A note on the difference between the first and second/later whale caught within a trip in the Icelandic fin whale fishery

GUNNLAUGSSON, TH., VÍKINGSSON, G.A.

Marine Research Inst., Skúlagata 4 121 Reykjavík Iceland

Sigurjónsson (1988) described the operational factors of the Icelandic large whale fishery conducted from the whaling station in Hvalfjörður. Several factors can potentially affect selection of targeted individuals on the whaling grounds. After catching a whale it has to be brought in to the station within a specified time limit to ensure the quality of the meat. One would therefore expect the whalers to be prepared to spend some effort on hunting a big first whale in a trip while there will be limited time to spend on later whales and hunting more difficult when towing a whale on the side.

Catches during 1979-89 and 2009-13 were classified as first whale, second or later whale per trip. Here, we only considered fin whales where there were no intervening whales of other species. Genetically identified hybrids and one suspected hybrid male in 2013 (measuring 70 ft), were not included.

A selection for a fin whale as the first whale is seen where a mixture of species is taken in the same trip. In catches 1979-89 in mixed trips, 58 had fin whale as first whale while 31 had a fin whale caught later. The selection also shows up in females that are larger (see Table 1) more likely as the first whale caught. Only female fin whales measure above 66 ft and these number 72 out of 517 females as first whale taken (14.1%) while there are 32 out of 394 as later caught (8.1%) so in this size range selection is clear. The impact on the overall average length of females is 0.43 ft larger as first caught during this period and 0.23 during the later (2009-13) period (see table 1). The difference is less for the males that are smaller or 0.06 for the first period and 0.08 for the latter. In compliance with the IWC Schedule, there is a penalty for catching fin whales less than 50 ft, so in the size range just above 50 ft there must at all times be avoidance, but in effect a selection for larger whales is small within the range 50 to 66 ft.

Table 1. Average length (in feet) of landed fin whales 1979-89 and 2009-13. First whale caught per trip and later whales are given separately, only including data where there was no intervening by other target species. M: males. F: females.

		1979-89			2009-13		
Sex	Sequence	Length	S.E.	N	Length	S.E.	N
M	first	58.55	0.17	414	60.15	0.28	107
M	later	58.49	0.18	356	60.07	0.28	82
F	first	61.44	0.19	517	63.46	0.36	123
F	later	61.01	0.21	373	63.23	0.48	67

Given the on average larger whales caught in the latter period of about 2 ft and that selection appears to be mainly among the larger whales, one would expect the difference in the first and later whale caught (by sex) to be greater in the latter period, but this is not the case.

If the distribution in size was the same in both periods one would expect the size of the second whale to be similar in both periods and most of the difference seen in the first whale. The difference in the size of first and later whales should even be on the order of 2 ft. As this is not seen, it indicates that the difference in size is not a function of greater selectivity of the catchers for large whales, but reflecting a factual change in average size on the grounds, where there are now very few small whales.

Table 2 shows that the higher proportion of females can mostly be explained by a higher proportion of females as a first whale in a trip. There was a surplus of mixed sex trips in the period 2009-10 and a low proportion of females thereafter. However, the difference in the proportion females as first whale over female as second whale is even higher in the latter period indicating that selection for a large whale as first whale is just as strong during the latter period.

These findings contradict scenarios where the stock was heavily depleted and should still be increasing. Such a scenario would also imply that the females should have been more depleted at the end of the earlier period (when in fact they were 53.5% of the catches) and the sex ratio in the selective catches then more skewed towards females after the hiatus in whaling, but this is not seen in the recent catches (50% sex ratio), rather the opposite.

Table 2. Sex composition and percentage females as first (%F1) and second (%F2) whale in trips where fin whales were the first two whales caught by year and period. M: males. F: females. Excluding hybrids.

Years	MM	MF	FM	FF	%F1	%F2	N
79	20	24	28	22	54.7	47.7	260
80	25	22	21	20	52.1	47.0	236
81	24	24	25	30	52.9	51.3	253
82	24	22	14	20	49.6	51.8	194
83	14	15	15	15	51.9	51.6	143
84	11	16	21	22	65.6	52.6	166
85	17	14	13	21	54.8	52.9	161
86	5	5	6	9	67.3	57.7	75
87	9	4	6	12	53.7	51.3	80
88	7	7	4	6	51.2	56.0	68
89	3	5	10	11	76.3	55.2	67
1979-89	159	158	163	188	55.7	50.9	1703
2009	11	18	17	6			52
2010	4	6	9	3			22
2009-10	15	24	26	9	47.3	44.6	74
2013	14	4	11	18			47
2009-13	29	28	37	27	52.9	45.5	121

During 1987-2001 surveys there was a significant increase in the abundance of fin whales on the whaling grounds and adjacent waters west of Iceland (Víkingsson et al. 2009) while this increase seemed to have reached a plateau according to the 2007 survey (Pike et al. 2008). During the earlier period, catches consisted mainly of young (medium) animals indicating high reproduction on the grounds. After the hiatus in whaling (1990-2005) the grounds have apparently become infiltrated by older whales and the subsequent higher density caused by this and the initially high reproduction then on the grounds has lead to a response that is apparent in low reproduction in the recent catches and the average high age of caught animals. This is supported by observations of stunted growth in the recent catches (Gunnlaugsson *et al.* 2013).

In summary:

Proportion females as a first whale is even higher than as a second whale in the recent period

→ selection for large whales just as high.

Whales are larger while size difference of first and later whales is less in the later period

→ recent size distribution is more uniform and change in average size reflects population.

Few small/young animals and female proportion not higher in recent period

→ stock was not heavily depleted, infiltration, density response on the grounds has passed.

REFERENCES

Gunnlaugsson, Th., Víkingsson, G.A., Halldórsson, S.D. 2013. Recent changes in biological parameters of North Atlantic fin whales. Paper SC/65a/RMP04. 5Pp

Pike DG, Gunnlaugsson T, Víkingsson GA, Mikkelsen B (2008) Estimates of the abundance of fin whales (Balaenoptera physalus) from the T-NASS Icelandic and Faroese ship surveys conducted in 2007. IWC SC/60/PFI13-revised

Sigurjónsson J (1988) Operational factors of the Icelandic large whale fishery. Rep Int Whal Comm 38:327–333

Víkingsson GA, Pike DG, Desportes G, Öien N, Gunnlaugsson T, Bloch D (2009) Distribution and abundance of fin whales (Balaenoptera physalus)