

SOVIET PROPOSALS FOR A PROGRAM OF ECOSYSTEM MONITORING IN THE COMMONWEALTH SEA AND PRYDZ BAY

U.S.S.R.

Abstract

A general framework for a joint international CCAMLR Ecosystem Monitoring Program in the Prydz Bay area is proposed. Major components of the program are observations of prey and predator species including agreed indicator species and parameters, as well as environmental conditions. Background studies include hydrological and hydrochemical surveys as well as observations on phytoplankton. It is recommended that all surveys and sampling techniques should be standardized and that all research activities be co-ordinated by participating CCAMLR Members. The overall program should be co-ordinated and supervised by the CCAMLR Scientific Committee.

* * * * *

PROPOSITIONS SOVIETIQUES POUR UN PROGRAMME DE CONTROLE DE L'ECOSYSTEME DANS LA MER DU COMMONWEALTH ET LA BAIE DE PRYDZ

U.R.S.S.

Résumé

Les grandes lignes d'un programme international en coopération au sein de la CCAMLR et portant sur le contrôle de l'écosystème dans la baie de Prydz ont été proposées. Les éléments principaux du programme consistent en des observations d'espèces proies et prédatrices, y compris les espèces indicatrices et paramètres convenus ainsi que les conditions du milieu. Les études générales comprennent des examens hydrologiques et hydrochimiques ainsi que des observations sur le phytoplancton. Il est recommandé de normaliser toutes les études et techniques d'échantillonnage et que toutes les activités relatives à la recherche soient coordonnées par les membres de la CCAMLR y participant. L'ensemble du programme devrait être coordonné et supervisé par le Comité Scientifique de la CCAMLR.

* * * * *

PROPOSICIONES SOVIETICAS PARA UN PROGRAMA DE CONTROL DEL ECOSISTEMA
EN EL MAR DEL COMMONWEALTH Y EN LA BAHIA PRYDZ

U.R.S.S.

Resumen

Se propone un marco general para un Programa internacional conjunto de Control del Ecosistema CCRVMA en el área de la Bahía Prydz. Componentes principales del programa son las observaciones de especies-presa y de depredadores incluyendo especies indicadoras y parámetros, así como también condiciones ambientales. Los estudios de base incluyen prospecciones hidrológicas e hidroquímicas, así como también observaciones del fitoplancton. Se recomienda que todas las prospecciones y técnicas de muestreo deberían ser estandarizadas y que todas las actividades de investigación deberían ser coordinadas por Miembros participantes de CCRVMA. El programa total debería ser coordinado y supervisado por el Comité Científico de CCRVMA.

* * * * *

ПРЕДЛОЖЕНИЯ СОВЕТСКОГО СОЮЗА ПО ПРОГРАММЕ МОНИТОРИНГА ЭКОСИСТЕМЫ
В МОРЕ СОДРУЖЕСТВА И ЗАЛИВЕ ПРЮДС

СССР

Резюме

Предлагается общая наметка совместной международной Программы АНТКОМ'а по мониторингу экосистемы в районе залива Прюдс. Основными составляющими этой программы являются наблюдение над видами-жертвами и видами-хищниками, включая выделенные виды-индикаторы и параметры, а также наблюдение за состоянием окружающей среды. В программу предварительных исследований входят гидрологические и гидрохимические съемки, а также наблюдения над фитопланктоном. Рекомендуются, чтобы все съемки и техника взятия проб были стандартизованы и чтобы вся исследовательская деятельность была скоординирована участвующими членами АНТКОМ'а. Вся программа в целом должна координироваться и проводиться под наблюдением Научного комитета АНТКОМ'а.

* * * * *

SOVIET PROPOSALS FOR A PROGRAM OF ECOSYSTEM MONITORING
IN THE COMMONWEALTH SEA AND PRYDZ BAY

One of the key requirements for the successful organization and implementation of a monitoring program for a particular region concerns development of a detailed research program co-ordinating the activities of participating CCAMLR members. Given that such a program is developed on the basis of knowledge available on the area, the program should reflect top priority objectives and areas of research which need to be addressed, at both the preliminary and subsequent stages, and should also serve as a guideline for integrating members' efforts. It therefore seems expedient to propose that each member should submit to the Working Group, during the inter-sessional period of 1986/87, preliminary reviews of all available data.

1. GENERAL OBJECTIVES

1. The organization of regular detailed observations of the Prydz Bay ecosystem and that of the Commonwealth Sea as a whole, since this area has been identified as one of the priority areas for ecological monitoring, and E. superba production is the basis for the functioning of the ecosystem.
2. Establishment of structural (qualitative and quantitative) characteristics of the ecosystem components, as well as of functional interactions between them; investigation of the effects of environmental and anthropogenous factors on the functioning of communities (pelagic and bottom-dwelling biocenoses).
3. Establishment of the nature, and assessment of the impact of each particular factor or group of factors on individual components and on the ecosystem as a whole.

2. MAJOR ITEMS OF RESEARCH

The monitoring system is expected to provide adequate assessment of all ecosystem parameters and characteristics. It covers at least three major research directions, the findings of which might then be seen in inter-relation with the application of any particular model. These are:

1. Characteristics of the environment, including both non-biological factors and biological indices (which will provide the basis for relating environmental variables with biological patterns and distributions of species) ;
2. Life-cycle strategies and the production of prey species which determine food availability and accessibility for consumer species (to be determined initially for those species selected as indicators for ecosystem monitoring) ;
3. Life-cycle strategies, spatial and quantitative distribution patterns of predators (i.e. indicator species) related to biological and environmental conditions.

2.1 Background Observations

Detailed oceanographic surveys and standard transects, including those listed in the Soviet proposals (SC-CAMLR-III/INF.11), are envisaged to be regularly conducted with data on physical and chemical parameters of the environment, as well as on phyto- and zooplankton being collected.

Hydrological data should include horizontal and vertical distributions of water temperature and salinity at standard depths. The position of T_{\max} layer, E_{\max} , the surface system of geostrophic currents and the position of two or three representative strata, and indices of water mass structure and modifications need to be recorded. It is also necessary to collect data on ice conditions (dynamics of ice distribution, records of pack ice drift, etc). Furthermore, additional oceanographic data useful for monitoring objectives may be collected, if required.

Hydrochemical data should mainly include horizontal and vertical distributions of silicon, phosphorus, nitrites, nitrates, and oxygen at standard depths. Special attention should be given to determination of the Si/P ratio and ammonia-nitrogen (NH₄) concentration as indices of high water bioproductivity.

Plankton data should include spatial and quantitative phyto- and zooplankton distributions.

The total biomass of phytoplankton or the percentage of chlorophyll or C¹⁴ should be determined, and dominant forms of algae identified.

Zooplankton data should primarily concern dominant copepod forms, as well as those of Coelenterata, Salpae, and Chaetognatha. Records should also be kept of pelagic Polychaeta, Hyperiididae and fish larvae.

On the whole, hydrobiological samples should be used to assess the composition of species and regional distribution differences on the basis of plankton abundance level. Special attention should be given to the differences in the species composition and phenological structure of the community which relate to the different water masses and their modifications.

2.2 Observations on Prey Species

E. superba, E. crystallorophias and Pleuragramma antarcticum were selected as prey species to be monitored in the Commonwealth Sea ecosystem. It should, however, be borne in mind, that P. antarcticum is not only a prey species, but also feeds on fish larvae. Data on prey species should be collected by a standard type of fishing gear. Size composition, physiological status (feeding, reproduction) should be analyzed, and general trends of spatial and quantitative distribution differences identified. Inventory trawls and hydroacoustic surveys for E. Superba should be conducted regularly and the findings presented as recommended by CCAMLR (SC-CAMLR-IV paragraph 5.9).

2.3 Observations on Predator Species,
Including those Selected as Indicators

In addition to the above observations, data on higher trophic level organisms in the ecosystem need to be collected. Particular attention should be given to the following selected indicator species : crabeater seal, minke whale and Adelie penguin. Special observations on the distribution and abundance of animals in the open sea and on ice should be conducted, and data on age composition, feeding habits and sex condition should be collected. Regional differences between parameters should be identified.

Observations on other predator species, particularly of avifauna and ice-dwelling seals in the coastal part of the area, should be made in conjunction with the above studies. During investigations on P. antarcticum, information on other Nototherniidae fishes taken in the samples should be collected.

2.4 Preliminary Data Correlation

Data collected during the above observations should be analysed and correlated immediately on board ship, since such operational assessment and progress reporting of the results are useful in identifying further data requirements for more detailed analyses. This is especially true for data on the spatial distribution of physico-chemical characteristics, on phyto- and zooplankton, and on prey and indicator species. The analyses of data is very dependent on the use of standardised fishing gears and methodologies which need to be specifically agreed upon. A list of data collected and, if necessary, the general results of laboratory analyses should be submitted to CCAMLR.

3. AREAS AND TIMING OF RESEARCH ACTIVITIES

The monitoring program of the Commonwealth Sea and Prydz Bay ecosystem has to operate for a long time, since its major objective is to investigate and assess variability in the ecosystem. In so doing, it will be important to present the results of the research findings not only in terms of methodology or activities, but also from the spatial and temporal aspect (by individual sites of the area studied and by seasons).

If the longitudinal boundaries of the region studied are between 55° - 85° E, the latitudinal boundaries in the south will be determined by the coast line, or ice-edge, while in the north, by the winter maximum extent of the drifting ice-edge. During detailed surveys, the northern boundary of the station grid should be north of 60° S.

A standard grid of transects should be set up around the area to be studied in order to collect data according to the three research directions referred to above. The distance between survey transects should not exceed 1° , while that between stations should not exceed 0.5° . To the south of the of influence of the high-latitude modifications of the Commonwealth Sea and Antarctic circumpolar current, there may be cases when the spacing between stations should be less than 0.5° .

Since this region selected for ecosystem monitoring is situated in the Antarctic high-latitude zone, it will be difficult to conduct all-year-round investigations. Even so, it is necessary to have data collected every year for the spring, summer, and autumn seasons and, in particular years, the winter season as well. The total time dedicated to an observation series will depend on the scientific findings obtained each year.

4. PARTICIPANTS OF THE MONITORING PROGRAM OF
THE COMMONWEALTH SEA AND PRYDZ BAY REGION

The investigations which have been conducted by Australia, USSR, France and South Africa are worth continuing, with their principles and objectives being aligned to the monitoring aims specified in documents SC-CAMLR-IV/7 and SC-CAMLR-IV/13. It is also expedient to attract more participating countries, especially for the initial stage of the monitoring program. The sharing of effort between participating countries will be valuable in conducting integrated marine oceanographic, hydrobiological and ichthyological investigations, as well as coastal observations (around continental ice-edges) on predator species (indicators) and certain prey species with respect to ice distribution and drift of pack ice.

All research activities, and the collection and storage of data are to be performed under the supervision and control of the CCAMLR Scientific Committee.