

## Behavior of an Adult Female Bottlenose Dolphin (*Tursiops truncatus*) Toward an Unrelated Dead Calf

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### Abstract

We observed two unrelated, resident female common bottlenose dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida, one of which had a newborn calf that was alive for approximately 12 to 19 d. The behavior of the females was observed before and after the calf died. When the calf was alive, the two females spent most of their time in close proximity (93% of 46 time points collected over 3 d using the point sampling technique) with the calf generally surfacing between them. When the calf died, the females spent less time in close proximity but were within approximately 80 m of each other over 2 d. The unrelated female was near the dead calf most of the time (87% of 23 time points). In some cases, she surfaced next to the dead calf immediately after the calf appeared at the surface, suggesting that she brought it to the surface. The day after the calf was found dead, the females were still with the calf, and the unrelated female continued spending more time with the carcass than the mother. In fact, analysis of continuous data showed that the unrelated female spent 98% of the time points collected using the point sampling technique next to the dead calf, whereas the mother milled 10 to 80 m from them. The benefit that an unrelated female could gain from attending a dead calf is unclear, especially when there is evidence that she is more successful at raising her own calves than the mother of the dead calf.

**Key Words:** female, dead calf, assistance, bottlenose dolphins, *Tursiops truncatus*

### Introduction

Mammalian mothers are usually entirely responsible for the care of their young (Krebs & Davies, 1993). Yet, in some species, individuals sometimes provide care to a sick, injured, or dead individual (Caldwell & Caldwell, 1966), regardless

of whether or not they are related. Descriptions of this behavior have been documented in primates (Manson & Mendoza, 1998), pinnipeds (Trudeau, 1976), and cetaceans (Fertl & Schiro, 1994; Palacios & Day, 1995; Cremer et al., 2006; de Moura et al., 2008). Descriptions of cetaceans have included the behavior of adults—in some cases presumed to be the mother—toward dead calves (Cockcroft & Sauer, 1990; Harzen & Santos, 1992; Fertl & Schiro, 1994; Palacios & Day, 1995; Mann & Barnett, 1999). The assistance of a mother toward her calf is not surprising. However, the advantages an unrelated individual might gain from taking care of an unrelated calf, especially when the calf is dead, are not always clear (Whitehead, 1996). Herein, we document the behavior of a wild female bottlenose dolphin (*Tursiops truncatus*) toward the dead calf of her unrelated female associate.

Studies that included systematic data of the behavior of bottlenose dolphins toward their own dead calves (Connor & Smolker, 1990) or pre- and post-calf death are rare (Mann & Barnett, 1999). Most existing reports are anecdotal and do not include observations prior to death, and do not include characteristics such as relationship, sex, and parental history of the animals involved (Hubbs, 1953; Moore, 1953, 1955; Fertl & Schiro, 1994; Palacios & Day, 1995; Cremer et al., 2006; de Moura et al., 2008). The authors first describe the behavior of the two unrelated females when the new calf of one of them was alive and then their behavior after the calf died.

### Methods

The observations occurred in Sarasota Bay, Florida, the site of a long-term study on the biology, behavior, ecology, and health of bottlenose dolphins since 1970 (Scott et al., 1990). Up to at least five concurrent generations of dolphins have been observed in Sarasota Bay. Wells et al. (1980,

1987) and Wells (1991, 2003, 2014) describe the social organization of this dolphin community in their research.

A 38-y-old female (FB5) without a dependent calf and a 19-y-old female (FB33) with a newborn calf were observed. Both females are residents of Sarasota Bay, and they have associated at varying levels since FB33 was born in 1982. Their association is not surprising because FB33 was raised in the female band to which FB5 belonged (Wells, 2003), and FB33's mother and FB5 were close associates for many years (Wells et al., 1987; Wells, 2003). The association of FB5 and FB33 continued even after FB33's mother died in 1993. Based on genetic analyses, these two adult females were not closely related, and the calf was confirmed to belong to FB33 (Duffield & Wells, 2002).

FB33 gave birth between 29 June and 5 July 2001, and the calf died on 17 July, 12 to 19 d later. Behavioral data were collected following the birth of the calf as part of a concurrent research project examining the behavior of female bottlenose dolphins (Quintana-Rizzo, 2006). Surface behavioral data were recorded at 3-min instantaneous time points (instantaneous point sampling technique; Altmann, 1974) on 6, 16, 17, and 18 July. Data collected included activity state, nearest neighbor (within 5 m), and relative positions to each other. Activities recorded were (1) traveling, (2) milling, (3) socializing, and (4) feeding. *Traveling* was defined as synchronous and directional movement in a straight line or zigzag, and *milling* was defined as a non-direct moment. *Socializing* was defined as activity involving prolonged body contact in which individual dolphins were playful, aggressive, and/or engaged in exploratory surface behaviors (Shane, 1990). *Feeding* was recorded if a dolphin was observed with a fish in its mouth. However, *probable feeding* also was used for the behavioral activity analysis (Waples, 1995) because even though it does not provide confirmation of the capture of a fish, it is a strong indication that a dolphin is feeding (Shane, 1990). Probable feeding included dolphins swimming individually in circles near the surface of the water; dolphins chasing or striking a fish with their flukes (fishwhacking); dolphins increasing swimming speed suddenly, and then spinning in a circle or making a hairpin turn (pinwheeling); and dolphins, alone or in loose groups, repeatedly diving in varying directions at one location (Shane, 1990).

The day that the calf was found dead (17 July), we recorded the activities of the two adult females (Table 1) and their distances from the calf for 153 min. On 18 July, the day after the calf was observed dead, we re-sighted both females. The

degree of decomposition of the calf was such that the carcass floated at the surface. On this day, the dolphins were observed for 30 min before the calf was retrieved for a necropsy at Mote Marine Laboratory in Sarasota, Florida. For these observations, we recorded data using a combination of instantaneous point sampling and continuous sampling techniques (Altmann, 1974). At 3-min instantaneous time points, we recorded the activity of the females and the distance between them and the calf. These data were collected at the first surfacing of the focal dolphin after the time point. Altmann's (1974) method of continuous sampling, described as "sampling all occurrences of some behaviors," was used to record the identity and behavior of any animal within 5 m of the dead calf. Data collected using this technique were referred as to continuous points.

## Results

### *Days Prior to the Calf's Death*

During the observations prior to the calf's death on 6 and 16 July, the two females spent a high percentage of their time in close proximity. Mother FB33 and calf were estimated to be no more than 10 m from FB5 in 93% of the 3-min time points (total time points = 46) taken during 135 min of focal follows. The close association of these individuals was also evident in the calf's position. The calf surfaced between the two females as the nearest neighbor (within 5 m) of FB5 during 89% of the data collected using the point sampling technique. In the remaining 11% the same dataset, FB33 surfaced next to FB5, and the calf was on the far side of its mother (i.e., the mother surfaced between the two animals). FB33 and her calf were far from FB5 (estimated range to FB5: 20 to 100 m) in only 7% of the surfacings. Prior to the calf's death, the animals spent most of their time traveling (Table 2). Their activity patterns changed after the death of the calf.

### *First Day the Calf Was Found Dead*

As we approached the bottlenose dolphins on 17 July, we noticed that the calf was not continuously visible at the surface. Although the fresh carcass sank, it was brought to the surface always by one of the females. This day, FB5 was the only dolphin observed at the surface near the calf (87% of the 23 time points collected with the point sampling technique). In some of those cases, FB5 surfaced next to the calf immediately after the calf appeared at the surface, suggesting that she brought it up. Water turbidity precluded clear observations below the surface; however, at the surface, FB5 was observed with the calf between her jaws on eight occasions. No other dolphin was

**Table 1.** Observations of a single bottlenose dolphin (*Tursiops truncatus*) female (FB5), a mother (FB33), and her calf conducted between 6 and 18 July 2001 in Sarasota Bay, Florida. Dolphins were together if they were nearest neighbors or their inter-individual distance was 5 to 10 m. A female was considered to be “with calf” if she was within 5 m from the live calf or was carrying or pushing the dead calf. Time points are defined as the number of points collected at either 3-min time intervals (instantaneous point sampling) or continuously depending on the sample technique used.

Date	Time	Data type	Sample size
6 July	1435-1450 h	3-min interval	Total time points = 6 FB5 alone, $n = 0$ FB5 with calf, $n = 5$ FB33 alone, $n = 0$ FB33 with calf, $n = 6$ FB5 & FB33 together, $n = 6$
16 July	1222-1425 h	3-min interval	Total time points = 40 FB5 alone, $n = 4$ FB5 with calf, $n = 34$ FB33 alone, $n = 0$ FB33 with calf, $n = 40$ FB5 & FB33 together, $n = 36$
17 July	1247-1517 h	3-min interval	Total time points = 49 FB5 alone, $n = 13$ FB5 with calf, $n = 20$ FB33 alone, $n = 16$ FB33 with calf, $n = 2$ FB5 & FB33 together, $n = 32$
18 July	1402-1426 h	3-min interval	Total time points = 11 FB5 alone, $n = 0$ FB5 with calf, $n = 6$ FB33 alone, $n = 0$ FB33 with calf, $n = 1$ FB5 & FB33 together, $n = 4$
		Continuous data	Total time points = 48 FB5 with calf, $n = 47$ FB33 with calf, $n = 1$ FB5 & FB33 with calf, $n = 1$

observed within 200 m at any time when she was carrying the dead calf in her mouth.

Both females spent most of their time milling in the general area where the dead calf was found (Table 1), and travel activity was reduced by around 50%. Additionally, the females spent less time in close proximity to each other than they did prior to the calf's death. At the surface, they were observed as nearest neighbors only one time; and they were observed 5 to 10 m from each other for 65% ( $n = 32$ ) of the total time points collected using the instantaneous point sampling technique. Their maximum separation distance was estimated to be 80 m.

#### *Day After the Calf Was Found Dead*

On the second day of observation since the calf died, the degree of decomposition was such that the carcass floated at the surface. Analysis of

continuous data showed that FB5 spent 98% of the point samples next to the floating dead calf (total continuous time points = 48), while the mother (FB33) milled 10 to 80 m from them. When both females were away from the calf, their surface behavior indicated that they were feeding. Immediately after feeding events, FB5 returned to the floating carcass. The behaviors of this non-mother toward the dead calf on 18 July changed from the previous day. She pushed the floating calf up ( $N = 7$  times) and down ( $N = 38$ ) with her rostrum, and up with her tail ( $N = 1$ ). On one occasion, she held the calf under water with her rostrum for 18 s. FB5 also carried the calf in her jaws twice. On this day when the mother was near the calf, she also used her rostrum to push it down twice. At the surface on this day, the mother was observed alone with the calf only once.

**Table 2.** Activities of the single bottlenose dolphin female (FB5) and the mother (FB33) with newborn on days the calf was alive (6 and 16 July 2001) and on the day the calf was dead (17 July 2001) as recorded at 3-min time points

Activity	Calf alive		Calf dead	
	Single female (FB5)	Mother with calf (FB33)	Single female (FB5)	Mother with calf (FB33)
Traveling	36 (76%)	38 (81%)	16 (33%)	19 (39%)
Milling	1 (2%)	--	33 (67%)	30 (61%)
Probable feeding	9 (20%)	9 (19%)	--	--
Feeding	1 (2%)	--	--	--
Total (N)	47 (100%)	47 (100%)	49 (100%)	49 (100%)

## Discussion

Most reported cases of an animal remaining by a dead infant involve the infant's mother (primates: Hrdy, 1976; Altmann, 1980; bottlenose dolphins: Hubbs, 1953; Moore, 1953, 1955; Connor & Smolker, 1990; Mann & Barnett, 1999; Park et al., 2013; Alves et al., 2014). Observations of non-mothers behaving similarly are rare (Ritter, 2007). This could have been in part because in other cases, genetic testing was not done, and behavioral observations were not consistently collected to confirm that the animal interacting with the dead calf was not the mother. Thus, it is possible that these observations may happen more frequently in the wild than have been recorded.

An interesting observation for this calf and two females was the repetition of supportive behavior and submergence of the dead calf, even holding it down at one point. Since FB5 is a more successful mother (at least three of five documented calves survived to separation or beyond vs only one of six for FB33), the behavior cannot be attributed to inexperience, when females are known to be attracted to young offspring. Adult females in the late stages of pregnancy are also sometimes intensely attracted to calves (Mann & Smuts, 1998), but FB5 was not at this stage based on ultrasound examination on 5 June 2001. FB5 had elevated progesterone levels (15.4 ng/ml), indicating that she was either cycling or in the early stages of pregnancy (no fetus was observed via ultrasound). Though no subsequent calf was observed during the next calving season, perhaps FB5 was pregnant during the period of observation and lost her calf either during the pregnancy or shortly after birth. Still, with so few observations of dead calves and responses to them, the behavior of FB5 is difficult to interpret. Since FB5 and FB33 had a long-term association, FB5's interest in the calf could be a reflection of her relationship with the mother. We offer this description to stimulate the reporting by others of similar

events to help us to better understand the basis of such puzzling behavior.

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