Informing best practices for field body condition assessments of wild Arctic seals

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Background
Trained Arctic seals in human care provide the opportunity to study longitudinal changes in blubber mass and determine accurate metrics of body condition across species, age classes, and seasons. These metrics can then be used in the field to assess the health of free-ranging seals, where data are collected via direct handling of animals or using unmanned aerial vehicles.

Methods
We determined the true body condition of 3 ringed seals, 4 spotted seals, and 1 bearded seal using traditional truncated cones methods, over 36 months and compared to simpler field body condition metrics (e.g., mass/standard length, the LMD index, \( \sqrt{SL/\text{mass}} \times \text{blubber depth} \)), girth, and blubber depth at specific locations) using linear regressions.

![Image of a seal with measurements]

A. Measurements used to assess body condition: standard length (SL), girths at locations 1–6 (black solid lines) and blubber depths at specific markers (white circles).

B. Blubber depth measured using a portable ultrasound.

C. Representative ultrasound image showing blubber depth from the top of the skin to the base of the blubber layer.

Findings
LMD Index

<table>
<thead>
<tr>
<th>Subadult</th>
<th>Adult</th>
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<tr>
<td>0.0001</td>
<td>0.054</td>
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<tr>
<td>0.0001</td>
<td>0.058</td>
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Blubber Depth

<table>
<thead>
<tr>
<th>Subadult</th>
<th>Adult</th>
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<tr>
<td>0.0001</td>
<td>0.047</td>
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<td>0.0001</td>
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Ringed seals: the LMD index and blubber depth at the dorsal umbilicus (subadults) and lateral middle (adults) were the best metrics.

Spotted seals: the LMD index and blubber depth at the dorsal pelvis (subadults) and lateral middle (adults) were the best metrics.

Bearded seal: the LMD index and blubber depth at the dorsal middle (subadult) and lateral umbilicus (adult) were the best metrics.

Sternal blubber depth, commonly collected during field procedures, was also a reasonable indicator of body condition for these Arctic species.

Acknowledgements and Authorizations
We would like to thank the dedicated trainers and volunteers at the Pinniped Lab and ASLC, including H. Hermann-Sorensen, M. Meranda, M. Pardini, J. Sullivan, B. Ruscher-Hill, J. Mullens, S. Burman, J. Kim, and B. Russell. Research conducted under NOAA/NMFS marine mammal research permit 18902 with oversight from IACUC at UCSC and ASLC.

Gales & Burton 1987, Ryg et al. 1990