

# How to tell them apart? Blackfish species discrimination using fin and body morphometrics obtainable from photos at sea

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## Reliable identifications?

- There are four similar-appearing “blackfish” in tropical waters
  - Short-finned pilot whale
  - False killer whale
  - Pygmy killer whale
  - Melon-headed whale
- These species are often sympatric and sometimes associate (Baird 2016)
- Misidentifications of these species regularly occur, both in the field and in the literature
- A reliable technique to distinguish these species at sea or from photos is needed

## How to do that

- We developed a technique to quantify fin features from at-sea photos
- We conducted 10 standard measurements on 382 known individuals, and examined 14 ratios using ANOVA and PCA
- Inter-species comparisons were undertaken to determine which ratios were distinct and diagnostic
- Comparisons also assessed age and sex differences

**Short-finned pilot whale (*Globicephala macrorhynchus*)**



**False killer whale (*Pseudorca crassidens*)**



**Pygmy killer whale (*Feresa attenuata*)**

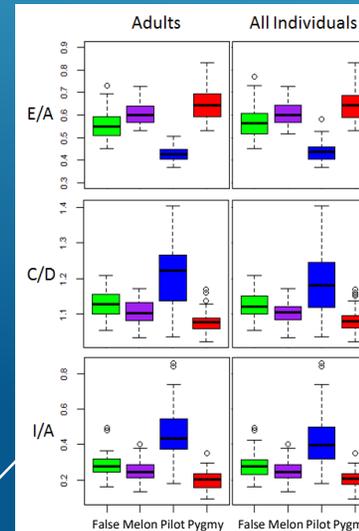


**Melon-headed whale (*Peponocephala electra*)**



## The golden ratios

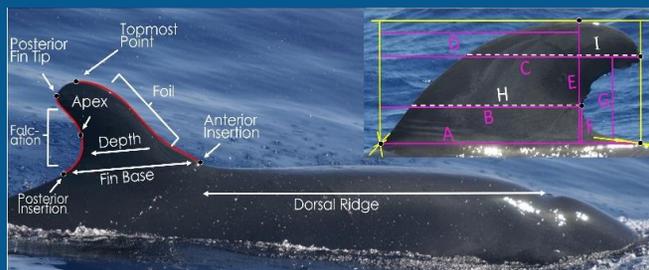
- We identified three diagnostic ratios for mature adults:
  - 1) Fin height / base length (E/A)
  - 2) Depth / depth at topmost (C/D)
  - 3) Foil depth (see diagram) at posterior tip / base length (I/A)
- Foil depth at posterior tip / foil depth at falcation apex (I/H) was diagnostic when calves and sub-adults included



## Intra-species findings

- Lateral ratios in adults were similar to calves but not sub-adults, indicating allometric fin growth during maturation in all species
- There was 90% consistency in the ratio relationships when calves and sub-adults were included in the analysis with mature adults
- Our findings indicate sexual dimorphism in the lateral fin proportions of short-finned pilot and false killer whales, but not of pygmy killer or melon-headed whales

These ratios were statistically diagnostic of species for both mature adults and all age classes



The primary photo shows terminology and 5 fin markers used to orient the 10 standard measurements, as shown in the inset photo

## References

Baird, R.W. 2016. The lives of Hawai'i's dolphins and whales: natural history and conservation. University of Hawai'i Press, Honolulu. 342pp.  
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Primary photo of a false killer whale; inset photo of a pilot whale