

Yield and need conversion in the Greenland take of minke and fin whales

LARS WITTING

This working paper reports the yield of meat, blubber and skin from the subsistence hunt of minke and fin whales in Greenland. It also estimates conversion factors so that it is possible to calculate the need satisfaction obtained from different strike limits.

The distribution of reported yield of meat from 1875 takes of minke whales and 134 takes of fin whales in the period from 1987 to 2007 is shown in Figure 1. The yield per whale is quite variable, with the reported meat yield for a minke whale ranging from 18 to 6,500 kilograms and the meat yield for a fin whale ranging from 400 to 40,000 kilograms. While some of the variation may reflect misreporting, it is true that the actual yield from a struck whale can be quite variable. It is, for example, not at all implausible that the yield of meat is below 100 kilograms in 0.2% of the minke whale takes (as found); this may simply reflect that the whale is lost on transit to flensing.

The average yields of meat, blubber and skin per whale as estimated from all catches with reported yields are

Minke whale					Fin whale				
	Meat	Blubber	Skin	Total		Meat	Blubber	Skin	Total
\bar{x}	1.37	0.22	0.39	1.96	\bar{x}	6.14	1.76	1.91	9.51
sd	0.85	0.24	0.31	1.17	sd	4.84	1.41	1.37	5.40
n	1875	1876	1862	2127	n	134	134	135	165

The average yield of meat for both species is lower than the existing conversion factors of 2 tonnes of meat for minke whales and 8 tonnes for fin whales.

In the last five year strike limit period (2003-07), an annual average of 172 minke whales (98% of the strike limit) and 10 fin whales (66% of the strike limit) were landed (Greenland progress reports to IWC; no data for 2004). This results in the following average annual landed catches (\bar{C}) and average annual obtained meat (\bar{m}) as a function of the strike limit (SL), with the %-tiles of the average meat per whale being estimates from five hundred thousand bootstraps of the landed number whales from the reported distributions of meat weight for minke whales and fin whales.

	Minke whale					Fin whale				
SL	150	175	200	225	250	13	16	19	22	25
\bar{C}	147	172	196	221	245	9	10	12	14	16
\bar{m}/whale	1.37	1.37	1.37	1.37	1.37	6.14	6.14	6.14	6.14	6.14
10%	1.28	1.29	1.29	1.30	1.30	4.37	4.45	4.58	4.68	4.75
5%	1.26	1.27	1.27	1.28	1.28	4.01	4.10	4.25	4.37	4.46
\bar{m} total	202	235	269	303	336	52	64	76	89	78
10%	188	222	253	287	319	37	47	57	67	78
5%	185	218	249	283	314	34	43	53	63	73

These results give point estimates of 269 tonnes of meat obtained from the current strike limit on 200 minke whales, and 76 tonnes of meat obtained from the current strike limit on 19 fin whales.

If the results are converted, we can obtain the following conversion factors (\bar{m}/s) that give the expected amount of meat (\bar{m}) per allowed strike (s) as a function of the strike limit

	Minke whale					Fin whale				
SL	150	175	200	225	250	13	16	19	22	25
\bar{m}/s	1.34	1.34	1.34	1.34	1.34	4.02	4.02	4.02	4.02	4.02
10%	1.26	1.27	1.27	1.28	1.28	2.86	2.92	3.00	3.07	3.11
5%	1.24	1.25	1.25	1.26	1.26	3.63	2.69	2.78	2.86	2.92

The point estimates of the conversion factor for the current strike limits are 1.34 tonnes of meat per allowed minke whale strike and 4.02 tonnes of meat per allowed fin whale strike.

However, as the objective of the subsistence hunt is to fulfill need if possible, it is unwise to use the point estimates when estimating the desired number of strikes that is needed to fulfill need. This is because such a conversion will ensure only a 50% chance that need is actually satisfied. We should instead apply a precautionary approach where, e.g., we could use the 10 or 5%-tiles of the estimated conversion factors. This will ensure that the probability that need is satisfied is increased to 90% or 95%.

If adopting, e.g., a 90% chance of fulfilling need if possible [by ‘if possible I mean if the SLA on a species will actually allow such a take], for the current strike limits, we would obtain a conversion factor of 1.32 tonnes of meat per allowed minke whale strike and 3.0 tonnes of meat per allowed fin whale strike. This should ensure a 90% probability that 253 tonnes of meat will be supplied from the minke whale hunt and that 57 tonnes of meat will be supplied from the fin whale hunt.

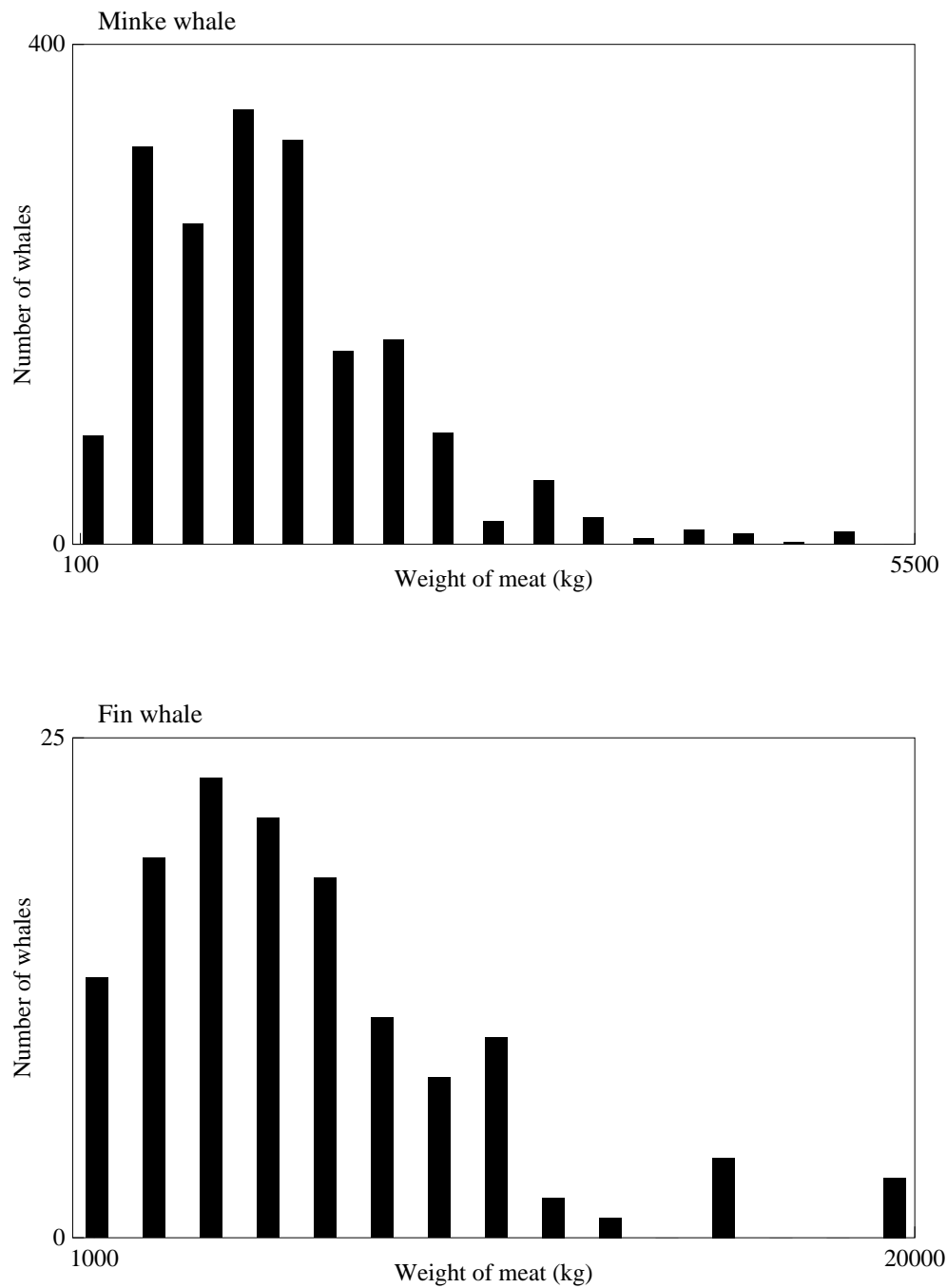


Figure 1: The distribution of meat yield for minke and fin whales caught in the period from 1987 to 2007 off West Greenland.