Status of the polar bear

Status and distribution

Polar bears are not evenly distributed throughout the Arctic, nor do they comprise a single nomadic cosmopolitan population, but rather occur in 19 relatively discrete subpopulations (Figure. 1). There is however an uncertainty about the discreteness of the less studied subpopulations, particularly in the Russian Arctic and neighbouring areas, due to very restricted data on live capture and tagging. The total number of polar bears worldwide is estimated to be 20,000–25,000. The following subpopulation summaries are the result of discussions of the IUCN/SSC Polar Bear Specialist Group held in Seattle, Washington, USA in June 2005 and updated with results that became available up to June 2006. The information on each subpopulation is based on the status reports and revisions given by each nation. We present estimated subpopulation sizes and associated uncertainty in estimates, historic and predicted human-caused mortality, and subpopulation trends, and rationale for our determinations of status. Where data allowed, or the approach was deemed appropriate for a jurisdiction, results of stochastic subpopulation viability analyses (PVA) to estimate the likelihood of future population decline are presented.

Figure 1. Distribution of polar bear populations throughout the circumpolar basin.

Status table structure

Subpopulation size

Table 1 presents subpopulation sizes and uncertainty in the estimates as ± 2 standard errors of the mean, 95% CI, or ranges. These estimates are based on scientific research using mark and recapture analysis or aerial surveys and the years in which data were collected are presented to give an indication of the current reliability of subpopulation estimates. For some subpopulations, scientific data were not available and population estimates were extrapolated from density estimates and/or local traditional ecological knowledge (TEK). In some cases, this also includes simulations based on the minimum size necessary to support local knowledge of subpopulation trends. Although these data are presented in addition to or in some cases as an alternative to dated scientific estimates, methods other than mark and recapture analysis or aerial surveys have unknown and in most cases inestimable errors.

Human-caused mortality

For most subpopulations, particularly those in North America, harvesting of polar bears is a regulated activity. In many cases, harvesting is the major cause of mortality for bears. In most jurisdictions, the total numbers of bears killed by humans in pursuit of sport and subsistence hunting, accident, and in defence of life or property are documented. Where data allow, we present the five-year mean of known human-caused mortality (removals) for each subpopulation. We also present the anticipated removal rate of polar bears in each jurisdiction based on known increases in hunting quotas and/or the average removal rate of polar bears by jurisdiction over the past five years.

Trend and status

Qualitative categories of trend and status are presented for each polar bear subpopulation (Table 1). Categories of trend include our assessment of whether the subpopulation is currently increasing, stable, or declining, or if we have insufficient data to estimate trend (data deficient). Categories of status include our assessment of whether subpopulations are not reduced, reduced, or severely reduced from historic levels of abundance, or if we have insufficient data to estimate status (data deficient).

Table 1. TR Status Report

	Aerial Survey/M-R Analysis		Additional/Alternative Analysis										
Sub-population	**Number (year of estimate)**	**estimate ±2 SE or 95% CI[h]**	**Number (year of estimate)**	**estimate ±2 SE[1] or min-max[2] range**	**Simulation**	**Density**	**TEK/IQ**	**Historical annual removals (5 yr mean)**	**Potential maximum annual removals**	**Observed or predicted trend**	**Status**	**Estimated risk of future decline (10 yrs)**	**Comments**
East Greenland	unknown							70	50	Data deficient	Data deficient	No Estimate	No subpopulation inventories have been conducted in East Greenland and therefore the size of the subpopulation is not known. During the last decades the extent of sea ice has decreased in the East Greenland area (e.g. Parkinson 2000). This decline is likely to continue (e.g. Rysgaard *et al.* 2003) resulting in a continued habitat destruction for polar bears in this area. Furthermore, various studies indicate that East Greenland polar bears may be negatively affected by relatively high body burden of organic pollutants (cf. Born and Sonne, this volume). During the last 5 years the total catch from the East Greenland subpopulation has decreased from 81 (1999) to 59 (2003) (Born and Sonne, this volume). Proposed quota (effective 1 Jan 2006) for East Greenland is 50 bears/year.
Barents Sea	2997 (2004)	2299 - 4116[i]						na		Data deficient	Data deficient	No Estimate	There has probably been an increase in the subpopulation size after 1973 until recently, but current subpopulation growth trend is unknown.
Kara Sea	unknown							na		Data deficient	Data deficient	No Estimate	The subpopulation size is unknown and no population surveys have been conducted in the Kara Sea.
Laptev Sea	800-1200 (1993)							na		Data deficient	Data deficient	No Estimate	The subpopulation size is based on Belikov (1993) using aerial counts of dens on the Severnaya Zemlya in 1982 and on anecdotal data collected in 1960-80s on the number of females coming to dens on Novosibirsk Islands and on mainland coast. The estimate should therefore be regarded as preliminary.
Chukchi Sea			2000 (1993)			X		43 - Alaska, unk. but substantial in Chukotka	uncertain	Data deficient	Data deficient	No Estimate	The subpopulation was estimated at 2000-5000 animals (Derocher *et al.* 1998) based on extrapolation of multiple years of spring den numbers data collected on Wrangel Island. The estimate was revised to 2000 animals with low confidence (Lunn *et al.* 2002). Abundance estimates with measurable levels of precision are not available. The subpopulation trend is believed to be declining and the status relative to historical levels is believed to be reduced based on harvest levels that were demonstrated to be unsustainable in the past. These harvest levels have been occurring for approximately the past 10–15 years. Without implementation of US-Russia polar bear treaty the levels of harvest are expected to continue and the risk for subpopulation depletion is rated as high.
Southern Beaufort Sea	1500 (2006)	1000 - 2000						58	81	Declining	Reduced	No Estimate	The 2006 subpopulation estimate is based on a preliminary analysis of capture-recapture data collected jointly by the U.S. and Canada, from 2001–2006. The 2006 subpopulation estimate was derived using the historic management boundaries for the SB subpopulation (i.e., from Icy Cape, Alaska, to Pierce Point, Northwest Territories, Canada). A final analysis of the recent capture-recapture data will be reported in 2007, along with suggestions for new management boundaries based on recent analyses of radiotelemetry data.
Northern Beaufort Sea	1200 (1986)	133 - 2097						36	65	Stable	Not reduced	No Estimate	A coordinated, intensive mark and recapture study covering the whole of the Beaufort Sea and Amundsen Gulf will be completed in 2006; a final analysis and report will follow.
Viscount Melville	161 (1992)	121 - 201	215 (1996)	99 - 331[1]	X			4	7	Increasing	Severely reduced	Very Low	14.0% of PVA simulation runs resulted in subpopulation decline after 10 years (86.0% resulted in subpopulation increase after 10 years). Simulations based on 1996 projected abundance.

* Where PVA simulations have been conducted, risk of decline is classed as Very Low (0–20%), Lower (20–40%), Moderate (40–60%), Higher (60–80%), and Very High (80–100%).

Table 1. TR Status Report (cont.)

	Aerial Survey/M-R Analysis		Additional/Alternative Analysis										
Sub-population	**Number (year of estimate)**	**estimate ±2 SE or 95% CI[1]**	**Number (year of estimate)**	**estimate ±2 SE[1] or min-max[2] range**	**Simulation**	**Density**	**TEK/IQ**	**Historical annual removals (5 yr mean)**	**Potential maximum annual removals**	**Observed or predicted trend**	**Status**	**Estimated risk of future decline (10 yrs)**	**Comments**
Norwegian Bay	190 (1998)	102 - 278						3	4	Declining	Not reduced	Higher	79.7% of PVA simulation runs resulted in population decline after 10 years (20.3% resulted in population increase after 10 years).
Lancaster Sound	2541 (1998)	1759 - 3323						74	85	Stable	Not reduced	Higher	78.3% of PVA simulation runs resulted in subpopulation decline after 10 years (21.7% resulted in subpopulation increase after 10 years). PVA estimate should be regarded as conservative due to unique male-bias in harvest (males decline over short term but not females); over longer time horizons PVA suggests sustainability of harvest.
M'Clintock Channel	284 (2000)	166 - 402						3	3	Increase	Severely reduced	Very Low	3.1% of PVA simulation runs resulted in subpopulation decline after 10 years (96.9% resulted in subpopulation increase after 10 years).
Gulf of Boothia	1523 (2000)	953 - 2093						46	74	Stable	Not reduced	Lower	21.0% of PVA simulation runs resulted in population decline after 10 years (79.0% resulted in population increase after 10 years).
Foxe Basin	2197 (1994)	1677 - 2717	2300 (2004)	1780 - 2820[1]	X		X	97	109	Stable	Not reduced	Lower	N = 2197, SE = 260 in 1994 based on Jolly-Seber M-R with tetracycline biomarking and harvest recoveries. Using Baffin Bay survival and recruitment rates, 25.9% of PVA simulation runs resulted in subpopulation decline after 10 years (74.1% resulted in subpopulation increase after 10 years).
Western Hudson Bay	935 (2004)	794 - 1076						45	64	Declining	Reduced	Very High	100.0% of PVA simulation runs resulted in subpopulation decline after 10 years (0.0% resulted in subpopulation increase after 10 years).
Southern Hudson Bay	1000 (1988)	684 - 1116						37	43	Stable	Not reduced	Lower	22.7% of PVA simulation runs resulted in population decline after 10 years (77.3% resulted in population increase after 10 years).
Kane Basin	164 (1998)	94 -234						11	15	Declining	Reduced	Very High	100.0% of PVA simulation runs resulted in subpopulation decline after 10 years (0.0% resulted in subpopulation increase after 10 years).
Baffin Bay	2074 (1998)	1544 - 2604	1546 (2004)	690 - 2402[1]	X			217	234	Declining	Reduced	Very High	100.0% of PVA simulation runs resulted in subpopulation decline after 10 years (0.0% resulted in subpopulation increase after 10 years).
Davis Strait			1650 (2004)	1000 - 2300[2]	X		X	65	74	Data deficient	Data deficient	Lower	The subpopulation was estimated at 1,400 in 1996 based on traditional ecological knowledge (TEK) that the subpopulation had increased with historical harvest levels; and simulation results suggesting that subpopulation could not have sustained the historical harvest at numbers less than 1,400. In 2004, the subpopulation estimate was increased to 1,650 based on TEK that the subpopulation had continued to increase; and simulations suggesting that an increase of about 250 (from 1,400 to 1,650) from 1996 was reasonable at post-1996 harvest levels. In 2005 a multi-year M-R survey was initiated to confirm subpopulation numbers and status. Using Baffin Bay survival and recruitment rates, and abundance as above, 23.4% of PVA simulation runs under projected harvest (potential maximum removals) resulted in subpopulation decline after 10 years (76.6% resulted in subpopulation increase after 10 years).
Arctic Basin	unknown							na					

* Where PVA simulations have been conducted, risk of decline is classed as Very Low (0–20%), Lower (20–40%), Moderate (40–60%), Higher (60–80%), and Very High (80–100%).