

**Exploring the mechanisms and functions underpinning the
social networks of an endangered population of killer
whales, *Orcinus orca***



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ABSTRACT

For the majority of social species, group composition is dynamic, and individuals are interconnected in a heterogeneous social network. In this study I investigate the mechanisms underpinning social structure in the endangered southern resident killer whale (*Orcinus Orca*) population using a long term dataset, and explore the consequences of these.

My results demonstrate that resource availability may be an important determinant of social network structure. A significant relationship between the connectivity of the social network and salmon abundance occurred, with a more interconnected network in years of high salmon abundance.

As networks are non-random, highly connected individuals may play a key role in population processes such as information and disease transmission. While associations occurred both within and between matriline, females had a significantly higher number of associates than males, as did older individuals of both sexes. Older males played a more important role in interconnecting the network.

The attributes of group leadership were then investigated in matriline and in individuals. Leadership was not a factor of size or mean age of matriline. However, there was a significant relationship between leadership score and the matriline sex ratio. Individually, females had higher leadership scores than males, and there was a positive correlation between leadership score and age in both sexes. I suggest that the oldest females have the highest

leadership scores due to increased ecological knowledge that comes with a prolonged lifespan.

Using multi-generational records for two populations of killer whales, I show that both reproductive and post-reproductive mothers increase the survival of offspring, particularly in older male offspring. This is consistent with theoretical predictions, and may explain why female killer-whales have evolved the longest post-reproductive lifespan of all non-human animals.

Given the role that individuals of high network centrality can play in population processes, understanding the driving forces behind social network structure is vital when designing effective conservation and management plans.

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