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Bryde's whale (*Balaenoptera brydei/edeni*) sightings in the Southern California Bight

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ABSTRACT

Bryde's whales (*Balaenoptera brydei/edeni*) have been considered an anomalous occurrence in the Southern California Bight (SCB). Thus, they typically have been excluded from species lists associated with SCB management documents. In the last 40 years only two visual sightings of Bryde's whales were documented in California waters, the last one in 1991 (Carretta et al. 2007). This is despite extensive systematic vessel and aerial surveys and presumed recent recordings of Bryde's whale vocalizations in the SCB. Bryde's whales are notoriously difficult to differentiate in the field and from fin (*B. physalus*) and sei whales (*B. borealis*), given the subtle differences in physical characteristics. Between August 2006 and September 2010, we photo-documented five sightings of five single Bryde's whales in the SCB. Two of the five sightings occurred in October 2008 and September 2010 during 33,880 km of aerial surveys. The remaining three sightings occurred during small-vessel surveys that included offshore waters: two in June 2006 and one in September 2010. These sightings combined with other reports of presumed vocalizations suggest that Bryde's whale numbers may be increasing in the SCB. This may be related to global warming, large-scale oceanographic events (e.g., El Niño and La Niña) and resulting changes in prey availability. However, no clear association pattern was evident between ENSO events and our sightings. The recent sightings reported herein indicate that the Bryde's whale should be considered as a species present in the SCB and photo-documentation is critical to ascertain species.

INTRODUCTION

- Bryde's whale's have been considered a rare occurrence in the Southern California Bight (SCB).
- Their typical known distribution has been in lower latitudes like the Eastern Tropical Pacific (ETP) and the Gulf of California.
- Bryde's whales have been frequently excluded from species lists related to SCB management reports.
- In the last 40 years, Bryde's whales were visually documented only twice in the SCB (in 1963 and 1991).
- Because Bryde's whales look very similar to fin (*B. physalus*) and sei whales (*B. borealis*), and it is very hard to confirm identity without photo-documentation and/or genetic sampling.

METHODS

- ~34,000 km of line-transect and focal behavior aerial surveys (circling) occurred Oct. 2008 - Sept. 2010; extensive opportunistic small-vessel surveys occurred in June 2006 and Sept 2010 off Southern California
- Behavioral data were documented with HD video and audio recordings, photography, and note taking
- Data recorded:
 - viewing angle, altitude, start/end time of sighting, Beaufort sea state
 - travel direction, group size, dispersal within group, initial behavior state, individual behavior events, respirations, and any reaction to plane



Figure 1. Partenavia twin-engine aircraft flown for aerial surveys. Line-transects were flown at 1000 ft altitude; focal observations were flown in circles from 1200-1500 ft. altitude and 0.5-1 km radial distance (outside the sound cone of plane) to avoid disturbance of marine mammals

RESULTS

Date	Species	Location	Lat./Long.	Group Size	Size /Age Class	Total Time Obsvd (min)	Water Depth (m)	How Confirmed?	Reference
8-Jan-63	Bryde's whale	1 km from La Jolla/San Diego	32.47/-118.44	1	13.7 m	180		Still photos & motion pictures	Morejohn & Rice 1973
5-Oct-91	Bryde's whale	Monterey Bay, CA	36.1162/-125.1496	2	13 m	20		Naked eye, photos	J. Barlow, pers. comm.
17-Aug-06	Bryde's whale	48 mi W of San Clemente Island	32.9/-119.1815	1	Adult	42		Digital photos from small vessel	Cascadia, Sighting N1-9
18-Aug-06	Bryde's whale	35 mi W of San Clemente Island	32.7515/-118.9345	1	Adult	6		Digital photos from small vessel	Cascadia, Sighting N1-5
19-Oct-08	Bryde's whale	75 mi NE of San Clemente Island	33.1184/-118.3312	1		5	5000 m	Digital aerial photos	Smultea et al. 2009, SES Sighting DS6
24-Sep-10	Bryde's whale	28 mi W of San Clemente Island	32.9278/-118.9063	1		5	5000 m	Digital aerial photos	Smultea et al. 2011, SES Sighting DS5
25-Sep-10	Bryde's whale	40 mi W of San Clemente Island	32.8549/-119.0826	1		25		Digital photos from small vessel	Cascadia, Sighting PHY-1

Table 1. Documented sighting information for Bryde's whales (*Balaenoptera brydei/edeni*) off central and southern California including the Southern California Bight 1963-2010. These data have been accepted for publication in Aquatic Mammals (in press).

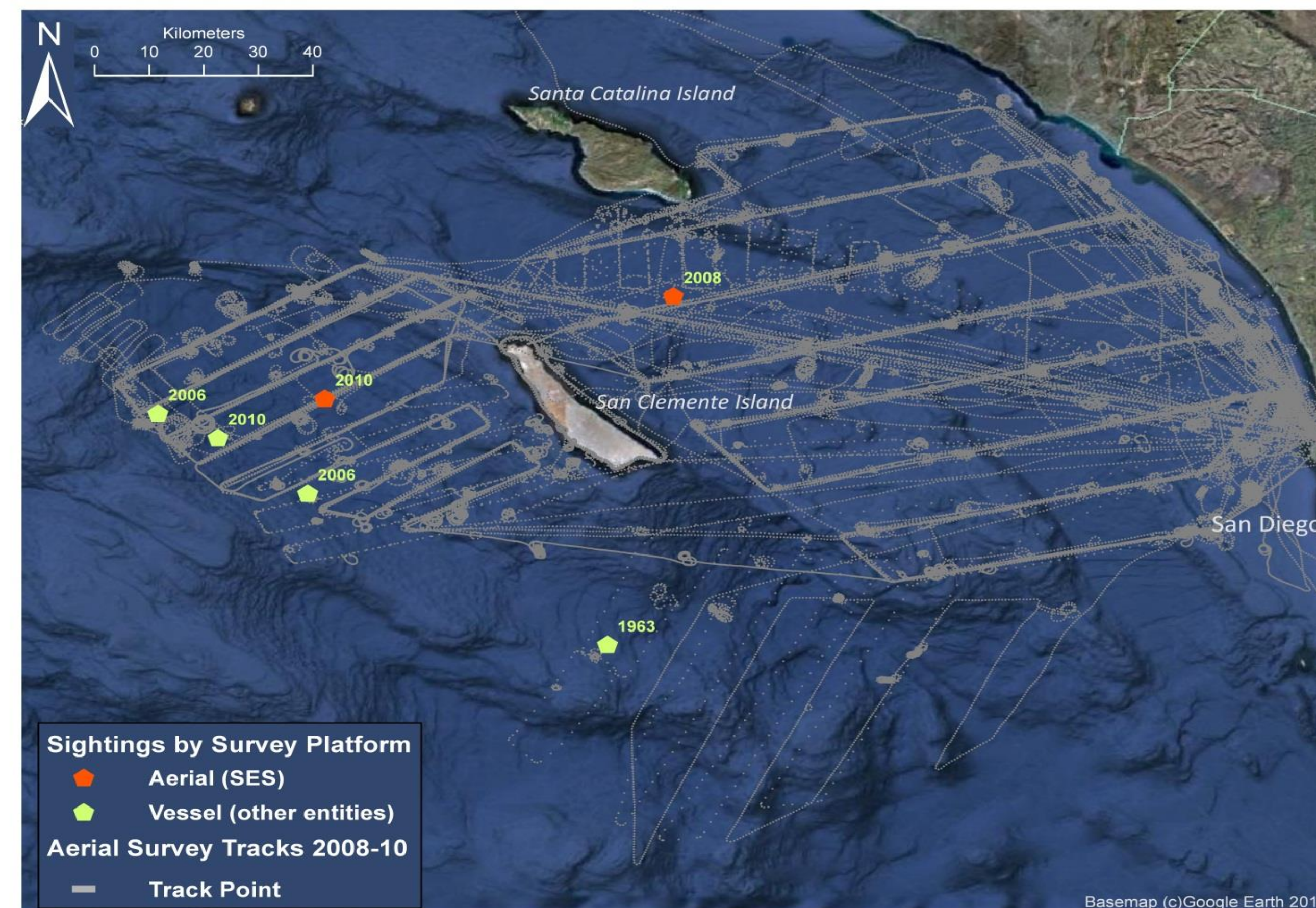


Figure 2. Bryde's whale sighting locations from 1963-2010 in the Southern California Bight. Notes: the 1991 central California Bryde's whale sighting is excluded from this map due to distance from the other sightings depicted here; survey tracks only represent aerial survey effort. They do not represent vessel effort although vessel sightings are depicted herein.

YOU can help! Capture photos of any potential Bryde's whale sightings and please share with us & other scientific & management entities.
msmultea@gmail.com



Figure 3a. Bryde's whale seen on 24 September 2010. Dorsal view of full body, showing prominent dorsal fin, the well-defined central longitudinal ridge on rostrum flanked by an auxiliary ridge on each side. Photographed by Bernd Würsig under NMFS permit 15369.

RESULTS (cont.)



Figure 3b. Bryde's whale seen on 19 October 2008, showing head in right dorso-lateral view with central longitudinal ridge on the rostrum and the well-marked, smaller lateral ridges on each side ("diagnostic character of species). The darker longitudinal stripes represent the shallow grooves on either side of the ridges. Photographed by Lori Mazzuca under NMFS permit 14451.

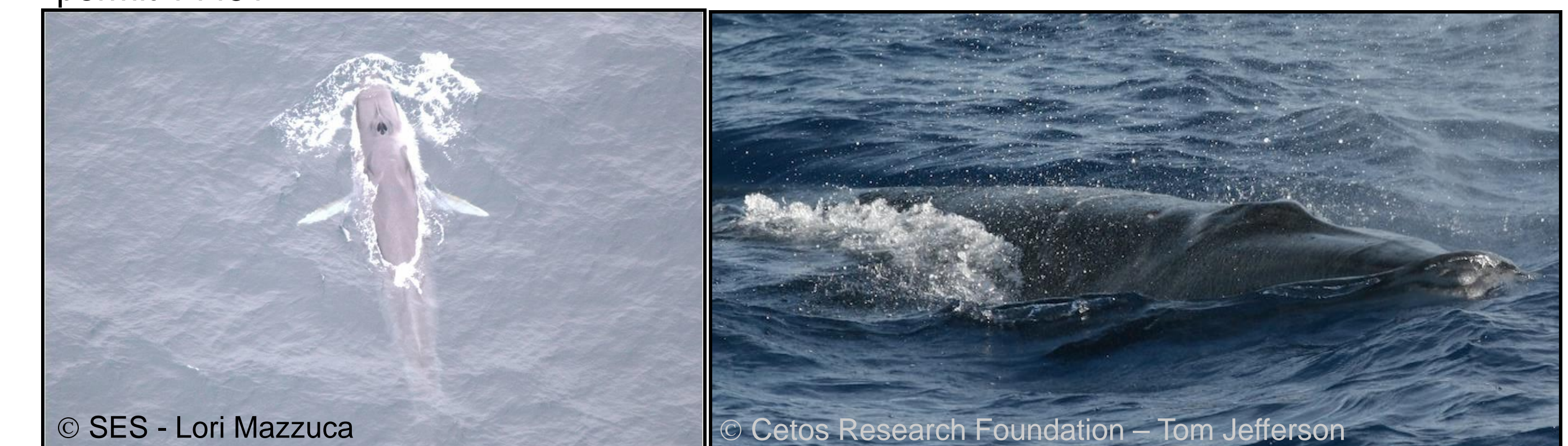


Figure 4. Fin whale (left) and sei whale (right) showing one prominent central rostrum ridge, and much-reduced auxiliary rostrum ridges. Fin whale photographed by Lori Mazzuca under NMFS permit 15369 on 16 May 2010. Sei whale photographed by T. A. Jefferson/Cetos Research Organization on 12 Nov 2007.

CONCLUSIONS

- We documented a marked sighting spike of five confirmed Bryde's whales in 2006-2010, nearly 3x more than in the previous 40 years, despite 1000s of km of aerial & vessel surveys in the SCB over the last 30+ years.
- Photo-documentation and/or genetic sampling are **crucial** to positively identify Bryde's whales and for stock management.
- Bryde's whale sightings and calls in the SCB are increasing.
- This may be, however unlikely, an artifact of increased sightings effort off California. More probable explanations include climate change, large-scale oceanographic events (e.g. El Niño Southern Oscillation [ENSO] events), increased abundance of the ETP stock with concomitant range expansion and resulting changes in prey distribution and availability.

FUTURE WORK

- Further research effort could lead to:
 - a better understanding of this species' occurrence in the SCB;
 - consistent inclusion of the Bryde's whale in environmental impact analyses and stock assessment reports in southern California;
 - increased efforts to photo-document and/or genetically sample future potential sightings to ascertain species and stock affinities.

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