]
*Onisimus caricus* Hansen, 1886 [2, 3, 4]
*Onisimus edwardsi* (Krøyer, 1846) [*, 2, 3, 4]

Table 2 – *continued*.

*Onisimus littoralis* (Krøyer, 1845) [2, 3, 4]
*Onisimus plautus* Krøyer, 1845 [*]
*Orchomene minutus* (Krøyer, 1846) [3, 4]
*Orchomene serratus* (Boeck, 1861) [*]
*Orchomenella minuta* (Krøyer, 1846) [*, 2]
*Pagurus pubescens* Krøyer, 1838 [*, 4]
*Parapleustes bicuspis* (Krøyer, 1838) [*, 2]
*Parapleustes monocuspis* (G.O. Sars, 1893) [2]
*Paroediceros lynceus* (M. Sars, 1858) [*, 2, 4]
*Phoxocephalus holbolli* (Krøyer, 1842) [*]
*Pleurogonium spinosissimum* G.O. Sars, 1868 [*]
*Pleustes medius* (Goes, 1866) [2]
*Pleustes panopla* (Krøyer, 1838) [2]
*Pleusymtes glabroides* (Dunbar, 1954) [2]
*Pontoporeia femorata* Krøyer, 1842 [*, 2]
*Protomedeia grandimana* Brüggen, 1905 [*]
*Protomedeia* sp. [*]
*Pseudomma truncatum* S.I. Smith, 1879 [*]
*Rhachotropis aculeata* (Lepechin, 1780) [*]
*Rozinante fragilis* (Goes, 1866) [2]
*Sabinea septemcarinata* (Sabine, 1824) [*]
*Stegocephalus inflatus* Krøyer, 1842 [*, 2]
*Stenopleustes latipes* (M. Sars, 1858) [*]
*Spirontocaris spinus* (Sowerby, 1805) [*]
*Syrrhoe crenulata* Goës, 1866 [*, 2]
*Themisto abyssorum* Boeck, 1870 [*, 2]
*Themisto libellula* (Lichtenstein, 1822) [*, 2]
*Themisto compressa* Goes, 1865 [2]
*Thysanoessa inermis* (Krøyer, 1846) [*]
*Tiron spiniferus* (Stimpson, 1853) [*]
*Unciola leucopis* (Krøyer, 1845) [*, 2, 3]
*Westwoodilla brevicalcar* Goes, 1866 [*]
*Weyprechtia pinguis* Krøyer, 1838 [2]

**Bivalvia**

*Astarte borealis* (Schumacher, 1817) [*]
*Astarte elliptica* (Brown, 1827) [*]
*Astarte montagui* (Dillwyn, 1817) [*]
*Axinopsida orbiculata* (G.O. Sars,1878) [*]
*Ciliatocardium ciliatum* (Fabricius,1780) [*]
*Cuspidaria subtorta* (G.O. Sars, 1878) [*]
*Dacrydium vitreum* (Müller, 1842) [*]
*Diplodonta torelli* Jeffreys, 1847 [*]
*Ennucula tenuis* (Montagu, 1808) [*]
*Hiatella arctica* (Linnaeus,1767) [*]
*Macoma calcarea* (Gmelin, 1791) [*]
*Macoma moesta* Deshayes, 1855 [*]
*Macoma torelli* (Jensen, 1905) [*]
*Montacuta spitzbergensis* Knipowitsch, 1901 [*]
*Musculus corrugatus* (Stimpson, 1851) [*]
*Musculus discors* (Linnaeus, 1767) [*]
*Musculus niger* (J.E. Gray, 1824) [*]
*Mya truncata* Linnaeus, 1758 [*]
*Mysella sovaliki* MacGinitie, 1959 [*]
*Nuculana pernula* Müller, 1779 [*]
*Portlandia arctica* (J.E. Gray, 1824) [*]
*Serripes groenlandicus* (Mohr, 1786) [*]
*Thracia devexa* G.O. Sars, 1878 [*]
*Thracia myopsis* Müller, 1842 [*]
*Thyasira dunbari* Lubinsky 1976 [*]
*Thyasira gouldi* (Philippi, 1845) [*]
*Thyasira sarsi* (Philippi, 1845) [*]
*Thyasira* sp. n. (see Bouchet and Warén 1979) [*]
*Yoldia hyperborea* Torell, 1859 [*]
*Yoldiella frigida* (Torell, 1859) [*]
*Yoldiella lenticula* (Müller, 1842) [*]
*Yoldiella lucida* (Lovén, 1846) [*]
*Yoldiella solidula* Warén, 1989 [*]

**Caudofoveata**

*Chaetoderma nitidulum* Lovén, 1844 [*]

**Gastropoda**

*Admete viridula* (Fabricius, 1780) [*]
*Alvania* sp. [*]
*Boreotrophon truncatus* (Ström, 1768) [*]
*Buccinum polare* J.E. Gray, 1839 [*]
*Buccinum scalariforme* Müller, 1842 [*]
*Buccinum undatum* (Linnaeus, 1758) [*, 4]
*Cryptonatica affinis* (Gmelin, 1791) [*]
*Cylichna* cf.*alba* (Brown, 1827) [*]
*Cylichna* cf. *occulta* (Mighels *et* Adams, 1842) [*]
*Euspira pallida* (Broderip *et* G.B. Sowerby, 1829) [*]
*Frigidoalvania cruenta* (Odhner, 1915) [*]
*Lepeta caeca* (Müller, 1776) [*]
*Margarites costalis* (Gould, 1841) [*]
*Margarites groenlandicus* (Gmelin, 1791) [*]
*Margarites helicinus* (Phipps, 1774) [*]
*Margarites olivaceus* Brown, 1827 [*]
*Menestho truncatula* Odhner, 1915 [*]
*Oenopota impressa* (Mørch, 1969) [*]
*Oenopota nobilis* (Müller, 1842) [*]
*Oenopota pyramidalis* (Ström, 1788) [*]
*Oenopota* spp. [*]
*Onoba aculeus* (Gould, 1841) [*]
*Retusa* sp. [*]
*Tachyrhynchus erosus* (Couthouy, 1838) [*]

Table 2 – *continued*.

*Trophon clathratus* (Linnaeus, 1767) *
*Turritellopsis stimpsoni* (Dall, 1919) *

**Polyplacophora**
*Ischnochiton albus* (Linnaeus, 1767) *

**Sipuncula**
*Golfingia elongata* (Keferstein, 1862) *
*Golfingia margaritacea* (M. Sars, 1851) *
*Golfingia vulgaris* (de Blainville, 1827) *
*Nephasoma diaphanes diaphanes* (Gerould, 1913) *
*Nephasoma diaphanes corrugatum* N. Cutler *et* Cutler, 1986 *

**Priapulida**
*Halicryptus spinulosus* von Siebold, 1849 *
*Priapulus caudatus* Lamarck, 1816 *

**Echinodermata**
*Amphiura sundevalli* (Müller *et* Troschel, 1842) *
*Hippasteria phrygiana* (Parelius, 1768) *
*Ophiocten sericeum* (Forbes, 1852) *
*Ophiura robusta* (Ayres, 1851) *
*Urasterias lincki* (Müller *et* Troschel, 1842) [4]
Holoturoidea indet. *

**Hexacorallia**
*Cerianthus lloydi* Gosse, 1859 *
*Edwardsia finmarchica* Carlgren, 1921 *

The species accumulation curves with 95% confidence intervals for the number of observed species (*S*obs) and *Chao2* estimator were computed using the formulae of Colwell (2009) and plotted as a function of the sampling effort. Frequency of occurrence (percentage of samples where a species was found in total number of samples) and dominance (percentage of the individuals of a particular species in total number of all animals found in all samples) were calculated for all species. Results are represented only for species, which occurred in more than 15% of samples or were presented in all samples by more than 10 individuals. For these species zoogeographical status as well as feeding type and mobility are given. Functional groups classification followed Fauchald and Jumars (1979), Bonsdorff and Pearson (1999) and Hartmann-Schröder (1996) supplied with WoRMS (http://www.marinespecies.org/index.php) and own observations. Three mobility types were recognized: motile, discretely motile and sessile as well as five major feeding groups: subsurface deposit feeders, surface deposit feeders, filter feeders, carnivores and grazers. Length measurements of specimens were performed under a stereoscope with 0.1mm accuracy.

## Results

Over 300 taxa of macrofauna were recorded from the collected material from which over 220 were identified to the species level including 93 species of Polychaeta, 62 species of Mollusca, 58 species of Crustacea and 13 representatives

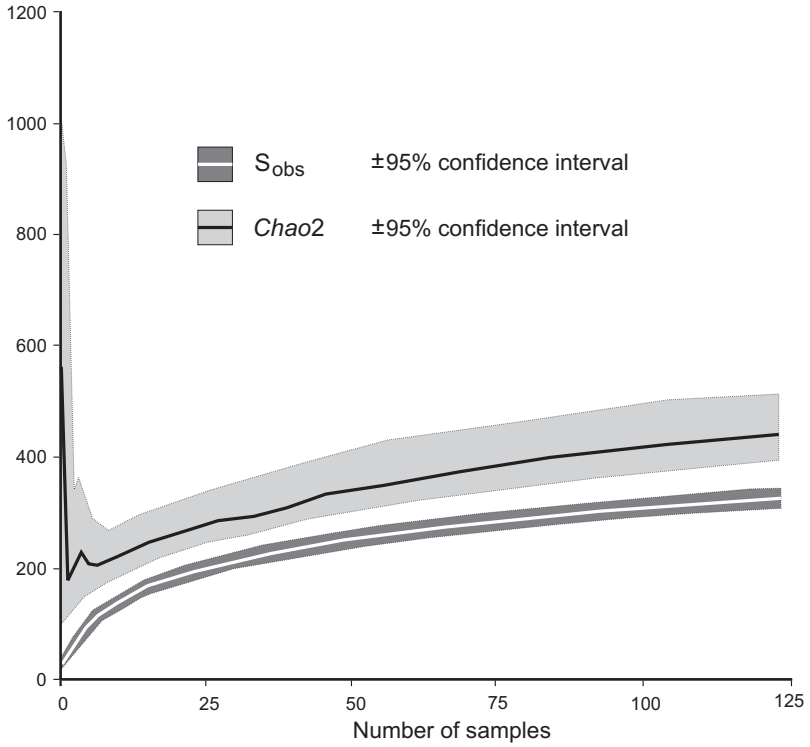


Fig. 2. Species accumulation curves plotted for observed number of species (*S*obs) and the true number of species estimated using *Chao2*. *S*obs and *Chao2* are plotted with 0.95 confidence.

of other major taxa (Table 2). Species-accumulation curves did not reach an asymptotic values in case of both observed values and estimated number of species (Fig. 2). *Chao2* gave an estimate of 430 species. Since the observed total number of species was below the 0,95 confidence interval of estimated number of species (with 95% confidence intervals from 390 to 517), it is likely that there are still new species to be found at soft bottom in Hornsund.

Only 126 species were found in more than 15% of the samples, or their abundance exceeded 10 individuals in the collection (Table 2). Seven species: an amphipod *Ampelisca eschrichtii*, polychaetes: *Capitella capitata* agg., *Cossura longocirrata, Maldane sarsi*, *Leitoscoloplos mammosus*, *Polycirrus arcticus* and one bivalve: *Ennucula tenuis* had high frequency of occurrence (from 20% to 100%) in all years and four species of polychaetes (*Cossura longocirrata, Chaetozone setosa, Lumbrines* cf. *mixochaeta*, *Aphelochaeta* spp.) had more than 10% dominance in two years of sampling at least (Table 3). Fifty eight species were of Arctic-boreal origin, 15 were of Arctic origin while boreal and cosmopolitan species were represented by seven taxa each. Forty nine species were discretely motile and 29 – sessile, whereas in terms of feeding types most were surface deposit feeders (50) and filtrators (20) (Table 4).

Table 3

Frequency of occurrence (F) and dominance (D) of selected species in all years of sampling in Hornsund at depths from 27 to 237 m

| | 2002 | | 2003 | | 2005 | | 2007 | |
|---|---|---|---|---|---|---|---|---|
| | F | D | F | D | F | D | F | D |
| Actiniaria indet. | | | 31.81 | 0.85 | | | 19.23 | 0.10 |
| *Admete viridula* | | | 18.18 | 0.13 | | | | |
| *Aglaophamus malmgreni* | | | | | 44.18 | 0.35 | 42.30 | 0.19 |
| *Ampelisca eschrichtii* | 32.35 | 0.3 | 22.72 | 0.37 | 32.55 | 0.08 | 30.76 | 0.14 |
| *Ampharete goesi* | | | | | 25.58 | 0.06 | | |
| *Amphiura sundevalli* | | | | | | | | |
| *Anobothrus gracilis* | | | | | 55.81 | 0.33 | 23.07 | 0.08 |
| *Anonyx nugax* | 17.64 | 0.1 | | | | | 15.38 | 0.03 |
| *Aphelochaeta marioni* | | | | | | | 50 | 1.87 |
| *Aphelochaeta* spp. | | | | | 100 | 37.71 | 96.15 | 20.29 |
| *Apistobranchus tullbergi* | | | | | 55.81 | 6.42 | 30.76 | 2.518 |
| *Aricidea (Allia) suecica* | | | | | | | 50 | 0.23 |
| *Arrhis phyllonyx* | 29.41 | 0.24 | | | | | 30.76 | 0.13 |
| *Artacama proboscidea* | | | | | 53.48 | 0.41 | | |
| *Astarte borealis* | 8.82 | 0.19 | | | | | | |
| *Astarte montagui* | 8.82 | 0.16 | 27.27 | 0.21 | 39.53 | 0.1 | 19.23 | 0.07 |
| *Axinopsida orbiculata* | 11.76 | 0.25 | | | | | | |
| *Balanus balanus* | | | 4.45 | 0.35 | | | | |
| *Brada inhabilis* | | | 22.72 | 0.5 | | | | |
| *Brada villosa* | | | | | 27.9 | 0.05 | | |
| *Bylgides elegans* | | | | | 23.25 | 0.04 | 23.07 | 0.05 |
| *Capitella capitata* agg. | 41.17 | 4.02 | 50 | 4.56 | 67.44 | 0.57 | 57.69 | 0.75 |
| *Cerianthus lloydi* | | | | | 18.6 | 0.03 | | |
| *Chaetozone setosa* | 79.41 | 38.88 | 68.18 | 25.45 | 100 | 7.91 | 92.30 | 6.83 |
| *Chaetozone christiei* | | | | | 55.81 | 0.63 | 38.46 | 0.27 |
| *Chone fauveli* | | | | | 27.9 | 0.09 | | |
| *Chone paucibranchiata* | | | | | 93.02 | 0.71 | 69.23 | 0.51 |
| *Ciliatocardium ciliatum* | 20.58 | 0.12 | 36.36 | 0.48 | 44.18 | 0.12 | | |
| *Cirratulus caudatus* | | | | | 44.18 | 0.39 | 23.07 | 1.88 |
| *Cossura longocirrata* | 47.05 | 3.81 | 31.81 | 0.48 | 100 | 12.25 | 100 | 9.01 |
| *Cylichna alba* | 41.17 | 0.3 | 27.27 | 0.26 | | | 26.92 | 0.07 |
| *Cylichna occulta* | | | | | 39.53 | 0.13 | | |
| *Diastylis goodsiri* | | | 22.72 | 0.13 | | | 15.38 | 0.06 |
| *Diastylis scorpioides* | | | 18.18 | 0.1 | | | 15.38 | 0.02 |
| *Diplocirrus longisetosus* | | | | | 37.2 | 0.08 | | |
| *Edwardsia* sp. | | | | | | | 26.92 | 0.06 |
| *Eteone flava / longa* | | | | | 79.06 | 1.11 | 65.38 | 0.61 |
| *Euchone analis* | | | | | 37.2 | 0.09 | 26.92 | 0.37 |
| *Euchone* sp. | | | | | 44.18 | 0.53 | 30.76 | 0.08 |
| *Euchone / Chone* | | | | | 20.93 | 0.06 | | |
| *Eudorella emarginata* | 55.88 | 0.54 | | | 44.18 | 0.12 | 73.07 | 0.68 |
| *Ennucula tenuis* | 61.76 | 2.08 | 50 | 1.46 | 20.93 | 0.04 | 65.38 | 0.87 |

Table 3 – *continued*.

| | 2002 | | 2003 | | 2005 | | 2007 | |
|---|---|---|---|---|---|---|---|---|
| | F | D | F | D | F | D | F | D |
| *Erinaceusyllis erinaceus* | | | | | 23.25 | 0.04 | | |
| Eusyllinae indet. | | | | | 23.25 | 0.05 | | |
| *Exogone naidina* | | | | | 16.27 | 0.03 | 34.61 | 0.09 |
| *Frigidoalvania cruenta* | | | | | 34.88 | 0.09 | | |
| *Galathowenia oculata* | | | 36.36 | 0.32 | 46.51 | 0.14 | 42.30 | 0.16 |
| *Gattyana cirrhosa* | | | | | 39.53 | 0.18 | | |
| *Haploops tubicola* | | | | | 25.58 | 0.074 | 26.92 | 0.10 |
| *Harmothoe* cf. *viridis* | | | | | 41.86 | 0.11 | | |
| *Harmothoe imbricata* | | | 22.72 | 0.16 | | | | |
| Harmothoinae indet. | | | 27.27 | 0.18 | | | | |
| *Heteromastus filiformis* | | | | | 95.34 | 1.18 | 96.15 | 1.50 |
| Holothuroidea indet. | 20.58 | 0.12 | | | | | | |
| *Laena ebranchiata* | 5.88 | 0.38 | | | 25.58 | 0.06 | 15.38 | 0.04 |
| *Lanassa nordenskioeldi* | | | | | 53.48 | 0.34 | 23.07 | 0.20 |
| *Laonice* sp.1 | 26.47 | 0.39 | | | | | 34.61 | 0.11 |
| *Laonice* sp.2 | 17.64 | 0.12 | | | | | | |
| *Laphania boecki* | | | | | 30.23 | 0.07 | | |
| *Leitoscoloplos mammosus* | 52.94 | 5.98 | 50 | 5.63 | 60.46 | 4.97 | 73.07 | 7.27 |
| *Lepeta caeca* | | | 9.09 | 0.32 | 32.55 | 0.13 | | |
| *Lepidepecreum umbo* | | | | | | | 30.76 | 0.07 |
| *Leucon nathorsti* | | | | | | | | |
| *Leucon* sp. | | | | | 20.93 | 0.11 | 42.30 | 0.10 |
| *Levinsenia gracilis* | | | | | | | 42.30 | 0.64 |
| *Levinsenia* sp. | | | | | 48.83 | 0.12 | | |
| *Lineus ruber* | | | 27.1 | 0.21 | | | 19.5 | 0.15 |
| *Lumbrineris mixochaeta* | 79.41 | 12.72 | 90.9 | 13.64 | | | 88.46 | 13.79 |
| *Lumbrineris* sp. 1 | 20.58 | 0.27 | | | | | | |
| *Lumbrineris* sp. 2 | 23.52 | 0.18 | | | | | | |
| *Lumbrineris* sp./*Scoletoma fragilis* | | | | | 60.46 | 7.73 | | |
| *Lysippe labiata* | | | | | 51.16 | 0.17 | 30.76 | 0.12 |
| *Macoma calcarea* | 8.82 | 0.15 | | | | | 11.53 | 0.08 |
| *Macoma moesta* | | | 22.72 | 0.21 | | | | |
| *Maldane sarsi* | 50 | 8.1 | 77.27 | 23.18 | 55.81 | 4.55 | 76.92 | 8.07 |
| *Margarites costalis* | 17.64 | 0.09 | 22.72 | 0.18 | | | | |
| *Melita formosa* | 17.64 | 2.84 | 22.72 | 1.49 | 27.9 | 0.97 | | |
| *Melita quadrispinosa* | | | 18.18 | 4.27 | | | | |
| *Menestho truncatula* | 17.64 | 0.21 | | | 44.18 | 0.5 | | |
| *Monoculodes packardi* | | | | | 18.6 | 0.03 | | |
| *Montacuta spitzbergensis* | | | | | 39.53 | 0.32 | | |
| *Musculus corrugatus* | 14.7 | 0.15 | 22.72 | 0.26 | | | | |
| *Musculus niger* | | | 18.18 | 0.13 | | | 15.38 | 0.03 |
| *Myriochele heeri* | | | | | 23.25 | 0.06 | 19.23 | 0.06 |
| *Mysella sovaliki* | 20.58 | 0.15 | | | 51.16 | 0.51 | | |

Table 3 – *continued*.

| | 2002 | | 2003 | | 2005 | | 2007 | |
|---|---|---|---|---|---|---|---|---|
| | F | D | F | D | F | D | F | D |
| *Nemertea* sp. | | | 27.27 | 0.24 | | | 23.07 | 0.21 |
| *Enipo* (*Nemidia*) *torelli* | | | | | 27.9 | 0.04 | | |
| *Nephtys* sp. | 26.47 | 0.39 | | | | | 23.07 | 0.05 |
| *Nereis* sp. | 52.94 | 0.76 | 22.72 | 0.21 | | | | |
| *Nuculana pernula* | 20.58 | 0.22 | 36.36 | 0.5 | | | 46.15 | 0.19 |
| Oligochaeta indet. | | | | | 55.81 | 1.48 | 30.76 | 0.20 |
| *Ophelina acuminata* | | | 18.18 | 0.16 | | | 30.76 | 0.46 |
| Ophiuroidea indet. | | | | | 20.93 | 0.05 | | |
| *Orchomenella minuta* | | | 18.18 | 0.18 | | | | |
| *Pagurus pubescens* | | | | | 48.83 | 0.34 | | |
| *Paraonella nordica* | | | | | 51.16 | 0.42 | 11.53 | 0.08 |
| Paraonidae indet. | | | | | 13.95 | 0.03 | 46.15 | 0.39 |
| *Parougia* sp. | | | | | 55.81 | 0.72 | 15.38 | 0.09 |
| *Pectinaria* (*Cistenides*) *hyperborea* | | | | | 41.86 | 0.12 | 15.38 | 0.06 |
| *Philomedes brenda* | | | 18.18 | 0.13 | | | | |
| *Pholoe assimilis* | | | | | 51.16 | 0.19 | 57.69 | 0.43 |
| *Phyllodoce groenlandica* | | | 45.45 | 1.04 | 41.86 | 0.18 | 30.76 | 0.07 |
| *Phyllodoce* sp. 1 | 50 | 1.17 | | | | | | |
| *Phyllodoce* sp. 2 | 26.47 | 0.27 | | | | | | |
| *Polycirrus arcticus* | 58.82 | 5.21 | 68.18 | 6.03 | 46.51 | 0.85 | 96.15 | 3.17 |
| *Polycirrus medusa* | | | | | 16.27 | 0.03 | | |
| *Polydora* sp. | | | | | 48.83 | 0.22 | 38.46 | 0.37 |
| Polynoidae indet. | 47.05 | 0.82 | | | | | | |
| *Portlandia arctica* | 20.58 | 0.27 | | | | | 15.38 | 0.07 |
| *Praxillella praetermissa* | | | | | 9.3 | 0.08 | | |
| *Priapulus caudatus* | | | | | | | | |
| *Protomedeia* sp. | | | | | 16.27 | 0.04 | | |
| *Retusa* sp. | | | | | 13.95 | 0.05 | | |
| *Scalibregma inflatum* | | | 18.18 | 0.16 | 51.16 | 0.36 | | |
| Sipunculidae indet. | 52.94 | 1.09 | | | | | | |
| *Spio* spp. | | | | | 23.25 | 0.12 | 23.07 | 0.08 |
| *Syllidia armata* | | | 31.81 | 0.24 | | | | |
| *Syllis* (*Ehlersia*) *cornuta* | | | | | 53.48 | 0.48 | 46.15 | 0.63 |
| *Syllides* sp. | | | | | | | 42.3 | 0.37 |
| Tanaidacea indet. | | | | | | | 38.46 | 0.33 |
| *Terebellides stroemi* | | | | | 48.83 | 0.34 | 15.38 | 0.05 |
| *Themisto abyssorum* | | | | | | | 30.76 | 0.08 |
| *Thyasira dunbari* | 17.64 | 0.36 | | | 27.9 | 0.15 | | |
| *Thyasira gouldi* | 29.41 | 0.85 | 18.18 | 0.32 | 13.95 | 0.05 | | |
| *Thyasira sarsi* | | | | | | | 15.38 | 0.05 |
| *Turitellopsis stimpsoni* | | | | | 13.95 | 0.03 | | |
| *Unciola leucopis* | 17.64 | 0.15 | | | 30.23 | 0.09 | 19.23 | 0.09 |
| *Yoldia hyperborea* | 20.58 | 0.25 | 31.81 | 0.45 | 18.6 | 0.04 | 19.23 | 0.08 |

Table 4

Basic characteristics of selected species including mobility and feeding type, minimum, maximum and mean length [mm] and zoogeographic status. P – Polychaeta, CR – Crustacea, M – Mollusca, E – Echinodermata, S – Sipuncula, PR – Priapulida, N – Nemertea; m – motile, dm – discretely motile, s – sessile; ssdf – subsurface deposit feeder, sdf – surface deposit feeder, f – filter feeder, c – carnivore, g – grazer; A – Arctic, AB – Arctic-boreal, B – boreal, K– cosmopolitan

| | Taxa | function | length | zoogeographic status | | | |
|---|---|---|---|---|---|---|---|
| | | mobility | feeding | mean | min | max | |
| P | *Aglaophamus malmgreni* | m | c | 15 | 5 | 30 | B |
| CR | *Ampelisca eschrichtii* | dm | f | 12 | 3 | 21 | AB |
| P | *Ampharete goesi* | s | sdf | 15 | 5 | 30 | A |
| P | *Amphitrite cirrata* | dm | sdf | 10 | 5 | 20 | AB |
| E | *Amphiura sundevalli* | dm | sdf | 10 | 5 | 20 | AB |
| P | *Anobothrus gracilis* | dm | sdf | 10 | 5 | 20 | B |
| CR | *Anonyx nugax* | m | c | 18 | 3 | 36 | A |
| P | *Aphelochaeta marioni* | dm | sdf | 10 | 5 | 20 | K |
| P | *Apistobranchus tullbergi* | dm | sdf | 6 | 3 | 10 | AB |
| CR | *Arrhis phyllonyx* | m | sdf | 8.5 | 2 | 19.5 | A |
| P | *Artacama proboscidea* | dm | sdf | 15.9 | 3 | 28.3 | AB |
| M | *Astarte borealis* | dm | f | 10 | 3 | 30 | AB |
| M | *Astarte montagui* | dm | f | 11.6 | 2 | 21.7 | AB |
| P | *Axinopsida orbiculata* | dm | sdf | 5 | 2 | 10 | AB |
| CR | *Balanus balanus* | s | f | 10 | 3 | 35 | AB |
| P | *Brada inhabilis* | s | sdf | 10 | 15 | 30 | AB |
| P | *Brada villosa* | s | sdf | 8.7 | 3.9 | 18.8 | K |
| P | *Bylgides elegans* | dm | c | 10 | 3 | 15 | AB |
| P | *Capitella* spp. | s | sdf | 10.3 | 6.9 | 14.8 | |
| P | *Chaetozone setosa* | s | sdf | 15 | 5 | 25 | K |
| P | *Chone paucibranchiata* | s | f | 4.5 | 2.3 | 13.6 | B |
| M | *Ciliatocardium ciliatum* | s | f | 26.7 | 3 | 45.5 | AB |
| P | *Cirratulus caudatus* | s | sdf | 6 | 3 | 10 | AB |
| P | *Cossura longocirrata* | s | sdf | 3 | 1.6 | 4.4 | AB |
| M | *Cylichna alba* | dm | sdf | 7 | 4 | 9 | AB |
| M | *Cylichna occulta* | dm | sdf | 7 | 4 | 9 | AB |
| CR | *Diastylis goodsiri* | dm | sdf | 7.8 | 3 | 25.9 | A |
| CR | *Diastylis scorpioides* | dm | sdf | 5.1 | 3 | 8 | AB |
| P | *Diplocirrus longisetosus* | dm | sdf | 10 | 8 | 30 | AB |
| H | *Edwardsia* sp. | s | sdf | 30 | 10 | 60 | |
| P | *Enipo* (*Nemidia*) *torelli* | dm | c | 5 | 3 | 15 | AB |
| P | *Eteone flava / longa* agg. | dm | sdf | 10 | 2 | 30 | |
| P | *Euchone analis* | s | f | 8.6 | 6.6 | 10.2 | K |
| CR | *Eudorella emaginata* | dm | sdf | 5.5 | 1 | 11 | AB |
| M | *Ennucula tenuis* | s | sdf | 3 | 2 | 5 | AB |
| P | *Exogone naidina* | dm | sdf | 10 | 5 | 25 | B |

Table 4 – *continued*.

| | Taxa | function | length | zoogeographic status | | | |
|---|---|---|---|---|---|---|---|
| | | mobility | feeding | mean | min | max | |
| M | *Frigidoalvania cruenta* | dm | sdf | 3 | 2 | 5 | AB |
| P | *Galathowenia oculata* | dm | sdf | 20 | 10 | 30 | AB |
| S | *Golfingia margaritacea* | dm | ssdf | 73 | 35 | 118 | AB |
| CR | *Haploops tubicola* | dm | f | 10 | 2 | 12 | AB |
| P | *Harmothoe* cf. *viridis* | m | c | 55 | 2 | 50 | AB |
| P | *Heteromastus filiformis* | s | sdf | 11.6 | 5.07 | 28.8 | B |
| P | *Lanassa nordenskioeldi* | s | sdf | 19.78 | 2 | 21.3 | A |
| P | *Laphania boecki* | dm | sdf | 5 | 2 | 8 | AB |
| P | *Leaena ebranchiata* | s | sdf | 25.5 | 2 | 46.8 | A |
| P | *Leitoscoloplos mammosus* | dm | | 20 | 10 | 100 | AB |
| M | *Lepeta coeca* | dm | g | 12 | 2 | 15 | AB |
| CR | *Lepidepecreum umbo* | dm | sdf | 4 | 2 | 8 | AB |
| CR | *Leucon nathorsti* | dm | sdf | 4 | 2 | 8 | AB |
| P | *Levinsenia* sp. | dm | sdf | 5 | 2 | 10 | |
| N | *Lineus ruber* | dm | c | 12 | 7 | 30 | AB |
| P | *Lumbrineris mixochaeta* | m | c | 25 | 10 | 100 | AB |
| P | *Lysippe labiata* | s | sdf | 9.8 | 2 | 19.8 | A |
| M | *Macoma calcarea* | s | f | 25 | 2 | 50 | AB |
| M | *Macoma moesta* | s | f | 10 | 5 | 35 | AB |
| P | *Maldane sarsi* | s | ssdf | 57.9 | 8.3 | 109 | K |
| CR | *Melita formosa* | m | sdf | 8.05 | 2 | 12.9 | AB |
| CR | *Melita quadrispinosa* | m | sdf | 8.05 | 2 | 12.9 | AB |
| M | *Menestho truncatula* | dm | sdf | 4 | 2 | 6 | AB |
| CR | *Menigrates obtusifons* | dm | sdf | 4 | 2 | 12 | AB |
| M | *Montacuta spitzbergensis* | s | sdf | 5 | 2 | 6 | AB |
| M | *Musculus corrugatus* | s | f | 20 | 5 | 25 | A |
| M | *Musculus niger* | s | f | 20 | 5 | 45 | AB |
| P | *Myriochele heeri* | s | sdf | 5 | 2 | 10 | AB |
| M | *Mysella sovaliki* | dm | sdf | 3 | 2 | 4 | A |
| P | *Nephtys* sp. | m | c | 50.7 | 5 | 85.5 | |
| P | *Nereis* sp. | m | | 50.7 | 5 | 85.5 | |
| M | *Nuculana pernula* | dm | sdf | 10 | 5 | 15 | AB |
| O | Oligochaeta indet. | dm | df | 6 | 2 | 15 | |
| E | *Ophiocten sericeum* | dm | sdf | 15 | 2 | 20 | AB |
| CR | *Orchomenella minuta* | m | c | 5 | 2.5 | 6 | A |
| CR | *Pagurus pubescens* | m | c | 15 | 10 | 25 | AB |
| P | *Parougia* sp. | m | c | 7 | 5 | 10 | |
| P | *Pectinaria* (*Cistenides*) *hyperborea* | s | sdf | 27 | 2 | 39.8 | AB |
| P | *Pholoe assimilis* | m | c | 1.5 | 1 | 3.8 | B |
| P | *Phyllodoce groenlandica* | m | c | 30 | 10 | 100 | AB |

Table 4 – *continued*.

| | Taxa | function | length | zoogeographic status | | | |
|---|---|---|---|---|---|---|---|
| | | mobility | feeding | mean | min | max | |
| P | *Polycirrus arcticus* | s | sdf | 20 | 2 | 30 | AB |
| P | *Polydora* sp. | s | sdf | 10 | 5 | 15 | |
| M | *Portlandia arctica* | dm | f | 25 | 2 | 30 | A |
| PR | *Priapulus caudatus* | dm | ssdf | 40 | 10 | 60 | K |
| P | *Scalibregma inflatum* | dm | ssdf | 20 | 10 | 80 | AB |
| P | *Scoletoma fragilis* | dm | ssdf | 8 | 3 | 10 | AB |
| P | *Spio* spp. | s | | 8.5 | 2 | 16.23 | |
| P | *Syllidia armata* | dm | c | 5.3 | 1.5 | 19.3 | AB |
| P | *Syllis* (*Ehlersia*) *cornuta* | dm | c | 5.3 | 1.5 | 19.3 | AB |
| CR | Tanaidacea indet. | m | c | 3 | 2 | 4 | |
| P | *Terebellides stroemi* | s | sdf | 23.9 | 4.9 | 64.4 | K |
| M | *Thyasira dunbari* | dm | f | 3 | 2 | 6 | A |
| M | *Thyasira gouldi* | dm | f | 8 | 2 | 10 | AB |
| M | *Thyasira sarsi* | dm | f | 3 | 2 | 6 | A |
| CR | *Unciola leucopis* | m | sdf | 7.5 | 3 | 14 | A |
| M | *Yoldia hyperborea* | dm | f | 15.4 | 2 | 36.1 | A |

## Discussion

Over 220 species of macrofauna from soft bottom were recorded in Hornsund during this study. This is a first attempt to list sublittoral soft bottom fauna in this south Spitsbergen fjord and first so extensive with large quantitative sampling behind. Until now the occurrence of over 100 species was documented in Hornsund; of them only 40 species were recorded during the present study (Table 2). First attempt to describe Hornsund benthic fauna was undertaken by Görlich *et al.* (1987), however these authors have concentrated their study on the effect of suspension settling on benthic biomass distribution. They provided only very rough information on the benthic fauna composition and listed 80 taxa. More information was given by Gromisz (1992) in her study on Polychaeta fauna (naming 48 species) collected from the shallow depths only. List of 58 amphipod species from Hornsund was provided by Węsławski (1990), Jażdżewski *et al.* (1995) and later updated by Legeżyńska *et al*. (2000) (Table 2).

Similar results were obtained from other west Spitsbergen fjords for soft bottom fauna: 184 taxa were noted in Van Mijen fjord (Renaud *et al.* 2007), 242 taxa in Kongsfjorden (Włodarska-Kowalczuk and Pearson 2004; Kędra *et al.* 2010). Włodarska-Kowalczuk *et al.* (1998) listed 116 taxa in glacial bays in Spitsbergen and later gave precise list of 95 taxa for Yoldiabukta glacial bay in Isfjorden (Włodarska-Kowalczuk *et al.* 1999).

*Chao2* estimator indicated the possible presence of over 400 species, so possibly about 100 species are still to be found in the fjord (taking into account 60 species previously found in Hornsund and not noted in this study). This shows that further research on Hornsund soft-bottom fauna with more sampling effort is needed. The reason for that might be the high habitat diversity within Hornsund and the fact that many sites have a complex array of habitat types in small area. In this study we focused on the soft bottom sublittoral fauna and therefore even more species are likely to be found in different habitat types like gravel beach (Ronowicz 2005) or kelp forest (Włodarska-Kowalczuk *et al.* 2009).

Much lower number of species than in Hornsund was reported from Greenland fjords with 75 taxa in Disko fjord (west Greenland, Schmid and Piepenburg 1993) and 100 species in Young Sound fjord (east Greenland, Sejr *et al*. 2000). Also Norwegian fjords are less diverse with 109 taxa in Holandsfjord (Holte 1998) and 125 taxa in Balsfjord (Oug 2000). Holte and Gulliksen (1998) listed 157 taxa both for Svalbard (Raudfjord and Van Mijen fjord) and Norwegian fjord (Holandsfjord). Much more diverse are open systems like the Pechora Sea with 365 recorded taxa (Dahle *et al.* 1998), the Kara Sea with 387 taxa (Jorgensen *et al.* 1999), Franz Josef Land archipelago with 420 taxa (Dahle *et al.* 2009), the Barents Sea with 660 taxa (Cochrane *et al.* 2009) or even shallow intertidal soft and rocky bottom fauna around Iceland (163 taxa, Ingolfsson 1996). Subarctic waters around Tromsø have high diversity (395 species) which is mainly due to organic enrichment (Holte and Oug 1996).

Arctic-boreal species were most common in Hornsund which is also typical of many of high Arctic locations influenced by Atlantic water. Arctic benthic assemblages are rather poor in truly Arctic species and cold-eurythermal boreal immigrants are typical of many Arctic locations (Piepenburg 2005). Arctic-boreal elements made up over 55% of species in the Kara Sea (Jørgensen *et al.* 1999), 54% to 60% depending on the fjord zone in Disko Fjord, west Greenland (Schmid and Piepenburg 1993), 69% in Franz Josef Land archipelago (Dahle *et al.* 2009), about 45% in Skoddebukta, west Spitsbergen and Franz Joseph Land (Włodarska *et al.* 1996) and 29% of species in Spitsbergen glacial bays (Włodarska-Kowalczuk *et al.* 1998). The low occurrence of species of Arctic origin is typical of Arctic marine benthos and is explained by short period of its evolution, which did not allow for much speciation as far (Curtis 1975). Many Arctic species complexes seem to be still in stage of active evolution and adaptation to the habitat conditions (Dunbar 1968; Curtis 1975). Moreover, Arctic fauna is highly dominated by polychaetes and bivalves, which are mainly animals of wide distributions. Due to ongoing colonization (Dunton 1992; Dayton *et al*. 1994) these groups may supply Arctic macrofauna from the more boreal latitudes.

We would like to highlight the need for further studies on the biodiversity of Hornsund, an All Taxa Biodiversity Inventory (ATBI) site.

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