

Rare Sightings of a Bryde's Whale (*Balaenoptera edeni*) and Sei Whales (*B. borealis*) (Cetacea: Balaenopteridae) Northeast of O'ahu, Hawai'i¹

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Abstract: In the Hawaiian Islands small numbers of Bryde's whales (*Balaenoptera edeni*) have been documented only in the Northwestern (leeward) Hawaiian Islands, and sei whales (*B. borealis*) have only recently been confirmed near the islands of Maui and Hawai'i. In November 2007, one Bryde's whale and two sei whale groups (including three subadults) were documented during a 7-day, systematic vessel-transect survey conducted east and northeast of O'ahu. The Bryde's whale sighting is the first in nearshore (<70 km) waters of the main Hawaiian Islands, and the two sei whale sightings are the first near O'ahu, including the first documented subadult sei whales there. The latter information suggests that Hawai'i may be a reproductive area for the endangered sei whale, whose breeding and calving ground locations remain unknown in the Pacific Ocean. Other than rare incidence, the lack of historical sightings of these two species despite many years of previous shipboard and aerial surveys off Hawai'i may be due to misidentification and/or poor sea conditions prevalent in deep, offshore windward waters of the Hawaiian Islands. We recommend conducting more offshore vessel surveys for, and biopsy sampling of, these species to clarify habitat use and current stock boundaries and numbers, information important for management of Pacific populations.

ALTHOUGH EIGHT SPECIES of baleen whales have been documented to occur in the Hawaiian Islands region, little is known about their distribution or occurrence, with the exception of the humpback whale (*Megaptera novaeangliae*) (e.g., Balcomb 1987, Mobley et al. 2000, Barlow 2006). Before 2007, the Bryde's whale (*Balaenoptera edeni* Anderson,

1879) had not been documented near (<200 km) the main Hawaiian Islands, and sei whale (*B. borealis* [Lesson, 1828]) detections were limited to recent small groups near Maui and the island of Hawai'i (e.g., Shallenberger 1981, Balcomb 1987, Mobley et al. 2000, Mobley 2004, Barlow 2006, Rankin and Barlow 2007). The taxonomy of the medium-sized baleen whale group that includes the Bryde's whale is currently confused and controversial (see Reeves et al. 2004). There are several species in that group; however, the nomenclature is not resolved, due to questions about the affinities of the type specimens of *Balaenoptera edeni* and *Balaenoptera brydei*. Therefore, the appropriate scientific name for the Bryde's whale is currently not known; however, we use *B. edeni* herein for simplicity purposes.

Differentiation of Bryde's and sei whales in the field is difficult, given their physical similarities, unless a clear view of the presence or absence of auxiliary rostral ridges is seen (see Figures 1 and 2). Until the last few decades, whalers and field observers typically did not distinguish between the two in their

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FIGURE 1. Photo of a Bryde's whale seen 13 November 2007 showing the presence of auxiliary rostral ridges, a diagnostic characteristic unique to this species (see text).



FIGURE 2. Photo of a subadult sei whale seen 16 November 2007 showing the lack of auxiliary rostral ridges. Several apparent cookie-cutter shark bite marks can also be seen.

records (Jefferson et al. 2008), and there is continued confusion and lack of species verification associated with many reported Bryde's and sei whale records. Furthermore, their underwater vocalizations have only recently been verified and only in a few areas (e.g., Gedamke et al. 2001, Oleson et al. 2003, Rankin and Barlow 2007). Consequently, corroborated identification data differentiating these two species are important to further understand their populations and life-history patterns, particularly for the sei whale, which is listed as Endangered under the U.S. Endangered Species Act (ESA).

The Bryde's whale is circumglobally distributed in tropical and subtropical oceans, where it is the only whale species known to habitually occur year-round (Reeves et al.

2002, Jefferson et al. 2008). It is typically one of the more ubiquitous whale species in shallow coastal waters, although it also occurs in offshore waters (Reeves et al. 2002, Jefferson et al. 2008). It tends to inhabit areas with higher primary productivity (Kato 2002). Bryde's whales do not have a well-defined breeding season, because births have been documented year-round.

Less is known about the sei whale, which is considered one of the most poorly known of all the baleen whales (see Horwood 2002). Despite being heavily hunted by whalers in both hemispheres during the twentieth century, little is known of their distribution and movements in most areas. From whaling data, sei whales are known to breed and calve during fall (Horwood 2002, Reeves et al.

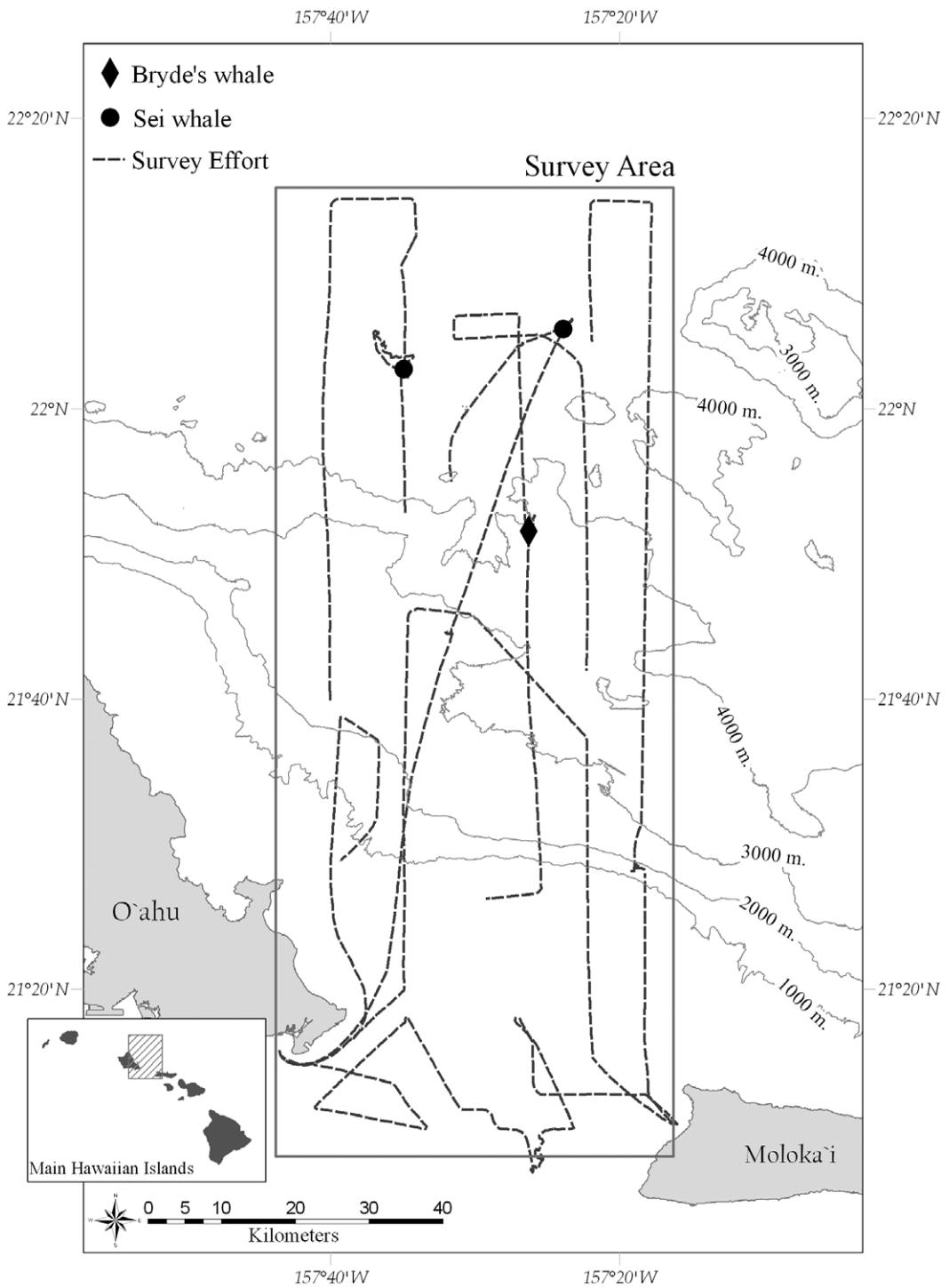


FIGURE 3. Map showing locations of the one Bryde's whale and two sei whale group sightings made during November 2007 northeast of O'ahu. The inset shows the location of the study area within the Hawaiian Islands.

2002, Jefferson et al. 2008). Breeding/calving grounds of North Pacific sei whales have not been located, although 16 sei whales were recently documented in the Mariana Islands during winter 2007 (Fulling et al. 2007).

The purpose of this paper is to document the occurrence of Bryde's and sei whales, particularly subadult sei whales, near O'ahu so that they are considered in management decisions that may affect them. Further, we want to stress the importance of collecting data that allow species verification, because these species are difficult to differentiate and at a distance could be mistaken as humpback whales during their winter breeding season.

MATERIALS AND METHODS

Visual observations were conducted while following predetermined north-south line-transect survey lines in waters east and northeast of O'ahu, Hawai'i, from 11 to 18 November from aboard the 29-m M/V *Searcher* (Figure 3). The survey grid measured approximately 55 km wide by 130 km long and encompassed waters near the coast to approximately 100 km from shore and over 5,000 m deep. Six experienced observers (four of whom each had over 15 yr of experience) rotated through three positions. Two scanned an approximately 90° arc from dead ahead (0 degrees) to just past the beam on their respective side of the vessel using 25 × 150 pedestal-mounted binoculars (Big Eyes Binoculars, Victoria, British Columbia, Canada) located at each forward (bow) corner of the vessel on the flying bridge platform (eye-level elevation 7.9 m above sea level). A third observer scanned the region nearest the vessel and out to the horizon with the unaided eye or with 7 × 50 reticle binoculars (West Marine, Watsonville, California). The third observer also functioned as the dedicated data recorder using a laptop computer with a real-time Global Positioning System (GPS) input. When a sighting was made, the vessel broke from the transect line to follow and conduct detailed behavioral observations of whales for up to approximately 2 hr. The vessel maintained a slow (about 2–9 km/hr) parallel course to the whales to obtain photo-

graphs and/or video as possible. Field review of digital photographs taken during sightings allowed keying of species' diagnostic features.

RESULTS AND DISCUSSION

A single sei whale was seen on 12 November, followed by a single Bryde's whale on 13 November and a group of three sei whales on 16 November near the same latitude as the first single sei whale sighting (Figure 3, Table 1). All three sightings occurred northeast of O'ahu in waters 2,000–5,000 m deep and approximately 50–70 km from shore. Observations continued with each group until species identification was definitively confirmed.

The Bryde's whale identification was confirmed by the presence of three rostral ridges combined with a prominent falcate dorsal fin, body length, surfacing behavior, and snout shape. The sei whales were confirmed by lack of accessory rostral ridges, slightly downturned rostrum tip, hooked ("jointed") dorsal fin, and a slight chevron on the dorsal surface (Figure 4 [see Jefferson et al. 2008]). At least 15 fresh bite scars, presumably made by cookie-cutter sharks (*Isistius brasiliensis*), were seen on and below the dorsal fin on the right side of the Bryde's whale, and some of the sei whales had similar (but fewer) white scars (Figures 2 and 5). The three sei whales sighted together were believed to be not more than 1–2 yr old based on their estimated body lengths of approximately 9 m compared with a typical reported length of about 12–16 m for adult sei whales (Table 1) (see Masaki 1976, Lockyer 1981, Lockyer and Martin 1983). We considered them to be subadults (defined herein as postweaned physically immature animals). Detailed behavioral observations were made during all three sightings, and animals in all three groups maintained slow travel with no apparent adverse (e.g., avoidance) reactions to the vessel. The three subadult sei whales appeared to "surf" the swells, often "gliding" approximately 1–2 m below the water surface parallel to the vessel with little or no movement of the tail flukes. On numerous occasions, all three sei whales approached the vessel, then crossed the bow and appeared to "ride" the

TABLE 1

Sighting Information for the Bryde's and Two Sei Whale Sightings Made during a Vessel-Based, Line-Transsect Visual Survey 11–17 November 2007 Northeast of O'ahu, Hawaii

| Date | Species | Lat. (N), Long. (W) | Group Size/Type | Approx. Body Length (m) | Total Obs. Time | Water Depth (m) | Beaufort Sea State | Summary of Observed Behavior |
|---------|---|----------------------------|--------------------------------|-------------------------------|-----------------------|-----------------------|-----------------------|--|
| 12 Nov. | Sei whale (<i>Balaenoptera borealis</i>) | 22° 02.71', 157° 34.95' | 1 adult | ~12 | 145 min | ~2,500 | 2–3 | 26 surfacing sequences observed. Typically made two closely spaced blows followed by 8- to 12-min. dives. Logging just below water surface and "no-blow" rises seen. Whale seemed undisturbed by vessel and paralleled and closely (~20 to 30 m) approached vessel bow repeatedly while maintaining ~7 km/hr (3–4 kt) travel. |
| 13 Nov. | Bryde's whale (<i>B. brydeii/ edeni</i>) | 21° 51.90', 157° 26.20' | 1 adult | ~9 | 50 min | ~4,500 | 3 | 11 surfacing sequences observed. Dives lasted 4–14 min. Exhaled underwater at least three times. Whale did not appear to actively avoid vessel and approached on numerous occasions, maintaining ~6–9 km/hr (3–5 kt) travel. |
| 16 Nov. | Sei whale (<i>B. borealis</i>) | 22° 05.70', 157° 22.59' | 3 subadult (~1–2 yr old) | 9–10 | 64 min | ~5,000 | 4 | Eight surfacing sequences observed. Dives lasted 8–10 min. Often traveled just below surface, sometimes logged at surface. Whales repeatedly followed/paralleled vessel, traveling generally south at ~2–6 km/hr (1–3 kt). They repeatedly crossed bow to within 5 m, "surfing" bow wave and swells. Whale movement appeared to be propelled by swells. All three whales seemed undisturbed by vessel. |



FIGURE 4. Photo of the dorsal fin of a sei whale seen 16 November 2007. The “jointed” shape of this dorsal fin is characteristic of the species (see text).



FIGURE 5. Photo of a Bryde's whale seen 13 November 2007 showing presumed cookie-cutter shark bite scars on its lateral body. Note the difference in dorsal fin shape between this Bryde's whale and the sei whale dorsal fin in Figure 4 (also see text for species diagnostics).

bow wave (Table 1). The surfing behavior we observed was attributed to the relatively large swells that day (0.9–1.5 m) and the movement of the observation vessel through the water and swells. Our observers had never seen this continuous repetitive, “leisurely” “surfing” behavior among sei whales, nor has it been reported to occur in the literature. However, sei whales appeared to “surf” swells frequently during a 4-month vessel survey in the Mariana Islands during winter 2007 (R. Rowlett, pers. comm.).

Despite several decades of vessel, aerial, and, more recently, acoustic surveys for cetaceans in Hawaiian waters, Bryde's whales have never been documented near the main Hawaiian Islands, and sei whales have rarely and only recently (2002) been documented there (Barlow 2006). Young sei whales have never been documented in this region. Since the 1970s, aerial surveys flown within about 45 km of the coast of the main Hawaiian Islands have never reported any Bryde's or sei whales, although fin whales have occasionally

been seen (e.g., Herman and Antinaja 1977, Mobley et al. 1996, 2000, Mobley 2004). Many small-boat surveys have also been conducted in coastal Hawaiian waters, mostly near the "Four-Island" (Maui, Moloka'i, Lāna'i and Kaho'olawe), the island of Hawai'i, and Kaua'i areas (e.g., Baker and Herman 1981, Darling and McSweeney 1985, Cerchio et al. 1998, Baird et al. 2008a,b). These have mostly been restricted to waters within 18–22 km of the coast, with a strong bias toward leeward waters <200 m deep (targeting mostly humpback whales) and to a lesser extent waters <1,000 m deep for other species. Taken together, these results suggest that Bryde's and sei whales are not common in coastal waters of the main Hawaiian Islands. Other than rare incidence, the lack of historical sightings of these two species despite many years of previous aerial and shipboard surveys of Hawaiian waters (e.g., Mobley et al. 2000, Mobley 2004, Barlow 2006) may be due to misidentification and/or poor sea conditions prevalent in deep, offshore windward waters of Hawai'i.

Based on our sightings, and those of Barlow (2006), the waters just north of the main Hawaiian Islands may be part of the winter breeding range of the North Pacific sei and Bryde's whales. The estimated body lengths of the three sei whales in sighting number 3 (Table 1) would make them approximately 1 to 2 yr old; thus, they would presumably be subadults and in any event not sexually or physically mature (see Masaki 1976). The presence of young, non-reproductive whales in these waters, as well as presumably breeding adults, lends weight to the potential importance of these waters for this stock.

The responsible U.S. management authority, NOAA Fisheries, now considers that there is a Hawaiian Islands stock of sei whales estimated to number 77 individuals (CV = 1.06) (Barlow 2006, Carretta et al. 2007). In comparison, an estimated 493 Bryde's whales (CV = 0.34) inhabit the entire Hawaiian Islands Exclusive Economic Zone (EEZ), primarily around the Northwestern Hawaiian Islands (Barlow 2006, Carretta et al. 2007). These Bryde's whales are provisionally managed by NOAA Fisheries as a "Hawaiian

Stock," although there is currently no biological basis for defining different stocks in the central Pacific Ocean. Given the ESA status of the sei whale, its scarcity in the Hawaiian Islands region, and its poorly known fall/winter breeding distribution, our recent sei whale sightings in Hawaiian waters, particularly of young individuals, are of management concern (see Carretta et al. 2007). Both sei and Bryde's whales are protected by the U.S. Marine Mammal Protection Act (MMPA). Thus, though apparently rare in the main Hawaiian Islands, both species must be considered relative to potential impacts from increasing anthropogenic activities in waters of the main Hawaiian Islands, including recent interisland high-speed ferry operations, cruise ships, general vessel traffic, and military exercises.

The limited available data suggest that Bryde's and sei whales are rare near the main Hawaiian Islands, and that a small number use deep offshore waters during the fall. It is our hope that the reporting of our sightings here will lead to a better understanding of these two species in Hawaiian waters. We recommend conducting more offshore vessel surveys for, and biopsy sampling of, these species to clarify habitat use and current stock boundaries and numbers, information that is important for management of their populations in the Pacific Ocean.

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