Calf Proximity to Adults in Aerial Video Sampling of Cook Inlet Belugas

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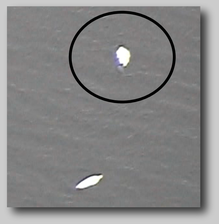
Cook Inlet beluga images were assessed qualitatively for proximity of calves to adults. Calf proximity categories were assigned accordingly.

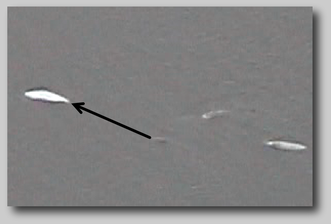
Proximity Categories

Code 1
Touching adult whale

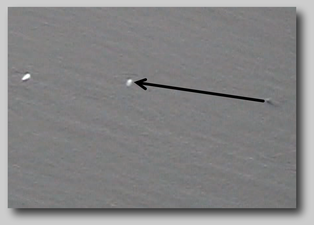


Code 2
1 adult whale length apart

Code 3
2-3 adult whale lengths apart



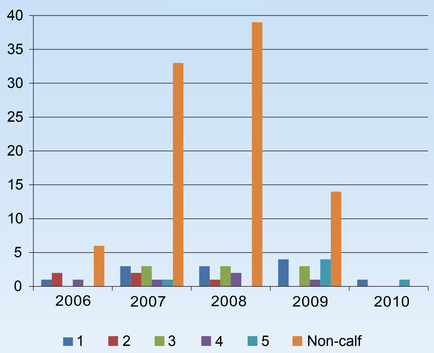
Code 4
In same field of view



Code 5
Alone in field of view

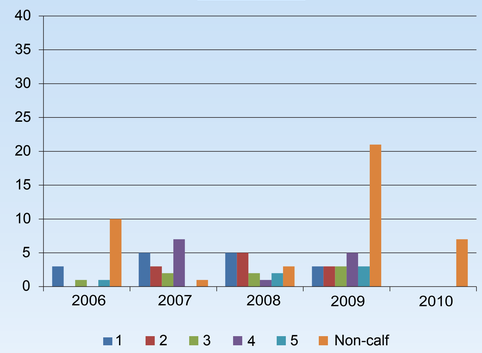
Graphs show number of whales per proximity category that were "found" in zoom video but were not visible in "standard" (wide angle) video due to size and/or color. The "Non-calf" category are those whales that were judged to be too large to be a calf or young juvenile, but due to the surfacing behavior or color these whales were not visible in standard view video.

June



Sample Size				
2006	2007	2008	2009	2010
10	43	48	26	2

August



Sample size				
2006	2007	2008	2009	2010
15	18	18	38	7

Average image sizes for each proximity category and all gray individuals are compared to the average image sizes for adults (white whales). Estimated average "calf" size is calculated by multiplying the image size ratio to an average length for Cook Inlet adult females of 361 cm, and age was obtained using the Gompertz growth curve from Suydam (2009). The growth curve equation is solved for the age at length to yield as follows: *age = ln[ln(estimated average length/361)/-0.84]/-0.35* where *ln* is the natural logarithm.

Estimated Size and Age by Proximity Category

Proximity Categories	Size (cm) based on 361 cm adult		Age from Gompertz growth curve (years)	
	June	August	June	August
1: Calf touching an adult	215	199	1.4	1.0
2: Calf within one body length of an adult	209	256	1.2	2.6
3: Calf 2 or 3 body lengths from an adult	239	246	2.0	2.2
4: Calf in same frame as an adult	224	235	1.6	1.9
5: Calf alone in field of view	313	182	5.1	0.6
Non-calves	286	296	3.7	4.1

- All images analyzed for proximity in June have average ages greater than one year.
- The "alone in field of view" samples in June showed an estimated age similar to that of lighter gray animals that were determined to be non-calves by the video analysts. These results are consistent with the analysis in Suydam (2009) which showed that animals estimated to be one year of age began to spend less time in close proximity to the mother.
- The estimated length and ages of animals found in proximity codes 1 and 5 in August indicate very young animals and are represented primarily by young of the year.
- The type 5 proximity (alone in the field of view) is problematic, based on estimated age for the August samples, it represents young of the year calves that are being brought to the surface by an unseen adult. Young of the year calves are known to surface more frequently than the accompanying adult.
- Results from proximity codes and estimated ages indicated young-of-the-year calves were found more often in August, suggesting that the majority of calving occurs after the June survey, making August the optimal time for collecting calving data.

Questions and Conclusions

How does surfacing behavior change with the age of the calf?

Krasnova et al. (2006) show that newborn beluga calves spend most of the time close to mom's side or tail, as do 1 month olds. However, by 2 months old, the calves' distance and duration from mom becomes longer. The authors also note that breath holding times dramatically increase from 5-6 seconds for newborns to up to 120-180 seconds for 1 and 2 month olds.

Does the mother change her surfacing behavior or does the calf surface without the mother?

A significant number of apparent calves were found "alone in the field of view," in the August samples, indicating more frequent surfacing of calves while mothers were submerged. Consequently, a calf to adult ratio should be calculated using only proximity code 1 samples to avoid over-counting calves.

References

Krasnova, V. V., Bel'kovich, V. M. and Chernetsky, A. D., Mother-Infant Spatial Relations in Wild Beluga (*Delphinapterus leucas*) during Postnatal development under natural conditions. Biology Bulletin, 2006, Vol. 33, No. 1, pp. 53-58

Suydam, Robert S. Age, growth, reproduction, and movements of beluga whales (*Delphinapterus leucas*) from the eastern Chukchi Sea. Dissertation. Unverisity of Washington School of Aquatic and Fishery Sciences. 2009.