

Long-term mom/calf associations in rough-toothed dolphins off the island of Hawai'i: evidence of a stable matrilineal social structure in a deep-water dolphin?

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Why is this interesting?

- Little is known about the social organization of rough-toothed dolphins (*Steno bredanensis*)¹
- A long-term resident community of this species is found off Hawai'i Island^{1,2,3}
- Assessing mother/calf associations is challenging for most species due to the inconspicuous nature of calves
- For rough-toothed dolphins, pigmentation patterns visible from birth can be used to assess associations in calves

What we did: Photo ID analysis

- We used photo-identification data (2003-2018) to assess associations between mom and calf pairs initially in close, constant association and demonstrating synchronous surfacing
- Mothers first sighted with calves in 2003-2004 were selected to assess longevity of associations

What we found: stable associations

Span of years mom (n=5) was seen*	# calves* (n=16)	Inter-calf interval (years)*	mom/calf association (years)*
11.5 (4.0 – 13.7)	3 (3-4)	3.8 (3.7 – 5.0)	4.2 (4 – 9.9)

*median (range)

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- 81.2% of calves were last sighted with the mom or when mom was last seen
- Older calves remained in association, even after new calves were observed, often traveling with the new calf between them (see photo top right)



What we found: Length of mother/calf associations differ by sex within the same familial group

	2003	2004	2005	2006	2007	2008	2011	2016	2017
HISb0214	Adult	Adult	Adult	Adult	Adult	Adult	Adult	Adult	Adult
Calf 1*	Juv	Juv	Juv	Juv	Sub-A	Sub-A	Adult		
Calf 2^					Calf	Juv	Juv	Adult	Adult
Calf 3							Calf	Sub-A	Sub-A
Calf 4								Calf	Calf

*Considered an adult male in 2011 when last seen, either dispersed or died
^Considered an adult female in 2015 using morphology and age but has not dispersed

Table (above) and photo (below) showing association of mother HISb0214 and her calves



Male calves (genetically determined, n=2) remained associated up to 7.6 years and either dispersed or died as sub-adults or adults

All female calves genetically or morphologically determined (n=3), remained associated as adults or until the mom was not seen again

Matrilineal social structure in rough-toothed dolphins

- This study provides evidence of long-term associations between mothers and calves, suggesting that if dispersal occurs, it is likely at attainment of sexual maturity
- Sightings included from citizen scientists with incomplete group coverage suggest some associations may have been missed
- More research is needed to determine genetic relatedness and whether male and female calves eventually disperse or remain in the natal group for life
- Stable groups (including adult males) and prolonged mother/calf associations have been suggested for populations off Brazil⁴ and Honduras⁵

For more information:

www.cascadiaresearch.org/projects/hawaii

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¹Baird, R.W. 2016. The lives of Hawai'i's dolphins and whales: natural history and conservation. University of Hawai'i Press, Honolulu, Hawai'i.

²Baird, R.W., D.L. Webster, S.D. Mahaffy, D.J. McSweeney, G.S. Schorr and A.D. Ligon. 2008. Site fidelity and association patterns in a deep-water dolphin: rough-toothed dolphins (*Steno bredanensis*) in the Hawaiian Archipelago. *Marine Mammal Science* 24:535-553.

³Albertson, G.R., R.W. Baird, M. Oremus, M.M. Poole, K.K. Martien and C.S. Baker. 2017. Staying close to home? Genetic differentiation of rough-toothed dolphins near oceanic islands in the central Pacific Ocean. *Conservation Genetics* 18:33-51.

⁴Lodi, L., 1992. Epimeletic behaviour of free-ranging rough-toothed dolphins, *Steno bredanensis*, from Brazil. *Marine Mammal Science* 8: 284-287.

⁵Kuczaj, S. A., and D. B. Yeater. 2007. Observations of rough-toothed dolphins (*Steno bredanensis*) off the coast of Utila, Honduras. *Journal of the Marine Biological Association of the U.K.* 87:141-148.