of the harvest over time provide insight into whether the population may be increasing or declining. Should mark-kill data, information from the monitoring program, or reports from local hunters indicate a problem with a particular population, the period between assessments could be shortened depending on the availability of research resources.

Data from ongoing research is incorporated into management practices as appropriate. The results of studies on which management of this species is based have been published in reports, conference proceedings, and refereed scientific journals.

3. Calculation of Sustainable Harvest

The GNWT manages polar bears under the assumption that the polar bear populations are experiencing maximal (e.g. no density effects) recruitment and survival rates. The estimated sustainable rate of harvest is then the maximum sustainable harvest.

Based on a model developed cooperatively between all jurisdictions managing polar bears, it was demonstrated that the two most critical parameters for estimating sustainable harvest are population numbers and adult female survival rate (Taylor et al. 1987a). As a result of sampling biases in the available data which affected the value of the analysis, the detailed analysis was simplified to contain only the most important features. One such simplification involved the use of pooled best estimates for vital rates for all Canadian polar bear populations. Using the pooled best estimates for vital rates, the polar bear harvest model indicated that the sustainable harvest (H) of a population could be estimated as:

$H=N\ (0.015/P_f)$,

where N is the total number of individuals in the population and P_f is the proportion of females in the harvest measured directly from the harvest returns. The formula can also be modified for populations with different renewal rates and, if new information becomes available, on birth and death rates (GNWT).

Table 3 provides vital information on each population including the population estimate, the total kill (excluding natural deaths), percentage of females killed, and the calculated sustainable harvest for the last harvest season and averaged over the last three and five seasons. Based on this information, the status of the population is designated as increasing, stable, or decreasing, represented by the symbols ''+'', ''O'', ''−''. The population status is expressed simply as the difference between the calculated sustainable harvest and the kill. For example, the calculated sustainable harvest for the Southern Beaufort Sea 1993/94 harvest season was 81.1. Since the total kill was 64, the harvest of polar bears in the Southern Beaufort Sea did not exceed the sustainable yield. Therefore, the population had the potential to increase. In contrast, the Foxe Basin (FB) kill exceeded the sustainable harvest, thus the population status is represented as declining. It should be noted that the status as outlined in the table allows for a difference of up to 3 bears between the kill and the calculated sustainable harvest. Thus, in the Gulf of Boothia, where the harvest in the 1993/94 season exceeded the quota by 2.3 bears, the status is considered to be stable.

TABLE 3.—POPULATION STATUS FOR CANADIAN POLAR BEAR POPULATIONS INCORPORATING HARVEST STATISTICS FROM 1989/90 TO 1993/94

[The populations are identified as follows: Southern Beaufort Sea (SB), Northern Beaufort Sea (NB), Viscount Melville (VM), Queen Elizabeth Islands (QE), Parry Channel (PC), Baffin Bay (BB), Gulf of Boothia (GB), M'Clintock Channel (MC), Foxe Basin (FB), Davis Strait (DS), Western Hudson Bay (WH), and Southern Hudson Bay (SH). The percent females (%/) statistic[1] does not include bears of unknown sex except for Labrador (1991/92 and 1992/93) and Greenland (all 5 years). Harvest statistics include all reported human-caused mortality of polar bears. Natural deaths are not included.]

Pop.[2]	Pop. estimate	Reliability* and S.E.	5-year average (1989/90–1993/94)		3-year average (1991/92–1993/94)		Current year (1993/94)		Population status** (5yr/3yr/1yr)
			Kill (%/)	Sustainable harvest[3]	Kill (%/)	Sustainable harvest[3]	Kill (%/)	Sustainable harvest[3]	
SB	[6]1800	Good	60.4 (39.6)	68.2	66.0 (39.5)	68.4	64 (32.2)	81.1	+/+/+
NB	1200	Good	32.2 (49.4)	36.4	30.0 (45.5)	39.6	16 (50.0)	36.0	+/+/+
VM[4]	230	Good	5.2 (45.8)	1.2	2.0 (83.3)	0.7	2 (50.0)	1.1	−/0/0
QE	200	Poor	10.6 (32.1)	9.0	9.7 (24.1)	9.0	11 (29.3)	9.0	0/0/0
PC–BB	[6]2470	Fair	197.0 (30.7)	111.3	199.3 (31.5)	111.3	200 (31.9)	111.3	−/−/− (Data uncertain)
GB	900	Poor	37.8 (40.4)	33.4	38.7 (36.5)	37.0	36 (40.0)	33.7	−/0/0
MC	700	Poor	30.4 (40.3)	26.1	27.3 (33.7)	31.2	24 (33.3)	31.5	−/+/+
FB[5]	2020	Good	128.6 (40.8)	74.3	125.0 (41.7)	72.7	100 (48.5)	62.5	−/−/−
DS	[6]1400	Fair	55.0 (41.6)	50.5	58.0 (38.2)	55.0	58 (36.2)	58.0	−/0/0
WH	1200	Good	44.8 (32.1)	54.1	41.3 (27.6)	54.1	32 (40.6)	44.3	+/+/+
SH	1000	Fair	59.0 (32.5)	45.0	51.0 (36.2)	41.4	45 (33.3)	45.0	−/−/0
Total[6]	13120		661.0	509.5	648.3	520.4	588	513.5	

*Good: Minimum capture bias, acceptable precision; Fair: Capture bias problems, precision uncertain; Poor: Considerable uncertainty, bias and/or few data.

**A difference of up to 3 bears between the kill and sustainable harvest statistics was considered to be no change in status. (− = decrease 0 = no change + = increase)

Notes:

[1] The percent of killed bears that are females is not regulated by law in all populations, but rather % Females is specified as a target in many of the Local Management Agreements.

[2] Local Management Agreements now exist for all populations except QE. These agreements are reviewed periodically as new information becomes available.

[3] Except for the VM population, the sustainable harvest is based on the sex ratio of the harvest, the population estimate (N) for the area and the estimated rates of birth and death (Taylor et al. 1987):

Sustainable Harvest = (N x 0.015) Proportion of Harvest that were Females.

Unpublished modelling indicates a sex ratio of 2 males to 1 female is sustainable, although the mean age and abundance of males will be reduced at maximum sustainable yield. Harvest data (Lee and Taylor, in press) indicates that the harvest is typically selective for males.