

Effect of matching uncertainty on population parameter estimation in mark-recapture analysis of photo-identification data

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Highlights:

- We conducted an experiment using Pacific white-sided dolphin photo-identification data to explore how uncertainty in photographic matching may affect population parameters.
- Putative matches of dolphins in high-quality photographs were assigned a matching certainty score and estimates of abundance and survival were obtained from capture history datasets created using different levels of matching uncertainty.
- Results revealed that using the conventional protocol of requiring 100% certainty of matches could result in substantial bias (20-50%) in abundance estimates.
- We recommend exploring the consequences of matching uncertainty in photo-identification studies and incorporating that uncertainty in estimates of abundance and survival.



This article is part of a thematic collection of articles (Special Issue) of *Mammalian Biology* and covers the following topics and taxa (marked with ☒) addressed in the Special Issue:

Article Type				
☒ Original Research	☒ Techniques	☐ Review	☐ Short Communication	☐ Concept Note
Taxon		Topic		
Terrestrial				
☐ Bats (Order Chiroptera)	☐ Primates : Great Apes (Family Hominidae)	☐ Acoustic ID	☐ Identification techniques	
☐ Carnivores : Bears (Family Ursidae)	☐ Primates : Old World monkeys (Family Cercopithecidae)	☐ Aerial surveys	☐ Life-history	
☐ Carnivores : Canids (Family Canidae)	☐ Ungulates : Bovids (Family Bovidae)	☐ Analytical innovations	☐ Machine learning	
☐ Carnivores : Felids (Family Felidae)	☐ Ungulates : Deers (Family Cervidae)	☐ Automated pattern recognition	☒ Mark-recapture analysis	
☐ Carnivores : Hyenas (Family Hyenidae)	☐ Ungulates : Giraffes (Family Giraffidae)	☐ Behavioural ecology	☐ Morphometrics	
☐ Carnivores : Mustelids (Family Mustelidae)	☐ Ungulates : Horses (Family Equidae)	☐ Camera-trapping	☐ Network analysis	
☐ Elephants (Family Elephantidae)	☐ Multiple taxa (3 or more Families/Orders)	☒ Conservation management	☐ Photogrammetry	
Marine		☐ Data management	☐ Population ecology	
☐ Baleen whales : Right whales (Family Balaenidae)	☐ Large toothed whales (Families Delphinidae & Hyperoodontidae)	☒ Demographic parameters	☐ Site fidelity & Movement	
☐ Baleen whales : Rorquals (Family Balaenopteridae)	☐ Pinnipeds : True seals (Family Phocidae)	☐ Field methodology	☐ Social ecology	
☐ Carnivores : Bears (Family Ursidae)	☐ Porpoises (Family Phocoenidae)	☐ Genetic ID	☐ Software/Package development	
☐ Carnivores : Mustelids (Family Mustelidae)	☐ Sirenians : Manatees (Family Trichechidae)	☐ Health conditions	☐ Thermal imagery	
☒ Dolphins (Family Delphinidae)	☐ Multiple taxa (3 or more Families/Orders)	☐ Other: (please specify)		

References

- Karczmarski L, Chan SCY, Rubenstein DI, Chui SYS, Cameron EZ (2022a). Individual identification and photographic techniques in mammalian ecological and behavioural research – Part 1: Methods and concepts. *Mammalian Biology* (Special Issue), 102 (3) <https://link.springer.com/journal/42991/volumes-and-issues/102-3>
- Karczmarski L, Chan SCY, Chui SYS, Cameron EZ (2022b). Individual identification and photographic techniques in mammalian ecological and behavioural research – Part 2: Field studies and applications. *Mammalian Biology* (Special Issue), 102 (4) <https://link.springer.com/journal/42991/volumes-and-issues/102-4>