



Behavioural observations of foraging minke whales (*Balaenoptera acutorostrata*) in the Moray Firth, NE Scotland

Kevin P. Robinson, Nicola M. Clark, Ross M. Culloch & Michael J. Tetley

Cetacean Research & Rescue Unit (CRRU), P.O. Box 11307, Banff AB45 3WB, Scotland, UK
School of Biological Sciences, University of Wales, Bangor, Gwynedd LL57 2UW, Wales, UK



Poster B23

Introduction

The cosmopolitan minke whale (*Balaenoptera acutorostrata*) is an opportunistic feeder showing spatial and seasonal variations in diet according to local availability of prey. With its broad menu and flexible feeding habits, the species utilises a range of strategies when foraging (Hoelzel *et al.*, 1989; Wells *et al.*, 1999). One method known as bird-associated foraging, however, appears to be particularly prevalent in Scottish waters. Here, the whales exploit concentrations of fish fry, compacted at the waters surface by flocks of feeding seabirds from above and predatory, schooling fish from below. Whilst several studies have noted this behaviour (e.g. Gill *et al.*, 2000; Robinson & Tetley, 2005), few have investigated the processes behind such a foraging strategy. In this presentation we aim to highlight the bird-associated feeding specialisation employed by coastal minke whales in northeast Scotland, both from a behavioural ecology approach, and with respect to the importance of the outer Moray Firth as a summer feeding ground for both cetaceans and other species of marine fauna.

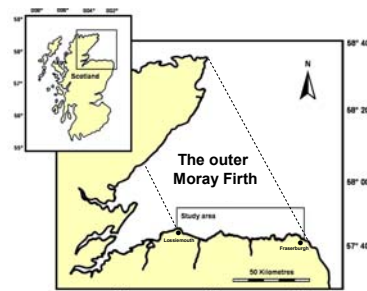


Figure 1. Map of the Moray Firth in NE Scotland showing the position of the study area along the southern coastline of the outer firth.

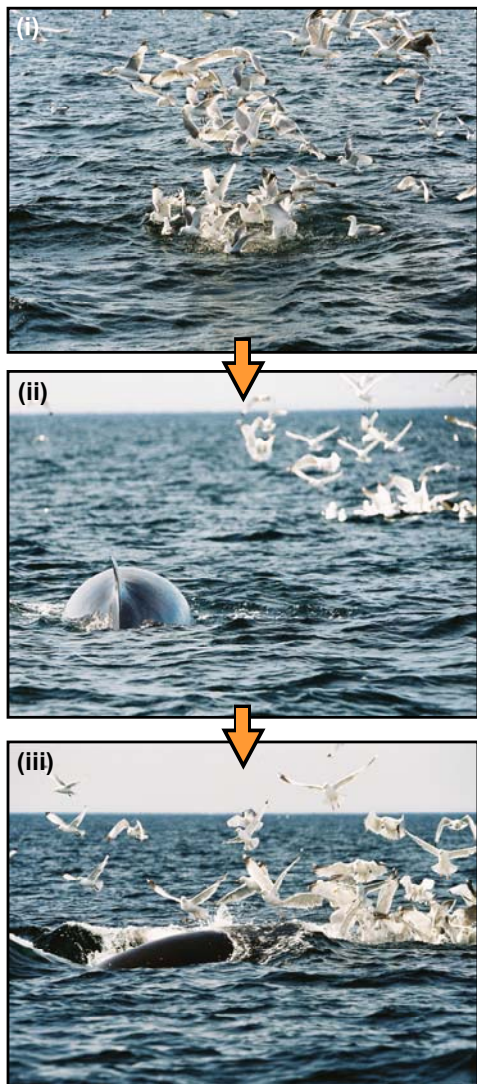


Figure 2. Illustrating the bird-associated foraging sequence of *B. acutorostrata* in the Moray Firth: (i) a bird raft forms independently of the presence of whales; (ii) a foraging minke makes its approach towards the frenzied feeding raft; and (iii) the whale lunges through the raft engulfing the aggregated bait ball beneath.

Methods

Data were collected from June to October 2000 to 2005 inclusive during dedicated boat surveys of an 880km² area of the outer Moray Firth between the coastal ports of Lossiemouth and Fraserburgh (fig. 1). The following observations were made as part of a longer term study on the fine-scale distribution and ecology of *B. acutorostrata* in the outer southern Moray Firth by Robinson and colleagues (see: www.crru.org.uk/minke).

Results

- During 136 encounters with foraging minke whales, bird-associated feeding was recorded in 76% of all cases.
- 12 species of seabird were identified in bird feeding rafts including: kittiwakes (*Rissa tridactyla*), gulls (*Larus canus*, *L. argentatus*, *L. marinus* and *L. fuscus*), gannets (*Morus bassanus*), auks (*Uria aalge* and *Alca torda*), shearwaters (*Puffinus puffinus* and *P. griseus*) and terns (*Sterna hirundo* and *S. paradisaea*).
- Bird rafts were seen to form independently of whale presence; the minke effectively being summoned to these feeding areas by the perceptible frenzy of congregating birds (fig. 2).
- Whales opportunistically exploiting this ephemeral food source expended less energy than those using traditional lunge-feeding entrapment manoeuvres.

Discussion

Minke whales in the outer Moray Firth largely employ low-energy, bird-associated feeding methods during the productive summer months. Diving birds, such as auks and shearwaters, may play an essential role in the creation of bait balls at the waters surface, but schooling mackerel (*Scomber scombrus*) – forming the most considerable component of the summer fish biomass in this North Sea area – are without question the principal force in the aggregation of targeted sand eel (*Ammodytes sp.*) prey. As such, the role of *S. scombrus* in increasing both the rate and density of bait ball formation (as indicated by the presence and activity of associated bird rafts) is thought to be highly significant in this inshore Scottish location. Since changes in oceanographic variables such as surface sea temperature have been directly correlated with the migration of *S. scombrus* (Reid *et al.*, 1997), the inter-annual variability observed in the fine-scale distribution of *B. acutorostrata* in this area (Tetley, 2004) may subsequently be accounted for by the respective distribution of this predatory, pelagic fish.

References

- Gill, A., Fairbairns, B.R. & Fairbairns, R.S. 2000. Some observations of minke whale (*Balaenoptera acutorostrata*) feeding behaviour and associations with seabirds in the coastal waters of the Isle of Mull, Scotland. *European Research on Cetaceans* 13: 61-64.
- Hoelzel, A.R., Dorsey, E.M. & Stern, S.J. 1989. The foraging specialisations of individual minke whales. *Animal Behaviour* 38: 786-794.
- Reid, D.G., Turrell, W.R., Walsh, M. & Corten, A. 1997. Cross-shelf processes north of Scotland in relation to the southerly migration of western mackerel. *ICES Journal of Marine Science* 54: 168-178.
- Robinson, K.P. & Tetley, M.J. 2005. Environmental factors affecting the fine-scale distribution of minke whales (*Balaenoptera acutorostrata*) in a dynamic coastal ecosystem. *ICES Annual Science Conference, CM 2005, Aberdeen, Scotland, UK*.
- Tetley, M.J. 2004. The distribution and habitat preference of the North Atlantic minke whale (*Balaenoptera acutorostrata acutorostrata*) in the Southern Outer Moray Firth, NE Scotland. M.Sc. Thesis. University of Wales, Bangor, 111pp.
- Wells, R.S., Boness, D.J. & Rathburn, G.B. 1999. Behaviour. pp. 324-422. In: J.E. Reynolds & S.A. Rommel (eds). *Biology of Marine Mammals*. Melbourne University Press, 896pp.