

DISTRIBUTION AND NUMBER OF MARINE MAMMALS IN THE OPEN BARENTS SEA AND THEIR CONNECTION WITH CAPELIN AND POLAR COD DISTRIBUTION

by

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Abstract

This paper presents the data on the character of distribution and the assessment of the number of marine mammals in the open part of the Barents Sea in autumn 2001-2004 by the results from PINRO's aerial surveys using the airborne laboratory AN-26 "Arktika" and the annual joint Russian-Norwegian vessel ecosystem survey for pelagic fish including capelin and polar cod. The aerial surveys were carried out being combined with the vessel surveys and their tracks coincided or crossed in several points.

Introduction

The aerial surveys for marine mammals were conducted by the transects oriented, primarily in the latitudinal direction (Fig.1). If it was possible, the distance of not more than 30 nautical miles between the transects was kept, the flying altitude was from 100 m to 500 m depending on the height of the lower border of cloudiness. The visual observations were made by not less than two observers through the board bubble windows from the right and left boards that allowed us to have enough wide observation strip. The observers registered marine mammals within the observation strip of their board, the information was sent through the internal communication means to the operator of the board computer station who input it to the protocol of the flight in the mode of real time with time, altitude, positions and others associated automatically.

The data on the distribution of marine mammals were collected in parallel with the observers from the research vessels participating in the survey. The observations aboard vessels were made using the standard methods. Only the vessel observation data which had been processed were presented here. Owing to that, the data on distribution of marine mammals are of generalized character. In processing the data from the aerial observations of marine mammals the areas of their largest concentration for each species were separated out, the areas for each group were mapped out. The position of such groups on the map shows the main parts of this species in the Barents Sea area in the given time period.

Among 20 species of the marine mammals dwelling in the Barents Sea about half of them are seasonal spending a certain time period there. As a rule, it is a warm season, spring-autumn, when migrations of the marine mammals in the Barents Sea are mainly caused by the movement of the large concentrations of the feeding objects, which are both plankton and fish (Geptner et al., 1976).

Now, based on the data from the surveys it is safe to say that the relative number of marine mammals spending the summer-autumn period in the Barents Sea area significantly increased. It may be explained by both the increase in population abundance of the cetaceans after the ban of their fishery and some reduction in harvesting pressure on pinnipeds. At the same time, the distribution of marine mammals in the area may differ much by years depending on change of status and distribution of the organisms constituting the food supply (Zabavnikov, 2005).

Among the large cetaceans a minke whale (*Balaenoptera acutorostrata*) was observed the most often. This species is easily identified and one of the most frequently occurring cetaceans in the Barents Sea. A humpback whale (*Megaptera novaeangliae*) is comparable with it in occurrence. It was not possible to identify species of some cetaceans.

A white-beaked dolphin (*Lagenorhynchus albirostris*), a representative of small cetaceans, is the most frequently occurring species in the Barents Sea. At present, this species being common and abundant is distributed, practically, all over the Barents Sea. The other dolphins (such as harbour porpoise *Phocoena phocoena* and common dolphin *Delphinus delphis*) were recorded more seldom.

Results

2001. In the area of the Hopen Island and the southeastern extremity of the Spitsbergen Archipelago, the dolphins which were not identified (groups of 5-12 individuals) and single specimens of minke and humpback whales were observed. Judging on the TAS (trawl-acoustic survey) data, all the cetaceans occurred in the areas where the capelin density was moderate (Fig.2).

According to the poor data obtained this year, the large stocks of the harp seals were registered in the area of maximal capelin concentration density. In the area of the southern extremity of the Spitsbergen Archipelago, the dolphins (from single to ten specimens), the stocks of harp seals and single killer whales were recorded. All the animals were distributed in the periphery of the polar cod poor concentration (Anon., 2002).

2002. In the area of the Hopen Island, the southern extremity of the Spitsbergen Archipelago, whales and dolphins had different direction of the migration and the conclusion may be drawn that all the animals were in that area looking for the available food. Whales, primarily, were distributed in the areas of capelin moderate concentration and dolphins – in those ones of small dense coastal concentration of polar cod (Anon., 2002a).

In the northern central Barents Sea, the white whales (single individuals), dolphins (single individuals), harp seals (groups consisting of to hundred animals), as well as whales including humpback and minke whales (Fig.3) were observed.

In the southwestern Barents Sea, both dolphins (mainly, white-beaked dolphins (groups to ten and a half tens individuals), killer whales (groups of to 10 animals) and whales including the minke and humpback whales (single individuals) were registered. The western and northern

groups, most likely, fed on polar cod which occurred in quite dense concentrations and the eastern one – on capelin (Anon., 2002b).

In the central Barents Sea, predominating were humpback whales (single individuals) consuming capelin which were distributed in dense concentrations.

In the central eastern Barents Sea, according to the observations from vessels, dolphins including the white-sided ones (from single individuals to several tens in groups) and whales (humpback whales, sei whales, killer whales) (from single individuals, that was the most often, to two tens in a stock (killer whales)) were recorded. In that area, the animals concentrated on dense aggregations of polar cod (Anon., 2002a).

That year, cetaceans primarily fed in the northwestern area of the Hopen Island. The feeding migrations were mainly connected with capelin.

2003. The most abundant marine mammal groups fed in the Hopen Island – the southeastern extremity of the Spitsbergen Archipelago area, the animals consumed capelin occurring in dense concentrations and polar cod, to a lesser degree. In that area, everywhere, dolphins including the white-beaked dolphins and northern bottlenose whales (single individuals), whales (the humpback whales and minke ones) and killer whales (groups consisting of 15-20 animals) were recorded (Fig.4).

An interesting regularity is observed marine mammals (with available data on migration direction) along the line from the Rybachy Peninsula to the southern extremity of the Frantz Josef Land moving in the eastern (southeastern and northeastern) directions towards the large concentrations of capelin and polar cod in the central Barents Sea (primarily white-beaked dolphins in groups being composed of from several individuals to ten) (Anon., 2003).

In the southern part, near the Spitsbergen Archipelago, the dolphins (inclusive of the white-beaked, dolphins white-sided dolphins and harbour porpoises), whales (the humpback whales and killer whales) and the harp seals (single individuals) were observed. Certain food items couldn't be identified based on the data from TAS.

In the central Barents Sea, whales (the humpback whales and sperm whales), dolphins (primarily, the white-beaked dolphins) as well as white whales (single individuals) were recorded. That group most likely fed on the both food items (capelin and polar cod) and had constant migrations to find dense concentrations.

2004. In the central Barents Sea, where, by the data from TAS, the densest concentrations of capelin and polar cod (more eastward) (Fig.5) occurred, the large stocks of dolphins (mainly, of the white-beaked dolphins (to thousand individuals in a stock), as well as common and non-identified ones), humpback whales and minke whales (to one and a half tens in a group), fin whales and killer whales (single specimens) were found. In accord with the data from both aerial and vessel observations, southern and southeastern migrations of animals (humpback whales and killer whales, harp seals and white-beaked dolphins) feeding in the areas of polar cod and capelin dense concentrations were prevailing (Anon., 2004).

To the west of the Bear Island, the group of animals (mainly white-beaked dolphins, northern bottlenose whales, humpback whales, minke whales and others) was found. The northern part of the group migrated mostly east and northeastwards, to the dense concentration of polar cod (white-beaked dolphins and humpback whales). The southern part had the migrations, chiefly, to the southeast (possibly to feed on herring).

In the northeastern Barents Sea, near the southwestern extremity of the Frantz Josef Land, the dolphins (primarily the white-beaked dolphins (groups consisting of to two hundreds of individuals), the white whales (to a thousand of animals (about two minute flight crossed the way of migration to the north-east)), the harp seals (to a hundred individuals in a group), whales (more seldom), the species of which could not be identified were registered. The direction of animal migrations coincided with the areas of concentrations of capelin (it was for the white whale) and polar cod (Anon., 2004).

In the area of the northwestern extremity of the Novaya Zemlya Land, large concentrations of the harp seals migrating in the eastern and northeastern direction to the coast and feeding on mainly polar cod having poor concentrations there were registered.

As the results of observations showed, in 2004, cetaceans and pinnipeds were widely distributed all over the area surveyed. The concentration of marine mammals on those ones of the food items was denser and more prolonged (humpback whales and dolphins) than in 2003. Against low strength of capelin (the lack of dense concentrations) the large groups of marine mammals primarily concentrated on polar cod and herring aggregations. In the Barents Sea area, the migrations of cetaceans have become more prolonged in respect of the period of stay in the sea area and distance. The character of revealed distribution of the marine mammals in the Barents Sea area in autumn is, possibly, a consequence of the effect of warming (pronounced earlier spring migration) as well as of the change of the food supply towards the reduction (capelin).

In the Barents Sea, a relative increase in occurrence of such species as sei whales, pilot, fin whales and sperm whales was noted. For the first time, in April, in the central Barents Sea, over the areas of capelin wintering concentrations, the groups of white-beaked dolphins were recorded. The number of minke whale in the coastal groups, near the Murman coast of the Barents Sea, grew (Zabavnikov, 2005).

Conclusions

Based on the data obtained mainly as a result of PINRO's aerial surveys it may be stated that:

- a relative increase in the number and the areal size in the Barents Sea of such species as humpback whales and minke whales and white-beaked dolphins was found;
- the distribution of cetaceans in the Barents Sea area is more connected with capelin, than with polar cod distribution; it was noticed that the distribution may be caused by the concentrations of the other food items;
- the trophic role of marine mammals in the ecosystem of the sea at present may be very significant;
- further research on marine mammals of the Barents Sea including special-purpose aerial surveys and study of feeding of marine mammals is necessary.

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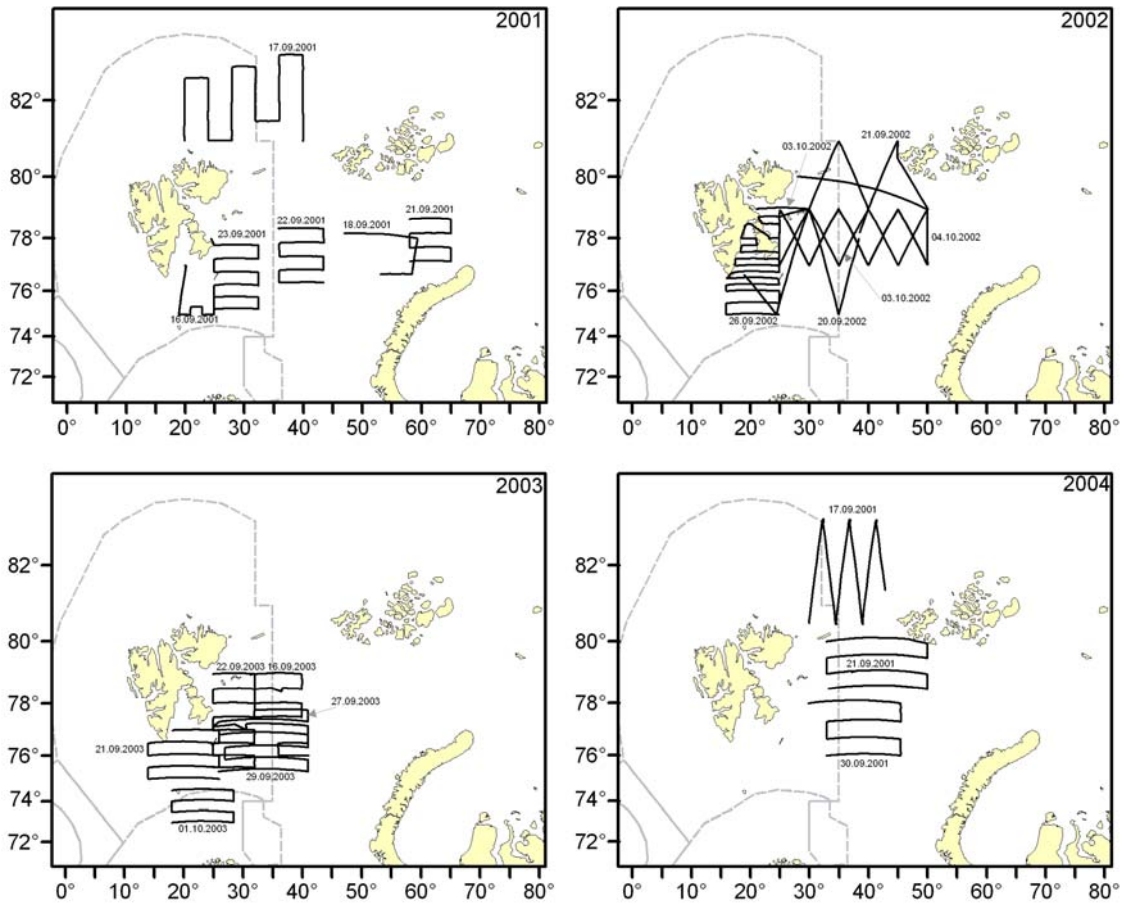


Fig.1. Situation of transects of air surveys 2001-2004

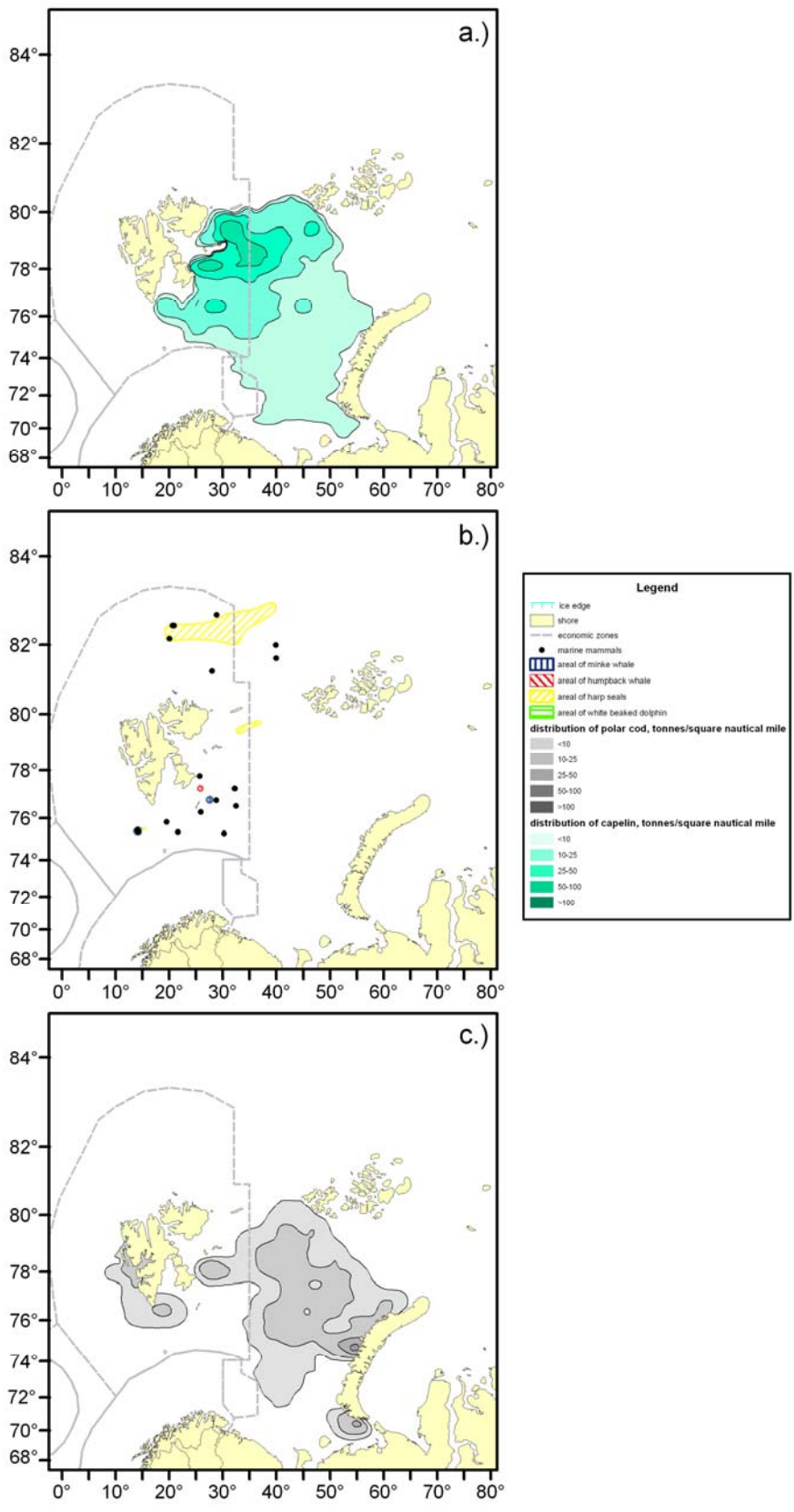


Fig.2. Distribution of capelin (a), marine mammals (b) and polar cod (c) in the open part of the Barents Sea during autumn 2001

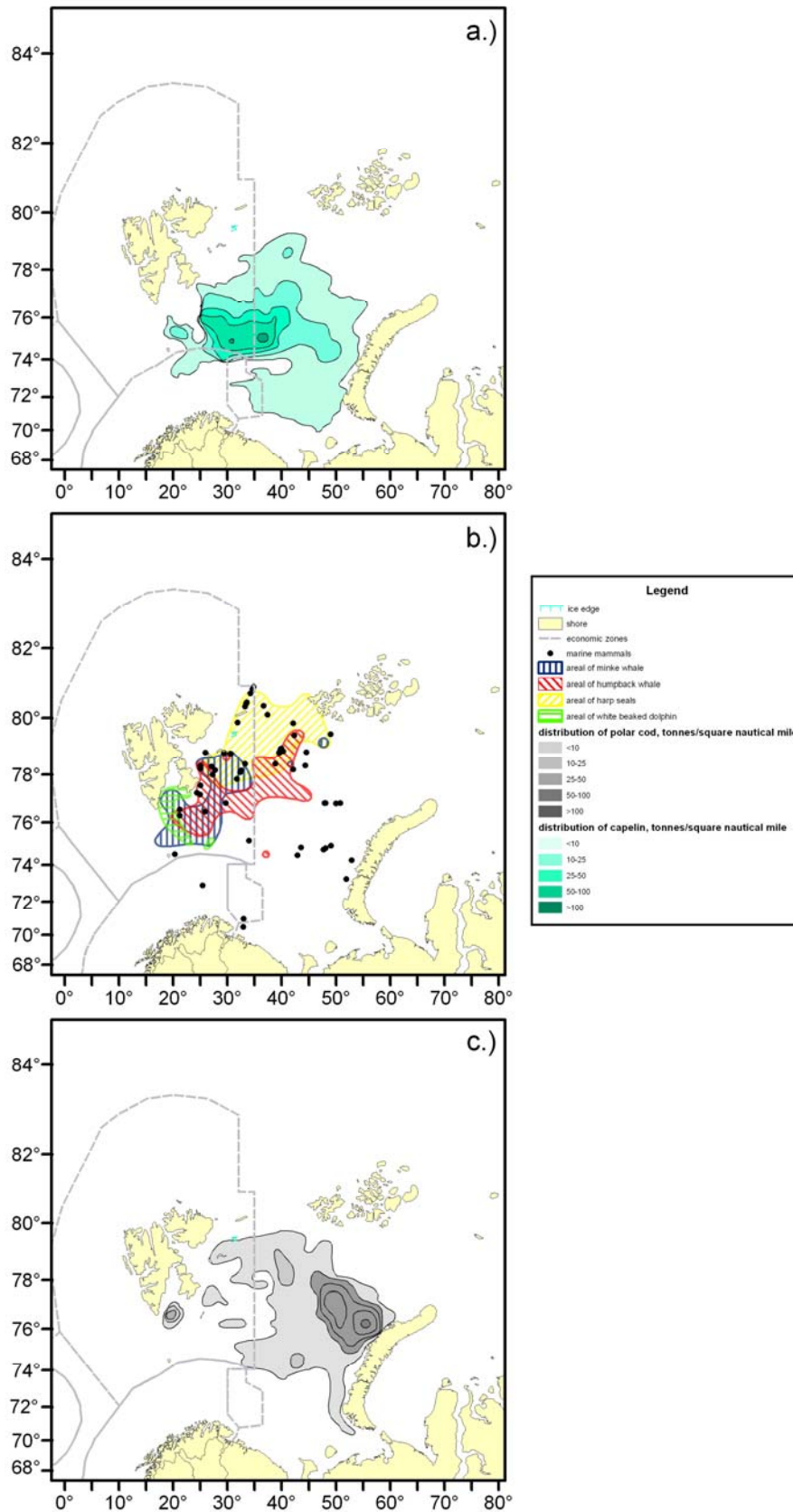


Fig.3. Distribution of capelin (a), marine mammals (b) and polar cod (c) in the open part of the Barents Sea during autumn 2002

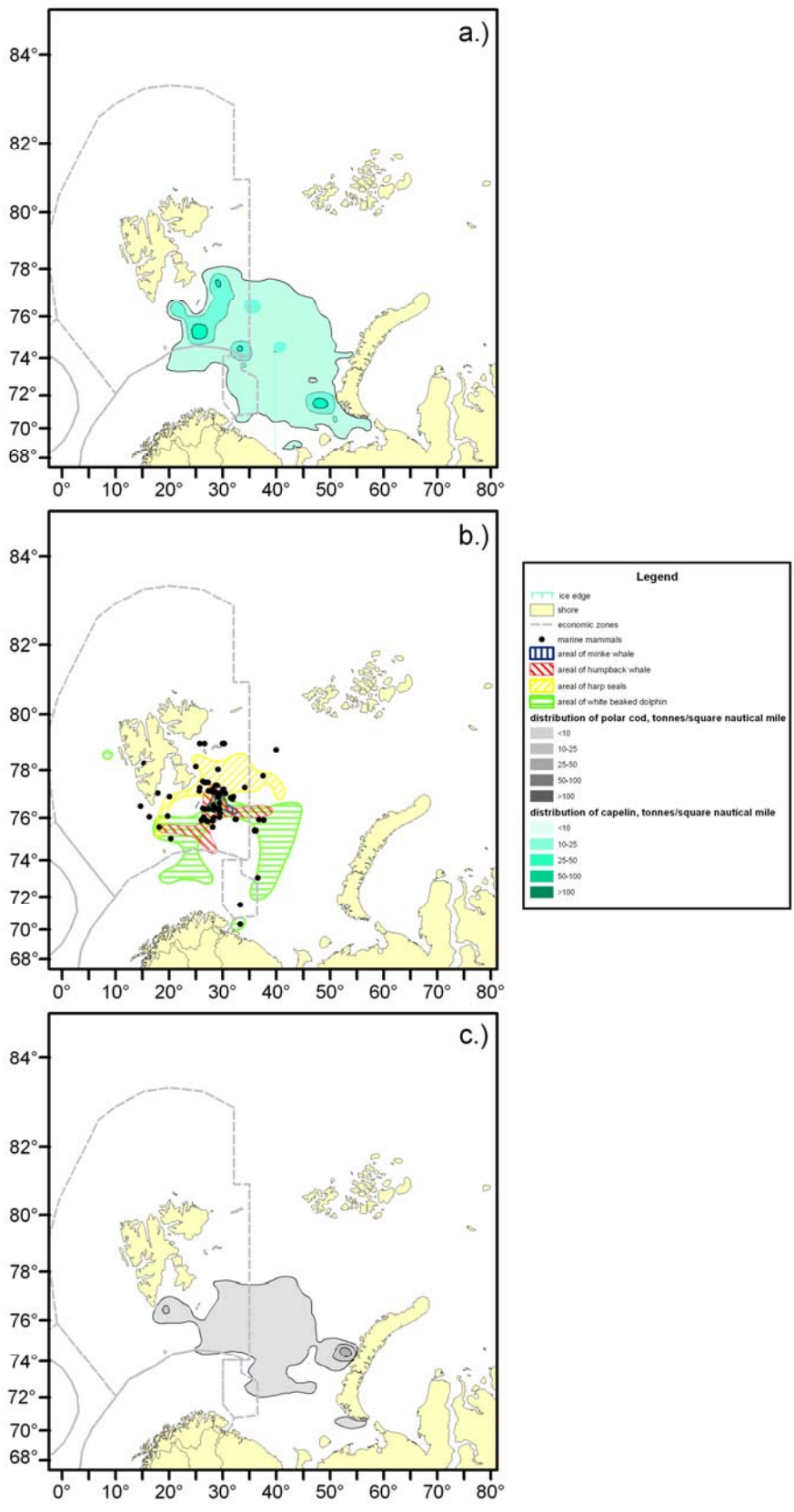


Fig.4. Distribution of capelin (a), marine mammals (b) and polar cod (c) in the open part of the Barents Sea during autumn 2003

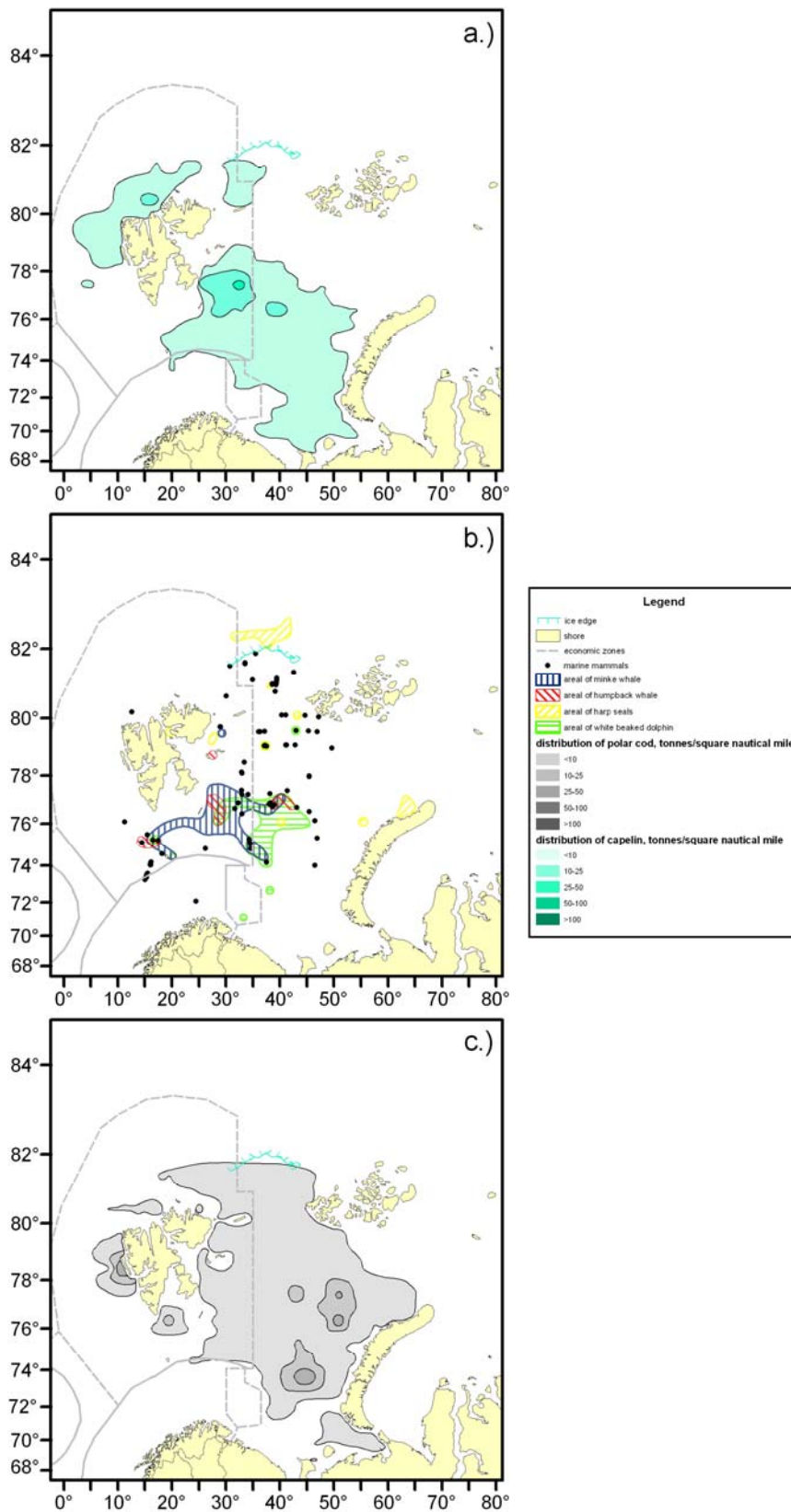


Fig.5. Distribution of capelin (a), marine mammals (b) and polar cod (c) in the open part of the Barents Sea during autumn 2004