2019 Polar Bear Technical Committee
Status Table Terms

1. **Purpose**

Under its Terms of Reference, the Polar Bear Technical Committee (PBTC) is to provide an annual report to the Polar Bear Administrative Committee (PBAC) on the status of each of Canada's 13 sub-populations of polar bears that is based upon the best available scientific information and Traditional Ecological Knowledge.

This document defines the various terms used in the Status Table and the basis on which the status of each sub-population was assessed by the PBTC in February 2019.

2. **Definitions**

2.1 Population Estimate

The most recent estimate of abundance as assessed by the PBTC.

2.2 Historic Trend

Historic trend is the PBTC's assessment of changes in abundance that a sub-population may have experienced since the signing of the international Agreement on the Conservation of Polar Bears (1973), which led to current management practices and research. The most recent population estimate and the first comparable documented historic estimate are examined. If a direct comparison of abundance estimates cannot be made or there is only a single estimate of abundance, other lines of evidence may be used in this assessment.

2.3 IK Assessment

The Polar Bear Technical Committee (PBTC) takes into consideration Indigenous Knowledge (IK) in the assessments of the status table. The Committee applies a definition of Indigenous Knowledge similar to the definition of Traditional Ecological Knowledge (TEK) adopted by the Polar Bear Range States:

Indigenous Knowledge (IK) refers to a cumulative body of knowledge about the relationships of living beings with one another and with their environment, which is generated from the cultural practices, lived experiences and traditions of local and Indigenous Peoples.

PBTC weighs the value of IK information according to the rigor of study methodology, execution and analysis and the professional experience and judgments of traditional knowledge holders.2.4

Recent Trend (15 Years Ago to Present)

Recent trend is the PBTC's assessment of the direction of abundance over the last 15 years. The objective of this assessment is to inform the PBAC as to whether a sub-population has increased, decreased, or remained stable. Recent trend is assessed by comparing the most recent population estimate to the previous population estimate. If a direct comparison of population estimates cannot be made or is not applicable, other lines of evidence such as population viability analyses, productivity indicators, and recent harvest pressure may be used to infer any changes in recent abundance.

2.5 Future Trend (Present to 10 Years into the Future)

Future trend is the PBTC's assessment of the anticipated direction of abundance. The objective of this assessment is to inform the PBAC as to whether a sub-population is likely to increase, decrease, or remain stable over the next 10 years. Multiple lines of evidence including but not limited to population estimates, population viability analyses, productivity indicators, harvest pressure, and traditional ecological knowledge may be used in this assessment. The OPT described in 4.1 are a basis to make inferences related to assessment of future trend.

2.6 Historic Annual Removals

The average annual removals reported, which should include all human-caused mortalities and removals to zoos.

2.7 Potential Maximum Removals

The annual total number of human-caused polar bear mortalities from a sub-population allowed under quota(s), Total Allowable Harvest, Total Allowable Take, and\or voluntary agreements. Potential maximum removals do not include credits applied for and approved under the flexible quota system in Nunavut.

3. **Historic Trend Assessment**

3.1 Steps to Assess Historic Trend

Compare current population estimate with the first documented and comparable historic population estimate. When a current estimate is directly comparable to an historic estimate, a designation without any qualifier (i.e. reduced, stable, or increased) may be used.

If the current estimate is not directly comparable to an historic estimate because of differences in study area, or methods, a comparison may be made but any assessment of changes in abundance are inferred. In this case, a qualifier is required (i.e. likely reduced, likely stable, or likely increased).

When population estimates cannot be compared or the comparison does not allow to establish a statistically significant difference between the estimates, other lines of evidence such as the most recent population attributes of the sub-population (e.g. age structure) may be used to infer changes in the abundance of the sub-population. This does not include IK. Again, a qualifier is required (i.e. likely reduced, likely stable, or likely increased).

When there is insufficient information or lack of confidence in available information to make an assessment of change in abundance, the sub-population is assessed as uncertain.

Additional text is provided in the comments section of the status table. It includes listing items such as major threats and other lines of evidence that may have been used.

3.2 Status Designations

Reduced	Current population estimate is statistically significantly lower than historic population estimate
Stable	Current population estimate is not different from historic population estimate

Increased	Current population estimate is statistically significantly higher than historic population estimate
Likely Reduced	Current or inferred current population abundance is lower than historic or inferred historic population abundance
Likely Stable	Current or inferred current population abundance is not different from historic or inferred historic population abundance
Likely Increased	Current or inferred current population abundance is higher than historic or inferred historic population abundance
Uncertain	Insufficient information or lack of confidence in available information to make an assessment

4. **IK assessment**

4.1 Steps for IK-based Assessment of Status

Consider the observations, propositions, and theories ("OPT" – the bundle of elements that contribute to and constitute IK) of Indigenous Knowledge Holders ("IKHs") to contribute to the assessment the current status of each management unit. Wherever possible the IK Assessment is based on the present to past 15-year timeframe, for consistency with the Recent Trend Column. However, given the nature of IK acquisition and transmission, the IK Assessment may extend beyond the most recent 15-year period, but within the lived experience and living memory of the IKHs. The OPT are a basis to make inferences related to assessment of future trend.

Assessment of status may include a full suite of population attributes collected from IKHs (e.g. population abundance, indicators of population productivity and viability, age, distribution, den locations, behaviour).

Compare the current IK-based population assessment of status with previous IK-based assessments (within a 10-20 year period). When a current assessment is directly comparable to a previous population assessment utilizing a consistent data collection protocol and methodology, a designation without any qualifier is made (i.e. reduced, stable or increased).

If the current assessment of status is not directly comparable to the previous population assessment because of differences in study area, population attributes, methods, or is outdated, a comparison may still be made as the basis for inference. Changes from the previous assessment may include qualification (i.e. likely reduced, likely stable, or likely increased).

When there is insufficient information or lack of confidence in available information to make an assessment of changes in status, the sub-population is assessed as uncertain.

4.2 IK based trend assessment designations

Decline	There is a high degree of confidence that the current population status assessment is lower than previous population assessment

Stable	Current population status assessment is not different from previous population assessment
Increase	There is a high degree of confidence that the current population status assessment is higher than previous population assessment
Likely Decline	Current or inferred current population assessment is lower than previous or inferred previous population assessment
Likely Stable	Current or inferred current population assessment is not different from previous or inferred previous population assessment
Likely Increase	Current or inferred current population assessment higher than previous or inferred previous population assessment
Uncertain	Insufficient information or lack of confidence in available information to make an assessment

5. **Recent Trend Assessment**

5.1 Steps to Assess Recent Trend

Compare current population estimate with previous population estimate assuming current population estimate is recent. When a current estimate is directly comparable to its previous population estimate, a designation without any qualifier may be made (i.e. reduced, stable, or increased).

If the current estimate is not directly comparable to its previous population estimate because of differences in study area, methods, or is outdated, a comparison may be made but any assessment of changes in recent population abundance are inferred and a qualifier is required (i.e. likely reduced, likely stable, or likely increased).

In the absence of a statistically significant difference between two population estimates, or when population estimates cannot be compared or are not applicable to assess recent trend, other lines of evidence that could provide insight to the status of the population (e.g. age distribution or body condition), may be used to infer any changes in the abundance of the sub-population. This does not include IK. Again, a qualifier is required (i.e. likely reduced, likely stable, or likely increased).

When there is insufficient information or lack of confidence in available information to make an assessment of changes in population abundance, the sub-population is assessed as uncertain.

Additional text is provided in the comments section of the status table. It includes listing items such as major threats and other lines of evidence that may have been used.

5.2 Recent Trend Designations

Declined	Population estimate is statistically significantly lower than previous population estimate
Stable	Current population estimate is not different from previous population estimate

Increased	Current population estimate is statistically significantly higher than previous population estimate
Likely Declined	Current or inferred current population abundance is lower than previous or inferred previous population abundance
Likely Stable	Current or inferred current population abundance is not different from previous or inferred previous population abundance
Likely Increased	Current or inferred current population abundance is higher than previous or inferred previous population abundance
Uncertain	Insufficient information or lack of confidence in available information to make an assessment

6. **Future Trend Assessment**

6.1 Steps to Assess Future Trend

Compare current population estimate with future population estimate but not exclusive to a population viability analysis (PVA). PVAs are considered in the assessment as long as the data derived vital rates used to generate the simulations are not older than 15 years. In all these cases, a qualifier is required (i.e. likely decline, likely stable, or likely increase).

In addition to PVAs, other lines of evidence (e.g. body condition, litter size, sea ice trend, IK) may be used to predict future trend of a sub-population.

When there is contradictory evidence, insufficient information or lack of confidence in available information to make an assessment of future changes in population abundance, the sub-population is assessed as uncertain.

Additional text is provided in the comments section of the status table. It includes listing items such as major threats and other lines of evidence that may have been used.

6.2 Future Trend Designations

Likely Decline	Future population abundance predicted to be lower than current population abundance
Likely Stable	Future population abundance predicted not to be different from current population abundance
Likely Increase	Future population abundance predicted to be higher than current population abundance
Uncertain	Contradictory evidence, insufficient information, or lack of confidence in available information to make an assessment

2019 PBTC Status Table

	Estimate	±2 SE or 95% CI	Year of Population Estimate	Method	Historic Trend	IK Assessment	Recent Trend (scientific)	Future Trend	Historic annual removal (5 yr mean)	Historic annual removal (3 yr mean)	Historic annual removal (2017/2018)	Potential Maximum Removals (2017-2018)	Comments/Vulnerabilities/Habitat	Jurisdiction	Subpopulation
Baffin Bay	2,826	2059-3593	2012-13 [1]	GM/R	uncertain	stable[2]	likely stable[3]	uncertain[4]	135.8	139.0	144	160 (NU:80+GL:80)	cannot make direct comparison of previous (1997) and current estimate because of differences in geographical coverage and distribution of bears; decline in sea ice; increased time spent on land; decline in body condition; reduced denning time; increased shipping (tourism)	NU, GL	Baffin Bay
Davis Strait	2,158	1833-2542	2007 [5]	PM/R	likely increased	increased[6]	likely increased[7]	likely decline [8]	84.4	67.0	64	QC + 76 (NU:61+NL:12+GL:3)	potential for high harvest (currently managed in some jurisidictions for a decline); decline in sea ice; currently being reassessed	NU, QC, NL, GL	Davis Strait
Foxe Basin	2,585	2096-3189	2009-10 [9]	A	stable	increased[10]	stable[11]	likely stable[12]	103.8	104.7	109	QC + 123	decline in sea ice	NU, QC	Foxe Basin
Gulf of Boothia	1,592	870-2314	2000 [13]	PM/R	likely stable	increased[14]	uncertain [15]	uncertain [16]	61.8	63.3	64	74	Current and projected habitat change may affect productivity of ecosystem; current fieldwork indicates healthy productivity; low harvest; potential for increased summer tourism shipping; currently being reassessed	NU	Gulf of Boothia
Kane Basin	357	221-493	2013-14 [17]	GM/R	likely reduced	increased[18]	increased[19]	likely stable [20]	8.0	9.7	7	11 (NU:5+GL:6)	small population; adult male survival 0.87 and female survival 0.95; changes in sea ice conditions (multi-year to seasonal sea ice); potential positive response to initial impacts of climate change and reduced harvest	NU, GL	Kane Basin
Lancaster Sound	2,541	1759-3323	1995-97 [21]	PM/R	likely stable	increased[22]	uncertain[23]	uncertain [24]	80.8	79.7	70	85	historic sex-skewed harvest; habitat decline; potential for increased summer tourism and commercial shipping; proposed Marine Protected Area; reassessment planned to begin in 2019	NU	Lancaster Sound
M'Clintock Channel	284	166-402	2000 [25]	PM/R	likely reduced	stable [26]	uncertain [27]	uncertain [28]	7.8	10.3	10	12	loss of multi-year ice; potential for increased summer tourism shipping; currently being reassessed	NU	M'Clintock Channel
Northern Beaufort Sea	1,291*	n/a	2006 [29]	PM/R	likely stable	stable [30]	likely stable[31]	likely stable [32]	41.4	44.0	42	77 (NU:6+ NWT:71)	changes in sea ice conditions (multi-year to annual sea ice)	NU, NWT	Northern Beaufort Sea
Norwegian Bay	203	115-291	1997 [33]	PM/R	uncertain	stable [34]	uncertain [35]	uncertain [36]	2.0	2.0	3	4	small, isolated population; reassessment planned to begin in 2019	NU	Norwegian Bay
Southern Beaufort Sea	1,215* old boundary: 907	n/a old boundary: 548-1270	2006 [37] old boundary: 2010	PM/R	uncertain	stable [38]	likely declined[39]	likely decline [40]	21.0	19.3	12	56 (US:35 + ISR:21)	currently being reassessed; sea ice declines; declines in body condition, growth and demographic parameters related to changing sea ice; analysis of data 2001-2010 indicated a decline in abundance through 2006 followed by a period of relative stability through 2010; changes in study area and annual sampling regime may have resulted in potential negative bias in recent estimate of abundance; eastern subpopulation boundary was adjusted in 2013/14; TK suggests that annual variability in ice conditions results in changes in density and that bears are shifting to NB because of ice conditions; potential for oil/gas development	US,ISR (YK, NWT)	Southern Beaufort Sea
Southern Hudson Bay	780	590-1029	2016 [41]	A	likely reduced	stable James Bay; likely increase in East Hudson Bay [42]	likely declined [43]	science- likely decline/IK-uncertain44	36.4	33.7	33	QC + ON + 43 (NU:20 + NMR:23)	Science indicates large declines of body condition; declines in survival rates; IK indicates winter body condition has not changed and that reproductive rates have improved; IK and science indicate changes in sea ice, ice free season increased by 30 days between 1980-2012. The IK does not generally project into future, but no concern for viability of subpopulation. Concerns: habitat decline; decline of permafrost-based denning habitat.	NU, QC, ON	Southern Hudson Bay
Viscount Melville Sound	161	93-229	1992 [45]	PM/R	likely reduced	increased [46]	uncertain [47]	uncertain [48]	3.6	3.3	3	7(NU:3 +NWT:4)	currently being reassessed; changes in sea ice conditions (multi-year to annual sea ice)	NU, NWT	Viscount Melville Sound
Western Hudson Bay	842	562-1121	2016 [49]	A	likely reduced	increased [50]	likely declined[51]	science- likely decline/IK-uncertain 52	29.6	30.0	34	34 (NU) + MB	Although not statistically significant, the 2016 abundance estimate was 18.3% lower than the 2011 abundance estimate; similar rate of change in abundance over same time period in adjacent Southern Hudson Bay (SH) subpopulation; sea ice decline; declines in body condition; lower productivity compared to adjacent Foxe Basin and SH subpopulations; linkage between female survival and sea-ice conditions; Nunavut TAH based on assumption that Manitoba's mean annual removal will continue to be 4	MB, NU	Western Hudson Bay

Notes

PM/R - Physical Mark Recapture Survey; GM/R - Genetic Mark Recapture Survey; A - Aerial survey; n/a - not available

* The revised estimates for NB and SB are the result of a management boundary change. Revision is based on an analysis by Griswold et al. looking at impact of new boundary on M\R estimates.

2019 PBTC Status Table Footnotes

1. SWG. 2016
2. Born et al. 2011; Dowsley 2005; Dowsley 2007; Dowsley and Taylor 2006; Nunavut Wildlife Management Board (NWMB) Public Hearing minutes and submissions for April 2008, September 2009;
3. SWG 2016
4. Changes in sea ice dynamics (SWG 2016); IK indicates population is stable;
5. Peacock et al. 2013
6. Kotierk 2010a, 2010b; York et al. 2015 recoginzing spatial limitations of work restricted to Labrador.
7. Peacock et al. 2013; Stirling et al. 1980.
8. The impact of a TAH increase on the population has not been modeled; predicted trend after survey was completed at harvest levels in 2007 was considered stable (Peacock et al. 2013); NWMB Davis Strait public hearing submissions May 16-17, 2011
9. Stapleton et al. 2016
10. Sahanatien pers com. 7 Feb 2013; Dyck pers com. 7 Feb 2013; Canadian Wildlife Service Nunavut consultation report 2009
11. Taylor et al 2006b; Stapleton et al. 2016
12. Stapleton et al. 2016
13. Taylor et al. 2009
14. Keith et al. 2005; Canadian Wildlife Service Nunavut consultation report 2009
15. Vital Rates are from 2000 (Taylor et al. 2009) and are considered too old/unlreliable for PVA
16. Hunters in area reporting ice conditions have improved productivity, harvest levels remain stable (Dyck pers com. 2013), however no recent TK collection, and vital rates are from 2000 (Taylor et al. 2009)
17. SWG. 2016
18. Canadian Wildlife Service Nunavut consultation report 2009
19. SWG. 2016
20. SWG. 2016
21. Schweinsburg et al. 1980; Taylor et al. 2008
22. Canadian Wildlife Service Nunavut consultation report 2009
23. For the period 1997-2012, the population would be expected to be stable under the historical harvest regimen (1993-97). At the mean harvest rate of 78 bears/yr (2002-2006), and based on a PVA, we estimate that the population is more likely to decline than to increase (Taylor et al. 2008). Current harvest rate should also lead to decline, but no recent vital rates have been collected to update the PVA
24. Vital rates for Riskman PVA are from 1997 and considered too old for PVA
25. Taylor et al. 2006a
26. Inuit report that bears are moving to neighbouring areas throughout the region. (Keith et al. 2005; CWS Nunavut consultation report 2009)
27. Likely an increase based on quantitative assessment of growth rate (Taylor et al. 2006a)
28. Vital rates for PVA are from 200020 and considered too old for PVA; several research planning consultations has been completed; further consultations ongoing.
29. Griswold et al. 2010; Stirling et al. 2011
30. Joint Secretariat. 2015
31. Population size used for management was historically adjusted to 1,200 due to bias in in population estimate (Amstrup et al. 2005; Stirling et al. 2011).
32. Durner et al. 2009, Stirling et al. 2011, and Joint Secretariat 2015 indicate stable population and habitat conditions may improve in short-term
33. Taylor et al. 2006a; Taylor et al. 2008
34. Canadian Wildlife Service Nunavut consultation report 2009
35. Vital rates for Riskman PVA are 20 years old and vital rates were substituted from other populations (Taylor et al 2008); no recent work in the area
36. Vital rates for Riskman PVA are 20 years old and vital rates were substituted from other populations (Taylor et al. 2008)
37. Griswold et al., 2010; USFWS 2010, Bromaghin et al. 2015
38. Joint Secretariat. 2015
39. Population estimate is lower but not statistically different from previous population estimates (Amstrup et al. 1986, Regehr et al. 2006). Quotas were based on the understanding that the total harvest of independent females would not exceed the modelled sustainable maximimum of 1.5% of the population (Taylor et al. 1987) and that a 2:1 ratio of males to females would be maintained in the total quota harvested (Stirling 2002)
40. Based on sea ice declines (Durner et al 2009), changes in body conditions measured in Alaska (Rode et al. 2010) and modelling (Regehr et al. 2010). Estimated risk of future decline is based on vital rates estimated from 2001-2006 data used in demographic models that incorporate sea ice forecasts.
41. Obbard et al. 2018
42. NMRWB Inuit Knowledge Study 2018, NMRWB Public Hearing Inukjuak February 2014
43. Based on comparison with previous subpopulation estimates (Obbard et al. 2018; Obbard et al. 2016; Obbard et al. 2013; Obbard 2008; Kolenosky 1994).
44. Body condition decline, vital rate declines and changes in ice conditions; Inuit observations show no decline in body condition or abundance (Obbard et a. 2018; Obbard et al. 2016, Obbard et al. 2015, Obbard et al. 2016, NMRWB, 2018)
45. Taylor et al. 2002
46. Canadian Wildlife Service Nunavut consultation report 2009; community consultations in 2012 and 2013
47. Harvest managed for population growth since last survey including a 5 year moratorium; comparable litter size in 2012 (GNWT unpublished)
48. Vital rates for Riskman PVA are from 1992 and considered too old for PVA; population reassessment currently in process
49. Dyck et al. 2017; see Lunn et al. 2016 mark recapture estimate
50. Canadian Wildlife Service Nunavut consultation report 2009, Kotierk 2012, NWMB Public Hearing minutes 2005, 2011, 2014, 2017; Tyrrell 2006
51. Lunn et al. 2016
52. Based on body condition, abundance estimates, reduced reproductive productivity, and changes in ice conditions (Stirling and Parkinson 2006, Stapleton et al. 2014, Sciullo et al. 2014, Lunn et al. 2016, GN Report 2017 (Dyck et al. 2017))