

## Killer Whale *Orcinus orca* sightings in coastal Victoria

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### Abstract

The web-based casual sightings network 'Auscetnet' receives an average 13 records of Killer Whales per year, mainly from coastal locations of southeast Australia. These data combined with data from the Atlas of Victorian Wildlife are presented to illustrate the pattern of monthly sightings. Sightings peak in late June/early July and again between September and November. There is a distinct decline in sightings between late July and the end August. One individual Killer Whale has been seen twice off the central coast of Victoria and twice off southern New South Wales since 2002, suggesting some Victorian Killer Whales occupy home ranges that extend into NSW waters, although the vast majority of sightings are from south of about 36°S. Sighting frequency is unlikely to reflect the species' true abundance and despite frequent records off Victoria and southern NSW, they may be uncommon. There is no evidence to characterise movement patterns but Killer Whales are likely to respond to changes in prey availability, influenced partly by the East Australian Current. Killer Whales have been observed feeding on sharks, sunfish, Humpback Whales and Australian Fur Seals in the region. (*The Victorian Naturalist* 125 (3), 2008, 76-81)

### Introduction

Development of the web-based sightings network 'Auscetnet' in recent years has increased capacity to document casual records of Killer Whales *Orcinus orca* and we find the species is frequently present and a notable component of Victoria's coastal environment.

Auscetnet has been active since 2002 receiving an average 13 records of Killer Whales per year (5–13% of all postings). Almost half of the 66 sightings (28) are from Victorian coastal waters and the rest from the immediately adjacent Sapphire Coast of New South Wales. They include five records of beached animals from Museum Victoria archives (Dixon and Frigo 1994).

Records are presented from between Merimbula, NSW (36° 53'S, 149° 56'E) and Portland, Victoria (38° 21'S, 141° 38'E), a distance of approximately 1000 km. Other records from the Atlas of Victorian Wildlife and the author's own observations bring the total to 161 records since 1933. Auscetnet sightings are submitted to the Southern Oceans Orca Database (Morrice 2006), which comprises approximately 1000 records, although about 62% of these are from Macquarie Island (Morrice *et al.* 2003).

This paper presents graphs and maps showing the locations of sightings and monthly frequency distribution in coastal

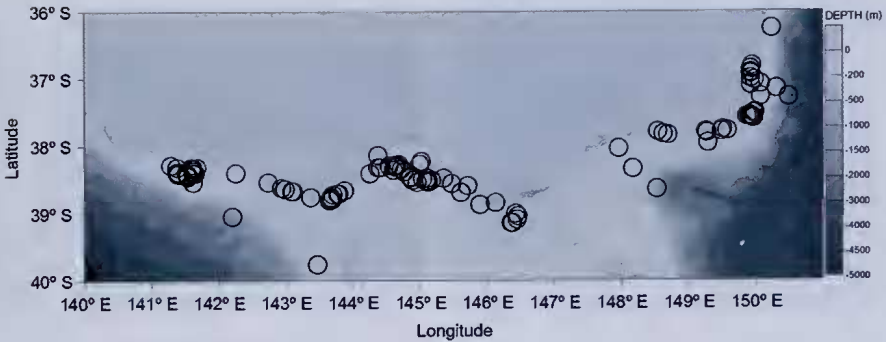
Victoria and immediately adjacent waters of southern New South Wales. Most observations are from land or from vessels within sight of the coast. Mammal taxonomy is referred to Menkhorst (1995) and fish taxonomy to Hutchins and Swainston (1986).

### Sighting Trends

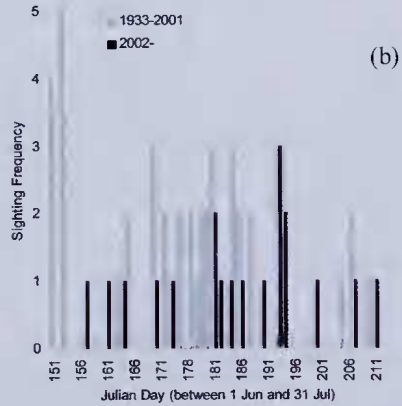
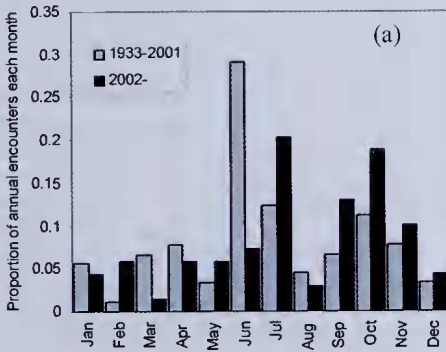
Sightings have occurred along most of the Victorian coast (Fig. 1) with a paucity of records between Wilsons Promontory and Lakes Entrance, most likely due to the poor coastal access and absence of human habitation along Ninety Mile Beach.

Data since 2002 provide the most consistent basis for discussion, as the number of annual reports has varied relatively little (mean 13; range 11–17). In this period, Killer Whales have been recorded throughout the year, though there have been only 1–2 sightings per month between December and May. Peaks in sighting frequency centre on June–July (30% of records) and September–November (42% of records) and there is a distinct lull in sightings in August – since the first observation in 1933, there have been only six records.

Peak sighting frequency since 2002 has been in July, which is similar for earlier records; however, data from 1933–2001 indicates a peak in June (Fig. 2a). Closer inspection (Fig. 2b) shows nine records



**Fig. 1.** Sightings of Killer Whales off southeast Australia. Apart from single records in 1933 and 1966, all other records are since 1970.



**Fig. 2.** Frequency histograms of Killer Whale sightings.

from the first two days in June. Six of these records are from just two separate days: three for 1 June 1951 from Seal Rocks (central Victoria), Cape Nelson and Cape Sir William Grant (western Victoria); and three for 2 June 1988 from Wilsons Promontory. In the latter case, it is likely these were repeat sightings of the same pod. In the former case, the sites are geographically separate so either it is coincidence or, more likely, the precise date was unknown and 1 June is a default, derived from only writing June into an Excel spreadsheet.

Closer inspection of the Atlas of Victorian Wildlife data indicates three similar duplications but none alters the pattern presented as monthly sighting frequency in Fig. 2a. Hence, these data are presented without amendment. Figure 2b is enough

to indicate that Killer Whales are mostly seen in late June and early July indicating that sightings are in decline through late July as well as August.

**Individual resighting**

Killer Whales were reported on 7 July 2005 at Port Phillip Heads, Victoria. One individual, identified by a uniquely disfigured dorsal fin (Fig. 3) has been observed twice off Eden, New South Wales (October 2003; November, 2004); once off Mallacoota in far-east Gippsland (July, 2003); and possibly offshore southeast Australia south of Gabo Island in May 2006 (David Donnelly, observation reported in AES 2007). A record from 1990 (Robert Warneke, *in litt.*) may be the same animal:

29.10.1990, Bushranger Bay, Cape Schanck (38° 20'S, 144° 54'E), pod of about 10. One



**Fig. 3.** Photo of split-fin Killer Whale taken in Eden in October 2003 (left); and at Port Phillip Heads, July 2005 (right). Photos courtesy of Ros Butt, Cat Balou (left) and Kelvin Aitken Photography (right).

of the two larger individuals had a split dorsal with the two halves flopping on either side.

This is the first evidence of a Killer Whale resighting in Australian coastal waters. It indicates that individuals may occupy home ranges that include the coasts of both southern NSW and Victoria. At Port Phillip Heads the animal was observed with a small pod (estimated four individuals) but was with 10–12 individuals off Eden.

#### Pod Size

Mean pod size is significantly greater ( $p < 0.05$ ) in New South Wales compared to Victoria (Table 1) but has a much greater level of variance. On average, pod in New South Wales are observed to be almost twice the size of pods in Victoria.

#### Seasonal Sighting Effort

Since 2002, all sightings from the southern coast of New South Wales have been provided by whale-watching operators or fishing vessels that from time to time, also run whale-watching. This activity occurs daily during the southerly Humpback Whale *Megaptera novaeangliae* migration season between September and December (DEW 2005). This effort-bias could explain the peak in sightings off NSW in spring/early summer. Nevertheless, fishing charter operators out of Eden and Merimbula, many of whom operate whale-watching vessels, are well aware of cetaceans, and report sightings of various species throughout the year.

Reporting frequency off the Victorian coast is not subject to similar bias as there

are no significant whale-watching operations in the state, and monthly sightings for central Victoria, excluding NSW (145–147°E), similarly exhibit peaks in June–July and October–November. A reduction in winter sightings would be expected when the weather is colder and there are fewer people walking on the coast or fishing from recreational boats. There is nevertheless a peak in sighting frequency in mid-winter (June–July), whilst for most of the summer and autumn months (December–May), there are relatively few sightings. If anything, seasonal bias would be expected to reduce the difference between winter and spring/summer, suggesting the relative decline in sightings in late July/August may be even more significant.

#### Conservation Status and Protection

Killer Whales are protected in Victoria from interference, killing or injury by the *Wildlife (Whales) Regulations 1997* (Victoria) in state waters out to three nautical miles offshore. They are also matters of national environmental significance on the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth), which protects them as ‘migratory’ species, pursuant to Australia’s commitments under the *Convention on the Conservation of Migratory Species of Wild Animals*. If there is a ‘real or not remote possibility’ of an impact that would be ‘important or notable’ (the Act’s definition of significant), an environmental assessment would be required, even in Victorian waters. Whether an impact is significant would depend on the

**Table 1.** Comparison of mean pod sizes in Victoria and New South Wales

<i>Student t-test assuming unequal variances</i>					
Location	Mean	Variance	95% confidence	n	P*
New South Wales	5.70	26.40	2.15	22	0.02
Victoria	2.99	5.50	0.47	95	

\*P = two-tail probability of no difference in mean values

intensity of the effect and the status of Killer Whales.

The Killer Whale population of Australia is presumed to be secure (Bannister *et al.* 1996), hence the species is not listed as vulnerable to extinction under Commonwealth legislation. Unfortunately, sighting frequency does not reflect true abundance and, although they are commonly observed (Morrice *et al.* 2003), they may be a relatively uncommon species (Warneke 1995; Ross 2006). Cetaceans have evolved to maintain relatively stable population sizes at or near carrying capacity (Wade 2002), but Warneke (1995) suggests that disastrous depletion of local populations of seals and migratory whales in Australian waters might have indirectly caused a decline in Killer Whales in the 19<sup>th</sup> century. If this is true, we have no way of telling how large the population used to be and to what extent the remaining population could cope with any intense environmental impact.

It is important therefore that sightings continue to be documented so they can contribute to the Southern Oceans Orca Database. Researchers can then keep a watching brief on the situation by better understanding Killer Whale ecology and identifying important conservation objectives (Morrice 2006; Ross 2006).

### Discussion and Conclusion

These data show that casual sightings networks are important, particularly in the case of a charismatic species that occurs at very low-density. Killer Whales are readily identified and popular, so it is not surprising Auscetnet receives a relatively high percentage of postings on this species.

Although the sample is relatively small, there is a consistent pattern of monthly abundance in Victoria evident from Atlas of Victorian Wildlife data pre-2002 and records from Auscetnet since 2002. A similar pattern is also shown by data from the Southern Oceans Orca Database combin-

ing records between 25-50°S (Morrice *et al.* 2003; Morrice 2006). Evidence indicates a predictable seasonal occurrence along Victoria's coastline.

Killer Whales from Victoria almost certainly occupy home ranges that extend into southern NSW, but sightings from northern NSW are rare. There are occasional sightings from Narooma (36°15'S), less frequently Newcastle (33°57'S) and hardly ever from further north, e.g. Coffs Harbour, where there is considerable Humpback Whale-focused whale-watching. Given an average swim speed of about 120 km per day<sup>2</sup> (Fish 2002), the coastline of the study region in Fig. 1 (about 1000 km) could be traversed in just over eight days, so it is possible that Victorian Killer Whales range further both to the east and west. Given the almost year-round sightings and lack of data in central and northern NSW, it is likely that the Killer Whale population found in Victoria mostly ranges south of 36°S.

The record of an individual off central Victoria and southern NSW involved different pod sizes, suggesting a varying association with animals at each location. Pod sizes in Victoria are relatively small compared to southern coastal NSW, and it is possible groups come together to feed or mate in the east of their range. If this resighting is indicative of an overall trend, the number of Killer Whales occupying the Victorian coastline may be a lot smaller than indicated by sighting frequency.

Monthly sighting frequency of Killer Whales is very similar to the pattern of north-south migration of Humpback Whales. Corkeron *et al.* (1999) made a case for evolution of migration in Humpback Whales as a mechanism to avoid predation by Killer Whales but this does not necessarily imply that Killer Whales specifically target migrating Humpback Whales as prey. Killer Whales certainly predate Humpback Whales, par-

ticularly calves on migration, and there have been two documented cases reported to Auscenet off Eden since 2000 as well as various other reported cases, mainly in the Southern Ocean (Naessig *et al.* 2004; Mehta *et al.* 2005; ). We do not know how severe or otherwise such predation may be, other than that such events are no more commonly observed than foraging on other species. For instance, since 2002 Killer Whales have twice been observed feeding on Southern Ocean Sunfish *Mola ramsayi* off Eden NSW and once on a School Shark *Galeorhinus galeus* or Gummy Shark *Mustelus antarcticus* in Port Phillip Bay, Victoria. Almost annually, they are seen in close proximity to Australian Fur Seal *Arctocephalus pusillus doriferus* colonies at Seal Rocks in central Victoria, and they have been observed eating seals off the coast of Eden, NSW.

It is quite likely that seasonal movements of Killer Whales in Victoria are influenced by the East Australian Current (EAC). Anti-cyclonic (warm-core) eddies sweep surface-water offshore, creating coastal upwelling off southern NSW. This is weakest in the winter months and extends furthest south in the spring and summer, when it creates phytoplankton blooms and drives marine surface productivity (Marchesiello *et al.* 2000). This is likely to explain the higher incidence of Killer Whale sightings in southern NSW between September and November. These data cannot provide more clarity on movement patterns and whether this is linked to any particular prey or oceanographic condition, though both are likely.

Killer Whales have been studied extensively in some parts of the world where they exhibit varied social and foraging ecology, and there is a suggestion that these traits may be linked. Groups are roughly divided into *residents* comprising discrete matriarchal groups with little or no immigration/emigration that feed mainly on fish; and *transients* whose offspring mostly disperse but continue to use their natal range and are more likely to exploit marine mammal prey (Baird 2000). There is no clear evidence of localised populations that could be considered 'resident' in Victoria (Warneke 1995).

The data provide evidence for peaks in sightings off Victoria in winter (late June-early July) and spring / early summer (September-November) whilst sightings for the rest of the year are less frequent but the species has been recorded in all months. For reasons unknown, there are very few Killer Whale sightings between late-July and the end of August. Observer effort does not appear to be biasing results in Victoria and, if it did, fewer sightings might be expected between June and July. Explanations could include movement of animals offshore, into waters off South Australia — where they were recorded on average three times per year between 1982 and 1990 (Ling 1991) — or perhaps aggregation into larger groups off southern NSW. Here, sighting bias could affect the pattern of reports. Between June and August there is little whale-watching activity in southern NSW, and larger pods moving into the area at that time of year would mean a lower encounter probability due to dilution effects.

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### Notes

<sup>1</sup>Auscenet is a Yahoo group community listserver established to provide a forum for sharing information on cetaceans around Australia and for discussing cetacean-related issues.  
<http://groups.yahoo.com/group/auscenet>

<sup>2</sup>Low sustained speed is described as 1.8-13.0 kph. A distance of 120 km could be covered by an animal swimming at approximately 5 kph or 2-3 knots.

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## Continent of curiosities: A journey through Australian Natural History

by Danielle Clode

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During her time as the Thomas Ramsay Science and Humanities Fellow, the author of this book chose a dozen specimens from the collection of Museum Victoria and used each of them as a peg on which to hang a discussion about modern biological concepts. As its title implies, the Fellowship, funded by bequest, fosters research and writing across both the sciences and humanities. The twelve chapters in this book are evenly clustered into four time slices: 500 years; 250 000 years, 250 million years and 4.5 billion years. A dia-

grammatic timeline prefaces each section, giving perspective to the chapters which follow.

To give some flavour, but nowhere near the scope: the skin of a Great Pampa Finch, collected by Charles Darwin in Uruguay, introduces a short history of Museum Victoria, its collections and research, and the principles of classification. A bark painting of a kangaroo and baramundi from Western Arnhemland is the key to European discovery and puzzlement over the marsupials of Australia, with