

COSEWIC
Assessment and Update Status Report

on the

Polar Bear
Ursus maritimus

in Canada



SPECIAL CONCERN
2002

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA



COSEPAC
COMITÉ SUR LA SITUATION DES
ESPÈCES EN PÉRIL
AU CANADA

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COSEWIC 2002. COSEWIC assessment and update status report on the polar bear *Ursus maritimus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 29 pp.

Stirling, I., and M.K. Taylor. 1999. Update COSEWIC status report on the polar bear *Ursus maritimus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 1-27 pp.

Previous Reports:

Stirling, I. 1991. Update COSEWIC status report on the polar bear *Ursus maritimus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 24 pp.

Stirling, I. 1986. COSEWIC status report on the polar bear *Ursus maritimus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 20 pp.

Production note:

The COSEWIC 2002 publication COSEWIC assessment and update Status Report on the polar bear *Ursus maritimus* in Canada, includes the 1999 update Status Report on the polar bear and a 2002 addendum.

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Également disponible en français sous le titre Évaluation et Rapport de situation du COSEPAC sur l'ours blanc (*Ursus maritimus*) au Canada – Mise à jour.

Cover illustration:

Polar bear — C. Douglas, *Natural History Notebook Series 1*, Canadian Museum of Nature, Ottawa, ON.

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Catalogue No. CW69-14/351-2004E-PDF

ISBN 0-662-35849-X

HTML: CW69-14/351-2004E-HTML

0-662-35850-3



Recycled paper



COSEWIC Assessment Summary

Assessment Summary – November 2002

Common name

Polar bear

Scientific name

Ursus maritimus

Status

Special Concern

Reason for designation

This very large carnivore plays a key role in Canada's Arctic ecosystem and is of tremendous importance to northern native peoples. The wealth of long-term information available for this species indicates that most populations appear stable. A few populations have declined, and corrective measures are being taken to reverse those trends. This species, however, has a slow reproductive rate and is highly vulnerable to overharvest of adult females. Its conservation is therefore heavily dependent on appropriate management strategies. Polar bears are also affected by climate change. In the southern part of their distribution, a trend towards longer ice-free seasons has affected their life history. Additionally, as top predators, the bears concentrate a number of pollutants in their bodies, which could increase mortality if the levels become toxic.

Canadian Occurrence

Yukon Territory, Northwest Territories, Nunavut, Manitoba, Ontario, Quebec, Newfoundland-Labrador

Status history

Designated Not at Risk in April 1986. Status re-examined and uplisted to Special Concern in April 1991. Status re-examined and confirmed as Special Concern in April 1999 and in November 2002. Last assessment based on an existing status report with an addendum.



COSEWIC Executive Summary

Introduction

The polar bear was designated by COSEWIC as Not at Risk in 1986; it was uplisted to Vulnerable in 1991 on the basis of a report that was completed in 1998. This is the second update status report on the species.

Distribution

Polar bears are found throughout northern Canada from Yukon to Labrador and from northern Ellesmere Island south to James Bay. There are no recognized subspecies. They are distributed in 14 relatively discrete populations with limited interchange so that geographic variation in population genetics can be demonstrated. The length and frequency of seasonal movements undertaken by bears within each population varies with the size of the geographic area they occupy, the annual pattern of freeze-up and break-up of the sea ice, and other features such as land masses, expanses of multi-year ice, and polynyas.

Protection

Polar bears are on Appendix II of CITES (Convention on International Trade in Endangered Species). Under CITES, any international shipment of polar bears or parts thereof must be done under permit. Management authority for this species rests with the provinces, territories, and wildlife management boards established under land claims. Enforceable quotas are in effect in NWT, Manitoba, Yukon, Nunavut and Labrador.

Population size and trends

The total Canadian population is estimated at about 15,000 animals. Of the 14 subpopulations in Canada, one is probably increasing, one may be declining, and 12 are probably either stable or being managed for increase.

Habitat

The productivity of polar bear habitat is closely linked to the type and distribution of sea ice and the density and distribution of seals, their major prey. From early winter until breakup in spring, polar bears are dispersed predominantly over the annual ice along the coast. They may range more than 200 km offshore. Maternal denning sites are mainly located on land in snow drifts near the coast or sometimes in multi-year pack ice offshore.

General biology

Ringed (*Phoca hispida*) and bearded seals (*Erignathus barbatus*) are the major prey of the polar bear but, in some areas, harp (*Pagophilus groenlandicus*), harbour (*Phoca vitulina*), and hooded seals (*Cystophora cristata*) are also important. The reproductive rates of different polar bear populations are variable but all are fairly low. Females reach sexual maturity at 4-6 years and, if successful, have cubs every three years at most. Most males do not breed until 8-10 years old. Few polar bears live longer than 25 years.

Limiting factors

In Canada, polar bears are harvested by Inuit, Indians, and non-native sport-hunters guided by Aboriginal people. The total annual harvest for all populations within and shared by Canada through the 1980s was approximately 600, most of which were taken in the former Northwest Territories, the majority of which is now in Nunavut. Other limiting factors include availability of food, climatic changes, and increasing development in the north.

Special significance of the species

Canada supports at least 50% of the world's polar bears and, as a signatory to the (International) Agreement on the Conservation of polar bears, it has a mandate to conserve both the species and their habitat.



COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national status of wild species, subspecies, varieties, and nationally significant populations that are considered to be at risk in Canada. Designations are made on all native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fish, lepidopterans, molluscs, vascular plants, lichens, and mosses.

COSEWIC MEMBERSHIP

COSEWIC comprises representatives from each provincial and territorial government wildlife agency, four federal agencies (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership), three nonjurisdictional members and the co-chairs of the species specialist groups. The committee meets to consider status reports on candidate species.

DEFINITIONS

Species	Any indigenous species, subspecies, variety, or geographically defined population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

* Formerly described as “Vulnerable” from 1990 to 1999, or “Rare” prior to 1990.

** Formerly described as “Not In Any Category”, or “No Designation Required.”

*** Formerly described as “Indeterminate” from 1994 to 1999 or “ISIBD” (insufficient scientific information on which to base a designation) prior to 1994.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list.



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The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

**Update
COSEWIC Status Report**

on the

Polar Bear
Ursus maritimus

in Canada

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1999

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INTRODUCTION

The last revision of the status of the polar bear in Canada was completed in 1987 and the COSEWIC status assigned was Vulnerable. The classification in this report is unchanged.

Taxonomy

Order: Carnivora
Family: Ursidae
Scientific name: *Ursus maritimus* (Phipps 1774)
Common names: Polar bear, White bear, Ice bear, Nanuk, Ours blanc

Distribution

Polar bears are distributed throughout the circumpolar Arctic. In North America, their range extends from the Canadian Arctic Islands and the southern edge of the permanent multi-year pack ice of the Arctic Ocean, to the Labrador coast, southern James Bay, and the Bering Sea. For the most part, the present range of the polar bear in Canada corresponds to its historic range (DeMaster and Stirling 1981), although it appears from limited available data that they were more common in southern Labrador and Newfoundland a few hundred years ago than they are today (e.g. Townsend 1911; Stirling and Kiliaan 1980). The reduction in numbers of polar bears in southern Labrador and Newfoundland was probably a consequence of several hundred years of human habitation and associated hunting. Elsewhere in their range, their frequency of occurrence in the immediate vicinity of settled areas may also be reduced, although this local area effect may be due to avoidance behaviour as well as reductions in the number of bears there. To date, there are no quantitative data with which to evaluate either hypothesis. The southern limit of the distribution of polar bears throughout their range can vary between years, depending on the distribution of the seasonal pack ice during winter (Stirling 1988a).

During summer, the ice may melt in all or part of the range of a particular population so that bears may be forced to spend up to several months on land while waiting for freeze-up in the fall. This pattern is most marked in Hudson and James bays (Jonkel *et al.* 1976; Stirling *et al.* 1977; Derocher and Stirling 1990), but it is also well documented in parts of the High Arctic and eastern Baffin Island (Stirling *et al.* 1980; 1984; Schweinsburg 1979; Ferguson *et al.* 1997).

During winter, most pregnant female polar bears den on land within about 50 km of the coast (e.g. Harington 1968; Stirling *et al.* 1984; Ramsay and Stirling 1990; Stirling and Andriashek 1992), while the rest of the population remains active through the winter. In some areas of the northwestern part of the Canadian Archipelago and the Beaufort Sea, some polar bears dig maternity dens in snow drifts on multi-year ice floes (Lentfer 1975; Messier *et al.* 1994; Amstrup and Gardner 1994). Direct observations (Van de Velde 1971; Messier *et al.* 1992, 1994) and Inuit traditional knowledge indicate

that males, solitary females, and females accompanied by yearling or two-year-old cubs may also dig interim dens during periods of particularly cold or inclement weather.

PROTECTION

Polar bears are on Appendix II of CITES (Convention on International Trade in Endangered Species) and they are classified as “Lower Risk: Conservation Dependent” in the IUCN Red Book. Within Canada, they are classified as Vulnerable under COSEWIC (Committee on the status of Endangered Wildlife in Canada). Under CITES, any international shipment of polar bears or parts thereof must be done under permit.

Lunn *et al.* (1998) recently summarized regulations pertaining to the management of polar bears in Canada. Management authority for this species rests with the provinces, territories, and wildlife management advisory boards established under land claims. The boundaries for the different populations of polar bears in Canada (Fig. 1) have been determined by satellite tracking of female polar bears, mark-recapture studies and return of tags from polar bears of both sexes taken by Inuit hunters (Taylor and Lee 1995; Bethke *et al.* 1996). More recently, genetic studies using micro-satellites have demonstrated there is also a genetic justification for the separation of populations (Paetkau *et al.* 1995 and unpublished data). The boundaries of populations are reviewed annually by the Federal/Provincial/Territorial Polar Bear Technical Committee (PBTC) and are subject to revision as the results of new research become available.

In Canada, the PBTC conducts an annual review of the status of each population of polar bears and its sustainable harvest, and monitors the annual kill. The sustainable harvest of independent female polar bears (i.e., 2 years of age and older) from a population is estimated to be about 1.6% in most populations (Taylor *et al.* 1987a). Enforceable quotas are in effect in NWT, Yukon, and Labrador. In most populations in the Northwest Territories, a flexible quota system is now being applied which takes the sex ratio of each year’s harvest into account, by population, and adjusts the allowable quota in the following year to account for any over-harvest that might occur (Lunn *et al.* 1998). In NWT, the hunting season was formerly closed during summer but now opens on 1 August so that defence kills can legally be authorized by the Hunters and Trappers Organizations (HTOs) and administered without investigation by the Department of Resources, Wildlife, and Economic Development (DRWED).

In Manitoba, polar bears are listed as a protected species under the Wildlife Act and there is no hunting season. Thus, bears in dens and females with cubs are automatically protected. This designation removes the right to kill polar bears under Aboriginal treaty rights. However, the Protected Species designation still allows for the possibility of a harvestable quota in Manitoba because the Minister may still, by permit, authorize the taking of individuals of a species that has been so designated. This is an important distinction between the no hunting season in effect in Manitoba and Ontario.

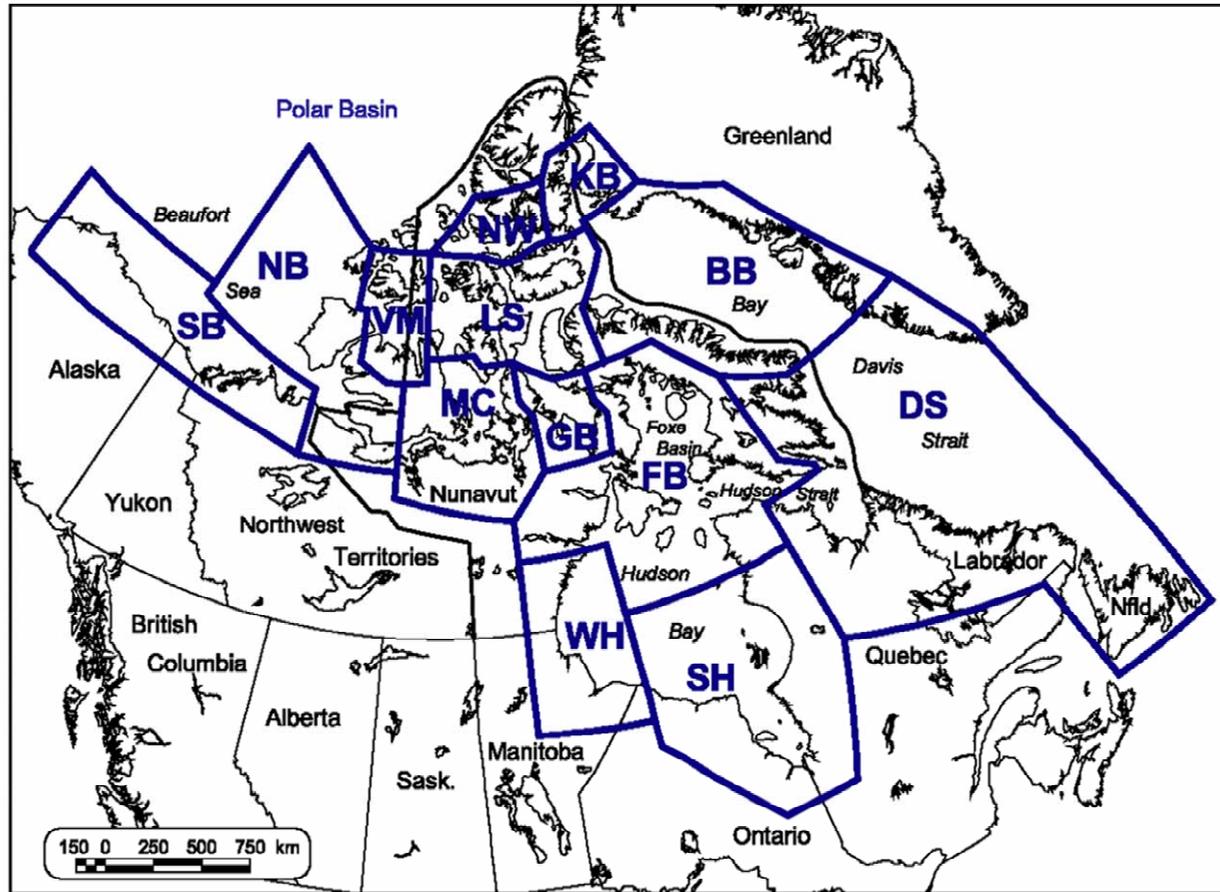


Figure 1. Map of boundaries of Canadian Polar Bear Populations, 1996. These boundaries have been determined from analyses of movements of bears in mark-recapture studies, returns of tags from bears killed by Inuk hunters, and the movements of adult females with satellite radio collars. Boundaries are subject to periodic revision as new research data are obtained and analyzed.

In Ontario, treaty rights do not allow regulation of hunting of polar bears, but there is an agreement with the Cree hunters on an allowable annual harvest quota. Harvest reporting is voluntary in Ontario but is considered to be generally reliable because polar bear skins may not be sold until they have been sealed by the province. In Ontario, polar bears in dens are not protected but the dens are. Females with cubs are not specifically protected in Ontario but only persons with treaty rights can legally hunt polar bears.

In Quebec, under the James Bay Agreement, the Inuit were allocated a “Guaranteed Harvest” of 62 bears annually. This means that the first 62 bears of an estimated sustainable harvest would be reserved for the exclusive use of Inuit. This number is subject to conservation limitations, however, so if the sustainable level was determined to be less than 62, the lower number would prevail and all the animals taken would be “guaranteed” for Inuit use only. The “Guaranteed Harvest” level was determined solely from harvest statistics and was not based on an estimate of sustainable yield from a population estimate. The James Bay Agreement was signed in 1975, before it was realized that Inuit hunters from Quebec harvested bears from three different populations. There are no quotas currently in effect in Quebec although Quebec Inuit hunters have agreed to constrain harvesting to current levels, which appear to be sustainable, until assessments are done for the three populations from which they harvest bears. When assessments have been completed for those three populations and sustainable harvests have been determined, the Quebec Inuit are expected to enter into co-operative management agreements with other user groups that share each population. Females with cubs of the year and bears in dens are not protected by legislation in Quebec (because no provision was made for this under the James Bay Agreement), but there is a local agreement by the hunters’ organization not to hunt these bears.

Formulating policy on polar bear research and management in Canada is complicated because there are seven government agencies involved: four provincial, two territorial, and one federal, plus the management boards established by land settlement claims. Discussion between representatives of all these jurisdictions to facilitate management decisions is co-ordinated by the Federal-Provincial Administrative Committee (PBAC) and the PBTC. The PBTC includes the biologists from each jurisdiction and invited experts from user groups and other research organizations (such as universities) who have direct experience with traditional knowledge or scientific field research on polar bears. Each year, the PBTC discusses the most recent research results and makes recommendations to the PBAC, which is comprised of the senior administrators from each jurisdiction plus user groups, and which also meets annually to co-ordinate management of polar bears on a national basis.

Internationally, polar bear research and management are co-ordinated under the *Agreement on the Conservation of Polar Bears* which was signed in 1973 and came into effect on 26 May 1976 (see Stirling 1988a). The Agreement requires that polar bears be managed according to “sound conservation practices”. In 1997, at their 11th meeting, the IUCN Polar Bear Specialist Group clarified that in order to be able to maintain “sound conservation practices”, accurate information is required on the number, location, sex, and age of harvested animals; the geographic boundaries of

polar bear populations; population number and sex-age composition; and rates of birth and death for the population. Although responsibility for management of polar bears in Canada lies with the provinces and territories, the International Agreement was signed by the federal government on behalf of all jurisdictions. Under the terms of the Agreement, the taking of polar bears is restricted to “local people” (which is interpreted in Canada to mean Aboriginal people or sport hunters guided by Aboriginal people) who harvest by traditional means and in accordance with sound conservation practices based on the best available scientific data. In Canada, “traditional means”, when applied to guiding non-resident sport hunters, means travelling by dog team. A particularly important section is that portion of Article II which states, “Each Contracting Party shall take appropriate action to protect the ecosystems of which polar bears are a part ...” This Agreement was renewed indefinitely in 1981 (Consultative Meetings of the Contracting Parties to the Agreement on the Conservation of Polar Bears 1981).

In recent years, several federally administered National Wildlife Areas, National Parks, and National Park Reserves have been established in the north, some of which provide protection to polar bears in summer sanctuaries and denning areas, although in many cases this is coincidental. There have been several similar initiatives by the provinces and territories. Ontario established the Polar Bear Wilderness Park in the northeastern corner of the province at the junction of James and Hudson bays. In Manitoba, a new National Park (Wapusk) has been excised from the previously existing Cape Churchill Wildlife Management Area (WMA). The area along the Manitoba coast from just south of Churchill to the Ontario border lay entirely within the Cape Churchill and Cape Tatnum WMAs, established in 1978 and 1973 respectively. Thus, the establishment of Wapusk National Park changes the category of land designation but not the protected status that had already been established by Manitoba.

The NWT does not currently have legislation that allows for the creation of protected areas. However, all polar bear habitat in the Northwest Territories lies within either the Inuvialuit or the Nunavut land claim settlement areas. Both the territorial government and the land claim boards require a review process for exploration, development, and research activities which includes a consideration of impact on polar bear populations and all wildlife. Additionally, under the terms of the land claim settlements, much of the coastal land used for polar bear denning and which adjoins marine areas of high biological productivity is owned collectively by the Inuit beneficiaries. Studies throughout the Arctic continue to identify maternity denning areas so that they may be considered in relation to industrial or other human activities (e.g., Jonkel *et al.* 1976; 1978; Kiliaan *et al.* 1978; Prevett and Kolenosky 1982; Stirling *et al.* 1978; 1980; 1984; Schweinsburg *et al.* 1981, 1984; Stirling and Andriashek 1992; Ramsay and Stirling 1988).

Lee and Taylor (1994) summarized several aspects of age, sex, and chronology of polar bears harvested in the NWT from 1979-80 through 1989-90. The main economic benefits of hunting polar bears include the commercial return from selling the hide, guiding non-resident hunters and, in some areas, human consumption of the meat as well. Hides sold by Inuit hunters are used mainly as luxury items such as rugs or wall hangings and may bring high prices on the fur market. Records of the economic value

in the trade in polar bear hides are available for some years, although many of the skins are sold locally and records are not available (Smith 1977, 1978, 1979; Smith and Jonkel 1975a & b; Smith and Stirling 1976). The Canadian quota for 1995-96, including the less stringent guidelines for Ontario and Quebec, was 605. Current prices for hides range up to about \$1,500 for a large male in prime condition.

The conditions of the guided non-resident hunt are that the hunter must be accompanied by an Inuk guide, hunting is done only with the aid of dog teams, and the tag for the bear taken comes from the quota of the settlement doing the guiding. Each settlement determines the number of polar bear tags from its annual quota that it wishes to allocate to the sport hunt each year. Thus, the allocation of tags for sport hunting does not result in an increase in the quota. If the hunt is unsuccessful, the tag cannot be re-issued to anyone else so that the introduction of guided hunting of polar bears has resulted in a reduction in the size of the total annual kill. In 1996, 132 non-residents participated in guided hunts, of which only 90 (68%) were successful. A secondary benefit of the guided non-resident hunting program is that a large proportion of the bears taken are male (76 of 90 in 1996).

The interest shown by Inuit hunters in guiding non-resident hunters results from the greater revenue that can be realized from each polar bear tag, compared to simply selling the hide. Even so, polar bear hunting remains a culturally important activity for the Inuit so that, to date, the majority of the tags issued each year are retained for local use.

In 1994, the US government passed an amendment to the Marine Mammal Protection Act of 1972 which made it legal for US hunters to import the hides from polar bears taken in guided non-resident hunts in Canada, provided certain criteria are met. The ability to import legally taken polar bear hides from Canada into the United States has resulted in an increased level of interest from American hunters in the guided hunt. Currently, seven populations in Canada have qualified under the US Fish and Wildlife Service criteria for approval. The increased level of interest has not resulted in any increase in harvest quotas.

POPULATION SIZE AND TRENDS

The world population is estimated to be between about 22-27,000 bears, of which 15,000 or more are in Canada (IUCN Polar Bear Specialists Group, 1998; Table 1). Polar bears are not evenly distributed throughout the Arctic, nor do they comprise a single nomadic cosmopolitan population, but rather they occur in about 19 or so relatively discrete subpopulations, of which 14 of those currently recognized are both solely within Canada or shared with either Alaska (USA) or Greenland (Figure 1). Because several subpopulations are shared internationally, and because numbers of different subpopulations of polar bears within Canada fluctuate and each is managed independently, we cannot think meaningfully of a "Canadian Population". Thus, Table 1 summarizes our current estimates of the numbers of polar bears in each subpopulation, harvest data, and provides a qualified status determination. The status assigned

Table 1. Status of Canadian polar bear populations (January 1997).

Population	% females in harvest	Number	Sustainable Annual Kill	Mean Annual Kill	Environ. Concern	Status ¹	Quality of Estimate	Degree of Bias	Age of Estimate	Harvest / Capture Data
Western Hudson Bay	31	1200	54	44	None	S ^a	good	none	current	good (>15 yrs)
Southern Hudson Bay	35	1000	43	45	None	S ^a	fair	moderate	old	fair (5-10 yrs)
Foxe Basin	38	2300	91	118	None	S ^a	good	none	current	good (>15 yrs)
Lancaster Sound	25	1700	77	81	None	S ^a	fair	none	current	good (>15 yrs)
Baffin Bay	35	2200	94	122	None	D? ^b	fair	none	current	fair (>15 yrs)
Norwegian Bay	30	100	4	4	None	S ^a	fair	none	current	good (>15 yrs)
Kane Basin	37	200	8	6	None	S	fair	none	current	fair (>15 yrs)
Queen Elizabeth	--	(200?)	9?	0	Possible	S? ^b	none	—	—	—
Davis Strait	36	1400	58	57	None	S? ^b	fair	moderate	out-dated	good (>15 yrs)
Gulf of Boothia	42	900	32	37	None	S ^a	poor	moderate	out-dated	good (>15 yrs)
M'Clintock Channel	33	700	32	25	None	S ^a	poor	moderate	out-dated	good (>15 yrs)
Viscount Melville Sound	0	230	4	0	None	I	good	none	current	good (>15 yrs)
Northern Beaufort Sea	43	1200	42	29	None	S	good	none	recent	good (>15 yrs)
Southern Beaufort Sea	36	1800	75	56	None	S	good	moderate	recent	good (>15 yrs)

¹S = stationary; D = decreasing; I = increasing; ? = indicated trend uncertain

^aPopulation is managed with a flexible quota system in which over-harvesting a given year results in a fully compensatory reduction to the following year's quota.

^bSee text "Population Size and Trend", for discussion.

follows the summaries of our current knowledge of the status of polar bear populations throughout Canada, as given in the 1997 summary of the world-wide status of the polar bear, completed by the IUCN/SSC Polar Bear Specialist Group (IUCN Polar Bear Specialists Group, 1998).

Western Hudson Bay (WH)

The distribution, abundance, and boundaries of this population have been the subject of research programs since the late 1960s (Stirling *et al.* 1977; Derocher and Stirling 1995a; Lunn *et al.* 1997; Taylor and Lee 1995) (Fig. 1). Over 80% of the adult population is marked and there are extensive records from mark-recapture studies and the return of tags from bears killed by Inuit hunters. This population appears to be geographically segregated during the open-water season, although it mixes with those of southern Hudson Bay and Foxe Basin on the Hudson Bay sea ice during the winter and spring (Stirling *et al.* 1977; Derocher and Stirling 1990; Stirling and Derocher 1993; Taylor and Lee 1995). The size of this population was estimated to be 1200 in autumn 1995 (Lunn *et al.* 1997), and the current harvest is believed to be sustainable. The sex ratio of the harvest, 2 males: 1 female, has changed the composition of the population to 58% female and 42% male (Derocher *et al.* 1997).

Southern Hudson Bay (SH)

The population boundaries are based on the observed movements of marked bears and telemetry studies (Jonkel *et al.* 1976; Kolenosky *et al.* 1992; Kolenosky and Prevet 1983; Stirling and Derocher 1993; Taylor and Lee 1995) (Fig. 1). The estimate of population size comes from a three-year (1984-1986) mark-recapture study, conducted mainly along the Ontario coastline (Kolenosky *et al.* 1992). This study also documented seasonal fidelity of individual bears to the Ontario coast during the ice-free season, and some intermixing with the Western Hudson Bay and Foxe Basin populations during winter and spring when the bay is frozen over. The calculated estimate of 763 was increased to 1000 by the PBTC because a portion of the eastern and western coastal areas was not included in the area sampled. Additionally, the area inland from the coast may have been under-sampled due to the difficulty of locating polar bears in the boreal forest. Thus some classes of bears, especially pregnant females, and females with cubs, may have been under-sampled. The estimate of 1000 is considered conservative, and the total harvest by NWT, Ontario, and Quebec appears to be sustainable. Discussions between these three jurisdictions on co-management and cooperative research are ongoing.

Foxe Basin (FB)

Based on 12 years of mark-recapture studies, a limited amount of tracking of female bears with conventional radios, and satellite tracking of adult females in western Hudson Bay, the Foxe Basin population appears to occur in Foxe Basin, northern Hudson Bay, and the western end of Hudson Strait (Taylor and Lee 1995) (Fig 1). During the ice-free season, polar bears were concentrated on Southampton Island and

along the Wager Bay coast. However, significant numbers of bears were also encountered on the islands and coastal regions throughout the Foxe Basin area. A mark-recapture population estimate of 2,300 was based on tetracycline biomarking concluded in 1996 (M.K. Taylor, unpublished data). The marking effort was conducted during the ice-free season, and distributed throughout the entire area. The previous harvest quotas are believed to have reduced the population from about 3200 in the early 1970s to about 2300 (15% CV) in 1996. The harvest quota in NWT for this area has now been revised to levels that will permit slow recovery of this population, provided the kill in Quebec does not increase. Co-management discussions with Quebec are ongoing.

Lancaster Sound (LS)

The central and western portion of the area occupied by the Lancaster Sound population of polar bears (Fig. 1) is characterized by high biological productivity and high densities of ringed seals and polar bears (Schweinsburg *et al.* 1982; Stirling *et al.* 1984; Kingsley *et al.* 1985; Welch *et al.* 1992). The western third of this region (eastern Viscount Melville Sound) is dominated by heavy multi-year ice and apparently low biological productivity, as evidenced by low densities of ringed seals (Kingsley *et al.* 1985). In the spring and summer, densities of polar bears in the western third of the area occupied by the Lancaster Sound population are low but, as break-up progresses from the east, polar bears move west to summer on the multi-year pack. Recent information on the movements of adult female polar bears monitored by satellite radio collars, as well as mark-recapture data from past years, has shown that this population is distinct from the adjoining Baffin Bay and Norwegian Bay populations (Stirling *et al.* 1984; M.K. Taylor, unpublished data). A new estimate of population numbers and population status will be available in fall 1997, when the results from the final field season (spring 1997) have been compiled and reported. The current estimate of 1,700 is based on a preliminary analysis of both historical and current mark-recapture data. The preliminary estimate compares favorably with a previous estimate of 1,675 that included Norwegian Bay (Stirling *et al.* 1984), and was considered to be conservative. Harvest quotas for the 1996/97 were reduced to sustainable levels based on the preliminary population estimate.

Baffin Bay (BB)

Based on the movements of adult females with satellite radios and recaptures of tagged animals, the Baffin Bay population is bounded by the North Water Polynya to the north, Greenland to the east, and Baffin Island to the west (Taylor and Lee 1995; M.K. Taylor, unpublished data) (Fig. 1). A distinct southern boundary at Cape Dyer, Baffin Island is evident from the movements of tagged bears (Stirling *et al.* 1980) and recent movement data from polar bears monitored by satellite telemetry (M.K. Taylor, unpublished data). In the initial (1984-1989) study conducted in Canada (R.E. Schweinsburg and L.J. Lee, unpublished data), mark and recapture samples were collected in April and May, when most of the bears were offshore in Baffin Bay. The initial spring estimate (300-600) was based on mark-recapture data collected when

capture effort was restricted to shore-fast ice and the floe edge off northeast Baffin Island. Preliminary estimates from mark-recapture sampling done during the autumn (1993-1995) open-water season suggested a population of 2200 (M.K. Taylor, unpublished data). It is clear from both analyses that sampling bias occurs when a portion of the bears are on offshore pack-ice and unavailable to capture teams. The second study (1993-ongoing) was done in September and October, when all polar bears from this population are available to be sampled in their retreat areas on Bylot and Baffin islands during the open water period. The results of the second year of mark-recapture sampling in 1995 were compromised by an unexpected autumn outflow of multi-year ice from Lancaster Sound, Jones Sound, and the polar basin. This resulted in an unknown fraction of the polar bears from Baffin Bay remaining on the offshore pack-ice where they were unavailable for sampling. Thus, the preliminary estimate of 2200, based on the 1993-1995 data, is believed to be conservative (M.K. Taylor, unpublished data). The field work for the Baffin Bay mark-recapture population assessment was completed in the fall of 1997. This population is shared with Greenland, which does not limit the number of polar bears harvested. Based on the preliminary population estimate, and the most recent harvest information, it appears the population may be over-harvested. Better information on population numbers and the Greenland harvest are required to clarify the status of this population. Co-management discussions between Greenland and Canada were initiated in February 1997.

Norwegian Bay (NW)

The Norwegian Bay population is bounded by heavy multi-year ice to the west, islands to the north, east, and west and polynyas (Stirling 1980; 1997) to the south (Fig. 1). From data collected during mark-recapture studies, and from satellite tracking of adult female polar bears, it appears that most of the polar bears in this population are concentrated along the coastal tide cracks and ridges along the north, east, and southern boundaries; and associated with a bearded seal population located in the Belcher Channel area just south of Cornwall Island (M.K. Taylor, unpublished data). The preponderance of heavy multi-year ice through most of the central and western areas results in low densities of ringed seals (Kingsley *et al.* 1985) and consequently low densities of polar bears. Based on preliminary data from ongoing research the current estimate for this population is 100 (M.K. Taylor, unpublished data). The harvest quota for this population was reduced to four (three males and one female) in 1996 and appears to be sustainable.

Kane Basin (KB)

Based on the movements of adult females with satellite radios and recaptures of tagged animals, the boundaries of the Kane Basin population are the North Water Polynya to the south, and Greenland and Ellesmere Island to the west, north, and east (M.K. Taylor, unpublished data) (Fig 1). Prior to 1997, this population was essentially unharvested in Canadian territory because it is distant from the closest Canadian community (Grise Fiord) and conditions for travel there are typically difficult. However,

this population was harvested by Grise Fiord in 1997 and continues to be harvested on the Greenland side of Kane Basin. In some years, Greenland hunters have harvested polar bears in western Kane Basin and Smith Sound as well. Few polar bears were encountered by researchers along the Greenland coast from 1995 through 1997, possibly because of intense harvest pressure there. Based on preliminary data from ongoing research (see Lancaster Sound summary), the population estimate of 200 would support a total cumulative harvest of eight per year at two males per female (M.K. Taylor, unpublished data). The current best estimate of the Greenland kill is 6 per year, which is sustainable. The Canadian quota for this population is 5, and if Canadian and Greenland Inuit were to harvest from this area, as they did in 1997, over-harvest and population depletion would occur. Although the habitat appears suitable for polar bears on both the Greenland and Canadian sides of Kane Basin, the densities of polar bears on the Greenland (harvested) side were much lower than on the Canadian (unharvested) side; suggesting that this population may have been larger in past years, and might be managed for increase. Co-management discussions between Greenland and Canada were initiated in February 1997 and are continuing.

Queen Elizabeth (QE)

The Queen Elizabeth or “Polar Basin” population is a geographic catch-all population to account for the remainder of the northeastern Canadian Archipelago (Fig. 1). Polar bears occur at low densities there, but systematic inventory studies have not been done. The area is characterized by heavy multi-year ice, except for a recurring lead system that runs parallel to the northern coast of the Queen Elizabeth Islands from the northeastern Beaufort Sea to northern Greenland. Perhaps 200 polar bears are resident in this area, and others are known to move through the area or use it for a portion of the year. This population is unharvested except for an occasional defense kill. Given the low numbers and low rate of reproduction that is likely, even a small amount of incidental take could cause population depletion if visitation to this remote area becomes more common.

Davis Strait (DS)

Based on the movements made by tagged animals and, more recently, of adult females with satellite radios, this population has been determined to occur in the Labrador Sea, eastern Hudson Strait, Davis Strait south of Cape Dyer, and an as yet undetermined portion of southwest Greenland (Stirling and Kiliaan 1980; Stirling *et al.* 1980 and unpublished data; Taylor and Lee 1995; M.K. Taylor unpublished data) (Fig. 1). The initial population estimate of 900 (Stirling *et al.* 1980) was based on a subjective correction of the original mark-recapture calculation of 726, which was felt to be too low because of possible bias in the sampling. In 1993, this estimate was increased to 1400 by the PBTC to account for the realization that the bias in sampling caused by the inability of researchers to survey the extensive area of offshore pack ice was greater than had previously been thought, to account for additional scientific information (I. Stirling and M.K. Taylor, unpublished data), and to incorporate traditional knowledge that suggests the population has increased over the last 20 years. The

principal justification for this adjustment is the observation that the annual harvest has been sustained for the last 20 years while non-quantitative observations all continue to suggest the population has increased, and there are no data to suggest the population has been detrimentally impacted by the ongoing harvest. The population estimate of 1400 was selected because that is the minimum number of animals required to sustain the observed harvest. Clarification of the status of this population will require a population inventory conducted during the open water season, and more reliable harvest information from Greenland. Within Canada this population is harvested by Inuit from NWT, Quebec, and Labrador. Co-management discussions between Greenland and Canada were initiated in February 1997.

Gulf of Boothia (GB)

The population boundaries are based on both movements of tagged bears, movements of adult females with satellite radio-collars in adjacent areas, and interpretations by local Inuit hunters of how local conditions influence the movements of polar bears in the area (Stirling *et al.* 1978; Taylor and Lee 1995; M.K. Taylor, unpublished data) (Fig. 1). An initial population estimate of 333 was derived from the data collected within the boundaries proposed for the Gulf of Boothia population, as part of a study conducted over a larger area of the Central Arctic (Furnell and Schweinsburg 1984). Although population data from this area are limited, local hunters report that numbers have remained constant or increased. The PBTC agreed to an increase in the population estimate from 333 to 900, on an interim basis pending completion of satellite tracking and mark-recapture studies, based on recognition that the central and eastern portions of the area were not sampled in the earlier study and the beliefs of local Inuit hunters about high polar bear abundance in the area. The status was listed as stationary (Table 1), but this designation should be regarded as uncertain and tentative. A satellite telemetry study of movements and a mark-recapture population inventory is scheduled for 1998-2001.

M'Clintock Channel (MC)

The current population boundaries are based on recovery of tagged bears and movements of adult females with satellite radio-collars in adjacent areas (Taylor and Lee 1995) (Fig. 1). These boundaries appear to be a consequence of large islands to the east and west, the mainland to the south, and the heavy multi-year ice in Viscount Melville sound to the north. A six year mark-recapture population study covered most of this area in the mid-1970s (Furnell and Schweinsburg 1984). Subsequently, a population estimate of 900 was derived from the data collected within the boundaries proposed for the M'Clintock Channel population, as part of a study conducted over a larger area of the Central Arctic (Furnell and Schweinsburg 1984). More recently, local hunters have suggested 900 might be too high so the PBTC accepted a recommendation to reduce the estimate to 700. Under a local Management Agreement between Inuit communities that share this population, the harvest quota for this area has been revised to levels that will permit the population to grow slowly if the population estimate of 700 is conservative. A satellite telemetry study of movements and a mark-recapture population inventory is scheduled for 1998-2001.

Viscount Melville Sound (VM)

A five-year study of movements and population size, using telemetry and mark-recapture, was completed in 1992 (Messier *et al.* 1992, 1994; M.K. Taylor, unpublished data). The population boundaries were based on the observed movements of female polar bears with satellite radio collars and movements of bears tagged in and out of the study area. The population estimate of 230 is accurate with a 14% CV (M.K. Taylor, unpublished data). Because this population occupies such a large geographic area, it was thought to be more abundant and productive at the time the original quotas were allocated in the mid-1970s. However, this area is characterized by heavy multi-year ice and low densities of ringed seals (Kingsley *et al.* 1985) and the productivity and density of polar bears was lower than was initially expected. Consequently, quotas have been reduced, and a five-year moratorium on hunting was agreed to. In 2000, harvesting will resume with an annual quota of 4 males.

Northern Beaufort Sea (NB)

Studies of movements and population estimates of polar bears in the eastern Beaufort Sea have been conducted using telemetry and mark-recapture at intervals since the early 1970s (Stirling *et al.* 1975, 1988; DeMaster *et al.* 1980; Lunn *et al.* 1995). As a result, it was realized that there were separate populations in the North and South Beaufort Sea areas and not a single population as was suspected initially (Stirling *et al.* 1988; Taylor and Lee 1995; Amstrup 1995; Bethke *et al.* 1996) (Fig 1). The density of polar bears using the multi-year ice of the northernmost area was lower than it was further south. The population estimate of 1200 (Stirling *et al.* 1988) is believed to be unbiased and the current harvest appears to be within sustainable limits.

Southern Beaufort Sea (SB)

The southern Beaufort Sea population is shared between Canada and Alaska (Amstrup *et al.* 1986; Stirling *et al.* 1988; Taylor and Lee 1995) (Fig. 1). Mark-recapture studies for estimation of population size and analyses of movements using data from tagged animals and those with radio collars (conventional and satellite) have been conducted semi-continuously since the late 1960s in Alaska and the early 1970s in Canada. The eastern and northern boundaries of this population have been determined from movements of marked bears and from telemetry (Stirling *et al.* 1988; Amstrup 1995). The western boundary, shared with the Chukchi population, is less clear at this point (Garner *et al.* 1994). The population estimate of 1,800 is believed to be reliable, but is confounded by uneven sampling in Alaska and Canada in different years resulting in non-random capture. A management agreement for this area was developed by the Inupiat (Alaska) and the Inuvialuit (Canada) who harvest this population (Nageak *et al.* 1994). The current harvest appears to be within sustainable limits, and local hunters feel the population has been increasing slowly.

HABITAT

The distribution of polar bears is influenced primarily by the type and distribution of sea ice, and the density and distribution of seals. From freeze-up in the fall until break-up in the spring, polar bears inhabiting the Canadian Arctic Archipelago and other areas lying over the continental shelf are dispersed over the annual ice along the coast, in the inter-island channels, and particularly in active ice areas associated with shore lead and mixed annual and multi-year ice (Stirling *et al.* 1993). In open ocean areas such as the Beaufort Sea or Baffin Bay, polar bears are widely dispersed throughout areas of annual and mixed annual/multi-annual ice (Garner *et al.* 1994; Bethke *et al.* 1996; M.K. Taylor, unpublished data). In general, polar bears are less abundant in areas of extensive multi-year ice and in the immediate vicinity of large polynyas with overwintering walrus populations, probably because the density of seals is lower there (Stirling *et al.* 1982; Kingsley *et al.* 1985).

Polar bears hunt throughout the year. Their hunting techniques and rates of success change with the seasons, and vary in different areas (Stirling 1974; Stirling and Latour 1978; Furnell and Oolooyuk 1980). The evidence from nutritional studies indicates that most of a polar bear's annual caloric intake occurs in spring and early summer, after the birth and weaning of ringed seal pups. The habitats most used by polar bears when hunting seals in spring are stable shore-fast ice with deep snowdrifts along pressure ridges which are suitable for ringed seal birth lairs and breathing holes, the floe edge where leads are wide (> 1 km), and areas of moving ice with seven-eighths or more of ice cover (Stirling *et al.* 1993). After break-up of the annual ice in late spring to early summer, hunting success is reduced and polar bears seek onshore retreats during late summer and autumn when open water conditions prevail.

Bears may occur near the coast or more than 200 km offshore, depending on the distribution of suitable ice for hunting seals. The preference of these habitats by bears is influenced by the distribution and accessibility of their principal prey species, ringed seals and, to a lesser degree, bearded seals (Stirling and Archibald 1977; Smith 1980). Ringed seals maintain their breathing holes from freeze-up in the fall to break-up in the spring by abrading the ice with the heavy claws on their foreflippers. These breathing holes are located on the last cracks to close over in the fall (Smith and Stirling 1975). In areas where wind, water currents, or tidal action cause the ice to continually crack and subsequently re-freeze, seals are apparently more accessible to polar bears and the bears can hunt more successfully. Bearded seals concentrate where natural cracks and polynyas form through the winter because it is easier to maintain breathing holes there. In smaller polynyas occupied by walruses, bearded seals occur mainly in adjacent areas of thinner ice but if walruses are absent or in low numbers, bearded seals may be found around the edges of polynyas themselves (Cleator and Stirling 1990). During winter, bears are less abundant in deep bays or fiords which have expanses of flat annual ice that are consolidated through the winter. In places where the snow cover in the fiords is extensive, large numbers of ringed seals give birth to their pups in subnivean lairs in the spring (McLaren 1958). Polar bears in general, but especially females with newborn cubs, move into such areas in April and May to hunt seal pups (Stirling *et al.* 1993).

It appears that most maternity denning takes place on land. The type of maternity den construction varies with the habitat features available. Most are constructed in snow drifts (Harington 1968), while in western Hudson Bay and James Bay the bears may dig dens in small banks along the edges of lakes or streams (Doutt 1967; Jonkel *et al.* 1972; Clark *et al.* 1997). It is particularly important that individual females show fidelity to general denning areas, though not necessarily to individual dens. Maternity denning sites and spring feeding areas are two of the most critical components of their habitat (Harington 1968; Stirling *et al.* 1984; Stirling 1990). Lentfer (1975) first suggested that a significant amount of the maternity denning of polar bears found in the western Beaufort Sea north of Alaska occurs on the multi-year ice of the Beaufort Sea. Telemetry studies conducted by Amstrup and Gardner (1994) have since confirmed this hypothesis.

GENERAL BIOLOGY

Reproductive capability

The reproductive capability of polar bears varies between areas. In the Beaufort Sea, the majority of female polar bears become sexually mature at five years of age (i.e., mating at the age of five years with the first litter produced at six) while in other populations such as Hudson Bay, Davis Strait, M'Clintock Channel, and Lancaster Sound, many mate at four and produce cubs at age five (Lentfer *et al.* 1980; Furnell and Schweinsburg 1984; Ramsay and Stirling 1988; Stirling *et al.* 1977, 1980, 1984). Males probably become physiologically mature at about five to six years of age but no detailed studies of the male reproductive cycle have yet been done. From studies of growth rates and tooth wear, however, it appears that most males do not enter the reproductive portion of the population until they are 8-10 years old (Ramsay and Stirling, 1988; Derocher and Stirling 1998). In un hunted populations, the adult sex ratio is even. In theory, because cubs remain with their mothers for two and one-half years before being weaned, those females would mate only once in three years, producing a functional sex ratio of three males per receptive female or greater (Ramsay and Stirling 1986). In Western Hudson Bay, analysis of progesterone levels of adult females indicated that 80-90% were pregnant (Derocher *et al.* 1992). However, probably mainly because of cub mortality and possibly some intrauterine mortality or failure to become pregnant, fewer than two-thirds of the adult females may be accompanied by either young of the year or yearling cubs and in some cases the proportion of females accompanied by cubs of any age may approach 50%. Lentfer *et al.* (1980) and Taylor *et al.* (1987a) estimated the average interval between litters to be about 3.6 years. The exception is western Hudson Bay where, in the early 1980s, up to about 40% of females weaned their young at one year of age (Ramsay and Stirling 1988), although that proportion has declined in recent years (Derocher and Stirling 1995b).

As a result of modelling the population dynamics of polar bears, Taylor (1987a&b; unpublished) determined that the sustainable yield of independent (2 years of age or greater) male polar bears could be twice that of independent females without depleting

the males, up to a maximum of 1.6% of the total female population. In populations where males are selectively harvested, adult males can be reduced to a point where they are 20% less abundant than females without having a negative effect on pregnancy rates (Derocher *et al.* 1992, 1997; Derocher and Stirling 1995b). Largely as a result of the low reproductive rate, the doubling time for a typical population of polar bears is about 24 years, so a depleted population could be expected to require decades to recover—even with no harvest.

Pregnant females enter maternity dens by about late October and the young, normally two, are born between about late October through early January (Harington 1968; Derocher *et al.* 1992) but, according to Inuit traditional knowledge, this varies with latitude. At birth, cubs weigh about 0.6 kg; they have a covering of extremely fine hair, and their eyes are closed. They are nursed inside the den until sometime between the end of February and the middle of April, depending on latitude. By this time, cubs weigh 10 to 12 kg (Ramsay and Stirling 1988; Derocher and Stirling 1995b).

Movements

The extent of seasonal movements varies greatly with ecological factors, particularly ice conditions or seal distribution, that prevail in the area inhabited by each population. Details of movements, such as they are known in each management zone at present, are summarized by (Jonkel *et al.* 1976; Stirling *et al.* 1975, 1977, 1978, 1980, 1984; Stirling and Kiliaan 1980; Schweinsburg and Lee 1982; Schweinsburg *et al.* 1981; Schweinsburg and Lee 1982; Ramsay and Andriashek 1986; Amstrup 1986, 1995; Messier *et al.* 1992; Taylor and Lee 1995; Bethke *et al.* 1996).

LIMITING FACTORS

The main factors affecting polar bear numbers today are probably hunting, availability of food, natural environmental fluctuations, and intraspecific predation (Taylor *et al.* 1985, 1987a&b; Stirling and Derocher 1993; Stirling and Øritsland 1995; Stirling and Lunn 1997). Physiological studies on the effects of oil on polar bears indicate there is a serious possibility that a single major oil spill in a critical area for polar bears could cause a significant reduction in population numbers (Øritsland *et al.* 1981).

Permanent habitation of the north has, until recently been restricted to Inuit settlements and a few military and government establishments. Since the mid-1960s, the search for new energy and mineral reserves has led to an increased amount of industrial activity in the Arctic. The extent to which these activities and developments may affect the habitat of the polar bear is not known, although destruction or disturbance of denning and feeding areas could seriously affect the individual populations of polar bears (Stirling and Calvert 1983; Amstrup 1993).

An additional risk resulting from increased habitation of the north is that foreign compounds are often stored in areas accessible to wildlife. Polar bears, because of

their highly investigative behaviour, are attracted to and may consume foreign substances that can be harmful or even cause death (Lunn and Stirling 1985; Stirling 1988b; Amstrup *et al.* 1989; Derocher and Stirling 1991).

In recent years, significant levels of various contaminants have been documented in polar bear tissues, particularly fat (e.g., Born *et al.* 1991; Norstrom *et al.* 1988; Norstrom and Muir 1994; Bernhoft *et al.* 1996; Letcher *et al.* 1995;). However, the effects of various compounds in the tissues of polar bears or in the tissues of the seals they feed on are as yet unknown. Finally, it seems likely that if climatic warming occurs, there could be significant negative effects on polar bears, but so far the consequences can only be speculated upon (Stirling and Derocher 1993).

SPECIAL SIGNIFICANCE OF THE SPECIES

Canada is believed to have between about 55 and 65% of the world's polar bears (IUCN/SSC PBSG 1998). Therefore, Canada has a central responsibility in conservation of the species for its own intrinsic value. This stewardship role is further emphasized by Canada's obligations as a signatory to the International Agreement on the Conservation of Polar Bears. Polar bears are also of significant cultural and economic importance to the Canadian Inuit.

EVALUATION AND PROPOSED STATUS

Polar bears are distributed at low densities. The current estimate is approximately 15,000 polar bears in Canada in fourteen populations (including those shared with Alaska and Greenland), each of which is estimated to number from less than 250 individuals up to a few thousand (Table 1). Polar bears have a low reproductive rate. Consequently, the size of a population could decline quickly as a result of over-hunting, or mortality caused by environmental damage to their habitat or prey. Experience at Churchill, Manitoba indicates that in areas where polar bears concentrate near sites of industrial or tourism development, there is a potential for defence kills to contribute to an overharvest situation. A slow decline in the size of a population, for whatever reason, would be difficult to detect from monitoring the harvest until it was serious, after which it could take decades to recover. At present, management of polar bears in Canada is based on a rotational population inventory cycle which reduces, but does not preclude, the possibility of a population declining because of overhunting. The status of several populations is uncertain because research results are dated or obviously biased. In these areas, research and community-based monitoring programs are planned or ongoing. Recent computer modelling has shown that polar bear populations are particularly sensitive to the harvest of adult females. Large scale environmental damage, while not highly likely to occur, is beyond the current ability of government or industry to control. Oiling of the fur and ingestion of oil are lethal to polar bears if not treated quickly. Because polar bears are at the top of the marine food chain and prefer to eat the fat of seals, in which toxic chemicals such as PCBs are deposited, they

concentrate these substances. If levels of local and global pollution increase, polar bears, and other apical predators, will be subject to the detrimental effects of increasing concentrations of toxic chemicals in their tissues. The long-term effects of such concentrations are unknown but cannot be ignored. Similarly, possible long-term effects of climate change on polar bears are unknown. For all of these reasons, the polar bear should be designated as Vulnerable.

TECHNICAL SUMMARY

Ursus maritimus

Polar bear

Ours blanc

YK, NT, NU, MB, ON, QC, NL

Extent and Area information	
<ul style="list-style-type: none"> extent of occurrence (EO) 	tens of thousands of km ²
<ul style="list-style-type: none"> specify trend (decline, stable, increasing, unknown) 	stable
<ul style="list-style-type: none"> are there extreme fluctuations in EO (> 1 order of magnitude)? 	no
<ul style="list-style-type: none"> area of occupancy (AO) (km²) 	?
<ul style="list-style-type: none"> specify trend (decline, stable, increasing, unknown) 	stable
<ul style="list-style-type: none"> are there extreme fluctuations in AO (> 1 order magnitude)? 	no
<ul style="list-style-type: none"> number of extant locations 	14 populations
<ul style="list-style-type: none"> specify trend in # locations (decline, stable, increasing, unknown) 	stable
<ul style="list-style-type: none"> are there extreme fluctuations in # locations (>1 order of magnitude)? 	no
<ul style="list-style-type: none"> habitat trend: specify declining, stable, increasing or unknown trend in area, extent or quality of habitat 	possibly declining
Population information	
<ul style="list-style-type: none"> generation time (average age of parents in the population) 	10-15 years?
<ul style="list-style-type: none"> number of mature individuals (capable of reproduction) in the Canadian population (or, specify a range of plausible values) 	9000-12000 (Tot 15000+)
<ul style="list-style-type: none"> total population trend: specify declining, stable, increasing or unknown trend in number of mature individuals 	stable
<ul style="list-style-type: none"> extreme fluctuations in number of mature individuals? 	no
<ul style="list-style-type: none"> is the total population severely fragmented? 	no
<ul style="list-style-type: none"> list each population and the number of mature individuals in each 	Table 1 in report
<ul style="list-style-type: none"> specify trend in number of populations (decline, stable, increasing, unknown) 	12 stable, 1 increasing, 1 possibly decreasing
<ul style="list-style-type: none"> are there extreme fluctuations in number of populations? 	no
Threats (actual or imminent threats to populations or habitats) [add rows as needed]	
<ul style="list-style-type: none"> - pollution - global warming - several populations apparently overharvested 	
Rescue Effect (immigration from an outside source)	
<ul style="list-style-type: none"> does species exist elsewhere (in Canada or outside)? 	yes
<ul style="list-style-type: none"> status of the outside population(s)? 	stable or unknown
<ul style="list-style-type: none"> is immigration known or possible? 	yes
<ul style="list-style-type: none"> would immigrants be adapted to survive here? 	yes
<ul style="list-style-type: none"> is there sufficient habitat for immigrants here? 	no
Quantitative Analysis	n/a

ACKNOWLEDGEMENTS

Funding was provided by the Canadian Wildlife Service, Environment Canada.

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ADDENDUM. A 2002 Addendum to the polar bear status report

Information on the status of polar bear populations within and shared with Canada is updated annually at the Canadian Federal/Provincial Polar Bear Technical Meeting (PBTC). The IUCN/SSC Polar Bear Specialist Group meets every 4-5 years, and they also produce a status report. In addition, research is published as it is completed, so even the annual PBTC status report can be outdated. The COSEWIC review cycle is quite long relative to the rate at which information on the status of polar bear populations can change.

Currently the method by which the status of polar bear populations is determined is under discussion. The current PBTC status report contains status determinations that are produced by two different and inconsistent methods. The old method (and the one used in the current COSEWIC status report) is a deterministic approach based on the indication that polar bear populations can sustain an annual harvest of females of 1.5% of their total number, and an annual harvest of males of about 3% of their total number. The old method does not incorporate the uncertainty of either the population estimate or the estimated sustainable rate of removal. The new method utilizes a Monte Carlo simulation model to incorporate the uncertainty of population and vital rate estimates into a risk analysis for any given harvest level. The new model suggests that past management practices for some polar bear populations have had a greater element of risk than was formerly understood.

However, the information required to conduct an entirely data-based risk analysis is not available for several of Canada's the 14 polar bear populations that are either contained within Canadian territory or shared with either Alaska or Greenland. For some populations, the existing data are suspect because of sampling problems and because the data were collected 15 or more years ago. Data from recently completed studies indicates that the rates of birth and death can vary considerably between populations, and recent work on the effects of climate change suggest that vital rates could already have been effected (Stirling *et al.* 1999). Vital rates can also vary significantly within the same population at different time periods (e.g. Stirling 2002). Polar bear researchers in Canada are attempting to reconcile the new information and new analysis methodologies with past approaches and data deficiencies in some populations to produce a status report that applies a single methodology to all populations. While it is possible to update the population estimates of the Viscount Melville (VM), Norwegian Bay (NW), Kane Basin (KB), Lancaster Sound (LS), Baffin Bay (BB), M=Clintock Channel (MC), Gulf of Boothia (GB), and Southern Beaufort Sea (SB) populations, not all of the same studies that provide the new population estimates support application of a blanket 1.5% females and 3.0 % males as a sustainable harvest estimate. It would be misleading to simply change the population estimate values in the existing table.

The boundaries of Canada's polar bear populations (Fig. 1) have recently been revised based on a new analyses of movements in several populations (Taylor *et al.* 2001,). These studies are continuing, and it is expected that the remaining populations will be re-defined periodically over the next few years as new results are analyzed.

While the new information does not lend itself to a quick and easy update of the status report, it is also not a cause for alarm. The new information documents that four populations have been over-harvested (VM, MC, FB, and KB). Management changes to enable recovery have already been initiated for the FB, VM and MC populations, and discussions are ongoing with Greenland about co-management with the shared KB population. The new information from the other populations (NW, LS, GB, BB, and SB) does not suggest that they are in any immediate danger of decline from over-harvest, climate change, or pollution.

Studies of polar bear movements (Amstrup *et al.* 2000, Taylor *et al.* 2001) have documented that while there is some exchange between populations, most bears return to their home populations within the same year and a cumulative analysis of the movement patterns of individuals can be used to define population boundaries for management purposes. Furthermore, studies of population genetics indicates that the majority of populations within Canada show measurable genetic distinctness which also supports the concept of separate geographic populations (Paetkau 1999). There is no evidence to support the recognition of subspecies of polar bears anywhere in the Arctic. Thus, it appears that while the status of polar bears as a species in Canada for COSEWIC can be given as a single value, it should comprise the sum of the best estimates available for each population, recognizing there is variability in the quality of those estimates.

A partial revision of the population estimates and the demographic data would not serve to clarify the status of polar bears because a single consistent status evaluation methodology has not been agreed upon for Canadian polar bear populations. The issue is on the agenda of the PBTC which will meet February 2003 to discuss it. The COSEWIC status report for polar bears could be revised in the next 2-4 years. Although some issues and information continues to change annually, the large picture is unlikely to change quickly. The current designation of "special concern" will remain accurate and adequate for that interval.

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