

Social Organization and Genealogy of Resident Killer Whales (*Orcinus orca*) in the Coastal Waters of British Columbia and Washington State

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ABSTRACT

The social organization and genealogy of resident killer whales in the coastal waters of British Columbia and Washington State are examined based on field observations and analyses of photographs of recognizable individuals collected during 1973-87. All individuals were identified in two communities, with 261 animals alive in 1987. The membership of social groups is determined by observing which individuals travel most frequently together and by examining the relative strength of bonds among individuals within groups. The strength of bonds is established from direct observations of the proximity of individuals to one another and from an analysis of the association of individuals in photographic sequences. The social organization is classified into communities, pods, subpods and intra-pod (matrilineal) groups. A community comprises individuals that share a common range and associate with one another; a pod is a group of individuals within a community that travels together the majority of the time; a subpod is a group of individuals that temporarily fragments from its pod to travel separately; an intra-pod group consists of a cohesive group of individuals within a subpod that always travels in close proximity. Communities contain 3-16 (mean=9.5) pods; pods contain 1-3 (mean=1.7) subpods, subpods contain 1-11 (mean=1.9) intra-pod groups and intra-pod groups contain 2-9 (mean=3.6) individuals. The membership at each group level was stable during the study, except for births and deaths. No dispersal of individuals or groups was observed.

Genealogical trees within pods are constructed from known genealogies and from inferences about genealogy based on the strength and continuity of bonds among pod members. The genealogical trees indicate that intra-pod groups are matrilineal. A matrilineal group typically comprises of 2-3 generations (range 1-4; mean=2.3) and a generalized matrilineal group consists of a grandmother, her adult son, her adult daughter and the offspring of her daughter. Matrilineal groups are the basic unit of social organization. New matrilineal groups appear to form by splitting along maternal lines. Subpods and pods appear to be comprised of related matrilineal groups and probably form through the gradual splitting of their natal subpods or pods along matrilineal group lines. Pod-specific dialects suggest that related pods eventually associate randomly. Pods are grouped into four acoustic (but not social) clans. Pods within each clan are likely to have a distant common ancestor.

The lack of dispersal of the resident form of killer whale from their natal groups appears to be unique among mammalian social systems. However, dispersal appears to occur in the transient form, which also differs in physical appearance, distribution and behaviour. The two forms may have evolved after adopting different foraging strategies. This species has the potential to have developed many local races over its cosmopolitan range, with each race having unique social and behavioural characteristics.

1. INTRODUCTION

Numerous studies on the biology of killer whales (*Orcinus orca*) in the coastal waters of British Columbia and Washington State have been facilitated by the fact that all individuals can be recognized from unique natural markings. These studies have provided information on abundance, movements, behaviour, feeding habits, vocalizations, social organization, life history and population dynamics (Balcomb, Boran and Heimlich, 1982; Bigg, 1982; Ford and Fisher, 1982; 1983; Balcomb and Bigg, 1986; Haenel, 1986; Heimlich-Boran, J.R., 1986; 1988; Heimlich-Boran, S.L., 1986; Jacobsen, 1986; Bigg, Ellis, Ford and Balcomb, 1987; Olesiuk and Bigg, 1990).

An important finding of these studies regarding social organization was that two forms of killer whale, termed 'resident' and 'transient', inhabit this region. The resident form comprises a northern and southern community, whereas the transient form is a single community that is sympatric with but does not mix with the two resident

communities. The resident form is the most abundant comprising about 75% of all individuals identified. Resident whales travel in long-term groups known as pods. It has also been noted that there are groupings within pods (Bigg, 1982).

In recent years, we have focused our studies on the social organization and genealogies of pods within the two communities of resident killer whales. Bigg *et al.* (1987) summarized some of these findings in a popular account on the biology of killer whales. In this paper we examine social organization and genealogies using field observations and photographs collected during 1973-87. The identity and individual membership of each pod and the social structure within pods was determined by observing which individuals travelled together most often and by examining the relative strength of bonds among individuals within groups. The relative strength of bonds was determined from: (1) direct observation of the proximity of individuals to one another as seen during field observations and in photographs; and (2) an index of the degree of association among individuals in photographic sequences. The individuals within each