

TITLE: Polar bears: Location and movements

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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 location and movement information for adult polar bears as obtained from Geographic Positioning Systems (GPS) transmitters mounted on collars (Telonics TGW-3680 Gen 3 and Gen 4, Telonics, Mesa, Arizona) and glue-on RFID tags (see Durner et al. 2009). Relocation data was obtained every hour. Gen 3 transmitters contained temperature sensors, while Gen 4 recorded temperature, collar contact with seawater (indicating swimming), and activity. Additionally, Actical accelerometers (Mini-Mitter, Bend, Oregon) were mounted on some collars and recorded movements every 5 minutes. No sensors were added to glue-on tags.

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:

Telonics TGW-3680 Gen-III and Gen-IV platform transmitter terminals. For specifications see <http://www.telonics.com/products/gps4/>

Actical by Mini-Mitter is a small omni-directional accelerometer designed to estimate energy expenditure. For specifications see http://www.minimitter.com/animal_products.cfm

DATA COLLECTION and PROCESSING:

Individual polar bears captured via helicopter darting using standard animal immobilization techniques (details in Durner et al. 2011). Telonics TGW-3680 Gen 3 and Gen 4 (Telonics, Mesa, Arizona) and glue-on tags (see Durner et al. 2009) were fit to a subsample of adults. These platform transmitter terminal (PTT) included an on-board global positioning system (GPS) unit and an Argos ultra-high frequency (UHF) satellite uplink (Argos Data Collection and Location System, or ADCLS). The collar stored hourly GPS location fixes during its deployment (i.e., 24 location fixes per day). Satellites uplinks occurred each day at 1000 hours ADST for 4 hours and sent the previous 6 hourly GPS locations. Only about 25% of the total daily GPS locations were transmitted through the Argos system; retrieval of the collar allowed the recovery of the complete history of GPS locations. Location data are currently unavailable because of the Threatened Species Status of the subjects.

Collar temperature (a proxy for ambient temperature) was measured hourly by a sensor within the PTT, as was collar activity. For select collars, a second activity sensor (Mini-Mitter, Bend, OR, USA) was attached to the belting of the collar and measured

acceleration in 360°. On Gen 4 PTTs a salinity sensor measured whether the collar was in contact with seawater, indicating a bear was swimming. Note that contact of the collar with seawater is reported in 2 different parameters. Some collars recorded the % of 3-hour blocks which was spent with the collar in contact with seawater; other collars recorded the duration (in seconds) of individual events in which the collar was in contact with seawater.

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: Latitude and longitude (unavailable), Collar temperature (°C), Collar activity score (unitless), Actical activity score, Percent of time in saltwater, Duration in saltwater (in seconds).

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

Data version 1.0 date 01/11/13

DATA REMARKS:

None of these data have undergone quality control and validation, and may include values collected prior to, and after, the collar was placed on a bear; such data were collected for validation and quality control purposes. All data are subject to change.

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.