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First record of an unsuccessful parturition of a southern right whale (*Eubalaena australis*) at Península Valdés, Argentina

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Southern right whale (*Eubalaena australis*) populations were severely depleted in past centuries by intensive whaling, but many are now recovering after receiving international protection in 1935 (IWC 2012). In the South Atlantic, the population of southern right whales that migrates each austral winter to calve at Península Valdés, Argentina (Payne 1986; IWC 2001, 2012), began experiencing unusually high calf deaths in 2003. The deaths peaked in 2012 with 113 dead calves (Rowntree *et al.* 2013, Sironi *et al.* 2018). The estimated age of dead calves ranged from 1 d to 4–6 mo (Rowntree *et al.* 2013, McAloose *et al.* 2016). A variety of techniques have been used to survey the Península Valdés population including: aerial surveys conducted annually since 1971 to photo-identify the individual whales present in the area (Payne 1986); aerial annual censuses to record the population abundance since 1999 (Crespo *et al.* 2015); monthly land and aerial surveys to locate and then necropsy dead whales on the beach since 2003 (Rowntree *et al.* 2013). In addition, a local stranding network of nearly 70 park rangers, fishermen, whale-watch captains, and tour guides have

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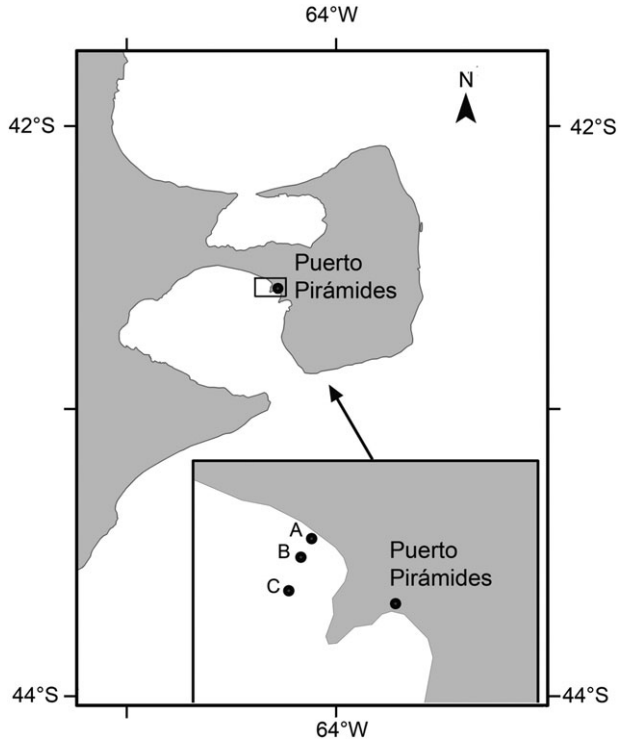

Figure 1. Location in Golfo Nuevo, Península Valdés, Argentina where a southern right whale female was observed in labor on 6 July 2012 in La Adela bay to the west of Puerto Pirámides. A: location of first sighting; B: location of last sighting, where photographs were taken; C: location of placenta found on 7 July 2012.

reported the locations of dead whales since 2003 (Rowntree *et al.* 2013). Scientists also conduct behavioral observations from cliffs, beaches, and boats. Whale-watching tours occur throughout the time the whales are present at Valdés (June through December) (Chalcobsky *et al.* 2017), and thousands of tourists also watch the whales every year from shore. Despite this substantial observation effort, an actual birthing event has never been documented at Península Valdés. Here we report the first observation with photographic and video documentation of a likely unsuccessful parturition of a southern right whale in the coastal waters of Península Valdés, Argentina.

Observations were made from the whale watch boat *Zeus* (length: 12.8 m and beam: 4.65 m, engine specification: 2 × 250 HP Evinrude) in the bay close to Estancia La Adela west of Puerto Pirámides, in Golfo Nuevo, Península Valdés, Argentina. The depth ranged from an average of 10 m near 42°33′01″S, 64°19′28″W and 30–35 m near 42°33′24″S, 64°19′49″W (Fig. 1). Weather conditions during the observations were light wind (5 km N), 10% cloud cover, Beaufort sea state of 2, and high tide.

Figure 2. Tehuelche's belly and the calf's tail flukes lacking the "curly" appearance that is common in many cetacean newborns.

On 6 July 2012 (austral winter), a group of tourists and the crew onboard the *Zeus* approached what appeared to be a southern right whale mating group. Observers consisted of the vessel captain (JG), the tour guide (JPM), the photographer (LP), and five tourists. The whales were first located at 1650. The group of whales included one adult female (later named Tehuelche) and three adults of unknown sex. This was the first time Tehuelche was sighted and photographed in 2012.

The first photograph was taken at 1654 and shows Tehuelche belly up with a calf's white-pinkish flukes protruding from her genital slit, which was filled with orange whale lice (cyamids). The calf's flukes did not have the "curly" trailing edge typical of newborn right whales (Fig. 2; Zani *et al.* 2008, Foley *et al.* 2011). Tehuelche displayed energetic behavioral patterns such as tail slaps, swimming at the surface at high speeds, repeated changes in direction, rolling and arching her body, showing avoidance behavior toward the other whales in the group, and producing loud blows. On many occasions, Tehuelche swam in a straight line toward the boat and then moved away following the same straight-line swimming pattern. Tehuelche's short dives were preceded by lobtailing and deep, loud blows. In contrast, the accompanying whales in the group displayed "calmer" behavior, swimming at slower speeds but following Tehuelche and swimming around her at varying distances that ranged from body contact to 100 m. At one point, Tehuelche rolled at the surface, elevated one pectoral flipper above the water, and remained belly up at the surface for a few seconds.

A video clip recorded between 1724 and 1730 shows Tehuelche swimming under the boat, with the calf's tail still emerging from her genital slit. A second video clip shows the same image below the surface a few minutes later. At 1804, a sequence of seven photographs taken over an

Figure 3. Fetal protrusion and withdrawal were observed during labor.

8 s interval shows the calf's flukes as Tehuelche rolls and emerges belly up at the surface. The last photograph with the calf's flukes still visible was taken at 1806. Observations were ended shortly after that to comply with local whale watch regulations and safety standards that prohibit boats from maneuvering in this area in dwindling light after sunset.

During labor, the calf's body was seen emerging from its mother to approximately a third of its body length, but later most of its body (except for the flukes) returned back inside the female's body (Fig. 3). The calf was not observed to make any movements and neither the umbilical cord nor blood were seen at any time during labor.

The next day at 1000, a placenta was found floating in the water in the same bay, approximately 3 km offshore at 42°34′13″S, 64°20′10″W (Fig. 1, 4). No umbilical cord or blood spots were evident. Tissue samples were collected but have not been examined histologically yet. Tehuelche was later seen twice in the same area without a calf, once alone between 20 and 25 July 2012 and in a mating group on 23 July. Therefore, we presume her calf was born dead or died shortly after birth. However, Tehuelche's calf was not identified among the 113 calf carcasses recorded during that year (Sironi *et al.* 2018).

Although Kelp Gulls (*Larus dominicanus*) often peck at the skin and blubber of southern right whales, and attacks on mothers and calves are ubiquitous in this population (Thomas 1988, Rowntree *et al.* 1998, Marón *et al.* 2015*a*), no gull attacks were seen during the observations reported here.

The calf's white coloration indicates it was a gray morph (Eroh *et al.* 2017) and likely a male, based on findings by Schaeff *et al.* (1999) on coloration patterns associated with sex. Tehuelche was identified as whale #1871 using the photo-identification catalog maintained since 1971 by Ocean Alliance and the Instituto de Conservación de Ballenas (Payne *et al.*

Figure 4. Placenta found on 7 July 2012, just 1 d after Tehuelche was observed in labor.

1990) based on her callosity pattern and the gray pigmentation on her back. She was photographed for the first time on 2 September 2004 and again on 26 September 2006, both times in Golfo Nuevo (where she gave birth in 2012) and accompanied by calf.

Southern right whale females normally calve once every 3 yr (Whitehead and Payne 1981, Best *et al.* 2001, Burnell 2001) spending the first year gestating (Best 1994), the second year lactating (Thomas and Taber 1984, Burnell 2001), and the third year building blubber reserves prior to conception in the following year. However, females that lose a calf during parturition or early in lactation may recover more quickly and conceive a second calf in one year rather than two (Burnell 2001, Marón *et al.* 2015*b*). Tehuelche's 2 yr calving interval between 2004 and 2006 suggests that she lost her calf in 2004. The observations described here indicate that she also lost her calf in 2012. She has not been resighted since 2012.

The event described here is the first known observation of an apparent unsuccessful birth in a mysticete species in the wild. Abnormal parturition in cetaceans has only been documented in the literature for odontocetes, including the common bottlenose dolphin (*Tursiops truncatus*) and the Atlantic spotted dolphin (*Stenella frontalis*), in captivity (McBride and Kritzler 1951, Essapian 1963). The loss or lack of a calf in subsequent observations of Tehuelche suggest that the behavior observed may have reflected an unusual or compromised parturition event. Possible indicators include (1) the calf was not speedily expelled after the anterior portion of the peduncle was released, with the episode lasting at least 1.16 h; (2) there was repeated calf protrusion and withdrawal; (3) maternal behavior during labor could be described as unusual, relative to the few

other mysticete births observed; (4) the calf's flukes lacked the common "curly" appearance seen in most newborn southern right whales; and (5) Tehuelche was resighted without a calf days after the parturition event was documented. Further details on each of these five points are provided below.

With regard to the duration of delivery, in a recorded birth observed in southern right whales off South Africa, the delivery occurred shortly after the mother was sighted with the tail of a gray morph calf protruding from her genital slit. In that birth, however, it was uncertain how much time elapsed between the calf's flukes first emerging and the delivery being completed (Best 1981). Although the duration of the delivery process in the wild is unknown, the need for calves to breathe after the umbilical cord stretches and is compressed during labor may favor a shorter delivery for successful calving (McBride and Kritzler 1951). The umbilical cord of Tehuelche's calf was never observed during labor, an indication that the calf's body had not emerged very far. In cetaceans, mothers or other accompanying adults support or lift the newborn to the surface immediately after birth probably to facilitate breathing (Béland *et al.* 1990, Notarbartolo-di-Sciara *et al.* 1997, Stacey and Baird 1997, Perrtree *et al.* 2016). Prolonged calf expulsion events during successful parturition have been reported for odontocetes in captivity, which lasted between 1 h and 1.57 h after first protrusion of the calf's tail (McBride and Kritzler 1951, Essapian 1963, Asper *et al.* 1988). It is not clear whether these long delivery times occur in the wild, where mothers are not confined in a limited space and where some environmental threats such as predation can occur at any time.

During Tehuelche's labor, the calf's body emerged and then receded repeatedly, but the quick calf release in other birthing events observed in cetaceans in the wild (Mills and Mills 1979, Best 1981, Weilgart and Whitehead 1986, Notarbartolo-di-Sciara *et al.* 1997, Zani *et al.* 2008, Foley *et al.* 2011, Faria *et al.* 2013, Perrtree *et al.* 2016) was not seen before observations concluded. Fetal protrusion and withdrawal was observed in an abnormal parturition of a captive bottlenose dolphin that was eventually delivered alive after 1.02 h (Essapian 1963).

Tehuelche's labor was different from other reported cases of mysticete births. In other cetaceans, mothers usually display distinct parturition behavior such as thrashing (Balcomb 1974, Zani *et al.* 2008, Perrtree *et al.* 2016), U-shaped and arched back body positions (Weilgart and Whitehead 1986), lurching and tail spasms (Leatherwood and Beach 1975), rotating (Stacey and Baird 1997), and shallow dives and tail slaps (Foley *et al.* 2011). Although Tehuelche dove and slapped her tail during labor, she stayed completely belly up on at least three occasions and produced many *loud* blows, behavior patterns that have not been observed in other mysticete births reported to date.

The shape of the calf's tail was also different to that of other observed cetacean births. The trailing edge of tail flukes has a characteristic curly appearance in many cetacean newborns (Weilgart and Whitehead 1986, Béland *et al.* 1990, Zani *et al.* 2008, Foley *et al.* 2011, Faria *et al.* 2013). This trait was not present in Tehuelche's calf, suggesting a possible unusual condition.

Tehuelche was unaccompanied by a calf on two separate days 2 wk after the parturition was observed, indicating that the calf was likely dead by the time Tehuelche was resighted. Calves are especially dependent on their mothers during their first month of life and maintain close proximity during 90% of their time under observation (Taber and Thomas 1982). Nursing calves stay with their mothers for at least the three months they spend on the Valdés calving ground (Taber and Thomas 1982, Thomas and Taber 1984).

Finally, although Tehuelche was accompanied by other adult whales during labor, it is not clear whether southern right whales participate in group births as occurs in belugas (*Delphinapterus leucas*; Béland *et al.* 1990) and sperm whales (*Physeter catodon*; Gambell *et al.* 1973) or in solitary births as occurs in gray whales (Leatherwood and Beach 1975, Mills and Mills 1979) and the North Atlantic right whale (*Eubalaena glacialis*; Foley *et al.* 2011).

Southern right whale females at Península Valdés have been experiencing unusually high calf mortality since the early 2000s from some unidentified cause (Rowntree *et al.* 2013, Marón *et al.* 2015*b*). The year that Tehuelche was sighted giving birth (2012) was the same year that mortality reached a record high of 113 dead calves (three times more than the number of calf deaths expected for 2012) (Sironi *et al.* 2014). The observation of an apparently unsuccessful parturition in a southern right whale offers interesting insights into the reproductive biology of this species, but also underlines the need for further investigations of the causes of the high calf mortality events at Península Valdés.

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