

PROBLEMS WITH CONSERVATION AND SUSTAINABLE USE OF POLAR BEARS IN THE RUSSIAN ARCTIC

STANISLAV E. BELIKOV, Ministry of Environmental Protection and Natural Resources, All-Russian Research Institute for Nature Conservation, Moscow, Russia, email: arctos@glas.apc.org

ANDREI N. BOLTUNOV, Ministry of Environmental Protection and Natural Resources, All-Russian Research Institute for Nature Conservation, Moscow, Russia, email: arctos@glas.apc.org

Abstract: Three polar bear populations (*Ursus maritimus*) occur in the Russian Arctic: Spitsbergen–Novozemelskaya, Laptevskaya, and Chukchi–Alaska. The status and local condition of each population differs and requires different conservation and management approaches. The Spitsbergen–Novozemelskaya population in the early 1980s had approximately 3,000–6,700 animals. About 1,700–2,000 bears of this population inhabit the Svalbard, Norway, region and are considered by Norwegian specialists as a separate sub-population. No survey data are available to detect changes in population size, although Barents Sea resources were over-harvested during the 1980s. Because of these uncertainties, it has been recommended that this population be placed in the fourth category (undetermined status) in the *Red Data Book of Animals of the Russian Federation* (Eliseev 1983) when the next issue is published. This status allows use of the population for recreational viewing purposes and for capturing cubs for zoological gardens. The Frans-Josef Land Archipelago has been designated a federal refuge, which protects the polar bear population in the region. Additional protected territories and marine areas in the Novaya Zemlya region are planned and would provide additional protection for the Spitsbergen–Novozemelskaya polar bear population. The Laptevskaya population of approximately 1,000 bears has been stable for decades. The comparatively small size and low density of this population justifies retaining it in the third category (rare status) of the *Red Data Book of Animals of the Russian Federation* (Eliseev 1983), which provides greater protection than other designations. In the denning areas of this population, the Severnaya Zemlya Archipelago and the Novosibirsk Islands, establishing natural protection territories has been recommended. Only recreational use (viewing) of this population is allowed. The Chukchi–Alaskan population numbers several thousand bears and is harvested only by Alaskan native people. A proposal is pending to move this population to the fifth category (restored or rehabilitated status) of the *Red Data Book of Animals of the Russian Federation* (Eliseev 1983). In Russia, hunting polar bears in this population for subsistence purposes by indigenous peoples is being considered. However, experts propose that legalized hunting be contingent upon elimination of the current illegal hunting that occurs in this region in Russia. For more effective protection of polar bears, it has been recommended that marine areas in the East-Siberian and Chukchi seas be added to the Wrangel Island State Nature Reserve and that an international protected marine area be established in the southern Chukchi Sea.

Ursus 10:119–127

Key words: conservation, management, polar bear, populations, Russian Arctic, sustainable use, *Ursus maritimus*.

In 1956, polar bear hunting was prohibited in the Russian Arctic because of an apparent critical decrease in bear numbers in some regions. This decrease was caused by over-harvesting during the late 19th and the first 30 years of 20th centuries and by unrestricted hunting near expedition bases, polar stations, and settlements in years immediately preceding 1956. This prohibition led to a gradual recovery of polar bear numbers. Numbers also increased because of the 1973 International Agreement on the Conservation of Polar Bears and Their Habitat (Int. Legal Materials 13:13–18), prohibition of polar bear hunting on Svalbard, and establishment of a state nature reserve on Wrangel and Herald islands.

Legalization of hunting of polar bears is now being considered in some regions of the Russian Arctic where populations are well recovered, although a conservative management approach should be continued in regions where number of bears are believed to remain low. Conservation and management of each population should be based on thorough evaluation of number and trends, distribution, and habitat characteristics, including populations of prey species. Because our

state of knowledge is incomplete research must be prioritized. Population management should be based on principles of sustainable use of wild species. A conservative approach is necessary when knowledge on important population parameters is lacking.

CURRENT STATE OF POLAR BEAR POPULATIONS

Elemental analysis of polar bear skull samples (Uspenski et al. 1985) and occurrence of bears during multi-year ice reconnaissance flights (Gorbunov et al. 1987, Belikov and Gorbunov 1991) provided data for distinguishing 3 populations (Fig. 1): western or Spitsbergen–Novozemelskaya in the Barents and Kara seas; central or Laptevskaya in the Laptevskaya and East-Siberian seas; and eastern or Chukchi–Alaskan in the Chukchi and Bering seas (Belikov 1992). The following review describes population characteristics necessary for understanding conservation and management problems in Russia.

The southern limit of polar bear distribution in the Russian Arctic changes seasonally and is generally the



Fig. 1. Polar bear populations in Russian and adjacent Arctic areas.

southern ice edge. Ice cover and area occupied by bears is most extensive in winter and early spring. In late spring and summer, ice cover decreases, causing a decrease of total area occupied by polar bears. In autumn and early winter, the advancing ice edge leads to an increase of area occupied by polar bears. The distribution of polar bears within habitats is not uniform and is influenced by distribution of primary prey species—ringed and bearded seals (*Phoca hispida* and

Erignathus barbatus, respectively). Polar bears decrease in density from the eastern (Chukchi and eastern East-Siberian seas) and western (Barents and Kara seas) areas toward the central (Laptevskaya and western East-Siberian seas) part of the Russian Arctic. Densities of other marine mammals, marine birds and fishes, and biomass of phyto- and zooplankton are abundant where polar bears abound, reflecting favorable ice conditions.

Chukchi–Alaskan Population

Radiotracking data from bears marked in 1986–93 show that the Chukchi–Alaskan population occupies a vast area including the Chukchi Sea, the northern Bering Sea, eastern East-Siberian Sea, and the western extreme of the Beaufort Sea (Garner et al. 1990, 1994, 1995; Garner and Knick 1991, Arthur et al. 1993). The area occupied by individual collared females varies in the Bering and Chukchi seas from 150,000 to 350,000 km² (Garner et al. 1990), in the Beaufort Sea from 10,000 to 270,000 km² (Amstrup 1986), and in the Canadian Arctic archipelago from 2,500 to 23,000 km² (Schweinsburg and Lee 1982).

Migrations of polar bears may be contrary to or coincide with the major drift of ice. In winter and spring, polar bears mostly stay in the Wrangel and Herald islands area, in Longa Strait, and in the southern Chukchi Sea. In years with heavy ice conditions in the Chukchi Sea, some polar bears migrate to the polynya north of Wrangel Island, while others move into the northern Bering Sea.

In summer, most bears stay on the retreating sea ice and occupy the drift ice edge. Location of the edge varies significantly from year to year. Bears are rare on the mainland shore and on Wrangel and Herald islands during summer. They appear on these islands in spring and autumn during seasonal migration and are especially abundant during the beginning of denning and den emergence (Belikov et al. 1986, Ovsyanikov 1993). The region of Wrangel and Herald islands is very important for denning and feeding because of the high density of pinnipeds (Belikov et al. 1984, Fedoseev 1992). Polar bear track densities are highest in areas of broken and young ice beyond the shorefast ice zone (Gorbunov et al. 1987).

Although the population occupies a large area shared by Chukotka (Russia) and Alaska (USA), radiotracking of denning females indicate that most denning and cub production occurs in Russian territory (Garner et al. 1990, 1994). Most maternity dens are concentrated on Wrangel and Herald islands (Uspenski and Chernyavski 1965, Kishinski and Uspenski 1973); Belikov et al. (1986) estimated about 250 dens there in 1980s. About 50–120 maternity dens have been reported on the northern coast of the Chukotka Peninsula (Stishov 1991). Few maternity dens have been found on the northwestern coast of Alaska (Amstrup and Gardner 1994). Maternity dens are generally located on land in the Chukchi Sea; however, Lentfer and Hensel (1980) and Garner et al. (1990) recorded apparent maternity dens in drift ice in the Chukchi Sea.

Belikov (1993) estimated the Chukchi–Alaska population to be 2,000–5,000 bears based on an estimated 300–400 breeding females that comprised 8–10% of the population. Based on data from ice reconnaissance flights from 1970–84, Gorbunov et al. (1987) concluded that the population gradually increased during that period. The current trend is probably the same, because bears in recent years have been appearing more often near shore settlements on the north coast of the Chukotka Peninsula (Belikov and Boltunov unpubl. data).

Laptevskaya Population

Distribution of the Laptevskaya population appears to be limited on the west by the eastern Kara Sea. Observations of ice conditions and marine mammals during multi-year ice reconnaissance flights indicate that the eastern boundary of the population is in the central East-Siberian Sea. In that area the multi-year ice massif remains throughout the year, which results in unfavorable conditions for marine mammals (Belikov et al. 1982).

The population numbers approximately 800–1,200 bears (Belikov 1992) and appears to have been stable during several recent decades. Density of bears is about 33–60% of that in the Barents and Kara Seas and about 67–75% of that in the Chukchi Sea (Belikov and Gorbunov 1991). In the central Russian Arctic, bear density is greater in the zone beyond shorefast ice near the Severnaya Zemlya Archipelago, along the northern and northeastern Taimyr Peninsula, and in the northern Novosibirsk Islands (Belikov and Boltunov, unpubl. data).

Maternity dens have been found on the Novosibirsk Islands (Kishinski 1969), the Severnaya Zemlya Archipelago (Belikov and Randla 1987), and on the mainland shore of the Laptevskaya and East-Siberian seas. Maternity dens are rare everywhere; according to surveys of local residents, they have become even more rare during the past 5–10 years. Habitat of the population has not changed substantially in recent decades except near settlements, where disturbance is especially harmful to bears in maternity dens (Belikov 1973).

Spitsbergen–Novozemelskaya Population

Larsen (1986) concluded that the Spitsbergen–Novozemelskaya population of polar bears extended from the eastern coast of Greenland (approximately 5° W longitude) to approximately 70° E longitude. However, radiotracking data from polar bears marked in the region of the Severnaya Zemlya Archipelago (Belikov et al. 1995, Belikov et al. 1998) and data on the dynamics of ice cover in the Kara Sea suggest that

this population extends east into the eastern Kara Sea (90° E longitude).

Larsen (1986) estimated the population at the beginning of the 1980s as 3,000–6,700, with about 1,700–2,000 bears in the Svalbard area. Norwegian specialists consider this group to be a separate population (Wiig 1995). The primary denning areas and areas of greatest density of bears include the following archipelagos: Svalbard, 135–160 dens; Frans-Josef Land, 50–150; dens, and Novaya Zemlya, 100–200 dens (Parovshikov 1965, Belikov and Matveev 1983, Larsen 1986, Belikov and Boltunov unpubl. data).

ANTHROPOGENIC EFFECT ON POPULATIONS

Anthropogenic factors effecting polar bears and their habitats in the Russian Arctic include illegal hunting, pollution, and habitat disturbance. Illegal hunting is currently the most serious human impact on polar bears. The number of poached bears is unknown, but according to questionnaire data from local residents it is at least some tens of animals. Poaching is increasing.

Large and medium size rivers carry pollutants, including heavy metals and organochlorides, to the Arctic Ocean. These compounds accumulate in polar bear tissues; however, no data exist on either the level of pollutants in tissues of bears in the Russian Arctic or the possible consequences of such contamination.

Hydrocarbons pose another major threat to polar bears. Low levels of hydrocarbons have been found in most parts of the Arctic, and most are brought there by ocean currents or from melted snow from polluted areas. Oil contamination can directly affect polar bears in 2 ways (Ortsland et al. 1981): (1) oiled hair loses insulating qualities, which affects thermoregulation; and (2) ingesting oil by eating oiled prey or grooming may have fatal physiological effects on bears. Cubs are particularly susceptible to oil contamination (Stirling and Calvert 1983). Prey species are also vulnerable to oil spills, which can cause direct mortality and reduce reproduction. Decreased seal numbers can lead to high mortality of juvenile and sub-adult bears (Stirling et al. 1984). There are plans for developing oil leases in the Barents, Chukchi, and Bering seas and for commercial shipping along the Northern Sea Route. These activities will likely increase the contaminant levels of the region and of the marine mammals and polar bears inhabiting the region. The cumulative effects of oil development could be severe where polar bear are concentrated.

Disturbance can adversely affect female polar bears and their young during the denning period (Belikov 1973, Amstrup 1993). Use of the Northern Sea Route for transit and regional development will likely increase disturbance throughout the Russian Arctic.

LEGAL BASIS FOR POPULATION MANAGEMENT

International Polar Bear Protection

International polar bear conservation is based on the International Agreement for the Conservation of Polar Bears and their Habitat (Int. Legal Materials 13:13–18) signed in 1973 by representatives of 5 Arctic countries—United States, Canada, Russia, Denmark, and Norway—and in effect since 1976. According to the agreement the individual countries can allow hunting of polar bears for the following reasons: (1) scientific purposes, (2) conservation purposes, (3) to prevent serious disturbance in the management and conservation of other species, (4) traditional use by local people using traditional methods in exercising traditional rights in accordance with national law of the country, and (5) when polar bears have or might have been subject to taking by traditional means by native peoples.

The agreement prohibits use of aircraft and large motorized vessels for hunting polar bears. Hunting is prohibited in areas where there was no traditional hunting of polar bears in the past (e.g., the central Arctic Ocean).

Each party to the agreement is responsible for protecting habitats of polar bears, with special attention to breeding areas and areas with high concentration of animals. Parties agree to conduct research and develop ways and methods for cooperative management of shared populations. In a resolution to the agreement, parties are asked to prohibit hunting of female polar bears and their cubs and in denning areas when bears are moving into denning areas or are in dens.

The agreement has played an important role in conserving polar bears and their habitats and in developing international programs of research and population management of shared polar bear populations. However, the agreement should be periodically reviewed and modified to strengthen it and to ensure consistent interpretation among parties. Items to be addressed include the interpretation of traditional hunting and hunting females with cubs.

Protection and Management in Russia

Hunting polar bears in the Russian Arctic has been prohibited since 1956. Bears may be removed from the population only by shooting for scientific purposes and by capture for zoos and circuses. A special permit is required for all removals. Bears may also be shot in defense of human life.

Polar bear conservation and management in Russia occurs on both federal and regional levels. The Department of Conservation of Biological Resources of the Ministry of Environmental Protection and Natural Resources is responsible for conservation and management on the federal level. Regional Committees of Ecology, Marine Inspection, and Departments of Hunting are responsible for polar bear conservation and management on the regional level.

The following documents comprise the legal basis for polar bear protection and management in Russia: "Environmental Protection Act" (1991), Presidential Edict "About Federal Natural Resources" (No. 2144, 16 Dec 1993), Presidential Edict "About Urgent Measures for Protecting Lands of Living Small Native Nationalities of The North" (No. 397, 22 Apr 1992), Presidential Edict "About Strictly Protected Natural Territories of Russian Federation" (No. 1155, 2 Oct 1992), and Presidential Edict "About Economical Zone of Russian Federation" (5 May 1992).

According to Presidential Edict "About Federal Natural Resources", plant and animal species listed in the *Red Book of the Animals of the Russian Federation* (Eliseev 1983), economically important species of animals whose natural migrations go through more than 2 subjects of the Federation, and species that are subjects of international agreements are considered federal resources. Consequently, the polar bear is a federal natural resource.

Conservation and Management of Shared Populations

Chukchi-Alaskan Population.—Polar bears of the Chukchi-Alaskan population occupy the eastern part of the East-Siberian Sea, the Chukchi Sea, and the northern portion of Bering Sea. According to the 1972 U.S. Marine Mammal Protection Act (16 USC 1361–1407), native people of Alaska are permitted to hunt polar bears for subsistence purposes, for clothing, and for handicrafts. There are no restrictions on number, sex, age of hunted bears, or place and time of hunting, provided waste does not occur.

In 1992, specialists from Russia and the United States met in Anchorage, Alaska, to develop cooperative approaches for conservation and management of this shared population. This meeting resulted in a Protocol of Intentions, which noted that the indigenous native peoples of Alaska and Chukotka have the right to use the population to support traditional ways of life.

During a second meeting in Nome, Alaska, in 1994, representatives of the 2 countries continued discussing the problems of conserving and managing the population. The parties agreed to the following:

1. The 1973 International Agreement would serve as the basic framework for joint conservation agreements.
2. To accomplish the conservation objectives, a government-to-government agreement would be developed in conjunction with a native-to-native agreement.
3. Sound biological information, including scientific data and traditional ecological knowledge, would be fundamental to the agreement. Therefore, the parties would continue and expand co-operative research programs to enhance knowledge of polar bears.
4. Principles of sustained yield would be institutionalized in the agreement and would serve as the basis for future harvest guidelines and allocation.
5. Subsistence use of polar bears, including the making and selling of articles of handicraft and clothing, was a recognized limited use.
6. Both parties would strive to minimize commercial exploitation of polar bears harvested for subsistence purposes.
7. Habitat protection and conservation would be a cornerstone of future agreements.
8. Both parties recognized the need to curb illegal take or trade of polar bears or their products.
9. Monitoring and verification programs would be an integral component of the agreement. All efforts shall be made to secure funding in support of the preparation and implementation of monitoring programs.
10. Both parties resolved to seek authorization to begin formal negotiations of this agreement as soon as possible.

The parties resolved to exchange documents to further the principles of polar bear conservation and to conduct concurrent meetings of government to government and native to native parties to further advance the agreements.

A meeting of representatives of the native peoples of Chukotka and Alaska was conducted in 1994 in Anadyr, Russia. Problems of conservation, management, and research of polar bears were discussed. It was emphasized that the native-to-native agreement should not contradict federal law and principles of sustainable use of wildlife species.

Spitsbergen–Novozemelskaya Population.—Hunting polar bears in Svalbard (Norway) has been prohibited since 1973. According to the 1920 agreement about Svalbard, the prohibition applies only to the islands and 4 nautical miles seaward. Norway has declared its right for economic zone resources, including the marine area around Svalbard. This declaration could provide special protection for polar bears in this part of the Barents Sea. However, no conservation measures have yet been implemented (Wiig 1995).

In Svalbard, about 50% of the territory, including the most important areas of polar bear denning, is protected in National Parks and Nature Reserves (Wiig 1995). The Ministry of Environment of Norway has responsibility for nature protection in Svalbard.

Specialists from Russia, Norway, and the U.S. have developed a cooperative research program to address some polar bear conservation problems in the Barents Sea. One of the goals is to test and apply methods for estimating the level and character of radioactive contamination of polar bears.

CONSERVATION MEASURES AND APPROACHES

Population Protection

Population status differs for different Russian polar bear populations, requiring different conservation approaches. The Chukchi–Alaskan polar bear population is harvested in Alaska. In recent years, about 90–100 bears have been killed each year. The average age of harvested bears has increased in recent years, which indicates that the population is not overharvested. Habitat, including the food base, is secure. The All Russia Research Institute for Nature Conservation has proposed reclassification of this population to Category 5 (Recovered) when the next edition of the *Red Data Book of Animals of the Russian Federation* is published. Such status allows strictly controlled hunting. It has been proposed that only native people of Chukotka should be allowed to hunt polar bears for subsistence use, as in Alaska. However, it has been recommended that hunting not begin until the popula-

tion size is determined and illegal hunting can be prevented.

Similarly, the Category 3 (Rare) was proposed for the Laptevskaya population of polar bears. The protection regime for this population should be stricter than for adjacent populations. In this category, the only allowed use is recreational viewing by tourists.

For the Spitsbergen–Novozemelskaya region, the population estimate of polar bears is rough. It appears that the Barents Sea ecosystem has not recovered from overharvesting and pollution. For this reason, the population should be classified as Category 4 (Undetermined), which does not allow hunting.

Habitat Protection

The primary denning area of the Chukchi–Alaskan population of polar bears is in the Russian Arctic on Wrangel and Herald islands and along the northern shore of the Chukotka Peninsula. In 1976, the Wrangel Island State Nature Reserve was established and included a 5-km protected marine area around the islands. After the reserve was established, it was found that a greater density of polar bears and Pacific walrus (*Odobenus rosmarus*) and seals occurs in a more extended area around the islands than was included in the protected 5-km zone. Consequently, it has been proposed to extend the protected marine area 30–60 km around Wrangel and Herald islands. This protected area must be established prior to leasing of some sites in the Chukchi and East-Siberian seas for development and exploitation of oil and gas resources. Some of the proposed sites for development encompass the Wrangel Island State Nature Reserve, which may lead to unmitigable damage of marine mammal habitats.

Denning areas along the northern coast of the Chukotka Peninsula are protected only in the eastern portion of the peninsula where Berengiyiski Nature Park is situated. A restriction has been proposed by the All Russia Research Institute for Nature Protection on industrial and other human activity for the non-protected portion of the peninsula during the denning period from 1 September to 15 May.

Recently, special attention has been paid to areas with high concentrations of polar bears, their maternity dens, or both. In 1994, the government of the Russian Federation established by decree a 4,200,000-ha State Natural Refuge in the Frans-Josef Land Archipelago. There are also proposals to establish protected areas in portions of the Novaya Zemlya and Severnaya Zemlya archipelagos. Part of the Novosibirsk Islands Archipelago is included in the Ust'-Lenski Reserve. Because marine areas sur-

rounding the islands are also protected, both the denning and feeding areas of polar bears are protected.

Other marine areas with high densities of polar bears and their prey, such as the northern portion of the Barents Sea between Svalbard and Frans-Josef Land, should also be considered for protection. It is also reasonable to restrict human activity in areas of seasonal concentrations of polar bears such as the dividing zone between fast ice and drift ice in the winter–spring period and the southern edge of drift ice in the late summer–early autumn.

Other Protection Measures

To counter the illegal hunting of polar bears in the Russian Arctic, which has increased in recent years, increased fines have been proposed to deter poaching. Fines could be as high as the cost of a bear skin on the black market, which would be thousands of U.S. dollars.

Measures to prevent or decrease the risk of bears attacking people and damaging property include storing food properly and dressing and cutting harvested marine mammals and fish a safe distance away from settlements. These measures are described in detail in *Instruction on preventing bear attacks on people* (Belikov 1989, unpubl. pamphlet). It is also recommended that regional hunting inspectors be provided with immobilizing equipment that would allow them to capture and transport bears (especially females with cubs) a safe distance away from people.

Public ecological education is especially important for bear protection in Russia. Under Russia's present economy, it will be necessary to involve regional, federal, and international foundations to financially support this effort.

MONITORING AND SCIENTIFIC RESEARCH

Monitoring of Populations

Population and harvest monitoring are important management tools for protection and sustainable use of the wildlife populations. Monitoring the population status should include such basic population characteristics as number, structure, distribution, migration, and contaminant levels of both animals and their habitats. At present, such activity appears feasible only for the Chukchi–Alaskan population. American and Russian specialists are planning a census of polar bears along the edge of drift ice during 1997 or later, and a test of improved methods for censusing maternity dens on Wrangel Island is planned for 1998. The initial census of polar bears and the regu-

lar census of maternity dens will form the basis for determining the status and trend of the population. In Alaska, polar bear hunting has been monitored since 1989 by U.S. Fish and Wildlife Service representatives in the coastal settlements where polar bears are hunted. Hunters must provide samples of reproductive organs and a tooth for aging from harvested bears and report the sex of the bear and the date and place of the kill. A similar monitoring program should be applied to the Chukotka region if hunting is permitted.

Scientific Research

Russian priorities for the next 5–10 years should focus on research to determine status of the populations, anthropogenic impact, and bear–human relationships. The following list of research needs and methods are suggested:

1. Evaluate the population number and trend. Density estimates of polar bears along the edge of drift ice using a vessel-based helicopter might be used for this purpose. This method is being developed by American specialists. Maternity dens should be censused.
2. Study distribution limits and seasonal migrations using satellite telemetry.
3. Study seasonal use of sea-ice habitats and level of inter-population exchange. Much multi-year data from ice reconnaissance flights and radiotracking of marked bears provides the basis for this research. Satellite telemetry and observations of ice conditions have been used for these types of studies (Arthur et al. 1993, 1996).
4. Study the level of population discreteness using DNA analysis.
5. Estimate the level and character of pollution of polar bear habitats and tissues. This will require obtaining and analyzing samples of marine water and tissues of polar bears and their prey species.
6. Study the role of permanent polynyas in life history of polar bears and their primary prey species.
7. Study polar bear–human relationships in both protected and unprotected territories.
8. Study polar bear–prey relationships.
9. Study sex, age, and spatial structure of populations including mortality and reproductive rates. Census data on polar bears and maternity dens, bear harvest data, radiotracking studies, and DNA research will provide data for these studies.
10. Study the effect of oil and gas exploration and development and commercial transport in the arctic seas on polar bears.

11. Develop rescue measures for polar bears contaminated by oil. These measures could be guided by experience with other species.
12. Study and synthesize traditional knowledge and experience of native people and incorporate their knowledge into plans for protection and use of polar bears.

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