4) to standardize conventions, protocols, and procedures for sampling and monitoring, both intensively and extensively, at selected sites in the Arctic, whenever possible at MAB Biosphere Reserves.

Computerized databases, mapping applications, and a geographic information system were demonstrated. Working groups were formed for bryophytes, lichens, vascular plants, marine algae, birds, and mammals.

A second meeting, 3-8 February 1992 in St. Petersburg was hosted jointly by the Botanical and Zoological institutes of the Russian Academy of Sciences.

Problems of creating the data banks on various plant and animal taxons were the first thing discussed at the meeting. In Russia the collections of Botanical Institute (St. Petersburg), Zoological Institute (St. Petersburg), Institute of Animal Evolutionary Morphology and Ecology (Moscow), Zoological Museum of Moscow University and Institute of Biological Problems of the North (Magadan) should be the basis of the data banks; in USA there are similar collections at the University of Alaska Fairbanks and the Smithsonian Institution.

The methodological, legal, and financial problems were discussed. Special attention was paid to the financial support of field expeditions, which are necessary for studying animal groups with small collection funds. In the USA financial support of the project is possible through the NSF, and in Russia through the several national programs of the State Committee on Science and Technologies and Ministry of Ecology and Nature Management.

The organization of the data banks will follow the subprojects on separate plant and animal groups. Data banks on vascular plants, mosses, lichens, mammals, birds, fishes, some groups of terrestrial invertebrates, including *Coleoptera, Diptera, Collembola, Lepidoptera,* are most likely during the first years of the project. Many groups of invertebrates (*Hymenoptera, Oligochaeta, Nematoda* and others) require additional taxonomic and faunistic studies and collecting.

The project was initiated under a bilateral agreement between the Russian Academy of Sciences and the National Science Foundation. Obviously, a truly panarctic effort must be multinational, and the coordinators are seeking formal links with colleagues, especially in Canada and in the Nordic countries, who share our interest and approach to the study of biodiversity in the Arctic.

The executive committee consists of:

Robert S. Hoffmann, (Smithsonian Institution), David F. Murray, (University of Alaska Museum), Doulgas Siegel-Causey, (University of Kansas), Orest A. Scarloto, (Zoological Institute, St. Petersburg), Vladimir E. Sokolov, (Institute of Evolutionary Animal Morphology and Ecology, Moscow) and Boris A. Yurtsev, (Komarov Botanical Institute, St. Petersburg),

Chief organizations in the project are: Smithsonian Institution, University of Alaska, Institute of Animal Evolutionary Morphology and Ecology (Moscow), Botanical and Zoological Institutes (St. Petersburg), and Institute of Biological Problems of the North (Magadan).

ARCTIC BIOLOGICAL DIVERSITY

by V.A. Krassilov, S.E. Belikov and A.E. Volkov (Institute of Nature Conservation and Natural Reserves, Moscow)

Concerns about biological diversity are focussed on tropical forests while northern ecosystems, with far fewer species, are often neglected. However, biological diversity includes not only taxa but biotic communities and their constituent life forms as well. For purely ecological reasons, life forms are more essential than species: they are the indispensable building stones of ecosystem structure. The relationships between taxa and life forms are very different in tropical and northern ecosystems. While the former show minute differentiation of ecological hyperspace with many species quite similar in their life form characteristics; in the latter, each species normally represents a fairly distinct life form. The species of tropical communities are small bricks in ecological pyramids, while in northern communities they are massive blocks each of which cannot be removed without threatening the whole pyramid. Thus, in terms of ecosystem conservation, a species weighs much more in the north than in the tropics.

Moreover, many mid-latitude biotic communities are now considered as quite recent assemblages of species, brought together by accidents of their secular migration histories. In contrast, arctic communities are bound by at least 2.5 million years of coevolution, the putative consequence of which could be that their species tend to die out together. They also have a comparatively large seasonal component - locally from 30% to 75% of bird species (Table 1) - which is especially vulnerable.

Table 1. Biodiversity of the Russian high latitude reserves.

Reserve	Area (10^3ha)	Zone	Floristic represen-tativeness	Vascular plants	Mammals	Species Bird (total)	Number Bird (nesting)
Kostomukshian	47,50	north. taiga		350	26	182	142
Laplandian	268,43	north. taiga	49	530	31	180	116
Kandalakshian	58,10			633	31	240	134
including							
Seven Islands		tundra	55	281			
Ajnovian Isl.		tundra	25	130			
Northern Archipelago		north. taiga	31	324			
Pinezhian	41,20	north. taiga		487	37	126	97
Putcranian	1887,30	north. taiga		398	34	140	100
Tajmyrian	1348,30	tundra		654	16	74	50
Petchoro-Ilytchskian	721,32	north. taiga	55	695	45	213	40
Ust-Lenskian	1433,00	tundra		633	32	88	66
Wrangel Isl.	795,70	tundra	84	438	17	148	48

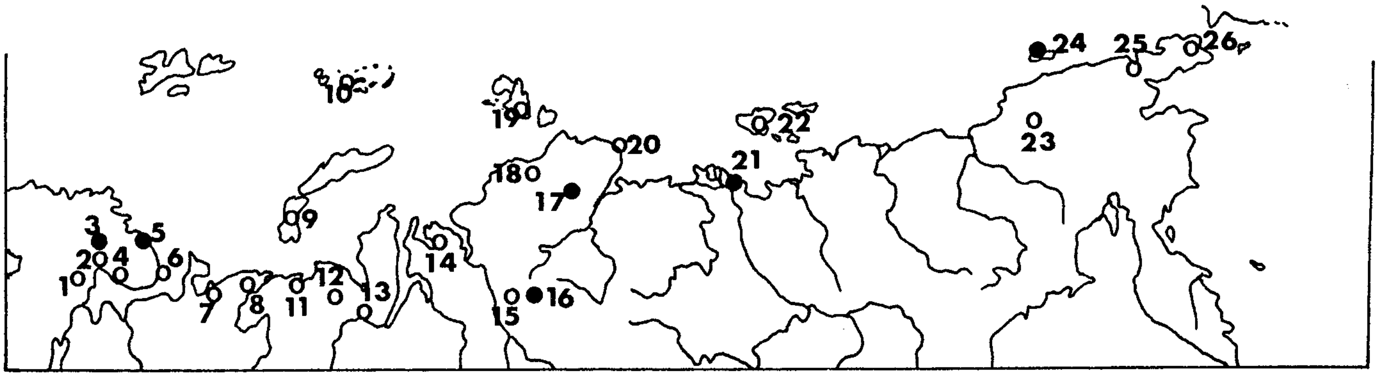

Fig. 1. Existing (black circles) and proposed (open circles) protected areas: 1 - Paanajärvi, 2 - Kandalakshian, 3 - Laplandian, 4 - Terski Bereg, 5 - Kandalakshian, 6 - Kolskian, 7 - North Timanian, 8 - Nenetskian, 9 - Novozemelskian, 10 - Franz Josef Land, 11 - Bolshezemelskian, 12 - Polar Uralian, 13 - Yamalian, 14 - Gydanskian, 15 - Lamsko-Putoranian, 16 - Putoranian, 17 - Tajmyrian, 18 - Great Tajmyrian, 19 - Severnozemelian, 20 - Laptevskian, 21 - Ust-Lenskian, 22 - Novosibirskian, 23 - Chaunskian, 24 - Chukotskian, 25 - Wrangel Island, 26 - Beringian.

Major threats to arctic biodiversity come from the global climate changes (supposedly more pronounced here than in the lower latitudes), acidification from large smelters such as Petchenga and Norlisk, oil spills, radioactive pollution from not yet effectively banished nuclear tests, dumped wastes, and over harvesting. Species-oriented protective measures have been effective in the face of massive industrial invasion. Now conservation efforts must focus on the most representative ecosystems, the most vulnerable of which should be put under the territorial protection of a circumpolar network of protected areas.

For such a network a species/area criterion is essential. Incomplete data (Table 1) show a logarithmic increase in both plant and bird diversity with increasing area. The representativeness of existing reserves in relation to plant diversity was estimated by Nukhimovskaja as varying from 25% for Kandalaksha Reserve to 84% for Wrangel Reserve, with an average of about 45%. To achieve a 20% increase in representativeness the existing protected areas has to be enlarged by a factor of 1.44. Furthermore, the reserves are unevenly distributed between the northern taiga and tundra zones, while deserts and aquatoric areas are scarcely, if at all, protected.

Additional criteria are related to the distribution of endangered species. In the Russian Arctic, 30 vascular plant, 22 bird and 15 mammalian species are in the Red Data Lists. Critical decreases occurred recently in the Barents Sea population of capelin (*Mallotus villosus*), reindeer on Severnaja Zemlia Islands, and the Pacific walruses and other marine mammals of the Bering Sea. In more affected areas, endemic plant species are replaced by ruderals, and the indigenous plant communities give way to more uniform secondary vegetation. About 80% of the endangered plant species occur in Chukotka where the International Beringian Park is now planned (Fig 1.).

In the Beringian project, we advanced the idea of an ethnic park protecting both the natural and historical heritage and the traditional life-style of the indigenous people. The project was recently discussed in the Russian Supreme Soviet Committee where senior officers of the Audubon Society supported the designers.With great conservation potential, the Great Arctic Reserve Project was developed for the Taimyr-Severnaja Zemlya by the Institute of Animal Ecology and Morphology in cooperation with the WWF-Germany. It is focused on alongshore migratory route protection. An alternative concept, provided by the Institute of Nature Conservation and Reserves (INCR), includes key inland areas, notably an ethnic area south of Taimyr. INCR is also involved in the Franz Josef Land Project, to be finalized by the end of 1992, and reconnaissance studies on Novaja Zemlia and the Lena Delta. More international cooperation is needed to get these projects into action.

BIOLOGICAL DIVERSITY AND ECOLOGY IN THE EVENKI OF SIBERIA

by M.H. Crawford (University of Kansas, Lawrence), W. Leonard (Guelph University, Guelph, Ontario) and Rem I. Sukernik (Siberian Branch of the Russian Academy of Sciences, Novosibirsk).

This research project is an international collaboration among United States, Canadian and Russian scientists focusing on the effects of Russian expansion into the Siberian Taiga on a group of reindeer herders, the Evenki. The research is sponsored jointly by the Man and the Biosphere Programme, the National Science Foundation and the Research Council of Canada. Last summer, our research team spent six weeks in two Evenki communities (Surinda and Poligus, located in Central Siberia due south of the Tamyr Peninsula) examining the subsistence economy, demographic structure, activity patterns, genetics, health and nutrition of Evenki reindeer herders.

Up to the 1930's, the Evenki were socially organized into named, extended family lineages, which served as the units of reindeer herding, and into tribes sharing common languages. However, during Stalin's collectivization, the Evenki were forcibly re-organized into cooperative settlements, such as the village of Surinda, with smaller groups of up to 50 individuals (called brigades) responsible for breeding and herding reindeer. On average, the brigades that we investigated each herded approximately 1500 head of reindeer. Although several of the brigades that we encountered consisted of different extended families and lineages, most of them tended to be made up of close relatives.

One component of this research involves the study of the subsistence ecology and nutritional status of the Evenki herders. Data on household composition, dietary consumption, and health status were collected among the herders of the Surinda region. Additionally, anthropometric measurements, such as height, weight, limb circumferences and