

The use of natural markings in studies of long-finned pilot whales (*Globicephala melas*) and narwhals (*Monodon monoceros*)



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Pilot whale photo-id

Is the current photo-id method reliable? Can we improve it?

Pilot whale (*Globicephala melas*) studies have used photo-identification^{1,2,3}. These studies relied on the markings of the dorsal fin, which allowed the identification of only 30% of the population¹. None of these investigated the reliability of the marks used.

Methods & results

The prevalence of all mark types except the notch (χ^2 , $p < 0.001$) and the white scar (χ^2 , $p = 0.047$) were independent of a photograph's 'identifiability', as currently determined.

This suggests that the currently identifiable individuals do not differ from the rest of the population in their susceptibility to factors causing marks, such as predation, and thus appear to be representative of the population.

The rate of loss was calculated for each mark type found on individuals photographed in at least two different years.

$$\text{Rate of loss} = \frac{\# \text{ marks lost}}{\text{whale} \cdot \text{years of available marks}}$$

summation of the number of years between the earliest presence of a mark and either its latest presence or its earliest absence

The rate of loss of the marks types found on pilot whales

	Rate of loss (per mark per year)	Whale-years of available marks
Notch	0.0000	128
Protruding piece	0.0000	7
White scar	0.0000	7
Saddle patch	0.0000	21
Parallel linear scrape	0.7075	41
Single linear scrape	0.9145	152
Tooth rake	0.9024	41
Noncircular light patch	0.8871	62
Scratch patch	1.0000	1
Small white dot	0.8537	246
Miscellaneous	0.4000	5

Of the four permanent mark types, one, the notch, is used in the current photo-id method. Two others, the white scar and protruding piece, are usually found next to notches and are likely caused concurrently. Thus, they would not improve the method. Finally, the saddle patch is found in 50% of the photographs currently assessed as non-identifiable. Using this mark type would double the % of identifiable individuals.



Conclusion

The current photo-id method appears to be reliable but using the saddle patch would double the number of identifiable individuals

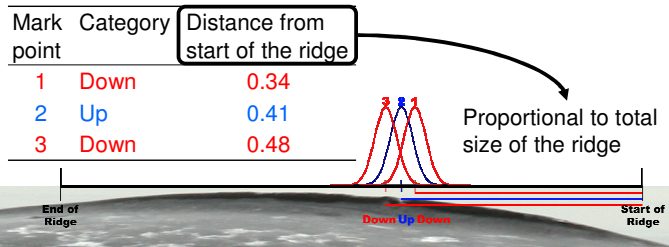
Narwhal photo-id

Which feature is suitable for individual identification?

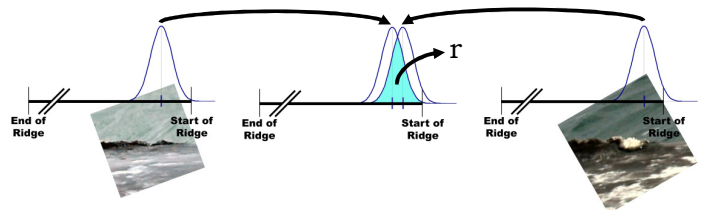
Photo-identification has not been developed for narwhals, in part because the features used to identify other cetaceans are not adequate for narwhal identification. Narwhals lack dorsal fins and show marked change in body pigmentation and tail morphology with age⁴.

Methods & results

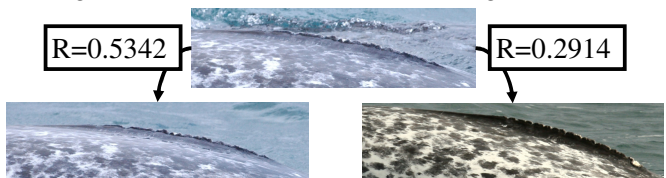
We are developing a computer program that uses the features and position of the notches found on the dorsal ridge to identify the individuals.



For each pair of dorsal ridges, it compares all mark points of the same category. Using the position of the compared mark points and their associated error, it calculates the fit (r). It then chooses the best fit (r) for each mark point.



To calculate the fit between the two dorsal ridges, R , it averages all the best r 's from the dorsal ridges.



The photo is tentatively matched to the individual in the catalogue that results in the highest R and then confirmed by eye.

Conclusion

It appears that narwhal can be identified using the notches found on their dorsal ridge.