THE ROSS SEA: A CANDIDATE FOR IMMEDIATE INCLUSION IN A NETWORK OF MARINE PROTECTED AREAS

ASOC Secretariat
1630 Connecticut Ave NW
Washington, DC 20009 USA
Tel: 1-202-234-2480
Fax: 1-202-387-4823
www.asoc.org

This paper is presented for consideration by CCAMLR and may contain unpublished data, analyses, and/or conclusions subject to change. Data contained in this paper should not be cited or used for purposes other than the work of the CCAMLR Commission, Scientific Committee, or their subsidiary bodies without the permission of the originators/owners of the data.
Abstract

In the Southern Ocean fisheries are increasingly being exploited while the effects of fishing are becoming obscured more and more by climate factors that in themselves are changing marine populations and communities, thus confounding management. It is timely for CCAMLR to develop a network of MPAs, with initial inclusion of the well-researched Ross Sea, the area of the Southern Ocean having relatively little human interference so far. Under present climate change scenarios, it could be among the last stretches of the world’s oceans where sea ice remains an important part of the system. The Ross Sea, therefore, represents a refuge both for science, historical value, and a diverse, sea-ice associated biotic community inhabiting neritic waters.
THE ROSS SEA:  
A CANDIDATE FOR IMMEDIATE INCLUSION IN A NETWORK OF MARINE PROTECTED AREAS

1. Introduction

The Ross Sea is arguably the last remaining stretch of ocean on Earth...a single ecological system in its entirety...that has had minimal alteration by direct human activity. It has experienced no minerals extraction activity, no widespread pollution, no anoxic dead zones, no red tides or other toxic algal events, no explosions of gelatinous organisms, no 'mysterious' fish or bird die-offs, and no introductions of alien species. Its fish have not yet been depleted beyond recovery, and it contains a full suite of top predators, including large fish and marine mammals. It deserves to be included in the MPA network.

The Ross Sea’s relatively pristine quality is shown by the recent analysis of Halpern et al. (2008), who quantified human impacts to the world ocean. The analysis divided the ocean into 232 segments and considered 17 impacts; with a score of 0.1 (highest was 17.7) the Ross Sea ranked the lowest impact score among all areas. Only little bits and pieces of the Arctic Ocean, and the southern Weddell Sea were comparable to the Ross Sea in this regard though scoring a bit higher. Certainly, the main reason for having escaped anthropogenic influence is the Ross Sea’s remoteness from the industrialized world (2000 km south of New Zealand), and its harsh conditions (dark for half the year, covered by sea ice for 3/5 of the year, and subject to frequent, raging 100+ knot katabatic winds), and the protection of its coast by provisions of the Antarctic Treaty.

2. The Case For Designation As A Marine Protected Area

Despite its harsh environment, the Ross Sea has the longest history of scientific endeavor of any area in the Southern Ocean, beginning with the cruises of J.C. Ross in the 1840s. Subsequently, it played a major role in the exploration of Antarctica during the continent’s ‘heroic’ era, with expeditions led by icons C. Borchgrevink, R. Amundsen, R. Scott, E. Shackleton, and R. Byrd. Its shores are now sprinkled with the buildings remaining from that age, all now Specially Protected Areas and contributing to the region’s rich heritage. Valuable ‘first impressions’ of the biota and samples were collected on these expeditions.

The importance of the Ross Sea in Antarctic exploration did not stop with the heroic expeditions. A transformation occurred with the International Geophysical Year. Now, it is one of the most intensively researched stretches of the Southern Ocean, and the only Antarctic continental shelf that has received a huge amount of scientific attention. The latter is the result of the scientific bases of three nations, operating since the IGY...Italy, New Zealand, USA...including the largest base in Antarctica: McMurdo Station. To date, >1000 peer-reviewed scientific papers have been published that are directly relevant to its ecology (see summaries in Waterhouse 2001, Pinkerton et al. 2005, Smith et al. 2007), and not counting the intensive research thus far conducted as well on its glaciology, geology, meteorology and physical oceanography, nor even including the wealth of studies conducted on organism physiology, behavior and cold-climate adaptation during the past 50 years. Moreover, it contains the five longest continual time series of ecological measurements available in the Southern Ocean, reaching 35-50 years: catch-per-unit-effort of Antarctic toothfish, annual variation in the demography of Weddell seals, annual growth of Adélie penguin populations, and long-term changes in near-shore benthic communities.

The area also contains the longest continual record of marine hydrography south of the Polar Front (50 years). It currently is the subject of intensive climate research, as it constitutes one end of the ‘Antarctic di-pole’ (Southern Annular Mode), whose global-warming- and ozone-hole-affected oscillation is bringing warming and loss of sea ice to the SW Atlantic and cooling and growth of sea ice to the SW Pacific (Ross Sea) sectors of the Southern Ocean (Parkinson 2002, Russell et al. 2006, Stammerjohn et al. 2008). Recently, its benthic communities have been mapped (Barry et al. 2003, Cummings et al. 2006), its bio-geo-chemical cycles elucidated (DiTullio and Dunbar 2003), its hydrographic connections to more northerly waters researched at the fine scale (ANSLOPE), and its baleen whales thoroughly surveyed (e.g., Branch 2006, 2007).

Unlike the remainder of the Southern Ocean, it has so far escaped depletion of its fish resources (cf. Kock 1992, Ainley and Blight 2008), and removal of its cetacean population was minimal, confined generally to its slope waters (see Tønnessen and Johnsen 1982). It is the most productive stretch of water, on a seasonal basis, in the Southern Ocean (Arrigo and McClain 1994, Arrigo et al. 1998). Currently, its waters harbour populations of a number of organisms of
world importance (Ainley 2002, 2004; Ainley et al. 2006). In spite of encompassing <13% of the circumference of Antarctica, the Ross Sea is habitat for:

- 1,880,000 breeding Adélie Penguins, 38% of the World population
- 104,000 breeding Emperor Penguins, 26% of the World population
- 6,000,000 Antarctic Petrels, >30% of the World population
- 71,000 Antarctic Minke Whales, ~21% of World population
- 3,500 killer whales, an unknown proportion of the World population.
- 32,000 Weddell Seals, 45% of the Southern Ocean Pacific sector population
- 205,000 Crabeater seals, 12% of the Southern Ocean Pacific sector population
- 6,000 Leopard seals, 11% of the Southern Ocean Pacific sector population

3. A Time For Action

Therefore, on the basis of criteria enumerated in Annex V to the Madrid Protocol, Art. 3, in regard to Antarctic Specially Protected Areas, ASOC believes that the Ross Sea easily qualifies for inclusion in an MPA network. Besides the sites of historical heritage, further support for its biotic value is shown by the fact that it contains two of the three Southern Ocean areas in which seals are protected under the Convention for the Conservation of Antarctic Seals, as well as five SPAs that contain marine aspects; Fig 1).

In the Southern Ocean, with fisheries increasingly being exploited and the effects of fishing becoming obscured more and more by climate factors that in themselves are changing marine populations and communities, thus confounding management, it is timely for CCAMLR to develop a network of MPAs. The well-researched Ross Sea should be considered for initial inclusion in the network, as the area of the Southern Ocean having relatively little human interference. Under present climate change scenarios, it could be among the last stretches of the world’s oceans where sea ice remains an important part of the system. The Ross Sea, therefore, represents a refuge for science, historical value, and a diverse, sea-ice associated biotic community inhabiting neritic waters.

The Ross Sea, showing protected areas, CCAMLR SSRUs, and the two principle food webs, that centered around *Euphausia crystalorophias/Pleuragramma antarctica* on the inner shelf and *E. superba* along the shelfbreak/slope.
4. References


