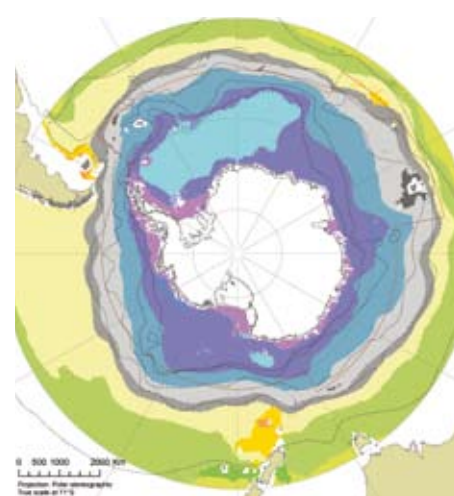
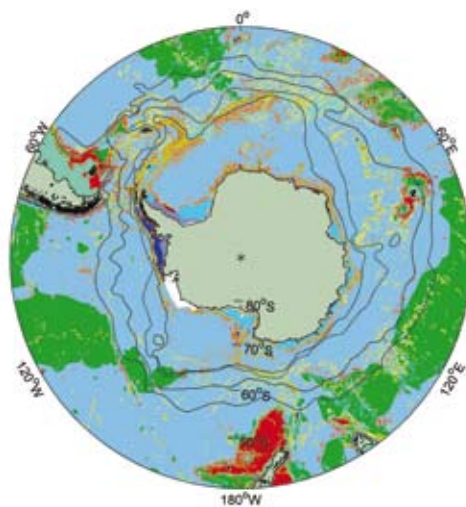


DEFINING BIOREGIONS FOR BIODIVERSITY CONSERVATION IN THE SOUTHERN OCEAN

Marine Protected Areas (MPAs) are a hot topic in the conservation world. They are used to protect important areas by controlling the types of activity that can take place within their borders – such as fishing. ‘Comprehensive, adequate and representative’ are the fundamental principles for a system of MPAs, with the ultimate goal being to protect marine biodiversity.



These figures illustrate the results of the process of defining benthic (sea floor; left) and pelagic (open ocean; right) bioregions in the Southern Ocean. Areas sharing the same colour have similar combinations of physical characteristics and are likely to share similar biological communities. As no two areas are exactly the same, we have to decide how many groups to show on the map – in these cases we have shown 20 groups.

But how do you know where to locate MPAs if you want representative coverage? A crucial first step in any systematic conservation plan is to define the ‘bioregions’ – geographic areas that are relatively distinct in terms of the complement of species inhabiting them. In some parts of the world this can be relatively straightforward – consider the difference between forests and grasslands. But how do you identify such differences in the vast expanse of the Southern Ocean, extending to depths of thousands of metres? Quite a challenge!

Defining bioregions in the Southern Ocean was the goal of a recent workshop held in Brussels, Belgium, as a joint initiative of the Commission for the Conservation of Antarctic Living Marine Resources (CCAMLR) and the Antarctic Treaty’s Committee for Environmental Protection (CEP). Two earlier workshops had discussed the role of MPAs within the CCAMLR area and developed a proof of concept for defining bioregions. Our task now was to put some meaningful lines on maps.

The first major step was to separate the surface waters (pelagic zone) from the seafloor (benthic

zone), as species living attached to the seafloor, or close to it, represent a different biological community from those freely swimming in the water column. There is limited information about what species occur where in the Southern Ocean, but it is possible to use physical characteristics – such as temperature – as proxies for biological communities and ecosystem processes. These physical characteristics have a strong and defining influence on where species live, forage or breed.

Workshop participants analysed combinations of temperature (surface or seafloor), depth, nutrient concentrations and sediment type, to group similar areas together. The end result was a set of maps covering the CCAMLR area and showing the considerable variation of the physical environment in space. These are likely to reflect variation in where different biological communities may occur.

These maps provide sufficient detail to guide MPA planners, particularly in identifying areas representing many different habitat features. Knowledge of bioregions, together with considerations of size, shape and connectivity between MPAs, will now feed into a separate

process to identify and design representative MPAs in the Southern Ocean.

Care will be needed to manage small-scale activities, such as fishing, in the Southern Ocean, so as not to prejudice future conservation options while the MPA boundaries are determined. To identify these boundaries we will need to consider how biological communities might vary in relation to the physical features and how the biodiversity might best be represented within an MPA. A number of sophisticated techniques are available to do this, some of which were explored at the workshop.

Reports on this work were submitted to the 26th Meeting of CCAMLR in October and were welcomed by CCAMLR as a significant advance in our understanding of the Southern Ocean. Further work, including finer-scale definition of bioregions, and consideration of MPA selection, will be undertaken in 2008 through the Working Group on Ecosystem Monitoring and Management.

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More information
www.environment.gov.au/coasts/mpa/index.html