

Status of the False Killer Whale, *Pseudorca crassidens*, in Canada*

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The False Killer Whale, *Pseudorca crassidens*, occurs at the northern limit of its range and is rare in Canadian waters. There are 23 confirmed records, totalling 10 occurrences from British Columbia, but none are reported from the east coast of Canada. General biology, world-wide status and management are reviewed. Little information is available on stocks or population estimates, but the species is not uncommon world-wide. The False Killer Whale is taken in small numbers in whaling and incidentally in fisheries. Strandings occur frequently and may significantly affect the levels of local populations. The effects of long-term degradation of its environment and subsequent impact on its populations are potentially serious and should be monitored.

Le Pseudorque, *Pseudorca crassidens*, est rare dans les eaux canadiennes, la limite septentrionale de son aire de répartition. Il existe 23 rapports confirmés d'observation, dont dix provenant de la Colombie-Britannique, mais la présence de cette espèce n'a pas été signalée dans l'est du Canada. Ce document parle sur sa biologie générale, son statut et sa gestion à l'échelle internationale. Malgré le manque de données sur la taille des stocks ou des populations, on sait que le Pseudorque est assez répandu dans le monde. Il n'est capturé qu'en petit nombre à l'occasion de chasses à la baleine ou accidentellement dans les pêcheries. Cet animal s'échoue fréquemment, et ce phénomène pourrait contribuer au déclin des populations locales. Les effets de la dégradation à long terme de son environnement et les répercussions sur ses populations pourraient être graves et doivent faire l'objet d'une surveillance.

Key Words: False Killer Whale, Pseudorque, *Pseudorca crassidens*, Canada, status, cetacean, North Pacific.

Relatively little is known about the general biology or world-wide status of the False Killer Whale, *Pseudorca crassidens* (Owen 1846), especially in comparison to a variety of larger commercially valuable cetaceans [eg. Humpback Whale, *Megaptera novaeangliae*, and Right Whale, *Eubalaena glacialis* (Gaskin 1987; Whitehead 1987)] or to several relatively accessible species of coastal odontocetes [eg. Killer Whale, *Orcinus orca*, and Bottlenose Dolphin, *Tursiops truncatus* (Shane et al. 1986; Bigg et al. 1987)]. This paper reviews the current state of knowledge of this species world-wide, with special reference to its status and management in Canada. As much of the information on False Killer Whales is anecdotal and widely scattered throughout the published literature, we attempt to review and summarize as many relevant references as possible.

False Killer Whales are toothed whales that attain maximum recorded lengths of 6.1 m for males and 5.06 m for females (Leatherwood and Reeves 1983; Perrin and Reilly 1984). They are slender in build and slightly compressed laterally anterior to the dorsal fin, becoming progressively more compressed caudally (Reinhardt 1866; Ross 1984). The head is rounded and relatively small, with no demarcation between the head and beak (Leatherwood et al. 1982; Figure 1). The dorsal fin

is tall, falcate, and positioned slightly behind the midpoint of the back (Leatherwood et al. 1982; Figure 2). A broad hump on the anterior edge of the pectoral flipper near the middle is diagnostic for the species (Leatherwood et al. 1982). The body colour ranges from dark gray to black with a blaze of light gray on the ventral surface between the flippers and occasionally an area of light grey on the sides of the head (Fraser 1936; Tomilin 1957; Leatherwood and Reeves 1983). In males the tip of the upper jaw overhangs that of the lower jaw (Mead 1975). There are typically 8 to 10 large conical teeth in each jaw (Reinhardt 1866; Fraser 1936). Maximum weight is at least 1360 kg (Leatherwood et al. 1982).

Distribution

False Killer Whales are generally confined to tropical and temperate waters throughout the world, although they occasionally stray to higher latitudes (Purves and Pilleri 1978). In the eastern Pacific they have been reported along coastlines from Alaska to the Galapagos Islands and Peru, and from the Hawaiian Islands (Mitchell 1965; Leatherwood et al. 1982; Tomich 1986; Baird et al. 1989). In the western Pacific they have been reported from Japan and the South and East China Seas, to Australia, Tasmania and New Zealand

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FIGURE 1. False Killer Whale stranded alive at Ucluelet, B.C. 28 July 1987. Photo by Mark Hobson.

(Flower 1865; Hershkovitz 1966; Leatherwood and Reeves 1983). In the western Atlantic they have been reported from North Carolina south to the Strait of Magellan (Miller 1920; Brimley 1937; Hershkovitz 1966; Caldwell et al. 1971; CETAP 1982; Goodall and Schiavini 1989). In the eastern Atlantic they have been reported from Britain, Denmark, Holland, and the North Sea south to Portugal and South Africa (Reinhardt 1866; Fraser 1936). False Killer Whales are also found throughout the Indian Ocean and the Mediterranean (Mitchell 1975a; Leatherwood et al. *in press*).

Off British Columbia, their presence has been confirmed by 23 records, all since 1987, and all of single individuals (Table 1; Figure 3; Baird et al. 1989). Three of these records represent strandings. Fourteen of the records were sightings in Barkley Sound on the west coast of Vancouver Island in 1989 and were most likely of the same individual (Barry et al. 1989). There have been several other reports of a single False Killer Whale in Barkley Sound, but details are insufficient to positively confirm species identity. There is one record from Prince William Sound, Alaska (Martin in Leatherwood et al. 1982), and two records from Washington State (Scheffer and Slipp 1948; Osborne et al. 1988). There are no confirmed records from the east coast of Canada. A record cited by some authors from Davis Strait, off Baffin Island, is unsubstantiated (Miller 1920). The

scarcity of records in Canada and the increasing frequency of records progressively southward suggest that False Killer Whales are at the northernmost limit of their range in Canadian waters.

Protection *International*

Regulation of international trade between members and non-members of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has been established by listing the False Killer Whale under Appendix II of the Convention (*see* Birnie 1982). The International Whaling Commission (IWC) regulates the taking of whales in accordance with the current Schedule provisions, but whether this Commission's mandate covers the False Killer Whale is unclear, as members of the Commission are divided as to whether "whale" refers to all cetaceans, or only to some species (Klinowska 1987).

National

Canada: The 1982 Cetacean Protection Regulations of the Fisheries Act of Canada of 1867 (as amended to date) provide protection for this and other species of cetaceans from all but aboriginal hunting. "Hunting" is defined as "to chase, shoot at, harpoon, take, kill, attempt to take or kill, or to harass cetaceans in any manner", and can only be undertaken under licence.



FIGURE 2. False Killer Whales in Puget Sound, Washington, May 1987. Photo by John Calambokidis.

United States: In the United States all cetaceans are protected under the Marine Mammal Protection Act of 1972, as well as under the Packwood-Magnuson Amendment of the Fisheries and Conservation Act and the Pelly Amendment of the Fisherman's Protective Act.

Population Sizes and Trends

No estimates of numbers exist. Ross (1984) notes that the possible existence of morphologically distinct populations has not been established, owing to a lack of knowledge of the expected degree of variation within a population. Purves and Pilleri (1978) examined skeletons from 99 individuals from a single stranding in the British Isles, and noted a large proportion of atavistic characters. They concluded that the latter were of genetic origin and gave support to the notion that whole schools could be closely related or possibly even a single family. Off Japan, the gross annual reproductive rate was calculated at 5% to 6% (Kasuya 1985), close to the mortality rate of some well-analyzed delphinids, suggesting that populations may not be increasing (Kasuya and Marsh 1984).

The numbers of animals in schools that have stranded are normally very large, ranging from 50 to 835 animals (mean of 180, $n = 14$) [Ross 1984]. The size of schools observed at sea is typically

small, usually fewer than 20 to 50 animals (Ross 1984), leading some researchers to suggest that when a mass stranding occurs, several schools have joined together for some reason (Ross 1984). Some larger herds with numbers estimated between 600 and 700 individuals have been seen in the eastern tropical Pacific (Miller and Odell *in press*). From 157 sightings in the eastern tropical Pacific of fewer than 100 animals, mean group size was 18 individuals, with a range of 1 to 89 (Miller and Odell *in press*). Tomilin (1957) suggests that judging by the size of the stranded schools, False Killer Whales are a species of considerable abundance.

Ross (1984) suggests that because False Killer Whales are conspicuous at sea and will often approach boats, sight records could be a fairly good estimator of actual population distributions and densities. However, considering the lack of experienced observers and comprehensive sighting surveys, and the difficulties in distinguishing between False Killer Whales and similar-appearing species such as Pilot Whales (*Globicephala* sp.), it is probable that False Killer Whales are more common than reported.

It appears that False Killer Whales are at the limit of their distribution in Canadian waters and therefore have always been rare. Present population trends are unknown due to the scarcity

TABLE 1. False Killer Whale records from Canada. All records are of single individuals.

Date	Location	Type ^a	Source ^b
03 May 1987	49°27'N, 124°41'W	1	1
22 June 1987	50°35'N, 126°52'W	2	1
28 July 1987	48°58'N, 125°33'W	3	1
06 June 1988	50°34'N, 126°50'W	2	2
08 July 1988	48°57'N, 125°19'W	2	2
21 July 1988	48°59'N, 125°19'W	2	2
29 September 1988	48°59'N, 125°19'W	2	2
16 April 1989 ^c	49°00'N, 125°00'W	2	2
21 June 1989 ^c	48°57'N, 125°05'W	2	2
30 June 1989 ^c	48°54'N, 125°06'W	2	2
20 July 1989 ^c	48°57'N, 125°02'W	2	2
22 July 1989 ^c	48°59'N, 124°59'W	2	2
28 July 1989 ^c	49°00'N, 125°03'W	2	3
29 July 1989 ^c	49°00'N, 125°03'W	2	3
01 August 1989 ^c	49°00'N, 125°03'W	2	3
05 August 1989 ^c	48°57'N, 125°05'W	2	2
03 September 1989 ^c	49°04'N, 124°52'W	2	2
04 September 1989 ^c	49°04'N, 124°52'W	2	2
09 September 1989	49°15'N, 126°05'W	2	2
16 September 1989 ^c	49°04'N, 124°52'W	2	2
17 September 1989 ^c	49°04'N, 124°52'W	2	2
30 September 1989	49°10'N, 126°00'W	4	4
17 October 1989 ^c	49°00'N, 125°00'W	2	2

^aType: 1. Stranding, dead; 2. Sighting; 3. Live stranding, returned to water; 4. Live stranding, died.

^bSource: 1. Baird et al. 1989; 2. British Columbia Marine Mammal Sighting Program — Stacey and Baird, unpublished data; 3. Barry et al. 1989; 4. Langelier et al. 1990.

^cThese records are likely repeat sightings of the same individual seen in the same general area.

of reported sightings and lack of distributional surveys.

Habitat

False Killer Whales are found most often offshore, although there are occasional records from inshore waters (Fraser 1936; Scheffer and Slipp 1948; Tomilin 1957; Lindsay 1964; Osborne et al. 1988; Baird et al. 1989). They are reported to frequent waters deeper than 30 fathoms in the northeastern Gulf of Mexico (Brown et al. 1966). Little information is available on the water temperatures of the False Killer Whale's habitat. They frequent both tropical and temperate waters with a wide range of temperatures. Sea surface temperatures at the time of the British Columbia records ranged from 9°C to > 20°C (Baird et al. *unpublished data*). The offshore habitat of the False Killer Whale is generally less susceptible to human impact and degradation than are coastal areas.

General Biology

Reproduction

Information on reproduction has largely been gained from analysis of specimens obtained from strandings or from fisheries data. The sex ratio is approximately equal in stranded schools (Ross

1984). As False Killer Whales are sexually dimorphic, and thus presumably polygynous (Ralls 1977; Connor and Norris 1982), male parental investment is expected to be relatively low (Marsh and Kasuya 1986). Age of sexual maturity in both sexes has been estimated by Purves and Pilleri (1978) to be between eight and 14 years at body lengths of 3.6 m or more in females (Tomilin 1957; Purves and Pilleri 1978). Estimates of the length of calving seasons range from several months to year-round (Ross 1984; Miller and Odell *in press*). Estimates of gestation range from 15.5 to 15.7 months (Purves and Pilleri 1978; Kasuya 1985). Length at birth ranges from about 1.5 m to 2.1 m (Leatherwood et al. 1976). Lactation has been estimated to last between 18 months and two years (Purves and Pilleri 1978; Perrin and Reilly 1984).

Longevity has not been determined. However, several of the oldest individuals reported have had up to 26 growth layer groups in the dentine (Purves and Pilleri 1978; Baird et al. 1989). In these cases the pulp cavities of the teeth were completely occluded, restricting further dentine deposition and making maximum age determination using this technique impossible. Marsh and Kasuya (1986) recorded individuals greater than 41 years of age, taken in the Japanese drive fishery, using

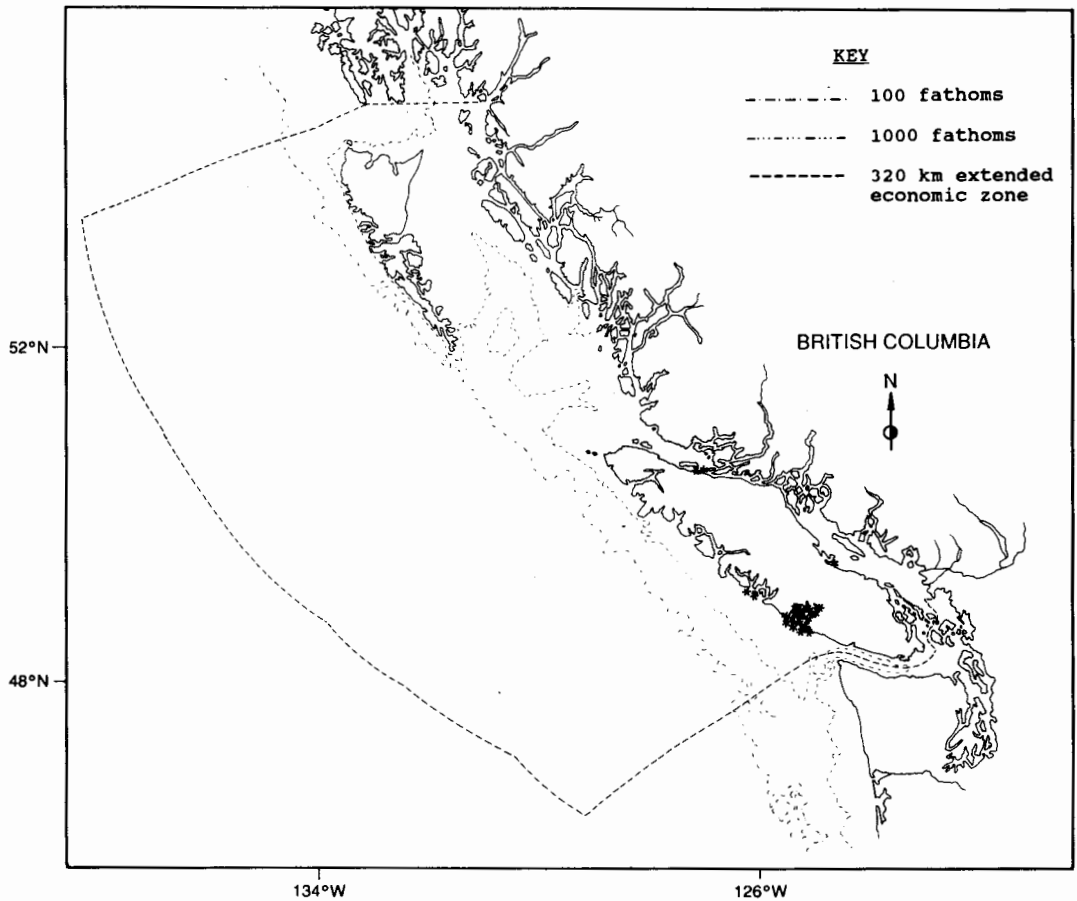


FIGURE 3. Known records of the False Killer Whale in Canada. See Table I for details of records. There are no records off the Canadian east coast.

growth layer groups in the cementum to age them. None of the 12 females greater than 41 years of age were pregnant, suggesting that reproductive senescence may occur in this species.

False Killer Whales are held in several aquaria around the world and have bred in captivity, producing both pure bred animals and hybrids with Bottlenose Dolphins (Nishiwaki and Tobayama 1982; Leatherwood et al. 1989).

Species Movement

Miller and Odell (*in press*) report that migrations have not been documented. Tomilin (1957) suggests that inshore movements are occasionally associated with those of squid. He also reported a school of False Killer Whales that followed a ship from Brazil to the English Channel. If such movements do occur, it is unlikely that distinct stocks within particular ocean basins exist.

Behaviour

False Killer Whales frequently strand in large numbers (Caldwell et al. 1970; Odell et al. 1980; Nicol 1986). High sociability is suggested by the large numbers and mixed age and sex classes found in strandings (Sergeant 1982). Strong social bonds are also evident, as in the description of a False Killer Whale stranding by Porter (1977) where a large injured male was supported for three days by 15 others in a shallow bay, until he died. Food sharing in the wild has also been observed (Connor and Norris 1982).

In captivity False Killer Whales are more easily tamed and trained than many other species of cetaceans, and are extremely adept at learning by observation (Brown et al. 1966). Research on False Killer Whale acoustical behaviour has been conducted on animals in captivity (Mizue et al. 1969; Kamminga and van Velden 1987; Thomas et al. 1988).

Only anecdotal observations have been reported of the reactions of False Killer Whales to vessels. False Killer Whales will often approach and ride the bow- or stern-waves of boats, the only "blackfish" to regularly do so (Brown et al. 1966; Leatherwood et al. 1976; Ross 1984). In the Gulf of Mexico, False Killer Whales have been reported to be wary of boats (Brown et al. 1966).

False Killer Whales appear to be opportunistic feeders, consuming a large size range and wide variety of prey, including the squids *Oregoniateuthis* sp., *Todarodes* sp., and *Phasmatopsis* sp., and fish species such as Bonito (*Sarda* sp.), Mahimahi (*Coryphaena hippurus*), Yellowtail (*Pseudosciaena* spp.), Perch (*Lateolabrax japonicus*), Salmon (*Oncorhynchus* sp.), and mackerel (Scombridae) [Tsutsumi et al. 1961; Brown et al. 1966; Connor and Norris 1982; Ross 1984; Kasuya 1985; Baird et al. 1989]. In the eastern tropical Pacific they have been reported preying on smaller dolphins (*Stenella* spp. and *Delphinus delphis*) (Perryman and Foster 1980). These observations were made both while the smaller dolphins were free swimming prior to their capture in tuna purse-seine nets and during their release. According to Hoyt (1983) there is at least one record of predation on a Humpback Whale calf.

Some speculation exists as to whether the numerous tooth rakes observed on Humpback Whales can be attributed entirely to Killer Whales. False Killer Whales are more abundant than Killer Whales in the Humpback's Hawaiian wintering grounds (Tomich 1986) and may be responsible for some of the attacks. Apparently, non-aggressive interspecific associations are rare, but Tsutsumi et al. (1961) have noted that associations with Bottlenose Dolphins occur during the winter off Japan. Sergeant (1969) calculated a mean daily feeding rate of a captive animal as 4.7% of the total body weight.

Limiting Factors

Perceived conflicts with fisheries have resulted in deliberate killing of this species in some areas. False Killer Whales have been recorded stealing hooked fish in the Japanese tuna long-line fishery and in the Gulf of Mexico (Brown et al. 1966; Mizue et al. 1969). In the Iki Island area of Japan they are killed to reduce conflicts with fisheries (Kasuya and Izumizawa 1981; Kasuya 1985). They are also taken occasionally in the small whale fishery in St. Vincent, in the Caribbean (Caldwell et al. 1971; Caldwell and Caldwell 1975). False Killer Whales have been taken incidentally in the gill-net fishery in northern Australian waters, the tuna purse-seine fishery in the eastern tropical Pacific, Chinese fisheries, and in Sri Lankan waters (Bannister 1977; Perrin and Oliver 1982; Zhou et al. 1982; Harwood et al. 1984;

International Whaling Commission 1986; Leatherwood et al. *in press*). Small numbers have been taken for live display (Bannister 1977; Reeves and Leatherwood 1984; International Whaling Commission 1984, 1987).

Causes and rates of natural mortality are largely unknown although mass strandings may significantly affect the level of local populations (Mitchell 1975a). Parasitic infestation of the inner ear by the trematode *Nasitrema gondo* has been implicated as a cause of mass stranding in False Killer Whales off Japan (Morimitsu et al. 1987). A variety of other parasites have been identified in False Killer Whales, including the trematode *Orthosplanchnus elongatus*, the nematodes *Anisakis simplex*, *Sternus auditivus*, and *Sternus globicephalus*, and the acanthocephalan *Bolbosoma capitatum* (Zam et al. 1971; Odell et al. 1979), although they have not been shown to cause mortality under normal conditions. No documented cases of predation by Killer Whales or sharks have been reported.

The introduction of toxic substances into the marine environment has as yet undetermined consequences. However, though bioaccumulation in the food chain, organisms such as the False Killer Whale may accumulate high levels of different toxins, even though they are an offshore species and thus presumably have low exposure to high levels of chlorinated hydrocarbons (Gaskin 1985). Tissue samples from a stranded False Killer Whale in British Columbia revealed the highest levels of mercury yet reported from a cetacean (liver, 1614 ppm wet weight), as well as high DDE levels in another individual (blubber, 1400 ppm wet weight) [Baird et al. 1989; Langelier et al. 1990]. High levels of organochlorines have been implicated in immunosuppression and high mortality in the St. Lawrence population of Belugas, *Delphinapterus leucas* (Martineau et al. 1987). The effects of other industrial activities on large odontocetes, such as oil and gas development and shipping, are largely unknown but warrant further study (Hain et al. 1985).

Special Significance of the Species

Many populations of dolphins and small whales are exploited directly or incidentally and must be assessed and managed (Perrin and Reilly 1984). False Killer Whales and other small cetaceans have generally received little attention and concern compared with the larger commercially harvested species. However, due to the frequency of, and numbers involved in mass strandings in certain areas of the world, False Killer Whales have become well known to local human populations. Their presence in aquaria around the world has brought increased attention and interest to them and other small cetaceans.

While regulation of fisheries for large cetaceans is under at least some level of control and management, regulation and management for small cetaceans is virtually non-existent worldwide. The deaths of over 600 Bottlenose Dolphins off the United States east coast in 1987 and 1988 (Marine Mammal Commission 1989) have helped to bring the increasingly complex factors affecting small cetacean populations into the forefront.

Evaluation

Occasional catches incidental to small whale fisheries will probably continue as long as these are in operation (Mitchell 1975a). However, the level of exploitation has probably not had a significant impact on stocks (Mitchell 1975b). There is no evidence that this species is or ever was common in Canadian waters. Based on the small amount of data available it is impossible to determine population trends. The False Killer Whale is rare in Canadian waters, as it is in the northernmost limits of its range, but its continued existence here does not appear to be under any threat and should not be considered at risk in Canadian waters.

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