

How reproductive are Harbour Porpoises?

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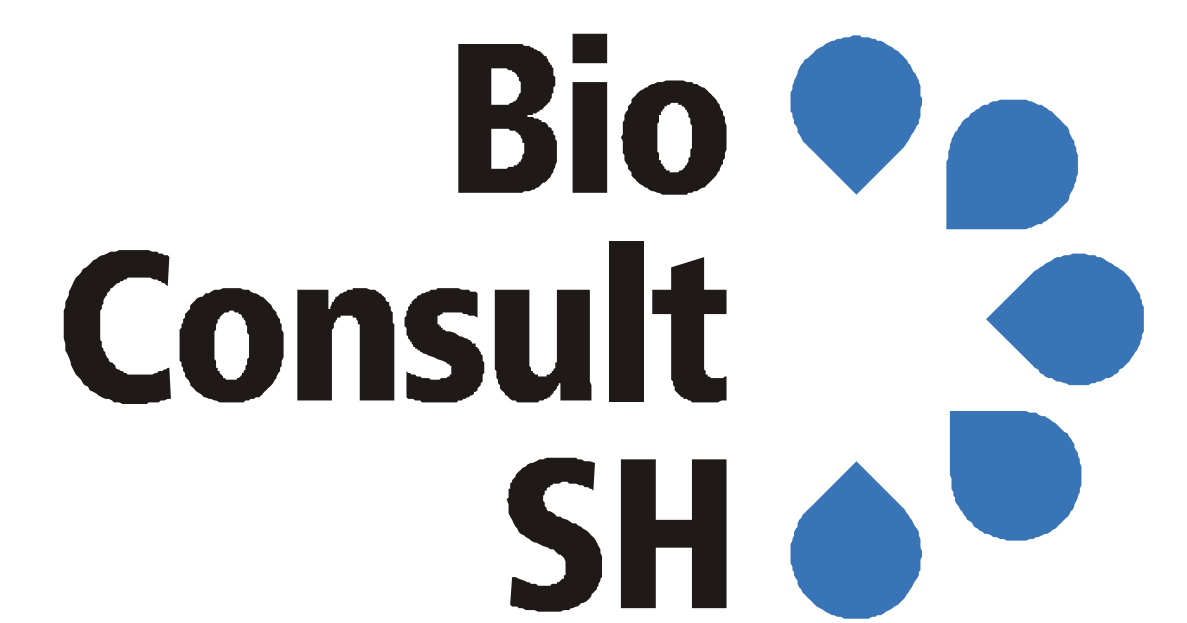
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Background



Reliable estimates of calf ratios are crucial for developing population models and management targets for marine mammals. From 2001 to 2004 we conducted aerial surveys of marine mammals at monthly intervals in the German Bight flying at low altitudes of 250 feet. We found seasonal peak calf ratios in harbour porpoises of 20% on average. These values are much higher than the ones found in other studies in the same area, and largely exceed the average ratio of 5%, as found in the framework of the SCANS surveys in the North Sea. Although a high calf ratio has been suggested to be typical for our study area, methodological differences may strongly bias the estimate of ratios. Therefore we evaluate the significance of observation platform, flight altitude and distance from the animals for the estimate of the ratios.

Methods



We applied the line transect distance sampling method and used planes and ships as platforms. From 2001 to 2004, we carried out 53 aerial surveys in an area of 2500 km² west of Sylt. 10 surveys were conducted in the summer months from May to August. We did not try to identify calves in other months.

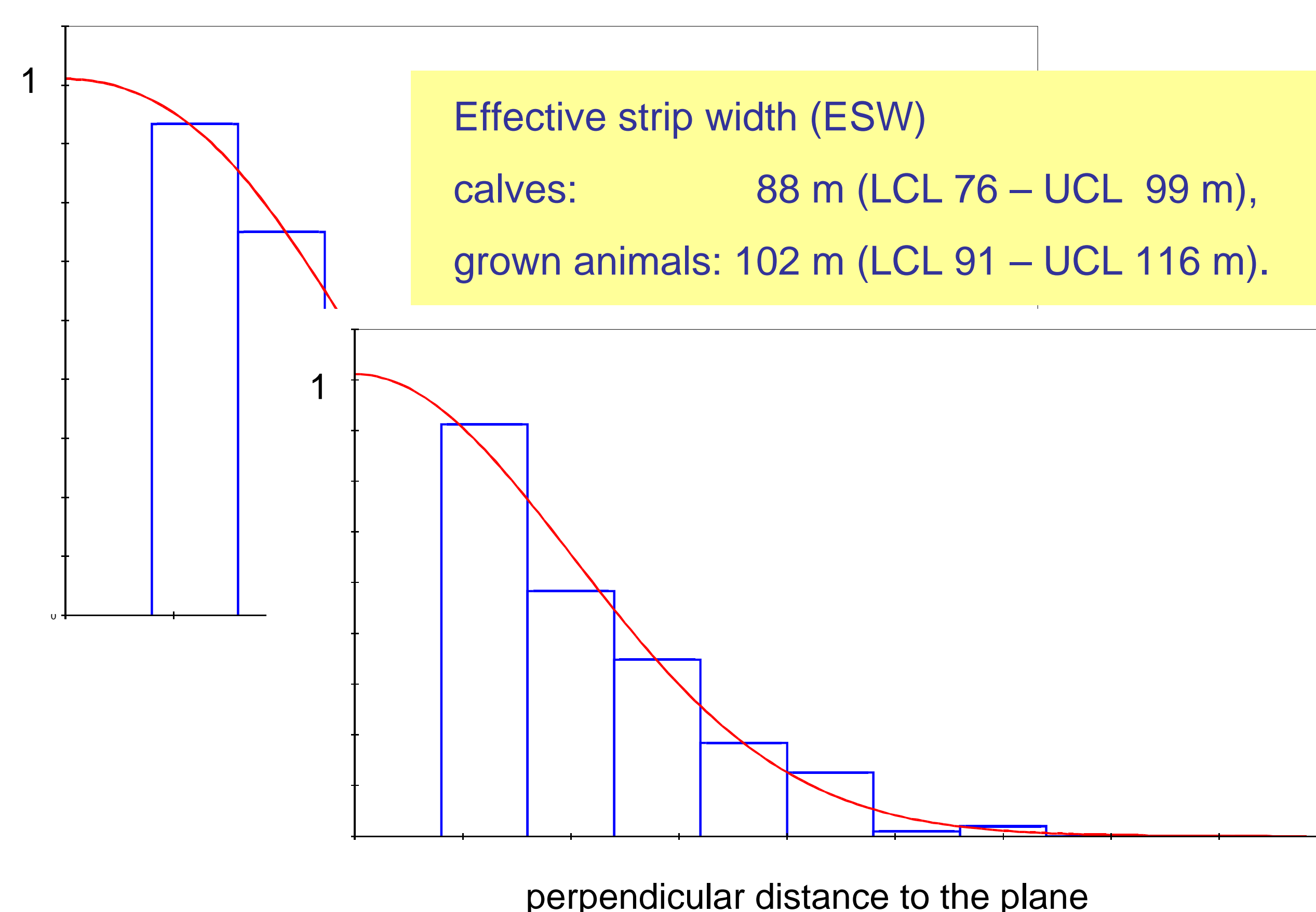
The flight altitude was 76 m (250 feet)

Newborn calves of harbour porpoises can be easily identified from the plane by comparing the length of companion animals, but the distance (the angle of the observation) may strongly influence the detection probability of a calf.

An animal seen at an angle of 45° degrees at 600 feet is 280 m away, at 250 feet the distance is only 117 m.

We propose to run the distance analysis (DISTANCE 4.1) exclusively with calf sightings in order to quantify the effect of distance on the detection probability of calves.

detection probability at distance 0

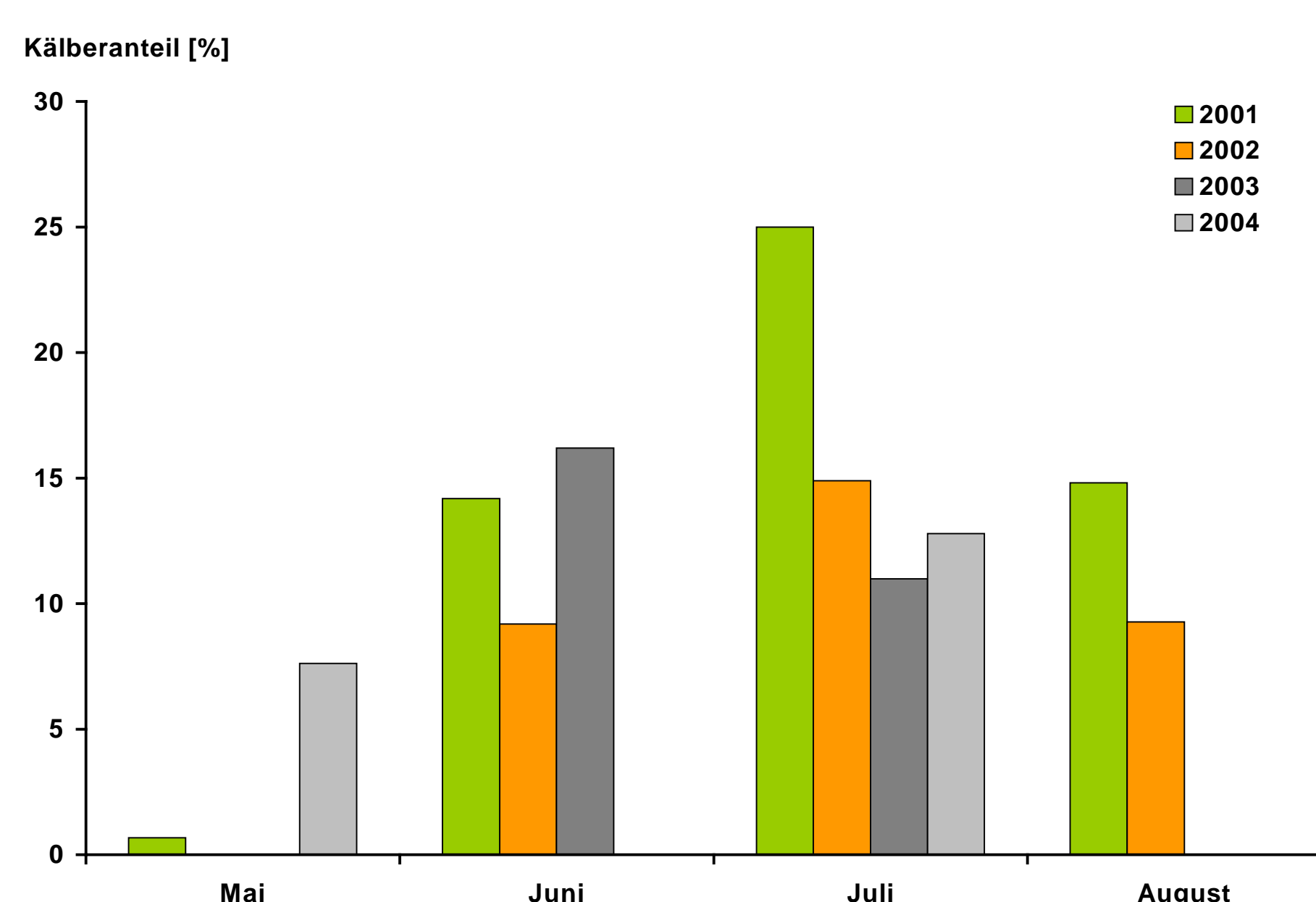


The detection probability of young calves differs from larger animals. The detection probability of calves is decreasing with distance to a larger extent. As a consequence, the values of the effective strip width are different (calves: 88 m and grown animals: 103 m), but the confident limits overlap.

Results

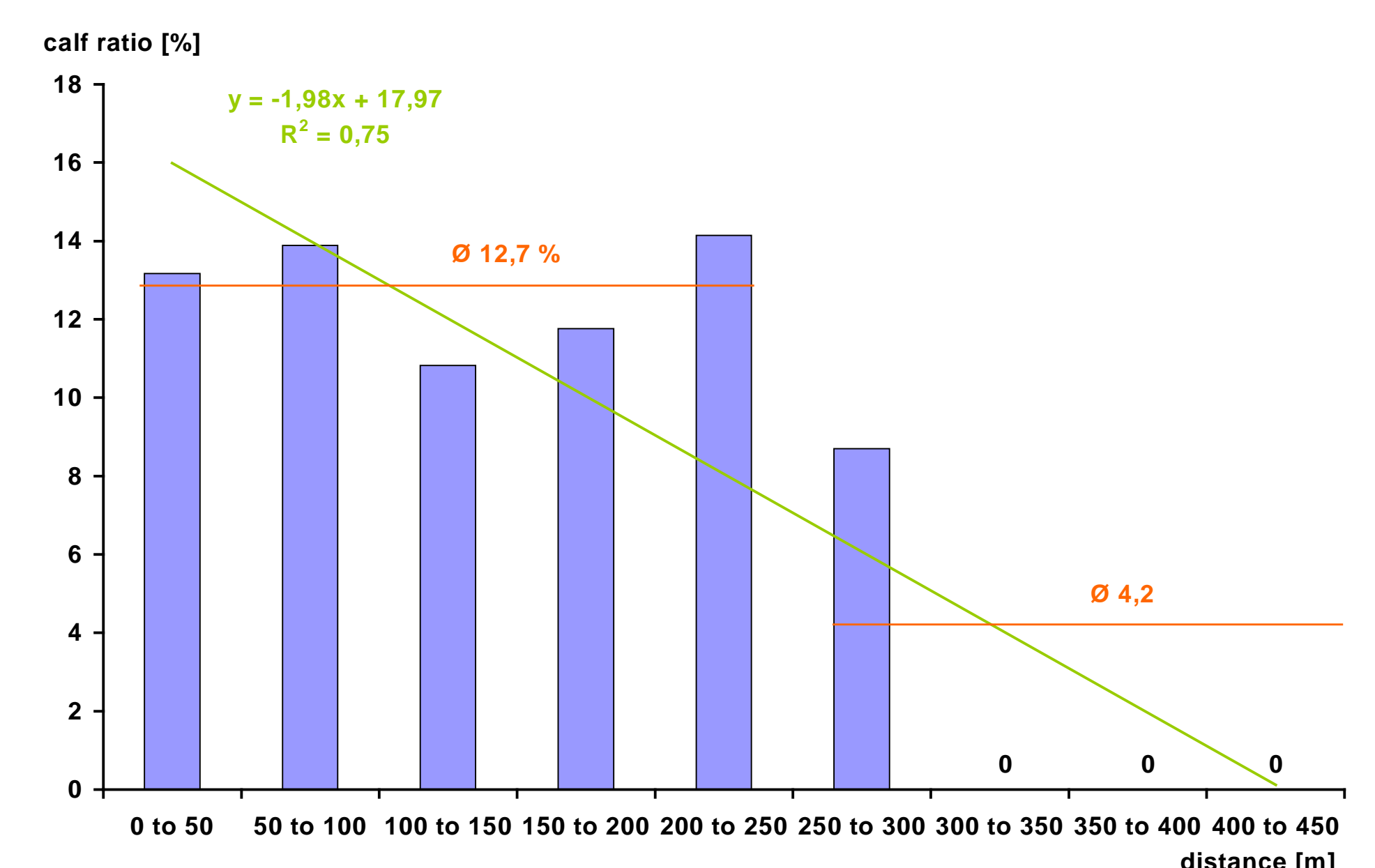
area	date	1 calf	2 grown animal	1 vs 2 ratio [%]	3 sighting	1 vs 3 ratio [%]
I	23.07.2001	24	87	28	76	32
I	05.07.2002	7	47	15	41	17
I	17.06.2003	46	284	16	233	20
II	31.07.2003	13	62	21	53	25
mean				20		

peak values in different years



seasonal effect of calf ratio:
peaks in June or July

2001 to 2004
n = 10 flights (May to Aug)
n = 219 calves,
n = 1752 grown animals,
n = 1488 schools.



distance effect of calf ratio:
decreasing ratio with increasing distance to the plane

Discussion

The difficulties in providing reliable estimates of calf ratios demand a critical review of methods and data.

We suggest that – due to favourable sighting angles - aerial surveys generally result in higher calf ratios than ship surveys and that altitude might be a very important variable in aerial surveys. Our results indicate that a low flight altitude (250 feet) as used in bird surveys facilitates calf counts.

We propose simultaneous flights at different altitudes (250 and 600 feet) in the same area to assess the importance of flight altitude in detecting calves. So far, answers to the question in the title still depend on the method.

Several aspects stress the probability and necessity of a high calf ratio (“Life in the fast lane”, Read & Hohn 1995):

- ! high numbers of mature pregnant females (Møhl-Hansen 1954, Read 1990, Smith & Gaskin 1983) and the pregnancy rate does not decrease significantly with time (Møhl-Hansen 1954),
- ! short pregnancy and nursing periods with one calf per year (Read & Hohn 1995),
- ! short adolescence: early sexual maturity at the age of two or three years (Read 1990),
- ! short life span: very few individuals reach an age of eight years (Gaskin & Blair 1977),
- ! high mortality in the first year (Benke et al. 1988).