

Sightings of Dwarf (*Kogia sima*) and Pygmy (*K. breviceps*) Sperm Whales from the Main Hawaiian Islands¹

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Abstract: Sightings of dwarf (*Kogia sima*) and pygmy (*K. breviceps*) sperm whales in Hawaiian waters have only rarely been reported. As part of boat-based surveys of odontocete cetaceans around the main Hawaiian Islands between 2000 and 2003, *Kogia* were observed on 18 occasions. *Kogia* were sighted most frequently in deeper portions of the study area (mean depth, 1,425 m) and in calm sea conditions (mean Beaufort sea state, 0.8). Thirteen of the 14 groups identified to species were dwarf sperm whales, the sixth most common species of odontocete documented around the main Hawaiian Islands. One group of six dwarf sperm whales containing two mother-infant pairs did not dive for more than a few minutes at a time. Most groups were difficult to approach, but photographs of several individual dwarf sperm whales showed distinctive marks on the dorsal fins, demonstrating that individual photo-identification is possible with this species.

SIGHTINGS OF DWARF (*Kogia sima*) and pygmy (*K. breviceps*) sperm whales in the wild are uncommon. Both species tend to live in deep water usually far from shore, may dive for long periods, typically show a very low profile at the water's surface, only very rarely engage in any obvious aerial or surface-active behavior, and tend to avoid vessels (see reviews in Willis and Baird 1998 and McAlpine 2002). For all of these reasons, most of what is known about these species tends to come from beach-cast, or stranded, animals. Only a few geographical areas, such as parts of the Bahamas (MacLeod et al. 2004), have been identified where conditions (depth, sea state, distance to shore) are suitable for small-boat-based research on these species. Around the main Hawaiian Islands, few records exist of either species, and most are of strandings

(Edmondson 1948, Shallenberger 1981, Mazzuca et al. 1999). Stranding records suggest that pygmy sperm whales are most common around the main Hawaiian Islands (Shallenberger 1981), though aerial surveys for marine mammals around the main islands over 3 yr resulted in only two sightings of *Kogia* (Mobley et al. 2000). Barlow (2003) noted that both species of *Kogia* are quite abundant in offshore Hawaiian waters, but he had no "on-effort" sightings of either species within several hundred kilometers of the main islands during a recent large-vessel survey. In this paper I summarize *Kogia* sightings in the main Hawaiian Islands during 2002 and 2003. These sightings resulted from an ongoing study of odontocete stock structure, population sizes, and ecology in the main Hawaiian Islands (see Baird et al. 2003, 2004).

Boat-based field operations were undertaken from 2000 to 2003. Vessels used ranged in size from 6 to 18 m and transited the study area at speeds from 16 to 30 km/hr, carrying two to six observers, scanning 360 degrees around the vessel. Apart from a period in 2003, boat observations involved 6- to 9-m vessels. During 2000–2001 one vessel was used at a time, but during some portions of fieldwork in 2002 and 2003 two boats were used simultaneously in different portions of the study areas (when two boats operated si-

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TABLE 1
Distribution of Search Effort

Year	Islands	No. of days	No. of hours on effort	No. of km on effort
2000–2001	Maui/Lānaʻi	72	486	5,780
2002	Maui/Lānaʻi	9	64	785
2002	Oʻahu	9	57	860
2002	Hawaiʻi	30 ^a	229	2,738
2003	Kauaʻi/Niʻihau	24 ^a	195	3,222
2003	Maui/Lānaʻi	16 ^a	107	1,659
2003	Oʻahu	13 ^a	111	1,789
2003	Hawaiʻi	39 ^a	281	4,286
Total		212	1,530	21,119

^a Two boats operated simultaneously in different areas.

multaneously effort is referred to as vessel-days). Locations of sightings and 5- or 10-min effort locations were determined using a Global Positioning System. Bottom depths of sightings and effort locations were estimated using a kriging interpolation (Golden Software 2003) of digital bathymetry data (obtained from National Oceanic and Atmospheric Administration). The two species were distinguished in the field based on the relative size and positioning of the dorsal fin: in dwarf sperm whales the fin is positioned approximately midway along the back and is relatively tall (>5% of the body length); in pygmy sperm whales the fin is positioned posterior to the midpoint of the back and is relatively short (<5% of the total body length [see Willis and Baird 1998, McAlpine 2002]). When possible, photographs were obtained to confirm field identifications. Table 1 summarizes research effort from 2000 through 2003. During 2000 and 2001 all search effort was in shallow waters, defined to be less than 500 m in depth. In 2002 search effort was in shallow waters off Maui/Lānaʻi, as well as in both shallow and deep waters off the Waiʻanae and south coast of Oʻahu, and in shallow and deep waters off the island of Hawaiʻi. In 2003 search efforts covered both shallow and deep areas off all the main Hawaiian Islands.

A total of 340 groups of odontocetes was seen during the surveys, and 15 species were documented. *Kogia* were observed on 18 occasions (Table 2, Figure 1), and groups were identified to species on 14 occasions (13

groups of dwarf sperm whales and one group of pygmy sperm whales). Photographs obtained from 8 of the 13 dwarf sperm whale sightings were used to confirm species identifications. Half of the *Kogia* sightings were off the island of Hawaiʻi, and 8 of the remaining 9 sightings were off Kauaʻi or Niʻihau (Table 2). Water depth was available for 17 of the 18 sightings; mean water depth was 1,425 m (SD = 954 m), with a range from 450 to 3,200 m. For positively identified groups of dwarf sperm whales, mean water depth was 1,565 m (SD = 1,017 m). Quantitative information on depth of search effort was only available for effort from Oʻahu east to Hawaiʻi and differed between island areas. The deepest average depth of search effort was off Hawaiʻi (median = 1,142 m, 50% of effort between 500 and 1,400 m), and the shallowest average depth of search effort was off Maui and Lānaʻi (median = 100 m, approximately 50% of effort between 1 and 100 m). The average depth of search effort off Oʻahu was intermediate (median = 549 m, with approximately 50% of effort between 200 and 600 m).

Group sizes for dwarf sperm whales ranged from 1 to 6 (mean = 2.33, SD = 1.56). Behavior of individuals in most groups was similar: animals logged at the water's surface for periods of up to a few minutes, then slowly sank or slow rolled out of sight and were not resighted. In contrast, healthy captive animals are often active and even breach at times (Manire et al. 2004). The largest group ob-

TABLE 2
 Details of Sightings of *Kogia* around the Main Hawaiian Islands

Species	Date	Island	Group Size	Beaufort Sea State	Depth (m) ^a	Latitude (° N)	Longitude (° W)
<i>K. sima</i>	17 May 2003	Lānaʻi	4	2	600	20.70	157.13
<i>K. sima</i>	3 June 2003	Niʻihau	1	1	2,158	22.17	160.08
<i>K. sima</i>	4 June 2003	Kauaʻi	3	1	525	22.10	159.26
<i>K. sima</i>	4 June 2003	Kauaʻi	1	0	2,600	22.36	159.33
<i>K. sima</i>	5 June 2003	Kauaʻi	2	1	1,200	22.28	159.43
<i>K. sima</i>	8 June 2003	Kauaʻi	1	0	3,200	21.70	159.12
<i>K. sima</i>	8 June 2003	Kauaʻi	1	0	2,550	21.90	159.22
<i>K. sima</i>	8 June 2003	Kauaʻi	3	0	3,200	21.70	159.15
<i>K. sima</i>	9 Oct. 2003	Hawaiʻi	6	1	915	19.71	156.08
<i>K. sima</i>	9 Oct. 2003	Hawaiʻi	1	0	1,005	19.63	156.05
<i>K. sima</i>	9 Oct. 2003	Hawaiʻi	2	1	805	19.69	156.07
<i>K. sima</i>	18 Oct. 2003	Hawaiʻi	3	1	850	19.57	156.02
<i>K. sima</i>	20 Oct. 2003	Hawaiʻi	5	1	731	19.69	156.07
<i>Kogia</i> sp.	8 Apr. 2002	Hawaiʻi	2	1	1,835	19.30	156.00
<i>Kogia</i> sp.	3 Oct. 2002	Hawaiʻi	3	1	NR	19.43	156.06
<i>Kogia</i> sp.	14 Oct. 2003	Hawaiʻi	1	3	450	19.67	156.04
<i>Kogia</i> sp.	20 Oct. 2003	Hawaiʻi	1	1	905	19.83	156.14
<i>K. breviceps</i>	2 June 2003	Niʻihau	2	0	700	21.90	160.00

^a NR, not recorded.

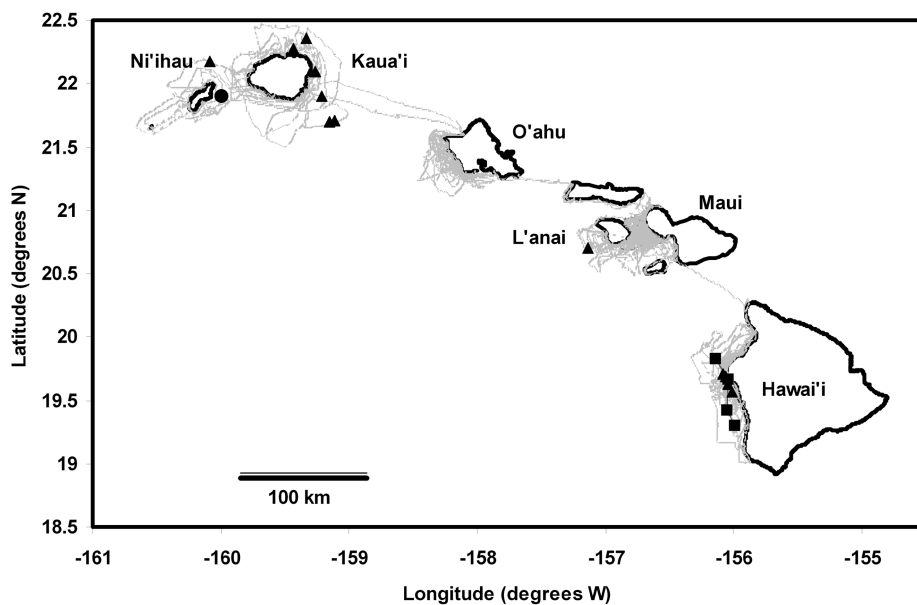


FIGURE 1. The main Hawaiian Islands showing search effort and sightings of *Kogia sima* (▲), *Kogia breviceps* (●), and *Kogia* sp. (■).



FIGURE 2. Dwarf sperm whales with distinctive dorsal fins (*top, middle*; top right individual with notch in middle of fin), photographed off the island of Hawai'i, 9 October 2003, and possible resighting (*bottom*) of one individual, photographed 20 October 2003.

served, of six dwarf sperm whales, was unusual in that all individuals would resurface within a few minutes of diving. This group contained two mother-infant pairs, with infants estimated to be less than a year of age based on body size, and it is likely that the short dive times documented were related to the young age and thus reduced diving capabilities of the infants (cf. Noren et al. 2002).

Based on the proportion of identified dwarf sperm whales to pygmy sperm whales, I suspect most of the *Kogia* spp. were dwarf sperm whales, because the two species should be similarly identifiable. Using only those positively identified to species, dwarf sperm whales rank as the sixth most frequently observed species of odontocete around the main Hawaiian Islands, representing 3.8% of total sightings. Using only sightings from 2002 and 2003 in Beaufort 0–2 sea conditions, dwarf sperm whale sightings represent 5.2% of the total sightings. Off Kaua'i and Ni'ihau, dwarf sperm whales were the fourth most frequently observed species, representing 12.1% of total sightings near those islands in Beaufort 0–2 conditions. Mean Beaufort sea state for *Kogia* sightings was 0.8 (SD = 0.8), reflecting the difficulty of spotting *Kogia* in anything other than ideal conditions. Given that surveys were regularly undertaken in sea conditions up to and including Beaufort 3 (and occasionally Beaufort 4 or 5), it is likely that *Kogia* are much more common near the main Hawaiian Islands than represented by these sighting rates.

The high sighting rate off Kaua'i and Ni'ihau is most likely an artifact of survey conditions off those islands; during surveys off those islands over 50% of the effort was in sea conditions of Beaufort 0 or 1, whereas sea conditions off other islands were typically greater (e.g., Baird et al. 2003). The relative lack of *Kogia* sightings off O'ahu, Maui, and Lana'i likely reflects the distribution of search effort over more shallow waters off those islands. The average depth of dwarf sperm whale sightings off the island of Hawai'i (mean = 861 m, SD = 105 m) was qualitatively similar to the depth of search effort and similar to depths reported for *Kogia* spp. in the Gulf of Mexico (Baumgartner et al.

2001), though substantially deeper than depths reported for dwarf sperm whales off the Bahamas (MacLeod et al. 2004). Dolar and Perrin (2003) found no correlation between sighting rates and water depth for dwarf sperm whales around the Philippines, with sightings over a range in depths from 117 to 3,744 m.

As has been reported elsewhere, *Kogia* often dived before close approaches. However, it was possible on several occasions to obtain photographs of dwarf sperm whales that can be used to identify individuals (e.g., Figure 2), and there is one possible match 11 days apart off the island of Hawai'i, demonstrating that the technique of individual photo-identification can be used with this species under some circumstances.

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