This study describes allonursing (females nursing offspring that are not their own) in captive belugas (*Delphinapterus leucas*). In addition to the calf’s mother, two females that were not pregnant or nursing at the time of the calf’s birth spontaneously lactated and nursed the male calf intermittently throughout 34 months of his life at the Vancouver Aquarium Marine Science Center. These observations suggest that allonursing may also take place in their wild counterparts and add to existing evidence of alloparental care in this species. Alloparental care, the care of nonoffspring, has been observed in every major mammalian taxon; the protection of calves through alloparental care may be a strong evolutionary benefit. Zoo Biol 29:1–5, 2010.
described in various species including belugas [Bel’kovitch and Sh’ekotov, 1993], sperm whales [Whitehead, 1996], bottlenose dolphins [Tyack, 2003] and killer whales [Waite, 1988]. Allonursing, the nursing of offspring of a different female, is a form of alloprenal care that has been observed, both in captivity and in the wild, in every major mammalian taxon [Packer et al., 1992] including cetaceans [e.g., Andersen, 1969; harbor porpoises; Smolder, 1988; Kastelein et al., 1990; Ridgway et al., 1995; Gaspar et al., 2000; bottlenose dolphins; Gero, 2005; sperm whales]. Given the difficulty of making detailed underwater observations of fast-moving animals in the wild, the captive environment provides an ideal means of gathering data on alloprenal care and particularly allonursing by cetaceans.

Beluga whales (*Delphinapterus leucas*) are long-lived (over 50 years), deep-diving odontocetes (diving to depths up to 350 m [Martin and Smith, 1992]) with a circumpolar distribution [COSEWIC, 2004]. They are found in groups ranging from two to hundreds of animals [Martin, 1996] but their sociality is not clearly understood. Wild female belugas form long-term associations with other females and calves and have been observed to form nursery groups tended to by a few adolescents while the adults are foraging [Bel’kovitch and Sh’ekotov, 1993]. Beluga births are rarely witnessed in the wild, but in one incident a researcher observed a newborn assisted to the surface and supported by adults swimming near the mother [Beland et al., 1990]. These observations provide some evidence of alloprenal care in wild belugas but the details and extent of this behavior are unclear.

A male calf born on July 20, 2002, at the Vancouver Aquarium Marine Science Centre, British Columbia provided the opportunity to observe allonursing. In addition to the calf’s mother (15 years old), two females that were not pregnant nor had calves of their own spontaneously lactated and nursed the calf. The females were the calf’s half-sister (8 years old) and an unrelated animal (19 years old). This study describes opportunistic observations of allonursing throughout 34 months of the calf’s life.

**MATERIALS AND METHODS**

From birth to 2.5 months of age the calf was housed with its mother only. The unrelated female and half-sister were introduced when it was 2.5 and 3 months old, respectively. The animals were housed in an outdoor pool (11 m × 15 m; depth 6.5 m) that was connected to an adjacent smaller medical pool (6 m × 7.6 m; depth 3 m). The belugas were observed from an underwater viewing window (7.5 m × 2.05 m) that allowed view of almost the entire pool and the entrance to the adjacent medical pool. All nursing and allonursing data were collected opportunistically as part of a larger study on captive beluga social and acoustic behavior [see Vergara and Barrett-Lennard, 2008]. The animals were observed for this larger study at various times throughout the day for a period of 1–3 hr, 2–4 times per week. Nursing bouts were considered to have occurred when the calf locked onto a teat with its mouth and held on to it for at least 2 sec. Bouts ended when the calf released the teat from its mouth; this was often accompanied by visible milk release. The date, time, behaviors and animals involved in interactions were recorded in real time in a computer database.

Due to the design of the larger study referred to above, data were collected during three separate periods: Period one, when the calf was 3–13 months of age (October, 2002–July, 2003), Period two, when the calf was 15–26 months of age.
RESULTS

After the females were introduced, the calf nursed almost exclusively from its mother during period one. During this period, the calf was observed nursing 147 times from the mother, seven times from the half-sister and once from the unrelated female. The calf attempted nursing from the unrelated female the first month she was introduced in October, 2002 and began nursing from the half-sister in April, 2003. The presence of expelled milk was not systematically recorded throughout the study but in the first period it was noted during one nursing bout from the half-sister. Additionally, during this period the unrelated female was observed to expel milk on three occasions without nursing the calf. Throughout period two, the calf nursed 47 times from the mother, never from its half-sister and 64 times from the unrelated female. During this period, the presence of expelled milk was recorded during three bouts with the unrelated female. Nursing rates from the mother decreased as the calf aged, from 0.93 times per hour in period one to 0.37 times per hour in period two. During period three, the calf nursed nine times from the mother, five times from the half-sister and never from the unrelated female. In this period the half-sister was observed expelling milk during one nursing bout.

Fig. 1. Hourly nursing rate for the mother, half-sister and unrelated female for period one (calf age 3–13 months; October, 2002–July, 2003), period two (calf age 15–26 months; October, 2003–September, 2004) and period three (calf age 30–34 months; February, 2005–June, 2005).
The decrease in nursing from the mother as the calf aged is consistent with other reports of nursing in captive beluga calves [Russell et al., 1997] and may be due to the calf becoming more efficient at obtaining milk [Russell et al., 1997] and/or requiring less milk as it began eating fish at approximately 12 months of age. Beluga calves nurse for up to 24 months in the wild [Brodie, 1969; Drinnan and Sadleir, 1981] and even longer in captivity. For example, the captive-born half-sister reported here nursed until she was 6 years old before the present study and was also observed to nurse from an unrelated female.

Allonursing is observed more in captive animals than in wild populations and it has been proposed that this behavior is partly an artefact of captivity [Packer et al., 1992] as nursing mothers and unrelated females are placed in close proximity to each other, providing more opportunities for allonursing to occur than may be possible in the wild. However, the present study demonstrates that non-nursing adult females can begin to lactate spontaneously when exposed to a calf. Studies have shown that groups with alloparental helpers have higher reproductive success than groups with fewer or no helpers [e.g., Macdonald, 1979; foxes; Moehlman, 1979, jackals]. Wells [2003] found that wild female dolphins that raised their calves in larger groups had significantly higher reproductive success and attributed this to potential alloparental care and improved protection of calves from predation and other threats.

These observations of allonursing in captive belugas raise interesting questions about the benefits of alloparental care in both wild belugas and cetaceans in general. Due to the complexities inherent to life in a marine environment, cetaceans may greatly benefit both energetically and reproductively from having helpers assist in raising their calves. A combination of factors likely lead to alloparental care in wild belugas. First, as a species with long term associations between individuals [e.g., Bel’kovitch and Sh’ekotov, 1993; Michaud, 2005], opportunities for reciprocity exist. Second, belugas are deep divers; having helpers may offer protection for the calf from predators and other hazards while allowing the mother more foraging time.

Compared with other social cetaceans, little is known of the social behavior of wild belugas. It has been suggested that the protection of calves through alloparental care improves the reproductive success of dolphins [Wells, 2003] and sperm whales [Whitehead, 1996]. Belugas may similarly benefit, considering that their sociality has been deemed comparable to these two species [e.g., Recchia, 1994]. It has also been proposed that the protection of calves through alloparental care is a strong evolutionary influence for social living in female sperm whales [Arnbom and Whitehead, 1989] and may be one of the driving forces for sociality in belugas as well. The observations of allonursing in captive belugas that we presented here contribute to the mounting evidence for alloparental care in this species and certainly suggest that allonursing may also take place in their wild counterparts.

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