

Lettevall, Erland. 2003. Abundance, association and movement within discrete populations of sperm whales, *Physeter macrocephalus*

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ABSTRACT

The sperm whale *Physeter macrocephalus* has a complex social system in which females form closely related social groups, living in a fission–fusion society with temporary associations between permanent social units. Groups of females and calves are found in lower latitudes, while males leave their natal group and disperse to higher latitudes. This thesis examines social structure and movement, and how these relate to population distribution over space and in time. Major results are based on length estimations and individual photo-identifications collected in both higher and lower latitudes.

Over a period of 12 years, the social life of adult females and immature groups was investigated in the eastern tropical Pacific, particularly around the Galápagos Islands. An individual has on average 11 constant companions, although unit membership was not perfectly stable and changes were observed. Social units also formed larger groupings in variable and non-seasonal temporal patterns, such that certain social units were more likely to move together.

The reproduction of sperm whales is known to be seasonal with a peak separated by about six months between the northern and southern hemispheres, but seasonality has been considered to be indistinct in equatorial waters. During a one-year study off the Galápagos Islands, higher proportions of infants were found during June–August and December–February than during periods in between, indicating the validity of seasonal reproduction with two peaks in equatorial waters as well. However, males did not show a clear seasonal pattern.

Aggregations and social structures of non-breeding males were investigated at typical feeding sites off Norway, Nova Scotia, New Zealand and the Galápagos Islands. The results revealed temporal associations but no indications of long-lasting relationships between males.

Nevertheless, close clusters of individuals were seen occasionally, though these rarely rejoined after splitting. In addition a few observations of pairs of whales swimming in a coordinated fashion for a few hours at a time suggest that social relationships might exist between adult males at some level.

A more detailed analysis of Bleiksdjupet canyon, Norway, showed a population with a mean body length of 15.0 m. Individuals of similar body length were associated more often with each other, which indicates at least a weak social relationship between males. At any one time 16–18 individuals were in the area, where they stayed for a few weeks, and then left. In a month about 2/3 of the population was exchanged at Bleiksdjupet. This illustrates the presence of ‘transients’ who briefly pass through and ‘seasonal residents’ who spend months at a time in the area. The annual population size varied over 15 the investigated years but with no trend observed. In an average year the population in Bleiksdjupet canyon consisted of about 100 individuals of which roughly 33% emigrated to the larger surrounding population of about 400 individuals. In the area, the whales moved within a discrete range of about 10 km, *i.e.*, roughly the distance across the canyon. This thesis emphasises the importance of dynamic relationships over different scales of both space and time in the understanding of behaviour and population ecology within discrete sperm whale populations.