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109

REPORT ON THE ECOLOGICAL RESEARCH PROGRAM  
WITHIN THE TIME FRAME OF CO-OPERATION BETWEEN  
RUSSIAN ANTARCTIC EXPEDITION AND QUARK  
EXPEDITIONS

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*Submitted by Russia and IAATO*

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**R E P O R T**  
**on the ecological research program**  
**within the time frame of co-operation between**  
**Russian Antarctic Expedition and QUARK Expeditions**

presented by Russia (RAE) and IAATO

According to Article 6 of The Protocol on Environmental Protection to the Antarctic Treaty about co-operation during concerted activity in the Antarctica, efficient use of possibilities of national operators, conducting of joint logistic, scientific and environmental projects becomes more and more topical. On the one hand it is caused by expansiveness of conducted works, from the other hand - by increasing impact from the individual activities of different operators. Under unfavourable conditions of continuing deficit of Russian state financial support of the Antarctic researches and simultaneous politics directed towards development of works within the frame work of Madrid Protocol, the RAE seeks for different possibilities of co-operation that could help to carry out ecological projects. Modern means of conveyance used by tourist operators for visiting inaccessible regions, long term planning and regular repeating of the same routes fit to the purposes of environmental monitoring studies. Given all mentioned above, an attempt to join efforts of the RAE and QUARK Expeditions to conduct project on ecological study and monitoring in Antarctica was made during First Full Tourist Circumnavigation cruise in Austral summer 1996/97.

Taking into account wide possibilities of circumnavigation including numerous coastal visits and perspectives of repeating such works, sampling geographically spread along the Antarctic coast and establishing of monitoring works were suggested expedient. Since it was the first attempt of such co-operation, program-maximum was worked out as follows:

*Applied goal* - to obtain the data for monitoring Antarctic ecosystems including both abiotic components and marine bird and mammal populations as objects affected by Antarctic coastal station activities and shipping including the following objectives.

- to obtain the data on local fauna and populations of marine birds in the vicinities of Antarctic stations
- to determine the most vulnerable marine bird populations in relation to human impact
- to obtain the data on behavioural reaction of marine birds as a result of tourist activities
- to evaluate species and parameters to be used in monitoring
- to obtain the data on types of human impacts for different regions
- to gather samples of water, ice, and biota to be used for chemical analysis of pollutant contents

*Scientific goal* - to determine pelagic distribution patterns of marine birds and mammals as related to environmental factors.

Ecological studies were carried out in Austral summer 1996-1997 during Antarctic circumnavigation cruise on board icebreaker Kapitan Khlebnikov. The cruise started on Falkland Islands in the end of November 1996, passed around Antarctic continent and finished on Falklands in the end of January 1997.

### ***Brief description of the results***

- Ship based survey of sea birds and mammals en route Antarctic Circumnavigation was carried out. Numerous landing during cruise allowed to conduct a unique set of counts on the cross-transects sea-land, that made possible to find out local quantitative distribution patterns in coastal waters adjacent to the Antarctic stations. The duration of quantitative counts totalled 270 hours

Brief analyses of obtained data gave preliminary broad scale distribution patterns of seabird and mammal in maritime Antarctica as related to marine habits. Totally 20 marine habitats were determined: regarding depth and distance to the mainland -

shelf seas, open ocean and shelf break; regarding ice conditions: ice-free waters, bergy waters, light pack ice (less than 7/10 concentration); heavy pack ice (8-10/10), special emphases was paid to the so-called marginal ice zone including polynyas.

Totally 40 species of sea birds and mammals were recorded at sea during Antarctic Circumnavigation (see table). There is evident effect of sea ice presence upon seabird distribution (see figure 1). In ice filled waters number of species did not exceed 9 being 8.1 on average, while in open pelagic waters in Antarctic zone it reaches 12 being 10.3 on average. A group of pagophilous species that are common and abundant includes snow and Antarctic petrels, Adelie and emperor penguins. In open drifting ice, large leads and polynyas Antarctic fulmar, Wilson's storm-petrel and Cape pigeon appear. In ice free oceanic waters black-browed and light-mantled sooty albatrosses can be observed already nearby drifting ice-edge, and in the sector between 90 and 180 W mottled petrel adds. However, the highest species diversity was observed in coastal waters of Antarctic Peninsula - 16 species, what even exceeded the value recorded while passing Antarctic Convergence zone (14). Imperial shag, kelp gull and skuas become common in the coastal waters. About 3 species of sea mammals were recorded in each section on average with no significant differences between ice free and ice filled waters found. Highest diversity was observed in two ice covered sections in shelf seas both crossed shelf break and in coastal waters of Antarctic Peninsula as well. Greatest numbers of Minke Whales were clearly confined to the shelf breaks, while Humpbacked Whales were abundant in highly productive coastal waters of the Peninsula. Most Orcas were sighted in polynyas next to the fast ice edge. The data obtained on seabirds and seals are more numerous and need in detailed treatment including statistical analysis. They are planned to be published later. Fast-ice edge zone is the only habitat clearly demonstrated increased occurrence and abundance of seabirds.

- While landing at Antarctic bases and other sites all bird and mammal species were recorded, quantitative counts or number estimating were conducted when time and conditions allowed, that provided local fauna characteristics. Totally 38 sites

were visited, including 18 bases and temporary camps, belonging to 10 countries. When at the bases, the data about their activities and personnel were gathered as well as photographs of the territory and constructions were taken.

- Samples of tissues from 3 bird species at 7 sites were taken (only carcasses of dead birds were used). Water from fresh water bodies at 8 sites was sampled. All samples will be analysed for pollutant contents to evaluate modern anthropogenic chemical impact on Antarctic coastal ecosystems.

All data mentioned above can be used as a background information for monitoring of marine bird populations. Quantitative characteristic of marine bird population near Antarctic stations as well as data on contamination are useful for the EIA process and for management recommendations as well.

Summarized results, we consider the first experience of interaction of QUARK Expeditions and the RAE to be positive and perspective for further co-operation aimed to ecological studies and monitoring. It should emphasis however, that such works become valuable for monitoring even being repeatedly conducted.



Species diversity within the sections enroute Antarctic Circumnavigation.

