TITLE: Polar bears: Morphological measurements and body condition at capture

AUTHOR(S):
Henry J. Harlow (PI) – hharlow@uwyo.edu
Merav Ben-David (Co-PI) – bendavid@uwyo.edu
John P. Whiteman (Co-PI) – jwhitema@uwyo.edu

Department of Zoology and Physiology (3166)
University of Wyoming
1000 East University Ave.
Laramie, WY 82071
USA
(307)-766-5307 (phone)
(307)-766-5625 (fax)
www.uwyo.edu/ploarbear

George M. Durner (Co-PI) – gdurner@usgs.gov

U.S. Geological Survey,
Alaska Science Center,
4210 University Drive,
Anchorage, Alaska 99508 USA

FUNDING SOURCE AND GRANT NUMBER:
National Science Foundation, Office of Polar Programs Grant 0732713.
U.S. Geological Survey, Ecosystems and Climate and Land Use Change Mission Areas

DATA SET OVERVIEW:
To establish whether polar bears that follow the pack ice north of the continental shelf experience food deprivation, and to estimate their ability for prolonged adaptive fasting and skeletal muscle protein and strength retention in comparison with land-bound bears, our goal was to sample individuals at the beginning of the ice-retreat period in the summer, and shortly before annual ice is re-formed. In the Beaufort Sea, the ice-retreat period extends from late-June to mid-July and new ice forms from mid to late-October.

This dataset contains morphometric measurements of individual polar bears captured via helicopter darting using standard animal immobilization techniques (Durner et al. 2011). Body length, girth, and skull size were measured using rope, calipers and measuring tape (in centimeters). Weight in lbs (± 0.1) was determined using a digital scale and tripod hoist and converted to kilograms. Percent body fat was estimated via bioelectric impedance analysis. A visual assessment of body condition was recorded on a scale of 1-5. The number of cubs accompanying adult females is also reported.

During our research efforts from August 2008 to May 2010, a total of 110 polar bears were captured and sampled and 29 were recaptured on shore and on the sea ice. Spring captures occurred on the ice between Point Lonely and the US Canadian border within 160 km of shore. Summer captures occurred in the same area on shore. Fall captures occurred in the same area on shore, and on the sea ice from the Alaskan coast to 80°N and from north of Wrangell Island, Russia, to Banks Island, Canada. Ice captures were conducted from the USCG *Polar Sea*.

Project information and updates can be found at www.uwyo.edu/polarbear

INSTRUMENT DESCRIPTION:
Percent fat in the body of the bear was estimated from length and resistance measured with a handheld bioelectric impedance Quantum X analyzer (RJL Systems, Clinton Township, MI; www.rjlsystems.com).

Table of specifications:
Automatic off
- When no subject is connected: 5 seconds
- When the subject is disconnected: instant off
- When a subject is connected: 5 minutes

Constant current accuracy
- Nominal: 425 microamp at 50 Khz ± 1 %
- Regulation: better than 0.1 %
- Range: 0 to 10,000 ohms, resistive or capacitive

Resistance accuracy
- Nominal: ± 0.5 ohm
- Range: 0 to 1000 ohms
- Resolution: 0.1 ohm

Reactance accuracy
- Nominal: ± 0.5 ohm
- Range: 0 to 1000 ohms
- Resolution: 0.1 ohm

DATA COLLECTION and PROCESSING:
This dataset contains morphometric measurements of individual polar bears. For body, length a tape measure was stretched from the tip of the nose to the base of the tail. The girth was measured by encompassing the bear's body with a rope and then lining the rope against the tape measure. Skull measurements were obtained with calipers.

Percent fat in the body of the bear was estimated from length and resistance measured with a handheld bioelectric impedance analyzer (see instrument description). The bear was thoroughly dried and placed on an inflatable thermarest® pad. Two needles were inserted on both sides at the base of the tail and connected to 2 of the BIA electrodes. The other 2 electrodes were clamped onto the inside upper lips of the bear. The low voltage current was administered 3 separate times and readings of resistance in (Ohms) were recorded and averaged for each bear.

To weigh the bears a collapsible tripod was erected and a digital scale was hung at the top. Before the bear was hoisted on the tripod, the digital scale was zeroed.

Body condition was visually assessed based on the "Polar Bear Score Card: A Standardized Fatness Index" published by the World Wildlife Fund (WWF) and Polar Bears International (PBI). This score card ranks body condition from 1 – 5 based on visibility of ribs, hip bones and width of torso. A score of 1 is equivalent to "skinny", 2 is "thin", 3 is "average", 4 is "fat", and 5 is "obese". This is considered a subjective measure of body condition.

Data flags: BIA data are questionable. Comparisons of changes in body weight of bears with multiple captures and changes in percent fat calculated from BIA data suggest the latter is unreliable.

DATA FORMAT:
Data file structure: Microsoft Office Excel (.xlsx), Comma delimited ASCII (.csv)

Data format and layout: Each variable is listed in a separate file. Headers provide variable names and units of measurements. To obtain data from multiple files select from the appropriate list.

List of parameters: Heart, shoulder, and neck girth (cm); skull width and length (cm); total body length (including tail), straight line length, and BIA length (excluding tail; cm); Bioelectric resistance (Ohms); Weight (measured in lbs and converted to kg), body condition score (1-5); Number of cubs.

Description of flags: For data protected under the threatened species status code is "UTSS".

Data version 1.0 date 12/31/12

DATA REMARKS:
BIA data are questionable.

To view and manipulate data use Microsoft Excel.

REFERENCES:
Durner, G. M., J P. Whiteman, H. J. Harlow, S. C. Amstrup, E. V. Regehr, and M. Ben-David. 2011. Consequences of long-distance swimming and travel over deep-water pack ice for a female polar bear during a year of extreme sea ice retreat. Polar Biology 34: 975-984.