

1 **Appendix A: Background Information on Subpopulation Status, Harvest and**
2 **Management**

3 Globally, polar bears are divided into 19 subpopulations for management purposes. This is based
4 on movement patterns estimated from satellite telemetry data, and ear tags returned from
5 harvested bears. Although these boundaries are accepted for management purposes, frequent
6 movement of bears occur between subpopulations and both scientists and Traditional
7 Knowledge holders believe these subpopulations are not isolated. The three subpopulations that
8 occur at least partially in Québec are presented here along with a brief characterization of their
9 population history, status, and proposed management recommendation(s).

10 **A1 - Davis Strait subpopulation status, harvest and management**

11 The Davis Strait (DS) subpopulation is delineated in Canada within the Labrador Sea, eastern
12 Hudson Strait, Davis Strait south of Cape Dyer, and along a portion of southwest Greenland. This
13 delineation is based on the recapture or harvest of previously tagged animals and tracking adult
14 female polar bears with satellite collars (Stirling et al. 1980, Stirling and Kiliaan 1980, Taylor and
15 Lee 1995, Taylor et al. 2001). This subpopulation is therefore shared between Greenland,
16 Newfoundland and Labrador, Nunavut and Québec.

17 A genetic study of polar bears (Paetkau et al. 1999) indicated significant differences between
18 bears from southern Davis Strait and both Baffin Bay and Foxe Basin while Crompton et al. (2008)
19 found that individuals from northern portions of DS and those from Foxe Basin share a high
20 degree of ancestry. Peacock et al. (2015) used samples from both northern and southern DS in
21 an updated circumpolar genetic analysis, and found that the two regions are so distinct as to
22 belong to two different global genetic clusters (southern DS Southern Canada and northern DS
23 to the Canadian Archipelago).

24 According to mark-recapture studies conducted between 1974 and 1979, 700-900 bears were
25 estimated to be present in the southern Baffin Island portion of the current delimitation of DS
26 and 60-90 additional bears in the northern Labrador coast portion (Stirling et al. 1980, Stirling
27 and Kiliaan 1980). In 1993 the PBTC estimated the DS subpopulation at 1,400 polar bears to
28 account for the bias in sampling in the original studies. This estimate was then raised to 1,650 in
29 2005 based on the minimum population size that would be needed to sustain the harvest level
30 occurring at that time and on TK suggestion that more bears were being seen over the last 20
31 years.

32 According to a mark-recapture survey completed in 2007, the subpopulation was estimated at
33 2,158 bears (95% CI: 1,833–2,542) (Peacock et al. 2013) and the subpopulation was assessed as
34 stable but was displaying low reproductive rate. Polar bear survival in DS varied with time and
35 geography, and was related to factors that included reductions in sea ice habitat and increases
36 of harp seal (*Pagophilus groenlandicus*) numbers (Peacock et al. 2013). It was suggested that the
37 observed lowered reproductive rates and declines in body condition of polar bears in DS were

likely a result of habitat changes and/or polar bear density (Peacock et al. 2013, Rode et al. 2012). In 2017 and 2018, a genetic mark-recapture survey of the Davis Strait subpopulation was conducted collaboratively by Nunavut, Newfoundland and Labrador, and Québec but a derived population estimate from that survey has not yet been completed. Concurrently with the scientific study, IK studies in Nunavut, Nunavik, and Nunatsiavut, are currently at various stages of completion.

In 2015, Inuit representatives from Nunavut, Nunatsiavut, and Nunavik met in Montreal to discuss the management of polar bears for the Davis Strait management unit in anticipation of a joint public hearing process that would occur in the three regions. At that meeting, Inuit from the three regions reached consensus on management objectives, the total allowable level of harvest, and allocation for the Davis Strait management unit of polar bears. Inuit representatives also reached consensus on numerous non-quota limitations. Users agreed at that time that a total allowable harvest of 116 polar bears would be consistent with their management objective of reducing the number of bears in the management unit. Participants agreed that maintaining high numbers is not only detrimental to polar bears and other species but also poses a safety concern. Participants recommended that any management measures stemming from these points of agreement should remain in effect until such time as there is updated information such as an abundance estimate for Davis Strait polar bears. It should be noted that Nunavik Inuit subsequently voiced concerns about the contents of the agreement, and that a coordinated public hearing process was never undertaken and that no formal management measures were imposed within the Management Plan Area as a result.

59 In Québec and the Nunavik Marine Region, the 5 year average reported harvest in DS for the
60 2014/15 to 2018/19 period is 20.2 bears per year. The main Nunavik communities harvesting
61 from DS subpopulation are, in order of importance of the average annual reported harvest,
62 Quaqtaq, Kangiqsualujuaq, Kangiqsujuaq, Aupaluk, Kuujjuaq, Kangirsuk and Tasiujaq.

63

Latest population estimate: 2,158 bears (95% CI: 1,833–2,542) - 2007

65 **Recent trend (scientific):** likely increased (PBTC, 2020)*

66 Trend according to TEK: increased (PBTC, 2020)*

67 Current harvest limits: Nunavut = 61

68 Nunatsiavut = 12

69 Greenland = 3

70 Québec = 35 (voluntary limit)

*The Polar Bear Technical Committee (PBTC) reviews annually the status and trends of all polar bear subpopulations in Canada. The Polar Bear Administrative Committee (PBAC) use this information to support management decision making.

73 **Management recommendations:**

- 74 • Maintain current population abundance and review management objective(s) once the
75 new Traditional Knowledge studies and results from the recent genetic mark-recapture
76 study become available.
- 77 • Take necessary measures to ensure complete harvest reporting from this subpopulation.
- 78 • Increase cooperation among all jurisdictions that share this subpopulation to ensure a
79 sustainable harvest.
- 80 • Hold joint wildlife management board public hearings to consider management options.
- 81 • Encourage inter-jurisdictional discussions between governments and user groups to
82 identify appropriate management objectives and the allocation of the harvest between
83 regions.

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112 **A2 – Foxe Basin subpopulation status, harvest and management**

113 Based on decades of mark-recapture studies and satellite tracking of female bears, the Foxe Basin
114 (FB) subpopulation appears to occur in the Foxe Basin, northern Hudson Bay, and the western
115 end of Hudson Strait (Taylor and Lee 1995; Sahanatien et al. 2015). This subpopulation is shared
116 between Nunavut and Québec but only a very small portion of the total range occupied by that
117 subpopulation occurs within Québec and the Nunavik Marine Region. During the ice-free season,
118 polar bears are concentrated on Southampton Island and along the Wager Bay coast; however,
119 significant numbers of bears are also encountered on the islands and coastal regions throughout
120 the Foxe Basin area (Stapleton et al. 2015). A total subpopulation estimate of 2,197 (95% CI:
121 1,989–2,405) for 1994 was developed (Taylor et al. 2006) from a mark-recapture analysis based
122 on tetracycline biomarkers where the marking effort was conducted during the ice-free season,
123 and distributed throughout the entire area. Traditional Knowledge gathered through public
124 consultations conducted in Foxe Basin communities by the Government of Nunavut between
125 2004 and 2012 suggested that the polar bears numbers had increased since that initial survey.
126 During a comprehensive summertime aerial survey in 2009 and 2010 (based on distance sampling
127 and double-observer estimation) covering about 40,000 km each year, 816 and 1,003 bears were
128 observed, respectively (Stapleton et al. 2015). This study yielded an abundance estimate of 2,585
129 (95% CI: 2,096 – 3,189) polar bears (Stapleton et al. 2015), which is not statistically different from
130 the 1994 estimate, indicating a stable population.

131 Fragmentation of sea ice has increased, and total concentration and ice-floe size has decreased
132 in FB over the last 25 years (Sahanatien and Derocher 2012) which has resulted in a reduction in
133 sea ice habitat for polar bears (Stern and Laidre 2016). Stirling and Parkinson (2006) predicted
134 eventual population decline based on past and predicted changes in ice habitat for polar bears
135 but no direct evidence could be provided during the 2009–2010 aerial survey that would suggest
136 bears of FB are currently affected negatively by climatic change (Stapleton et al. 2015).

137 Foxe Basin is harvested by Nunavut and Nunavik communities. In response to the subpopulation
138 estimate from 1994, harvest levels in Nunavut were reduced in 1996 from 137 to 96 bears/year
139 to allow for a slow recovery of this subpopulation. After consultations in 2005, the Nunavut quota
140 was increased to a level consistent with the increasing trend observed by Inuit and a
141 subpopulation level estimated at 2,300 bears (106/year). The Nunavut Total Allowable Harvest
142 (TAH) was again increased from 106 to 123 bears/year in 2014/2015 based on the 2009–10 aerial
143 survey results suggesting that the subpopulation could withstand a higher removal rate.
144 Currently there are no harvest limitation in Nunavik for FB and the 5 year average reported
145 harvest for the 2014/15 to 2018/19 period is 6 bears per year. The main Nunavik communities
146 harvesting from FB subpopulation are, in order of importance of their reported harvest, Ivujivik,
147 Akulivik, Puvirnituq, Salluit and Kangiqsujuaq.

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149 **Latest population estimate: 2,585 bears (95% CI: 2,096–3,189) - 2010**

Recent trend (scientific): stable (PBTC, 2020)*

Trend according to TEK: increased (PBTC, 2020)*

Current harvest limits: Nunavut = 123

Nunavik = no harvest limit

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*The Polar Bear Technical Committee (PBTC) reviews annually the status and trends of all polar bear subpopulations in Canada. The Polar Bear Administrative Committee (PBAC) use this information to support management decision making.

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159 Management recommendations:

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- 194

195 **A3 – Southern Hudson Bay subpopulation status, harvest and management**

196 The range of the SH subpopulation includes much of eastern and southern Hudson Bay and James
197 Bay and large expanses of the coastline of Ontario and Québec as well as areas up to 120 km
198 inland (Kolenosky and Prevett 1983, Obbard and Walton 2004, Obbard and Middel 2012). Inuit
199 Knowledge has indicated that in Nunavik there were very few bears from the 1940s to the 1960s
200 in their area, with somewhat of an increase in population from the 1960s to the 1980s, and a
201 marked increase since the 1980s (NMRWB 2018).

202 The first scientific population estimate for SH came from a three-year (1984–1986) mark-
203 recapture study, conducted mainly along the Ontario coastline (Kolenosky et al. 1992). The initial
204 estimate obtained from that study (763 ± 323 bears) was later corrected to 641 bears (95% CI:
205 401 – 881) after a re-analysis of the original capture data (Obbard et al, 2007) but covered only
206 the Ontario coastline. A subsequent 3-year capture-recapture study (2003–2005), covering again
207 the Ontario coastline only, produced an estimate of 681 bear (95% CI: 401–961) (Obbard et al,
208 2007). An analysis of bears captured on Akimiski Island in James Bay during 1997 and 1998
209 resulted in the addition of 70–110 bears (Obbard et al. 2007) and the total SH subpopulation was
210 therefore estimated by the PBTC to be between 900-1000 bears for management purpose.
211 Results from the two capture-recapture studies suggested that the abundance was unchanged
212 between 1984–1986 and 2003–2005, though survival rates in all age and sex categories and body
213 condition declined (Obbard et al. 2006, Obbard 2008). Inuit Knowledge from Nunavik, further
214 north in the subpopulations range, indicates a very high increase in observations of bears at this
215 time, and no apparent declines in health (NMRWB 2018). A new aerial survey was conducted
216 during the fall ice-free season over mainland Ontario (same geographic area as for the capture–
217 recapture studies) and Akimiski Island in 2011, and over the remaining islands in James Bay, the
218 coastal areas of Québec from Long Island to the SH–FB subpopulation border, and the off-shore
219 islands in eastern Hudson Bay in 2012. Results of this mark-recapture distance- sampling (MRDS)
220 analysis provided an estimate of 860 bears (95% CI: 580–1,274) in the mainland Ontario,
221 neighboring islands, and Akimiski Island portions of the SH management unit during the 2011 ice-
222 free season plus an additional 83 bears (SE = 4.5) in the 2012 study area. Thus, combining the
223 aerial survey results from 2011 and 2012 yielded an overall estimate of 943 bears (SE: 174, 95%
224 CI: 658–1350) for SH (Obbard et al. 2015). Overall, despite the difference in methodologies,
225 assumptions, and biases between capture–recapture studies and aerial surveys, these lines of
226 evidence suggest it is likely that the subpopulation had not changed in abundance between the
227 mid-1980s and 2012. Nevertheless, the duration of sea ice within the boundaries of SH declined
228 over this period (Hochheim and Barber, 2014; Stern and Laidre, 2016, NMRWB 2018) and
229 scientific research also indicates a decline in body condition of bears during that same period
230 (Obbard et al. 2016). On the other hand, Nunavik Inuit Knowledge indicates there may have been
231 a population increase during this time and unchanging good health (NMRWB 2018).

232 An aerial survey, covering the same areas as the 2011/12 survey, was repeated in September
233 2016 to re-assess the abundance in SH. All areas in Ontario, Nunavut and Québec were sampled

234 within a 3-week period to ensure complete coverage within the same season and year. The
235 abundance estimate obtained from that survey (780 bears, 95% CI: 590–1029) suggested that the
236 subpopulation had declined by approximately 17% between 2012 and 2016. The proportion of
237 yearlings in the observed portion of the subpopulation also declined from 12% in 2011 to 5% in
238 2016, whereas the proportion of cubs remained similar (16% in 2012 vs. 19% in 2016) suggesting
239 a low survival of cubs to yearling (Obbard et al. 2018). Inuit knowledge from Nunavik indicated
240 that the number of bears was among the highest it had been in a lifetime at the time of data
241 collection in late 2014 and early 2015, although there were (sometimes very notable) fluctuations
242 from year to year (NMRWB 2018).

243 User-to-user meetings, which were held in 2011 and 2014, resulted in voluntary agreements to
244 better manage polar bear harvest in the SH subpopulation. Participants in these meetings
245 included harvesters from affected communities, as well as representatives from the
246 governments, wildlife management boards, and land claims organizations with management
247 responsibility. The 2011 meeting, which was held in Inukjuak, Québec, was organized in response
248 to a high removal of polar bears by Inuit hunters during the 2010/2011 hunting season (105 polar
249 bears, including 30 by Nunavut Inuit, 73 by Nunavik Inuit, 1 by Eeyou Istchee Cree), and
250 associated concern raised by domestic and international parties about the sustainability of
251 harvest. The Inukjuak meeting resulted in a voluntary agreement to limit the total harvest within
252 SH to a total of 60 bears. This agreement was in place for the 2011/2012 to 2013/2014 hunting
253 seasons. The 2014 meeting, which was held in Ottawa, resulted in an updated voluntary
254 agreement setting the total harvest limit within SH to 45 bears. This new harvest limit was in
255 place for the 2014/2015 and 2015/2016 hunting seasons.

256 Since 2016/2017, the following harvest limits have been in place:

- 257 • Nunavut Settlement Area: 25 (Nunavut Inuit)
- 258 • Nunavik Marine Region: 23 (Nunavik Inuit, with at least one tag allocated to the Cree of
259 Eeyou Istchee for harvest within the Inuit-Cree overlap area).

260 At present, there are no take limits in the Eeyou Marine Region (south of the Inuit-Cree overlap
261 area) or in onshore areas of Québec. The current existing harvest limits were however based on
262 the 2011/12 abundance estimate since the results of the 2016 survey were not available yet. An
263 inter-jurisdictional Southern Hudson Bay Polar Bear Management Advisory Committee was
264 established in 2018 to develop and recommend sustainable management options that will apply
265 to the whole range occupied by the SH subpopulation, taking into consideration the most up-to-
266 date Traditional and Scientific knowledge. A user-to-user meeting was then held in February 2020
267 as part of the process to establish those management objectives and revise the current harvest
268 limits.

269 There are three Nunavik Inuit communities (Inukjuak, Umiujaq, and Kuujjuaapik) and three
270 coastal Cree communities (Whapmagoostui, Waskaganish, and Chisasibi) that potentially harvest

from this subpopulation. The 5 year average reported harvest for the 2014/15 to 2018/19 period is 12.4 bears per year.

273 **Latest population estimate: 780 bears (95% CI: 590–1,029) - 2016**

274 **Recent trend (scientific): likely declined (PBTC, 2020)***

275 **Trend according to TEK:** stable in James Bay; likely increase in Eastern Hudson Bay
276 (PBTC, 2020)*

277 Current harvest limits: Nunavut = 25

278 Nunavik Marine Region = 23

279 Eeyou Marine Region + Québec = no harvest limit

280 Ontario = no harvest limit

281

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285 Management recommendations:

- Take necessary measures to ensure complete harvest reporting from this subpopulation.
 - Continue inter-jurisdictional discussions between governments and user groups to identify appropriate management objectives, evaluate sustainable harvest levels and ensure agreement on the fair allocation of the harvest between users.
 - Hold joint wildlife management board public hearings to consider management options.
 - Considering the likely declining trend of the subpopulation and the conservation concerns identified according to Scientific Knowledge, review harvest restrictions for Nunavik Inuit and Crees from Eeyou Istchee within the NMR, EMR and on mainland Québec (e.g. TAT, NQL, etc.) to ensure the sustainability of the total harvest within the whole subpopulation range.
 - Collaborate with Nunavut, ECCC and Ontario for reassessing the abundance and trend of this subpopulation before 2025.
 - Review management objective(s), sustainable harvest level and management options once new Traditional Knowledge or scientific knowledge becomes available.

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