

Short Note

Long-Range Longitudinal Movements of Sperm Whales (*Physeter macrocephalus*) in the North Atlantic Ocean Revealed by Photo-Identification

Keith D. Mullin,¹ Lisa Steiner,² Charlotte Dunn,^{3,4} Diane Claridge,^{3,4} Laura González García,^{5,6} Jonathan Gordon,⁴ and Tim Lewis⁷

¹Marine Mammal and Turtle Division, Southeast Fisheries Science Center, NMFS, NOAA, Pascagoula, MS, USA
E-mail: Keith.D.Mullin@noaa.gov

²Whale Watch Azores, Estrada da Caldeira, No. 2, Horta, 9900-089, Faial, Azores, Portugal

³Bahamas Marine Mammal Research Organisation, PO Box AB-20714, Marsh Harbour, Abaco, Bahamas

⁴Sea Mammal Research Unit, Scottish Oceans Institute, University of St Andrews, East Sands, St Andrews, KY16 8LB, UK

⁵Futurismo Azores Adventures, Marina Portas do Mar, 24-26 São Miguel Island, 9500-771 Ponta Delgada, Portugal

⁶Azorean Biodiversity Group (University of the Azores), Centre for Ecology, Evolution and Environmental Changes (CE3C), Rua Mãe de Deus, 9500-321 Ponta Delgada, Portugal

⁷NAMSC, Ale Oak Cottage, SY7 8QS, UK

Sperm whales (*Physeter macrocephalus*) are distributed throughout the world's oceans, mainly in waters greater than 200 m (Rice, 1989). Distribution and movements of individuals associated with social structure and age/sex have been previously described (Whitehead, 2003). Generally, mature females, their calves, and immature whales of both sexes live in matrilineal social groups throughout warm temperate to tropical waters. Females in matrilineal groups display long-term associations (Christal & Whitehead, 2001; Gero et al., 2015) and maintain regional ranging patterns (Whitehead et al., 2008; Engelhaupt et al., 2009). As males mature, their bonds with the matrilineal group weaken, and they associate in bachelor groups that are distributed in temperate and polar waters. When males reach sexual and social maturity, they are generally found alone or in small groups and periodically return to warm waters to mate with receptive females (Best, 1979; Rice, 1989; Whitehead, 2003). Worldwide, there are a number of studies that report on the movement patterns of individual whales within warm water habitats (Gero et al., 2007; Jochens et al., 2008; Whitehead et al., 2008; Carpinelli et al., 2014) and on the long-range movement patterns of males (Ivashin, 1967; Martin, 1982; Aguilar, 1985; Steiner et al., 2012; Mizroch & Rice, 2013; Straley et al., 2014). However, previously reported movements of whales from studies in warm waters of the Western North Atlantic (WNA) (e.g., Caribbean, Gulf of Mexico) were confined to the WNA (Gero et al., 2007; Jochens et al., 2008).

In the North Atlantic, sperm whale photo-identification (photo-ID) catalogues are maintained by researchers working within the Mediterranean Sea, Gulf of Mexico, Caribbean Sea, Bahamas, Azores, Canary Islands, Madeira, Norway, and Iceland, and some comprehensive catalogue comparisons have already been made (Steiner et al., 2012; Carpinelli et al., 2014). Based on a partial comparison of whales identified in the Gulf of Mexico and Bahamas in the WNA and those identified in the Azores in the Mid-Atlantic, we report new information on the movements of three sperm whales in the North Atlantic, including the movement of two whales between the WNA and the Azores. These represent the longest known movements of sperm whales in the North Atlantic outside of “Discovery” type tag results (Mitchell, 1970, 1975).

Sperm whale fluke photos for photo-ID (Arnbom, 1987) were collected in the Azores, Bahamas, and northern Gulf of Mexico during commercial whale-watching trips and/or dedicated cetacean research surveys. A brief description of each area (Figure 1) and the years covered are given below.

Azores

The Azores archipelago is centred roughly in the middle of the North Atlantic along the Mid-Atlantic Ridge (~38° N, 28° W). Both female groups and mature males (~10% of whales identified) occur in the region (Pinela et al., 2009;