

chapter

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Introduction

1.1 Aim and scope

Assessments of the quality of the marine environment form a basis for measures to protect the marine and coastal environment. They provide an opportunity to gather together and assess the results of scientific research and monitoring as well as information on the many human activities that can, directly or indirectly, change or damage the natural attributes of the marine environment. In combination, this information can be used to evaluate the causes and implications of change and to identify impacts that require early attention by policy-makers and environmental managers. Assessments are also used to review the effectiveness of existing measures to prevent degradation of the marine environment, to protect species and communities and, when practicable, to restore previously damaged habitats and ecosystems.

The value of environmental assessments depends to a large extent on the availability of reliable and up-to-date information. Thus it is essential that monitoring and other systems of recording marine environmental information are both ongoing and designed to yield high-quality data amenable to interpretation. In this context, assessments provide a means of reviewing the performance of monitoring programmes and of identifying important gaps in knowledge.

This report presents an assessment of environmental conditions in that part of the maritime area which, for assessment purposes, is known as the Arctic Waters or Region I (**Figure 1.1**). Region I is the second largest OSPAR region and incorporates a wide range of environmental conditions and human activities. Most of the region is sparsely populated and appears relatively pristine. However, the long-range transport of contaminants and human activities such as fisheries, industry, petroleum production and military activities do impact upon the region. Region I can be divided into the following subregions based on ecological characteristics: the Barents Sea, the Norwegian Sea, the Iceland Sea and

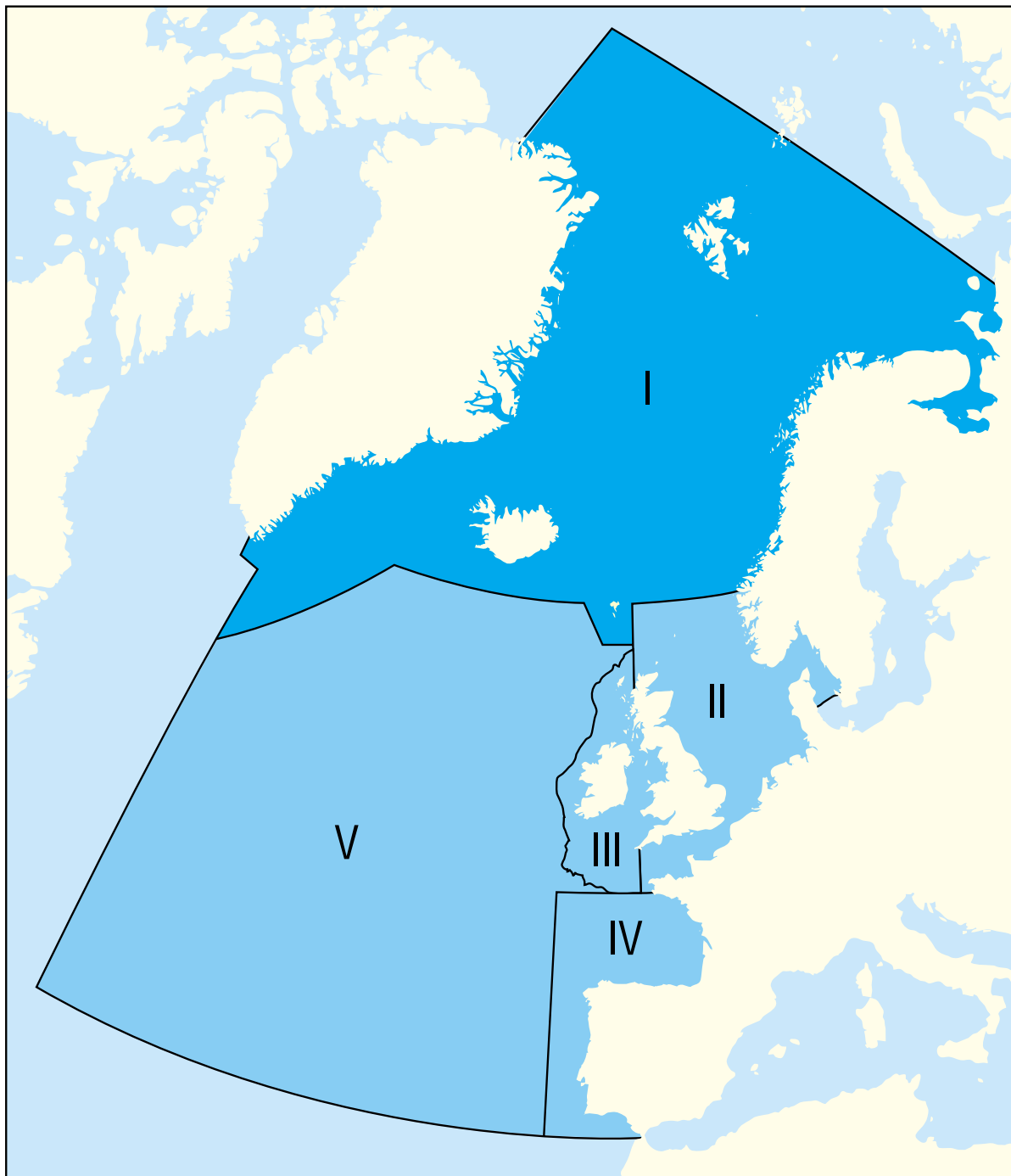
shelf and the south-east Greenland shelf, and the Greenland Sea. In addition, Region I also includes a sector of the Arctic Ocean. The five subregions have been used as the basis for the overall assessment of Region I. Together with similar quality status reports for the other four OSPAR regions, this report forms the basis of a holistic and integrated summary of the quality status of the entire OSPAR maritime area.

1.2 The assessment process

The assessment is based upon the most recent information available from national and international sources, including OSPAR committees and specialist working groups, the International Council for the Exploration of the Sea (ICES), the Arctic Monitoring and Assessment Programme (AMAP), published reports and the scientific literature. All material provided for AMAP assessments between 1995 and 1998 was made available for this report. Although most of the information relates to the 1990s, some topics required the use of earlier data, either because the recent record was sparse or because trend analysis involved a consideration of historical conditions. While every effort has been made to ensure the comparability of data from different times and locations, methodologies may have differed considerably and thus some comparisons will, inevitably, be tenuous. Where such uncertainties exist, they are indicated in the text.

There are several recent environmental assessments of the Arctic region, of which the most comprehensive was undertaken by AMAP (AMAP, 1998). In 1997 the Joint Norwegian–Russian Commission on Environmental Cooperation prepared a status report on the marine environment of the Barents Sea region (Lønne *et al.*, 1997); this focused on the various aspects of human impact. The Working Group on the Protection of the Arctic Marine Environment (PAME) summarised and assessed contaminant inputs to the Arctic from the various sources

Figure 1.1 Region I and the other regions of the OSPAR maritime area.



(PAME, 1996), while the Nordic Council of Ministers published information on human activities and ecological conditions in the Arctic sector of the Nordic countries (Bernes, 1996). The potential health and ecological risks from radionuclides in the Arctic Seas have been addressed by the Arctic Nuclear Waste Assessment Program of the US Office of Naval Research (Layton *et al.*, 1997). Information on the state of the Arctic environment was also included in an assessment by the European Environment Agency (EEA, 1996). These reports are the main sources of information for the present assessment.

1.3 Guidance to the reader

Chapter two gives a description of the physical geography, hydrography and climate of the area, as these have an important bearing on the types and distributions of marine habitats and communities as well as on their sensitivity to environmental change. Region I is characterised by a severe climate, with extreme variations in light, temperature and ice-cover. The formation of deep water in the region is recognised as one of the important features of the global ocean circulation, and may be critical to the development of the global climate. Although climate change is not addressed by OSPAR, Chapter two gives a brief consideration to the subject following a more detailed description of water masses and circulation in Region I. Chapter two also provides information on bottom topography, geology and sediments, coastal characteristics, transport of ice, meteorology and climate variability.

Chapter three examines human activities that directly

or indirectly impinge on marine areas, their amenities and resources, identifying localities most affected and assessing any apparent trends. As a result of the low population density in Region I, impacts on the marine environment related to urban settlements are relatively minor. The chapter therefore concentrates on the important regional fisheries, in addition to activities such as mariculture, petroleum exploration and production, industry, shipping, military activities, tourism, agriculture and forestry. Chapter three also includes an overview of international conventions and agreements relevant to the region.

Chapters four and five summarise existing information on the chemical and biological features of the various coastal and offshore ecosystems, focusing in particular on the causes and implications of the changes that are occurring. Chapter four presents information on sea-based, riverine and atmospheric inputs of contaminants, together with a consideration of spatial distribution and trends in concentration in different media. Chapter five comprises two major sections: a general description of the marine ecosystem and the associated impact of human activities. The impact of fisheries provides the main focus of the chapter, mariculture, offshore activities, contaminants, toxic algal blooms and the introduction of non-indigenous species are also considered. An attempt was made to prioritise the various human pressures and gaps in knowledge were highlighted.

Finally, Chapter six draws on the preceding chapters to identify the major causes of environmental degradation within the area and, where appropriate, makes recommendations for the managerial and scientific actions needed to redress them.