

Observations of Killer Whales, *Orcinus orca*, in Western Alaska: Sightings, Strandings, and Predation on Other Marine Mammals

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Recent observations confirm that Killer Whales (*Orcinus orca*) occur off the coast of western Alaska from at least Bristol Bay to north of Point Barrow. They have been seen in drifting ice in spring and in open water during summer. Three strandings involving 10 animals that occurred in 1982–1984 in the area from Nunivak Island to Norton Sound are described. Observations of Killer Whales chasing a Minke Whale (*Balaenoptera acutorostrata*) aground in Unalaska Bay, and of Killer Whales eating a Gray Whale (*Eschrichtius robustus*) in the Chukchi Sea are reported. The marine mammal prey of Killer Whales in the area include Gray Whales, Minke Whales, Walruses (*Odobenus rosmarus*), Beluga Whales (*Delphinapterus leucas*), and seals (Phocidae).

Key Words: Killer Whales, *Orcinus orca*, distribution, predation, strandings, Minke Whale, *Balaenoptera acutorostrata*, Gray Whale, *Eschrichtius robustus*, Walrus, *Odobenus rosmarus*, seals, Phocidae, Beluga Whale, *Delphinapterus leucas*.

Killer Whales, *Orcinus orca*, are one of the most widely distributed toothed whales, being found in all oceans and major seas (Dahlheim 1981). In some regions they have been comparatively well-studied, due either to their proximity to population centers (e.g. in Puget Sound, Washington) or to their importance in commercial harvests (e.g. off Japan and Norway, and in Antarctic waters). There are few published data available on Killer Whales in Alaskan waters, with the exception of some information on distribution and abundance in the Gulf of Alaska and Bering Sea (summarized in Braham and Dahlheim 1982; Leatherwood et al. 1983a, b). In this paper we report recent observations of Killer Whales in the Bering and Chukchi seas.

Methods

Our information on Killer Whales comes from two principal sources. The first are sightings made by the authors and other researchers during various shipboard and aerial studies of marine mammals. During these studies it has been common practice to record all observations of marine mammals and to deviate from scheduled activities, when necessary, in order to investigate particularly significant or unusual events. Our second source is a network of informants who live and work along the coast of the eastern Bering and Chukchi seas. These informants, consisting mostly of biologists, fishermen, and subsistence hunters, commonly report observations of marine mammals on standardized sighting cards which we have distributed, or by contacting local offices of the Alaska Department of Fish and Game.

Whenever possible, significant reports are investigated and confirmed. Killer Whales are generally conspicuous and easy to identify. Their appearance is distinct from that of other similar-sized cetaceans occurring north of the Aleutian Islands, and we therefore consider our sightings to be very reliable.

Where possible, ages of stranded animals were determined by counts of dentinal annuli, which were done by personnel at the National Marine Mammal Laboratory, Seattle, Washington.

Results

Sightings

Sightings of Killer Whales occurred in four general areas: the ice front and ice remnants of the Bering Sea; inner Bristol Bay; Bering Strait; and the Chukchi Sea (Figure 1).

In spring 1976–1979 we participated in seven research cruises investigating the ecology of ice-associated pinnipeds in the Bering Sea. On those cruises, other than occasional sightings near Unimak pass, we never sighted Killer Whales in open water south of the pack ice. On five occasions whales were seen in the ice (Table 1), generally within 10 km of open water in ice coverage ranging from 3 to 7 octas [or eighths]. Group sizes ranged from 1–12 animals. One additional sighting of 4–5 whales about 5 km south of the ice edge was made on 2 June 1985.

All other Killer Whale sightings were made during the open-water season: two sightings in inner Bristol Bay, two near Bering Strait, and four in the Chukchi Sea (Table 1). The largest was a group of about 20 seen in August 1976 just south of Bering Strait. The group

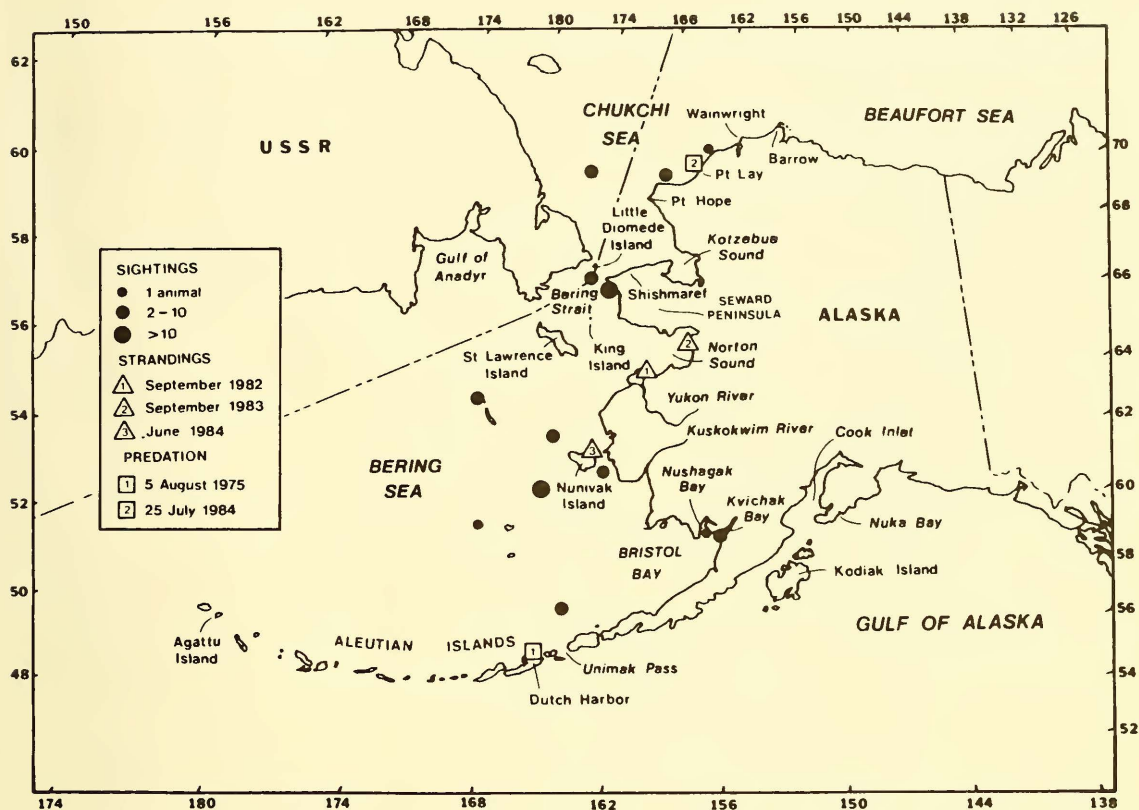


FIGURE 1. Map of Alaska showing the locations of sightings, strandings, and observations of predation by Killer Whales in the eastern Bering and Chukchi seas.

of six sighted on 26 July 1984 in the Chukchi Sea included at least one of the same animals seen on the previous day, a large male with a broad, shallow notch in the lower portion of the posterior edge of the dorsal fin. That animal had moved a minimum of 124 km in 17 hours.

Strandings

The best documented recent stranding occurred in early September 1982 at one of the northern mouths of the Yukon River near the village of Kotlik (Figure 1). We were notified of the stranding on 13 September, but inclement weather prevented us from investigating it directly. A resident of Kotlik, Mr. Joseph Mike, visited the site twice in September and provided the following detailed description.

On 10 September, two dead female Killer Whales were located just inside an unnamed slough which connects the Kvichavuk River to Pastol Bay. Two

other whales (presumably also dead and reported to be males) were grounded about 2 km offshore in a shallow portion of Pastol Bay. The females were examined for wounds but none were found. The other whales could not be reached. On 23 September the females had been moved by the tide to locations farther up the slough. The other two whales could not be located. One of them was later sighted about 11 km to the east. The females were measured and photographed, and teeth were extracted. The overall lengths and ages were 5.9 m and 18-20 years old, and 6.3 m and 17 years old, respectively. The fact that there was no evident cause of death puzzled our informant, since "there was enough water in the slough to keep them alive." Mr. Mike also stated that this was the first report of Killer Whales found dead along the Yukon Delta and that Killer Whales have been seen rarely in the vicinity of the Yukon River but never before in Pastol Bay.

TABLE 1. Sightings of Killer Whales in the eastern Bering Sea, Bristol Bay, and Chukchi Sea 1976-1984.

Date	Local Time	Location	Total No. of Whales	Setting	Comments
21 March 1976	0620	Bering Sea Ice Front 55°33'N 166°41'W	2	3 octa ice; small, loose floes	female with very small calf
17 April 1976	0755	Bering Sea Ice Front 57°09.4'N 172°08.1'W	1	in small polynya (300 × 200 m) in 7 octa ice	male
26 March 1977	0715	Bering Sea Ice Front 58°27.9'N 169°29.1'W	12	in polynya, swimming north and into the ice	1 large male, 3 small animals
24 May 1977	1400	Bering Sea Ice Remnant 60°31.5'N 174°21.9'W	2	in 4 octa ice	
29 May 1977	1515	Bering Sea Ice Remnant 60°25.9'N 168°56.3'W	9-11	moving through 3 octa ice	3 large males and 6-8 medium-sized animals
2 June 1985		Bering Sea Ice Remnant 59°58'N 164°55'W	4-5	about 5 km south of ice edge	
24-30 June 1981		Bristol Bay-Nushagak Bay 58°38'N 158°22'W	1	open water	sighted 4 times, apparently feeding on salmon
22 May 1984		Bristol Bay-Kvichak Bay 58°32'N 157°44'W	8	open water	2 large males and 6 medium-sized animals
21 August 1976	1310-1520	Bering Strait 65°38'N 168°15'W	±20	open water	sighted several times, at least 3 large males and 3 calves in the group
20 August 1983	1400	Bering Strait 65°46'N 169°59'W	2	open water	2 males
25 August 1976	1125	Chukchi Sea 68°18.2'N 172°32'W	3	open water	1 male, 2 medium-sized animals
11 July 1981	1919	Chukchi Sea 70°07'N 162°32'W	1	open water	about 50 m offshore from barrier islands
25 July 1984	1930-2100	Chukchi Sea 69°28.9'N 163°35.7'W	8	open water	3 large males, 5 small to medium-sized animals
26 July 1984	1400	Chukchi Sea 68°54'N 166°12.9'W	6	open water	3 large males, 3 small to medium-sized animals

In mid-September 1983, we received a report of a Killer Whale beached near Shaktoolik, about 8 km south of the old village site. The whale, examined by Mr. Clarence Katchatag of Shaktoolik, was reported to be a male, 10 m long with a dorsal fin 1.4 m high. A tooth was obtained from which a minimum age of 14 years was determined. Unfortunately, we were not able to verify the reported length of the whale or the manner in which it was determined.

On 12 June 1984 the Alaska Department of Fish and Game office in Bethel was notified of a group of Killer Whales stranded on Nunivak Island. Some details of the stranding were made available to us by

residents of Mekoryuk, particularly Mr. Jack Williams. The stranding occurred near the north end of the island on a gently sloping sand beach bordered by rocky points. The whales were first found on the beach in early to mid-May after the sea ice had moved away from shore. At that time, four small animals, arranged parallel to one another pointing shoreward, were all alive. A larger animal lay dead slightly to the seaward of the others, parallel to the beach and perpendicular to the other four whales. Later in the month, the small animals were also dead. According to residents, it is not unusual to see Killer Whales near Nunivak; however, the stranding was a very rare occurrence.

Predation on marine mammals

At approximately 1400 h on 5 August 1975 RRN saw a pod of seven Killer Whales chasing a Minke Whale (*Balaenoptera acutorostrata*) in the waters bordering the west side of Amaknak Island, near Dutch Harbor (Figure 1). The Minke Whale was traveling rapidly along the beach in a southerly direction inshore of the kelp beds. The Killer Whales were rapidly swimming in the same direction, parallel to the beach on the outside of the kelp. The Minke Whale ran aground on one of the numerous shoals that extend seaward from the beach where the incident took place. At this time, a large male Killer Whale swam shoreward through the kelp bed and approached to within approximately 10 m of the stranded Minke before turning around and heading back into deeper water. After about five minutes the Minke Whale dislodged itself and moved briefly into deeper water. It then swam forcefully onto the adjacent gravel beach and lay rather passively in approximately 0.5 m of water. The Killer Whales circled offshore for approximately 15 minutes before leaving the area.

Attempts by local residents to direct the Minke back to sea were unsuccessful as the whale repeatedly beached itself. The whale was later examined and measured and found to be a 7.3 m long female, apparently in good physical condition. Although there were numerous superficial cuts in the skin which were probably caused by barnacles, there were no obvious marks on any portion of the Minke Whale's torso that could be attributed to Killer Whales. Blubber was 5 cm thick and the stomach contained approximately 100 liters of mostly digested walleye pollock (*Theragra chalcogramma*).

At 1930 h on 25 July 1984 in the northeastern Chukchi Sea (Figure 1) RRN and LFL saw a group of eight Killer Whales at a distance of about 3 km. As the ship approached, we saw numerous rolls and blows of Killer Whales as well as occasional low spouts not accompanied by a back or fin. As we neared the center of activity at approximately 1940 h, we could see a slick on the water and the dorsal surface of a dead Gray Whale (*Eschrichtius robustus*) amid the group of Killer Whales. This group consisted of three large males and five small to medium-sized animals. For the following 60 minutes we watched as the Killer Whales fed on the Gray Whale carcass. The Killer Whales were spread out over an area about 1 km in diameter. One to three whales at a time approached the carcass at high speed, grasped it in their mouths, and attempted to tear off pieces of hide and blubber. Approximately 12 such "attacks" were seen. On four instances one or two whales grasped the carcass and took it below the surface for 40 to 120 seconds. Once,

the Gray Whale reappeared tail first, the flukes rising 2-3 m above the surface as if it were being pushed from below. During the period of our observations, most of the feeding was done by the small and medium-sized animals.

We later examined the Gray Whale, which was a female approximately 7 m long. There were numerous shallow lacerations and tooth marks on the flukes and peduncle, but the only obvious major damage was in the anterior region. All tissue was removed from the mandible and a large section of hide and blubber had been torn from the thorax, exposing some muscle and blood. The tongue and several small sections of hide and blubber from the maxillary region were missing. The blubber in the ventral region was 10 cm thick. The stomach contained a small quantity of recently eaten benthic crustaceans.

Our third observation is less direct. During the early afternoon of 20 August 1983, while on board the Soviet Research Vessel *Zykova*, RRN sighted two male Killer Whales in the vicinity of Bering Strait. Shortly afterwards, less than three miles to the south, we encountered a dead Gray Whale and a dead Walrus (*Odobenus rosmarus*) floating about 300 m apart. Blood and oil were evident in the water surrounding the Gray Whale carcass. It was not possible to examine the carcass closely, although some lacerations and probable tooth marks were visible. The Walrus carcass was intact and no tooth marks were seen on it, but large contusions were evident.

Discussion

The observations reported here, in combination with other anecdotal information and the published literature, confirm that Killer Whales are not uncommon in the eastern Bering and Chukchi seas. Previous reports (e.g. Braham and Dahlheim 1982; Leatherwood et al. 1983b) indicate the species is widely distributed in the southern Bering Sea with a notable concentration in the eastern Aleutians-Unimak Pass area (Murie 1959). Previous sightings have been principally in open water. Our observations confirm the presence of Killer Whales in the seasonal ice front and ice remnants, as well, during March-May. Such ice habitats support large numbers of ice-associated seals (Phocidae) and Pacific Walruses, *Odobenus rosmarus* (Burns 1970).

Killer Whales do not appear to be common in inner Bristol Bay. During late spring and summer this is an area of great activity associated with intensive fisheries for herring (*Clupea harengus*) and salmon (*Oncorhynchus* spp.), and at least during these times of year, it is much more thoroughly covered by capable observers than areas farther north. We saw no

Killer Whales in the area during two summers of researching the distribution and movements of Beluga Whales (*Delphinapterus leucas*) which are abundant there (see Frost et al. 1984). None were seen on any of 12 extensive aerial surveys for marine mammals we conducted in Bristol Bay from April 1980 to May 1981. Likewise, the data bases summarized by Braham and Dahlheim (1982) and Leatherwood et al. (1983b) included few sightings in Bristol Bay and those were mostly in the southwestern portion.

In the northern Bering Sea Killer Whales are sometimes seen by people on St. Lawrence Island, King Island, and Little Diomed Island (Frost et al. 1983a; Don Ljungblad, personal communication). In the eastern Chukchi Sea they are regularly seen along the coast during summer by residents of Shishmaref, Point Hope, and Wainwright and have also been sighted in Kotzebue Sound and near Point Lay and Barrow (Frost et al. 1983b). Ivashin and Votrogov (1981) have summarized recent Soviet records from the northern Bering and Chukchi seas. They consider Killer Whales widely distributed but "relatively scarce" in coastal waters. In the western Beaufort Sea two sightings of Killer Whales were made near the ice margin in September 1974, and a single animal was seen in loose ice at 72°28.5'N 156°06.7'W on 17 September 1982 (John J. Burns, personal communication). The latter is the most northerly sighting of which we are aware. The only apparent record of Killer Whales in the central or eastern Beaufort Sea is of two animals sighted in Liverpool Bay on 2 August 1962 (David Patriguin, personal communication).

Local residents considered the three recent strandings of Killer Whales in the eastern Bering Sea very unusual. The appearance on shore of 10 animals in a three-year period is unusual in our experience as well. We know of only four other records of Killer Whales stranded on the coast of western Alaska. The carcass of an 8.3 m long whale washed ashore on a beach near Nome in 1936 (Stephen Leatherwood, personal communication). Murie (1959) found a carcass on Agattu Island but reported no other details. A Killer Whale carcass was seen on the north side of the Seward Peninsula on 29 July 1980 (Dan Stewart, personal communication). The fourth record was of a large Killer Whale stranded on a sand bar in central Kvichak Bay in summer 1982 (Roy DeHart, personal communication). The whale was seen alive at low tide and was not observed again, so we do not know whether or not it survived. In the Cook Inlet region only two Killer Whale strandings were recorded during the period 1940-1979 (Francis H. Fay unpublished).

Killer Whale strandings have also been recorded in

other areas. Strandings appear to be relatively uncommon in the North Atlantic (Brown 1975; Sergeant 1979) and the temperate and tropical eastern Pacific (Dahlheim et al. 1982) but are more frequent near New Zealand (Sergeant 1982).

We have no information on the causes of recent strandings in the Bering Sea, and since our informants were native hunters who are excellent observers of their natural surroundings, we assume that the animals were not obviously wounded or injured. Heavy ice drifting into a bay was the cause of a stranding in Newfoundland in 1957 (Dearden 1958) and may have been a factor at Nunivak since the whales were discovered shortly after sea ice had left the area. The nature of the relationship between the abundance of a species and the rate of stranding is unclear (Brown 1975; Sergeant 1979). Nevertheless, our records suggest that the abundance or rate of occurrence of Killer Whales in the Nunivak Island-Norton Sound region may have increased in recent years.

Although we could not verify that Killer Whales had actually killed the animal they were with when we located them, there can be little doubt that in the Bering and Chukchi seas Killer Whales sometimes prey on other marine mammals. Gray Whales, in particular, are very abundant in the region in late spring and summer and are killed and eaten (Tomilin 1957). Instances of Killer Whales chasing and attacking Gray Whales have been reported to us by residents of Little Diomed, Point Hope, and Wainwright. Our observation in the Chukchi Sea corresponded closely to a similar event off the coast of California (Baldrige 1972), and in many ways appeared to be the conclusion of a chase sequence witnessed by Ljungblad and Moore (1983) in the northern Bering Sea in May 1981. Minke Whales are also attacked and eaten. Researchers witnessed the killing of a Minke Whale by a group of six Killer Whales in the northern Gulf of Alaska on 29 April 1976 (Anonymous 1978). Our observations of the incident near Dutch Harbor and those of Hancock (1965) suggest that Killer Whales may sometimes take advantage of coastal features such as small bays when hunting fast-swimming species such as Minke Whales.

Walrus, both adults and calves, are sometimes killed by Killer Whales (Tomilin 1957; Fay 1982). Eskimos from King Island and Little Diomed Island have reported to us that Killer Whales are often seen "harassing" groups of Walrus during summer. Although there is no doubt that Killer Whales sometimes eat Walrus (Tomilin 1957), all the carcasses of Walrus that have been examined and diagnosed as killed by Killer Whales have been virtually intact (Fay 1982; Lloyd F. Lowry

unpublished). Don Ljungblad (personal communication) saw a Killer Whale near St. Lawrence Island run into a Walrus at high speed. A large amount of blood immediately appeared in the water but the Killer Whale did not change course or slow down. Killer Whales have access to Walruses both in the pack ice of the Bering and Chukchi seas, and near coastal haulouts in Alaska and Siberia.

We know of only one record of beach-cast remains of a Beluga killed by Killer Whales. An Eskimo hunter from St. Lawrence Island found an adult Beluga on 7 November 1967 which he said had been killed by a Killer Whale (Francis H. Fay, personal communication). Tomilin (1957) describes one observation in which Belugas were "torn to pieces" by a group of Killer Whales and a similar encounter was described in Kleinenberg et al. (1964). On 15 July 1979, a single Killer Whale chased a group of Belugas and killed a calf about 100 m offshore near the village of Point Lay (Glenn Seaman, personal communication). John J. Burns (personal communication) has received several reports from residents of Kotzebue Sound who have seen Killer Whales chasing, and on occasion, capturing Belugas.

There are few records of predation by Killer Whales on seals in the Bering and Chukchi seas. Tomilin (1957) reported that 60 claws from Bearded Seals (*Erignathus barbatus*) were found in the stomachs of two Killer Whales taken in the Gulf of Anadyr, and seal whiskers were found in the stomach of the whale that washed ashore near Nome in 1936 (Stephen Leatherwood, personal communication). Bearded Seals and other species such as Ringed (*Phoca hispida*), Ribbon (*P. fasciata*), and Spotted (*P. largha*) seals are seasonally abundant in the area and may be included in the diet of Killer Whales.

Conclusions

Our observations confirm that Killer Whales occur all along the coast of western Alaska from at least Bristol Bay to north of Point Barrow. Available data are not adequate to determine the number of individuals or pods utilizing the area. These animals appear to range widely and those which summer north of Bering Strait undoubtedly move long distances in order to winter south of the heavy ice pack which covers the northern Bering Sea. They do not, however, avoid ice entirely and may be relatively common in the ice fringe and front during spring.

Three strandings, involving 10 animals, occurred in the area between Norton Sound and Nunivak Island from 1982 to 1984. These occurrences were unusual, and the causative factors are unknown.

Other marine mammals form a portion of the diet of Killer Whales in the Bering and Chukchi seas.

Documented marine mammal prey species are Gray Whales, Minke Whales, Walruses, Beluga Whales, and seals.

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