

**Baffin Bay Polar Bear Population**  
**Department of Environment, Government of Nunavut Submission**

**Current population size:**  $1,546 \pm 428$  (SE) as of 2004. This population estimate is a simulated estimate, derived from population viability analysis projections from the 1997 estimate of  $2,074 \pm 266$  (SE). Population size was derived from physical mark-recapture, using data from 1221 marked polar bears from 1974 to 1997 (Taylor et al. 2005).

**Demographic parameters:** Birth and death rates were estimated from mark-recapture data between for 1994 – 1997; these rates are used these population projections.

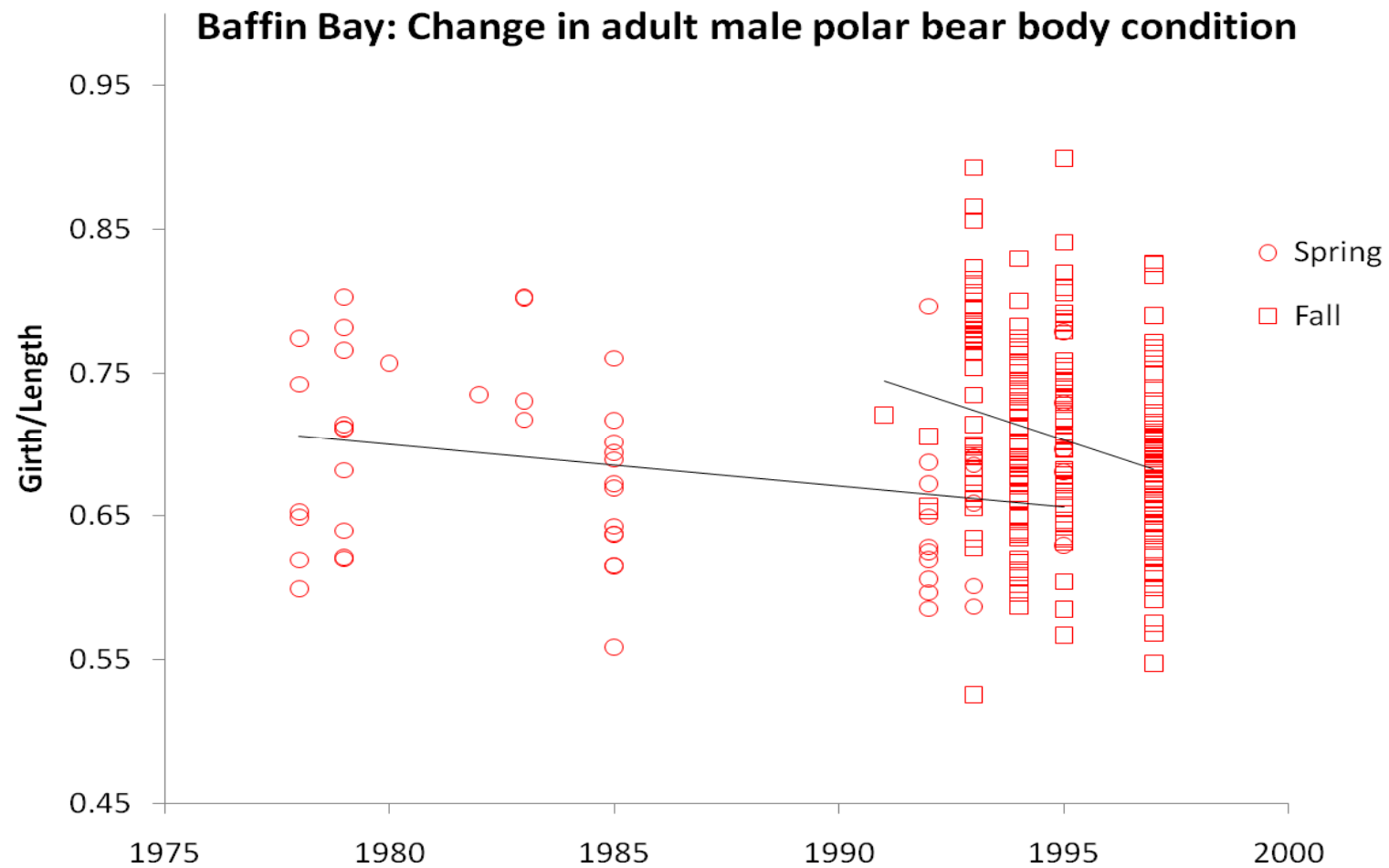
**Quota:** Current Total Allowable Harvest (TAH) in Baffin Bay is 105 polar bears per year (Nunavut) and 71 (Greenland – 2008 (will go to 68 in 2009)). A total harvest of 176 bears/year is permissible under these quotas. In Nunavut, the quota is divided between Qikiqtarjuaq (30), Clyde River (45) and Pond Inlet (30).

**Harvest:** The 5-year mean harvest is 232 (2002 – 2007). The 3-year mean harvest is 219 (2004 – 2007). These include the time period before Greenland's quota system, which started January 2006. The most recent year's harvest (2006 – 2007) was 174 animals (just below the regulated quota).

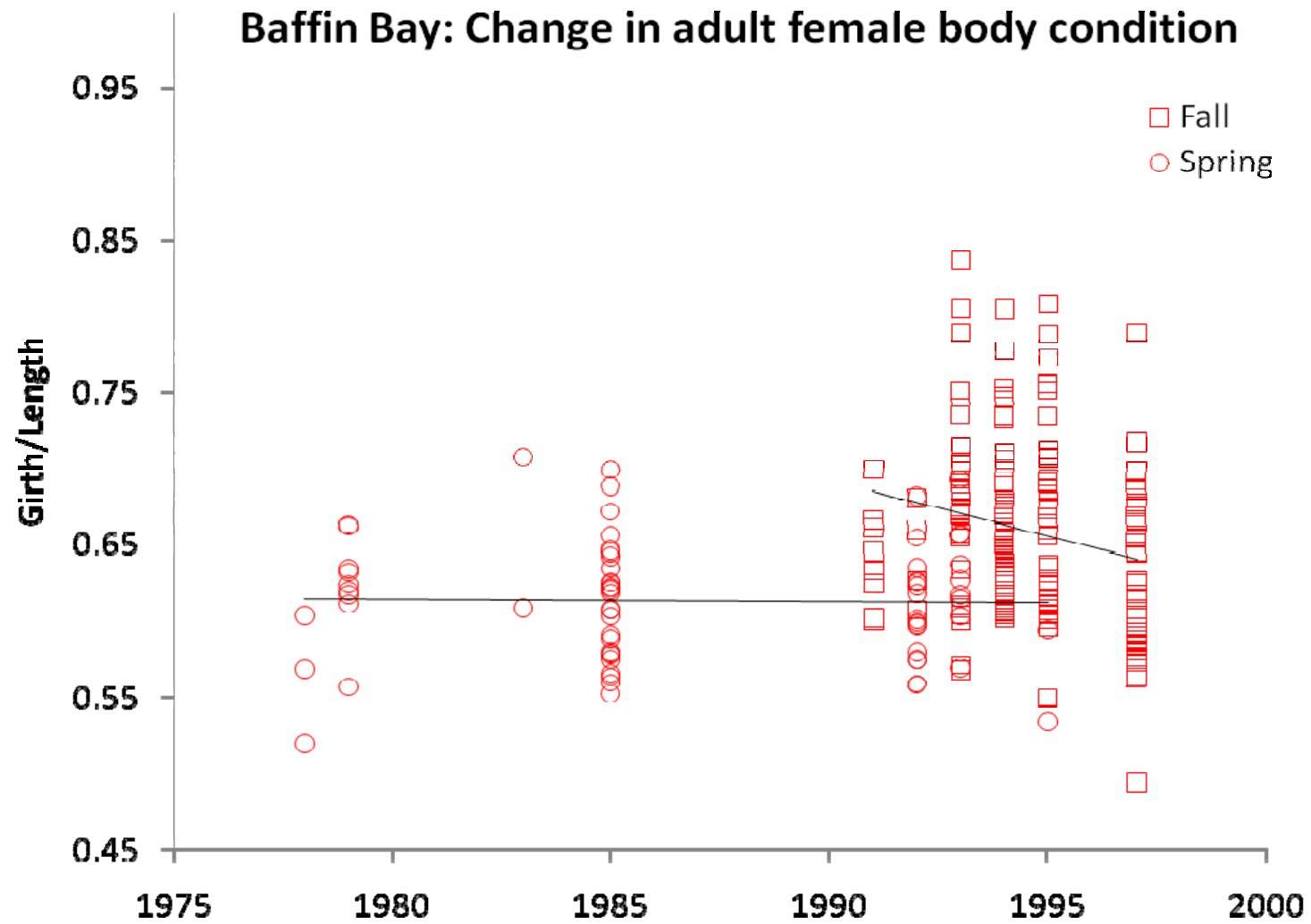
**Population viability:** Under the current harvest conditions and using demographic data from Taylor et al. (2005) there is a 100% likelihood of population decline. The estimated sustainable rate of harvest would be a combined (Greenland + Nunavut) harvest of 90 bears – if the objective is to remain at present numbers. However, it is likely that because of ice and body condition declines (see graphs below), demographic rates are lower than when they were estimated in the late 1990's (there is evidence that body condition relates with reproductive output and survival in polar bears); Population viability analyses currently do not take into account any changes in survival or birth rates in the future. It is possible that the population size decline has been more dramatic, and further that the even with 90 bears taken a year, population size may still decline.

**Current research:** The Government of Nunavut, polar bear research program is engaged in a genetic study to better discern the boundary between Davis Strait, Baffin Bay and Kane Basin, to better understand directional movement. Secondly, we will be analyzing genetic data to evaluate and/or corroborate and changes in effective population size in Baffin Bay. Lastly, we are using stable-isotope analyses to understand whether diet has changed in Baffin Bay over the last 15 years. The next population inventory is currently planned to start in 2014.

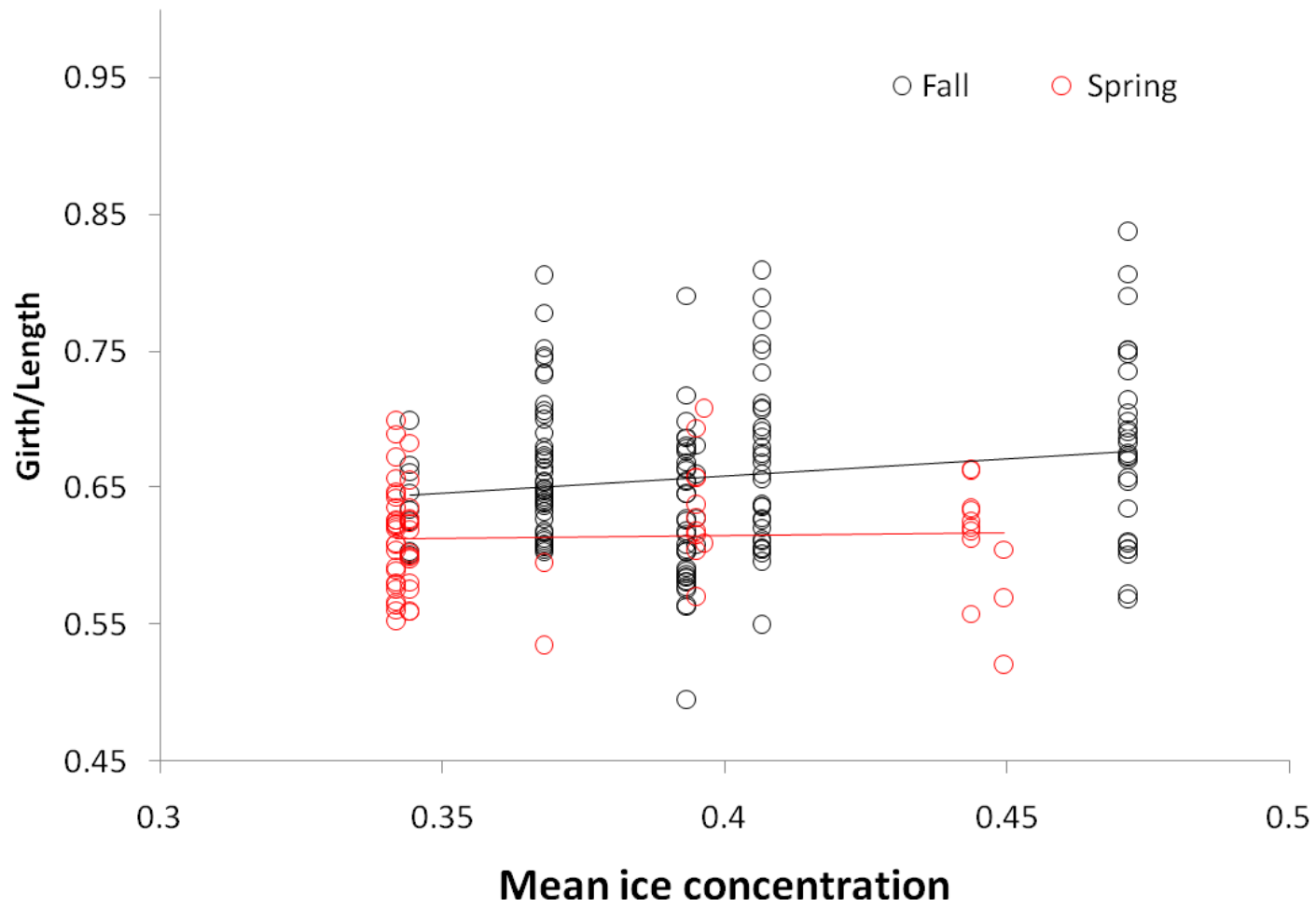
**Summary of Graphs and Data Presented Below:** These graphs and tables show that the body condition (axillary girth divided by straight-line length) of polar bears in Baffin Bay has decreased over time – using capture data from 1976 through 1997. The more rapid decrease in body condition has occurred in the 1990's. These data also demonstrate that body condition is related to average annual ice condition in Baffin Bay – more ice, better body condition of polar bears. Finally, ice coverage in Baffin Bay has been decreasing since the 1970's (the graph presented shows data from the 1990's); ice conditions are expected to continue to decline. Thus, we can expect body condition of polar bears to continue to decline, if the observed relationship between body condition and ice continues. See section on **Population Viability** above which relates these body condition data to survival/recruitment, population growth and harvest.



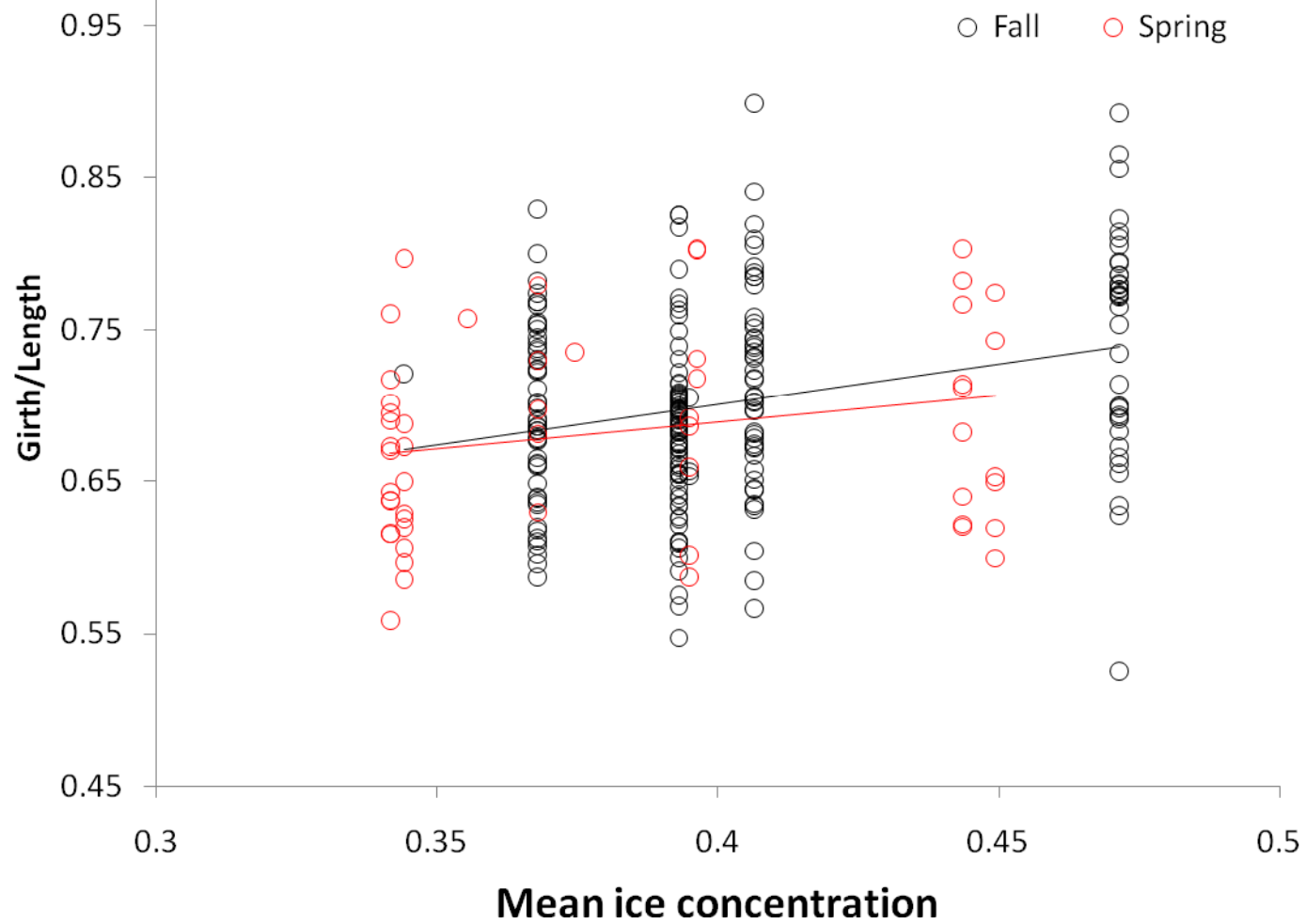
# Baffin Bay: Change in adult female body condition



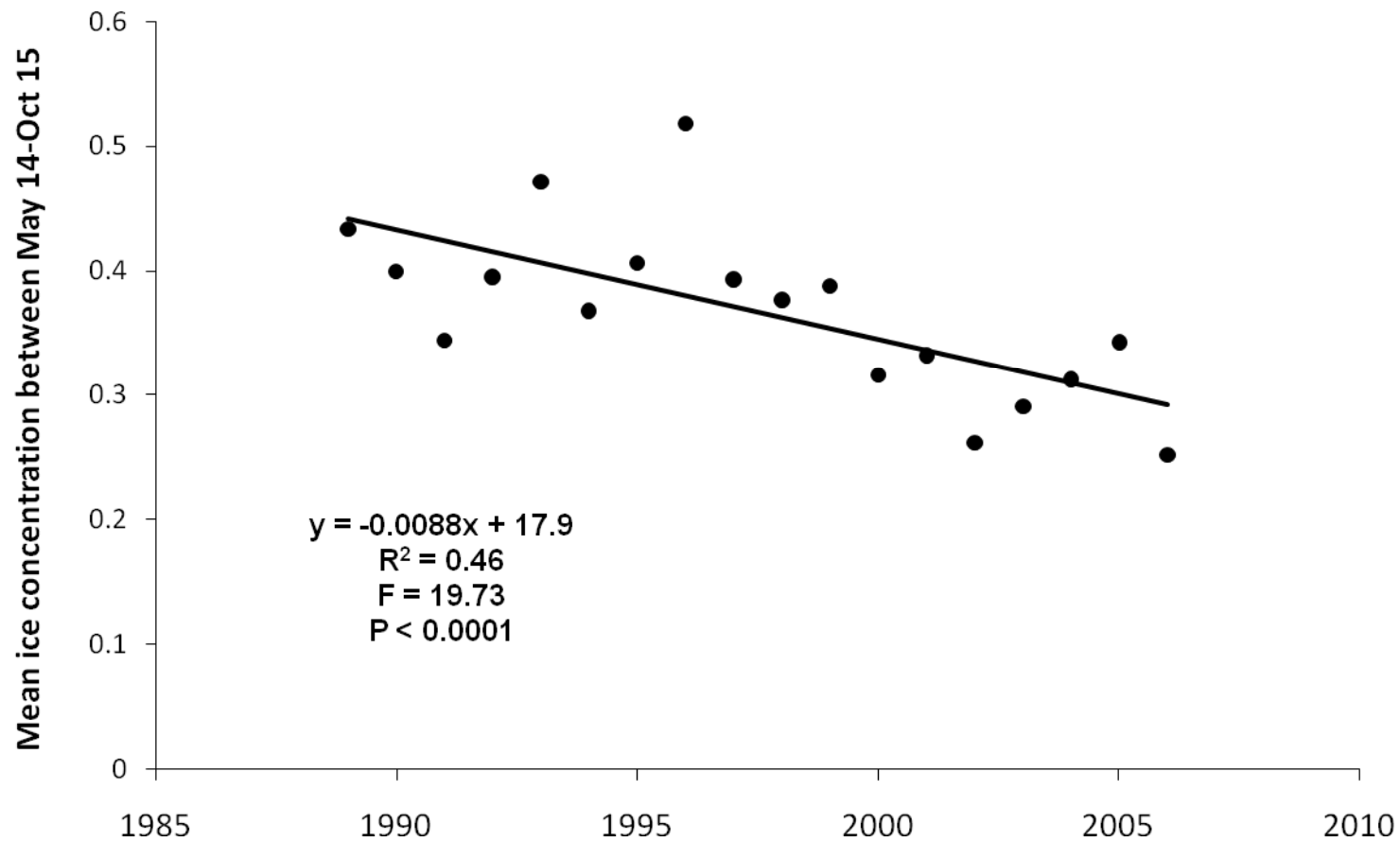
## Baffin Bay: Adult female polar bear body condition and ice



# Baffin Bay: Adult male polar bear body condition and ice



## Baffin Bay: Changes in mean annual ice concentration



Summary table of statistical results regarding changes in body condition (axillary girth, controlled by length) of Baffin Bay polar bears with respect to ice conditions. Cells highlighted indicate statistically significant results; All analyses were performed at  $\alpha = 0.05$ . All analyses incorporated covariates of age, capture date; for adult females the effects of presence of cubs; for adult females and cubs of the year - the effects of number of cubs.

Ice variable	Grown males	Growing males	Subadult males	Grown females	Growing females	Subadult females	Yearling	Cubs-of-the-year
Prior year ice	no effect	Trend to fatter with more ice	Fatter with more ice	Fatter with more ice	Fatter with average ice than less and more ice	Fatter with average ice than less and more ice	Fatter in spring with more ice	no effect in fall
Ice concentration	no effect	Fatter with more ice	Fatter with more ice	no effect	Fatter with more ice	Fatter with more ice	Fatter in fall with less ice, not measured in spring	no effect in fall; not measured in spring
Prior year freeze up	no effect	Fatter with earlier ice	no effect	Fatter with earlier ice	trend to fatter with earlier and later freeze up than average	Fatter with later and earlier ice than average	Fatter in spring with earlier ice	no effect in fall
Break up	Later break up, fatter	Later break up, fatter	no effect	no effect	Later break up, fatter	no effect	Not measured in spring; no effect in fall	Not measured in spring; no effect in fall

Summary table of statistical results regarding changes in body condition of Baffin Bay polar bears with respect to time. Cells highlighted indicate statistically significant results; All analyses were performed at  $\alpha = 0.05$ . All analyses incorporated covariates of age, capture date; for adult females the effects of presence of cubs; for adult females and cubs of the year - the effects of number of cubs.

Body metric	Grown males	Growing males	Grown females	Growing females	Yearling	Cubs-of-the-year
<b>Straight-line length</b>	No change	No change	No change	No change	<b>Decrease from early 1990's to late 1990's</b>	No change
<b>Axillary girth</b>	No change	<b>Decrease from early 1990's to late 1990's</b>	No change	<b>Decrease from early 1990's to late 1990's</b>	<b>Decrease from early 1990's to late 1990's in fall</b>	<b>Decrease from early 1990's to late 1990's in fall</b>
<b>Skull width</b>	No change	No change	No change	No change	No change	No change



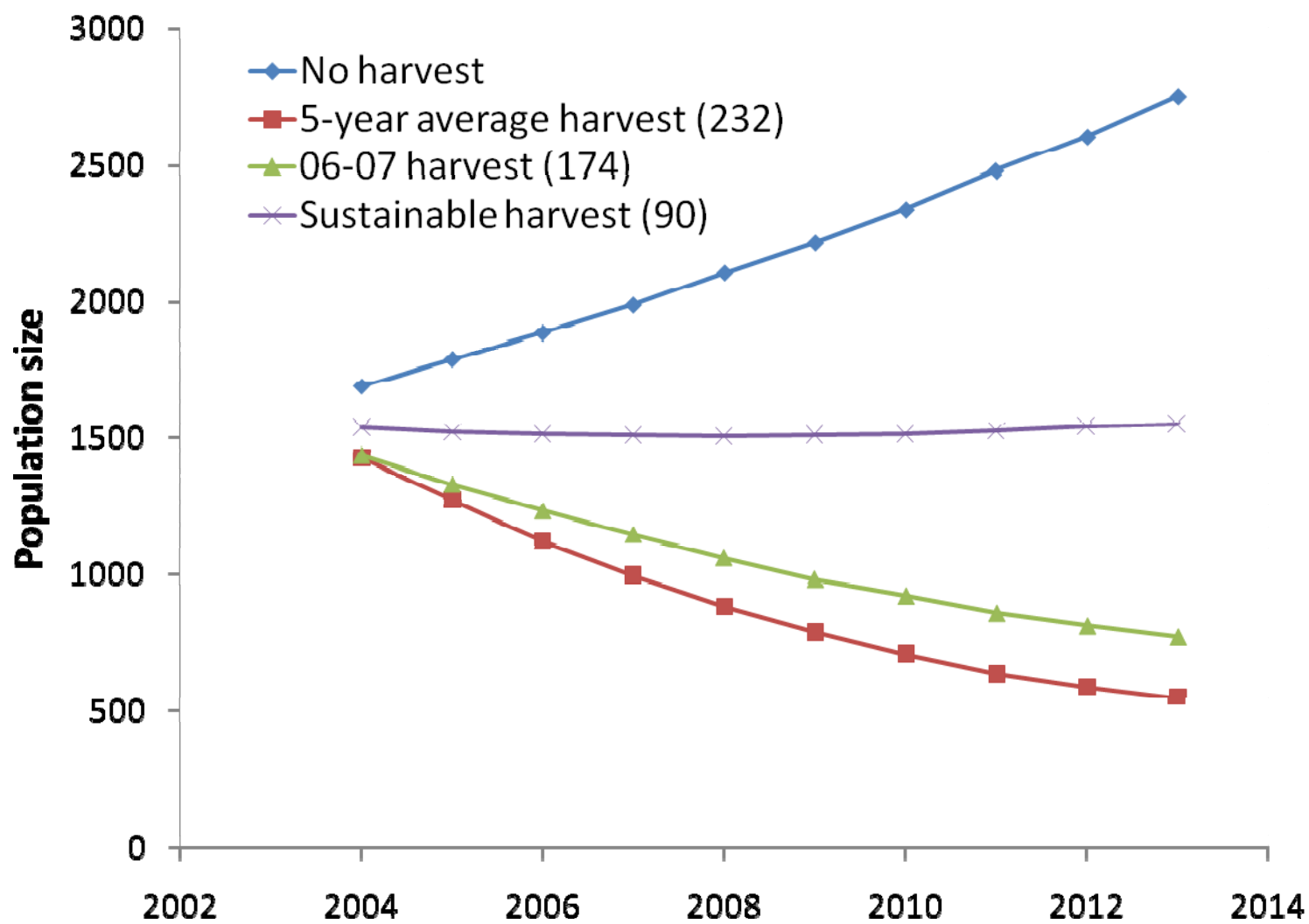


Figure showing 10-year population projections for the Baffin Bay polar bear population from a population size of 1,546 in 2004 using Population Viability Analysis and survival and birth rates measured with mark-recapture in Baffin Bay from 1994 – 1997

