

TITLE: Polar bears: Muscle analyses

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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 values on muscle fiber types, DNA and protein contents, and stable carbon and nitrogen isotopes as well as percent C and percent N for individual polar bears captured via helicopter darting using standard animal immobilization techniques (details in Durner et al. 2011).

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:

NA

DATA COLLECTION and PROCESSING:

Using sterile procedures, a small sample of muscle (~ 200 mg) was collected from the biceps femoris of a subsample of adults and stored in liquid nitrogen.

Cross-sectional area of type I and type II fibers types will be quantified via succinate dehydrogenase staining, according to Sweeney et al. (2004). Percent muscle fiber type I will be quantified via protein visualization with SDS-PAGE gel, according to Rourke et al. (2006). Data have not been generated yet.

A subsample of tissue was used to quantify DNA content (Thermo Scientific Hoechst stain 33342, product 62249) and protein content (Thermo Scientific Coomassie stain, product 23238). Each sample was analyzed in duplicate or triplicate until the CV was less than 0.1. Average data per sample are reported.

Muscle samples were prepared for stable carbon and nitrogen isotope signatures following standard protocols (Ben-David and Flaherty 2012) and submitted to the University of Wyoming Stable Isotope Facility (for quality assurance visit www.uwyo.edu/SIF). Each sample was analyzed in duplicate or triplicate until the CV was less than 0.1. Average data per sample are reported.

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:

Muscle type characteristics: % fiber type I (gel), fiber type I area (cross sectional area), fiber type II area (cross sectional area), DNA content (ug DNA/mg tissue), Protein content (ug DNA/mg tissue).

Stable isotopes: Muscle $\delta^{13}\text{C}$, Muscle $\delta^{15}\text{N}$, Muscle % C, Muscle % N

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

Data version 1.0 date 02/12/13

DATA REMARKS:

Data for cross-sectional areas have not been generated as of January, 2013.

To view and manipulate data use Microsoft Excel.

REFERENCES:

Ben-David, M. and E. A. Flaherty. 2012. Stable isotopes in mammalian research: a beginner's guide. *Journal of Mammalogy* 93: 312-328.

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.

Rourke et al. 2006. Maintenance of slow type I myosin protein and mRNA expression in overwintering prairie dogs (*Cynomys leucurus* and *ludovicianus*) and black bears (*Ursus americanus*). *J Comp Physiol B* 176:709-720).

Sweeney et al. 2004. An introductory biology lab that uses enzyme histochemistry to teach students about skeletal muscle fiber types. *Advances in Physiology Education* 28:23-28).