

62

Observations on the Reactions of Sea Lions to Killer Whales -  
Evidence of "Prey" Having a "Search Image" for Predators

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Observations on the reactions of California Sea Lions  
(Zalophus californianus) and Steller Sea Lions (Eumetopias  
jubatus) to the presence of foraging transient Killer Whales  
(Orcinus orca) were made on three occasions. Alert and  
avoidance responses by sea lions were made in the presence of  
Killer Whales of typical appearance. In the presence of a  
single, foraging Killer Whale of atypical appearance, no alert  
or avoidance response was observed. It is possible that the  
sea lions did not recognize the atypical whale as a Killer  
Whale, suggesting that sea lions may have a perceptual  
"search image" for the detection of predators, based on  
visual cues.

Key Words: Killer Whale, Orcinus orca, transient, California  
Sea Lion, Zalophus californianus, Steller Sea Lion,  
Eumetopias jubatus, prey, search image, foraging  
behaviour, Race Rocks Ecological Reserve, British  
Columbia.

The ability of a predator to perceive cryptic prey using a  
perceptual "search image" has been previously reported (e.g.  
Dawkins 1971). However, the concept of "prey" using a similar  
perceptual "search image" to detect potential predators does  
not appear to have been previously documented. During an  
ongoing study of Killer Whale (Orcinus orca) behaviour and  
ecology being undertaken around southern Vancouver Island,  
British Columbia, certain interactions between "transient"  
Killer Whales (after Bigg et al. 1987), California Sea Lions  
(Zalophus californianus), and Steller Sea Lions (Eumetopias  
jubatus) were noted on three occasions. These interactions  
suggest that sea lions may use a search image for the  
detection of potential predators.

Observations of interactions between transient Killer  
Whales and sea lions were made during 1987 at the Race Rocks  
Ecological Reserve (48°18'N, 123°32'W), a group of nine small  
islands approximately one mile off the southernmost tip of  
Vancouver Island, in the Strait of Juan de Fuca. Race Rocks  
is a year-round Harbour Seal (Phoca vitulina) colony, with  
seasonally abundant California Sea Lions and Steller Sea  
Lions (Bigg 1985). Transient Killer Whales feed primarily on  
marine mammals and have been observed preying on sea lions in  
local waters (Bigg et al. 1987). Transient Killer Whales  
vocalize much less than resident whales (Ford and Fisher

Ref. No.:

272

ECOLOGICAL RESERVES COLLECTION  
GOVERNMENT OF BRITISH COLUMBIA  
VICTORIA, B.C.  
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1982), possibly to avoid detection by mammalian prey (Morton 1987; Felleman et al. 1989). Thus the reaction of sea lions to the presence of Killer Whales might be mediated by visual cues.

Sea lions exhibited alert and avoidance reactions to the presence of transient Killer Whales on two occasions. Vigilant behaviour, high-speed swimming away from the whales, movement into dense kelp beds and continuously lifting the upper body far out of the water were observed.

On 12 October 1987 a lone, adult male transient Killer Whale of atypical appearance, photo-identified as X10 (after Bigg et al. 1987) was observed at Race Rocks. This individual has a dorsal fin which is bent over at its base to the left side, with the upper half dragging in the water (Figure 1). He was observed surfacing four times within three meters of approximately 150 California and Steller Sea Lions that were both in the water, and hauled out on small reefs. His behaviour was categorized as typical foraging behavior as described for transient Killer Whales (Baird and Stacey 1987, 1988a; Felleman et al. 1989). The whale moved through narrow channels between several reefs and circled a reef on which sea lions were hauled out. No noticeable reaction by the sea lions was observed.

It is possible that the sea lions did not recognize the atypical whale as a Killer Whale. We suggest that sea lions respond to visual cues, such as the dorsal fin of a Killer Whale, which match a perceptual search image. Although sea lions may be formidable prey for a lone Killer Whale, lone Killer Whales have previously been observed preying on sea lions (Lopez and Lopez 1985). Recognition of a predators' behavioural state has been noted as an important factor in reaction to predators by terrestrial ungulates (Estes and Goddard 1967; Kruuk 1972; Schaller 1972). From our observation we suggest that it is unlikely the sea lions recognized the whales' behavioural state since they did not react.

As the Killer Whales in an area may be members of more than one breeding population (Bigg et al. 1987; Baird and Stacey 1988b), some of which specialize in feeding on fish, proximity of Killer Whales to other marine mammals may not always be perceived as a potential threat by the latter. Dolphin (1987) reports non-aggressive Humpback Whale (Megaptera novaeangliae) - Killer Whale interactions in Alaska, but unfortunately fails to mention if the Killer Whales observed were the resident type, which feed primarily on fish, or the transient type. Marine mammals have been reported in close proximity to resident Killer Whales in British Columbia, showing no apparent reaction (Jacobsen 1986). However, even in the presence of resident Killer Whales, sea lions may show interest with an increase in vigilant behaviour (Jacobsen 1986). Killer Whale attacks on marine mammals usually elicit a variety of escape responses (eg. Steltner et al. 1984; Lopez and Lopez 1985). These

observations suggest that there may be a variety of cues influencing the reactions of marine mammals to Killer Whales. Further research on the perceptual processes sea lions and other similiar prey species use to detect predators and on their ability to discriminate between potentially threatening transient Killer Whales and non-threatening resident Killer Whales is warrented.

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Figure 1. Transient killer whale X10 at Race Rocks, B.C.,  
12 October 1987. Photo by Robin W. Baird.

