

Box S1

List of estimated parameters for the $H(a, s, f, e)$ and $H(a, s, yr)$ sub-models

$H(a, s, f, e)$ sub-models (total parameters = 63):

- Starting population sizes in 1980 for both sexes and all age classes (cubs, ages 1-9, age 10+) = 22 estimated parameters
- Number of cubs, $N_{t,0}$, in 1981-2007 = 27 parameters
note: $N_{1980,0}$ is included in the starting population size
 $N_{2008,0}$ is not estimated (these bears are never harvested so there is no information in the data to estimate this parameter)
- Survival of yearling females (relative to male yearlings) = 1 parameter
- Survival for male and female bears age 2 and older = 2 parameters
- Harvest parameters used to model temporal variability:
 - Vulnerabilities in 1980-1983 (where food index and hunting effort data were lacking) = 4 parameters
 - Regression parameters for years 1985-2008 reflecting an overall intercept and effects of food availability and hunting effort = 3 parameters
- Harvest regression parameters to model effect of sex and age (3 df) = 4 parameters

$H(a, s, yr)$ sub-models (total parameters = 85):

- Starting population sizes in 1980 for both sexes and all age classes (cubs, ages 1-9, age 10+) = 22 estimated parameters
- Number of cubs, $N_{t,0}$, in 1981-2007 = 27 parameters
- Survival of yearling females (relative to male yearlings) = 1 parameter
- Survival for male and female bears age 2 and older = 2 parameters
- Harvest rate parameters used to model temporal variability:
 - Vulnerabilities in 1980-2008 = 29 parameters
- Harvest regression parameters to model effect of sex and age (3 df) = 4 parameters