

Mixed-species associations seen in the Southern California Bight during aerial surveys 2008-2012

Cathy E. Bacon^{1,2,3}, Mari A. Smultea^{1,4}, Bernd Würsig⁴, Vanessa James¹ and Meggie Moore¹

¹Smultea Environmental Sciences (SES), P.O. Box 250, Preston, WA 98050; ²HDR, Inc., 9449 Balboa Avenue, Suite 210, San Diego, CA 92123; ³Marine Science Department, Texas A&M University at Galveston, 200 Sea Wolf Parkway, Galveston, TX 77553; ⁴Department of Marine Biology, Texas A&M University at Galveston, 200 Sea Wolf Parkway, Bldg. 3029, Galveston, TX 77553



Fin whale mother-calf pair following a group of over 1,000 northern right whale dolphins for ~1 hr. Dolphins bow rode off the whales' heads and the calf chased the dolphin tails, as documented in video and photographs. The fin whale calf was also videotaped nursing. Photo by Lori Mazzuca /Permit No. 14451.

ABSTRACT

Fifteen aerial surveys (72,467 km) occurred during 2008-2012 to monitor occurrence, abundance, and behavior of marine mammals in the Southern California Bight (SCB) on behalf of the U.S. Navy. Thirty-six (2%) of 2,151 total sightings of at least 11 species were mixed-species associations (i.e., at least two different species swimming together/interacting). Little is known about these associations. Risso's dolphins were most frequently associated with another marine mammal species (19 [7%] of 283 total Risso's sightings) as follows: with sperm whales (1x), California sea lions (CaSL) (3x), and bottlenose (7x), northern right whale (NRW) (4x), long-beaked common (1x), unidentified (1x), and common dolphin sp. (2x). Up to 3 species occurred together on 3 different occasions: (1) sperm whales/Risso's/NRW dolphins, (2) Risso's/unidentified dolphins/CaSL, and (3) Pacific white-sided/common dolphins with CaSL. The most unusual mixed species sighting was 24 sperm whales (including 4 calves) with 11 Risso's and ~50 NRW dolphins: Risso's repeatedly charged adult sperm whales' heads who responded by dropping their lower jaw, perhaps related to kleptoparasitism. Potential reasons for mixed-species associations include increased protection from predators via dilution, increased prey detection/consumption, and "play" (i.e., fin whale calf touching NRW- see photo). Data include interactions not previously documented in the SCB among these socially complex animal groups.



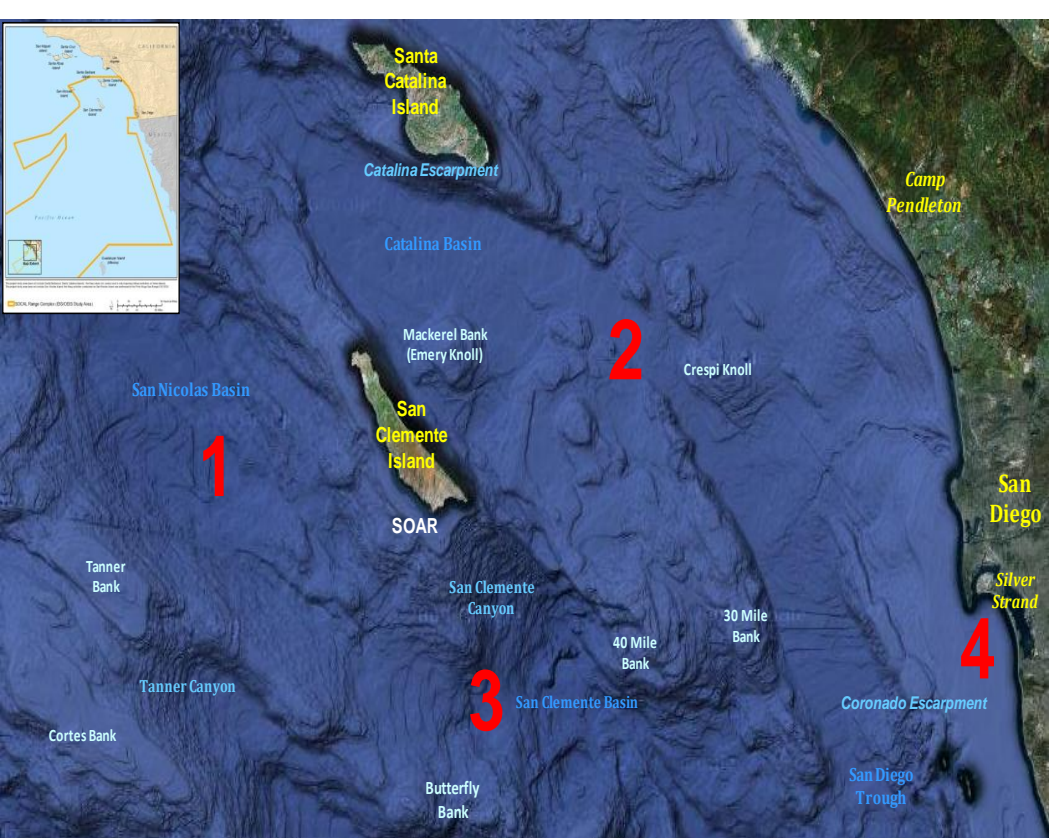
Zoomed-in high-definition (HD) photo of a sperm whale and calf with a Risso's dolphin that just charged the whale's head. Photo taken at 1500 ft altitude & 1 km distance on 14 May, 2011, ~44 km SW of San Diego. Note sperm whale's open jaw with white lips showing on lower jaw. Photo by Dave Steckler / Permit No. 14451.

METHODS

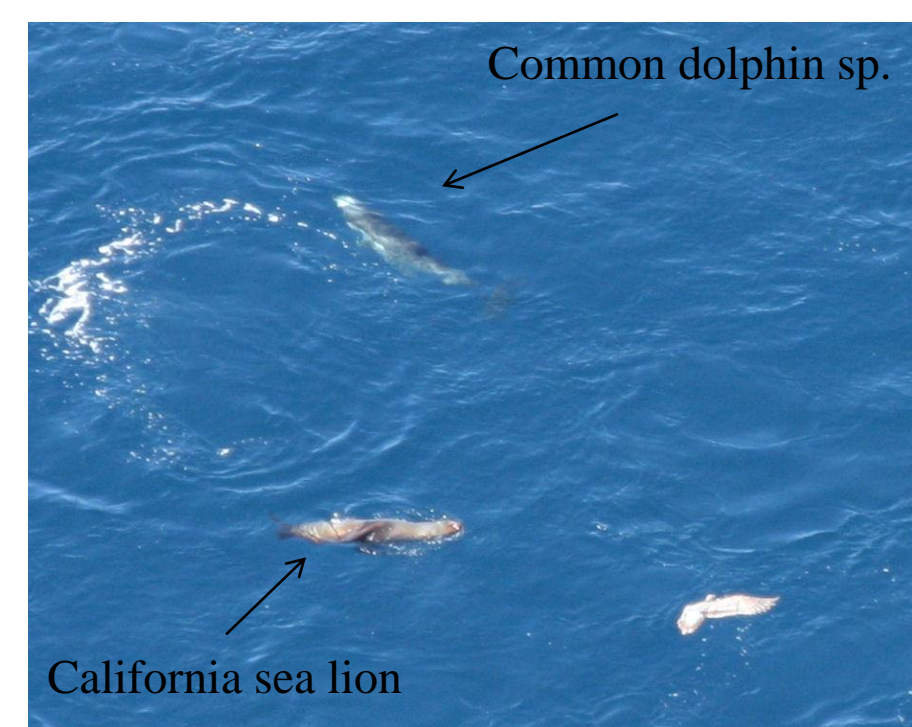


From 2008-2012, 72,467 km of line transect & focal behavior surveys were conducted from a twin-engine Partenavia aircraft by 2 observers and 1 recorder (spanning all months but Dec) off Southern California.

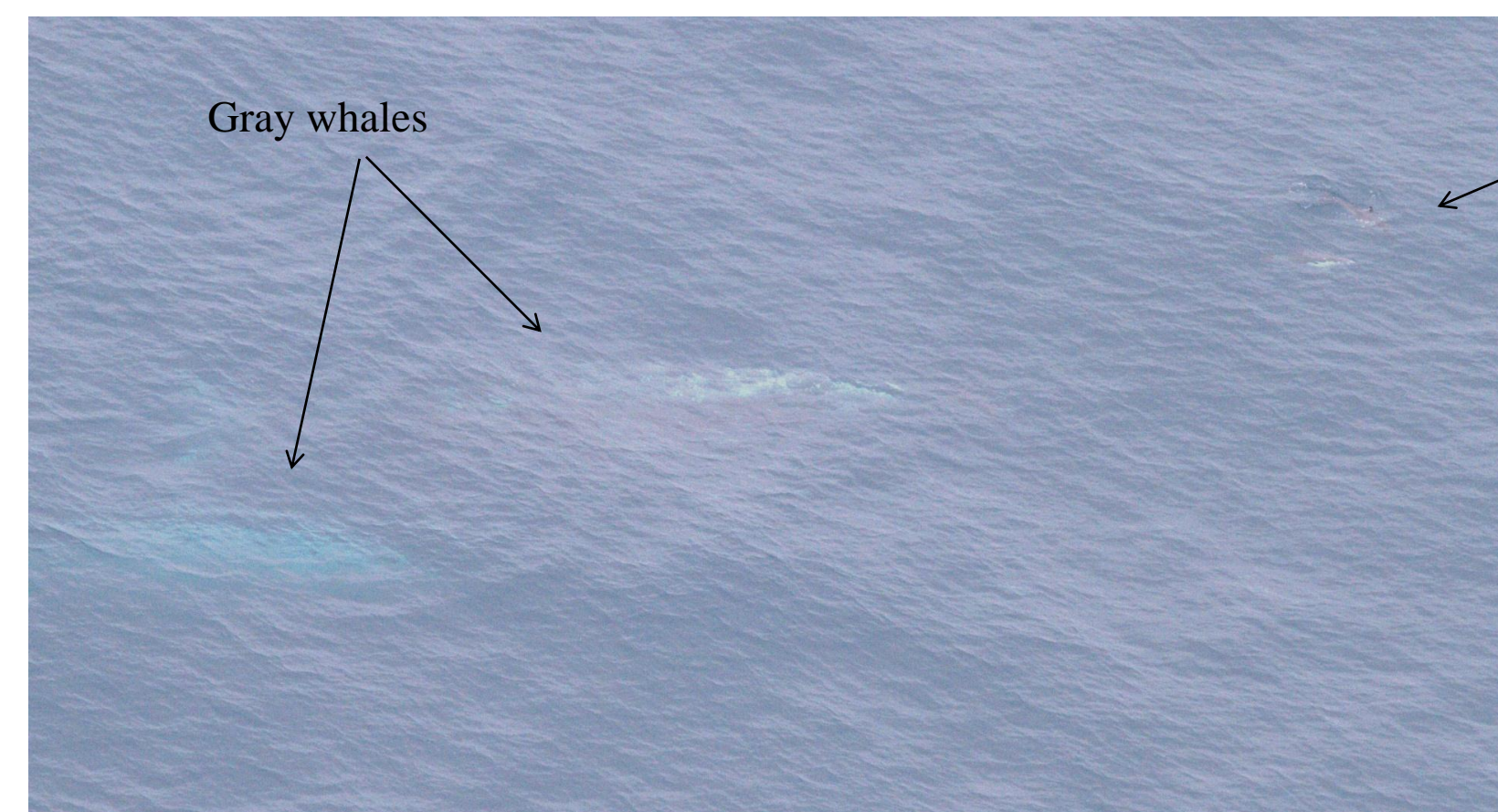
- Line-transect methodology used to survey at 1000 ft altitude & 100 kt.
- Sightings were circled to confirm species/group size/composition via photos as needed/feasible.
- Scan sampling methodology (Altmann 1974) was used to determine behavior state, heading (magnetic), and dispersal between individuals by watching the sighting for ~20-45 sec or longer if needed.



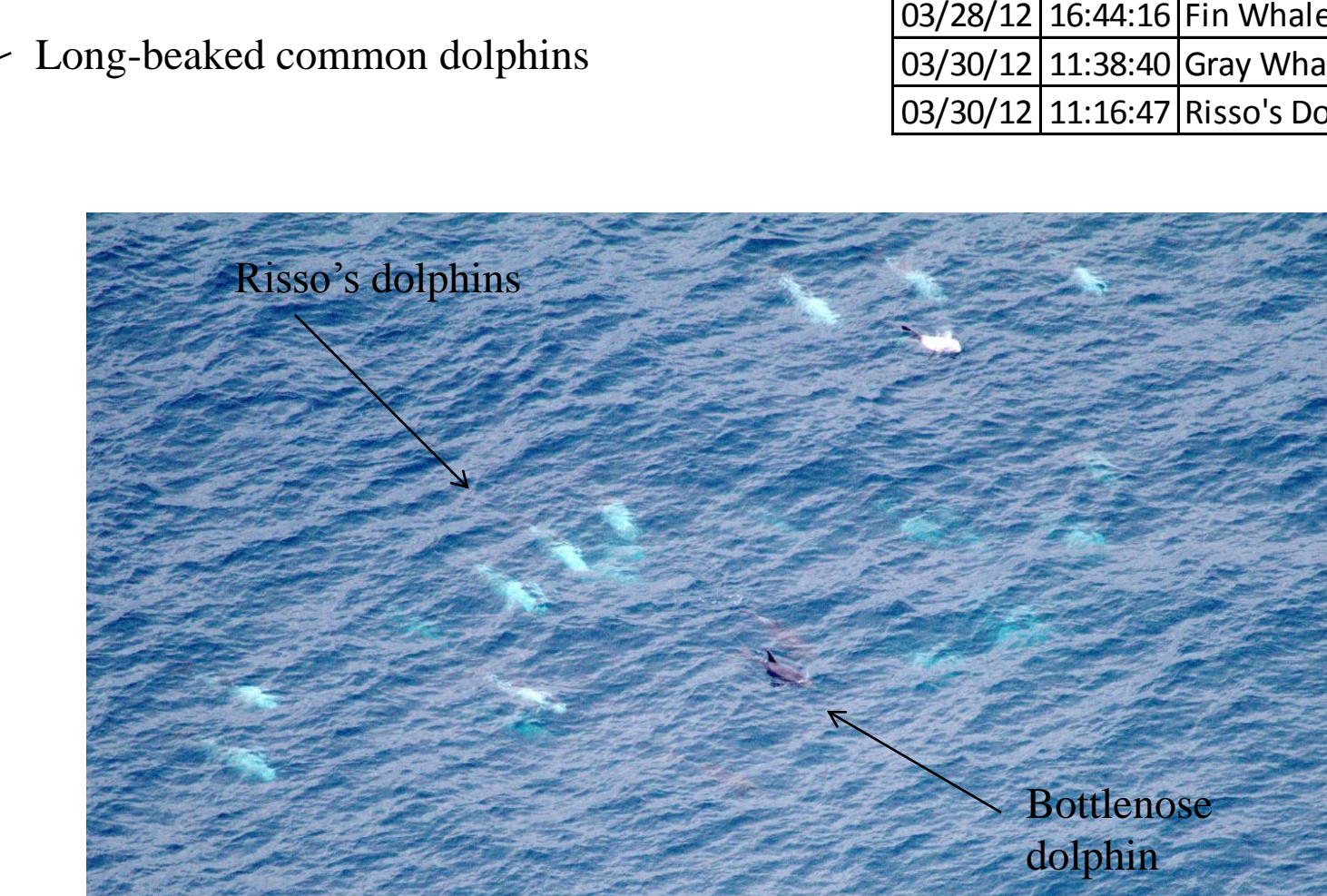
Location of the three primary aerial survey monitoring areas (Areas 1, 2 and 3) and underwater topographic features in the Southern California study area west of San Diego, CA.



Common dolphin sp. (top of photo) sighted with a California sea lion (center). (A bird is at lower right of photo). The presence of feeding birds suggest communal feeding by mixed species. Photographed 17 November 2008 by M. Deakos under NMFS permit 14451.



A pair of gray whales subsurface swimming with long-beaked common dolphins (upper right hand corner depicted by black arrow) photographed 30 March 2012 by M. Smultea under NMFS permit 14451.



Risso's dolphins mixed with two bottlenose dolphins (lower center, dorsal fin visible at surface) photographed 13 March 2012 by D. Steckler under NMFS permit 14451. Risso's dolphins were most commonly seen associated with the bottlenose dolphin (n = 7 of 19 occasions).

**See Smultea and Bacon 2012 for full study results

RESULTS***

List of mixed-species sightings (sightings with more than one species) made during Southern California Marine Mammal Aerial Survey Monitoring: 2008 – 2012. Warm season = May- Oct, cold season = Nov - Apr.

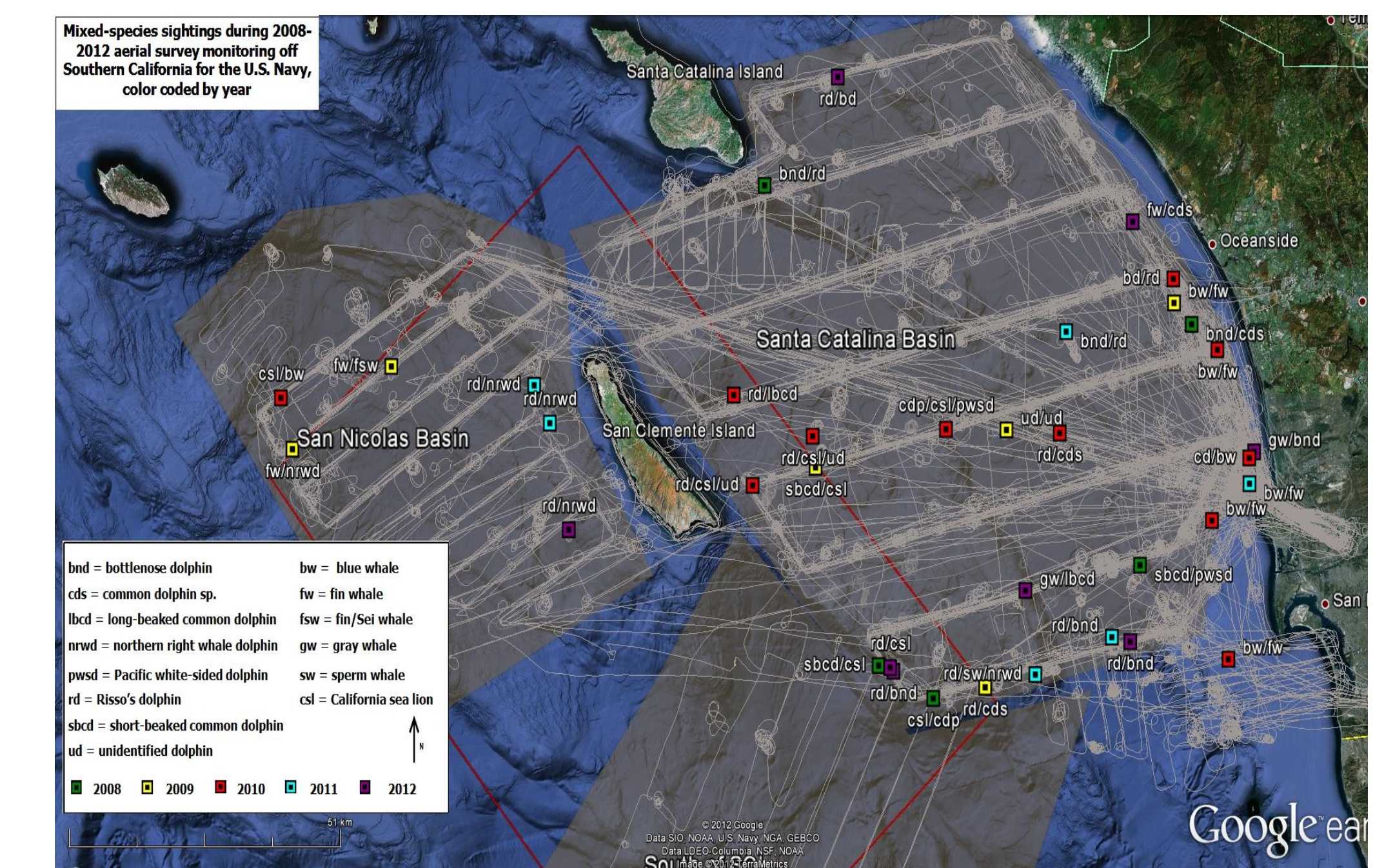
Date	Initial Sighting Time	Species (Number of Individuals)	Lat N	Long W	Water Season	Survey Area
10/17/08	14:09:01	Bottlenose Dolphin (75), Common Dolphin sp. (1200)	33.0905	-117.4190	warm	E of SCI
10/20/08	14:26:01	Bottlenose Dolphin (6), Risso's Dolphin (23)	33.2719	-118.2600	warm	E of SCI
11/17/08	11:00:58	Short-Beaked Common Dolphin (240), Pacific White-Sided Dolphin (300)	32.7690	-117.5201	cold	E of SCI
11/17/08	12:47:57	Short-Beaked Common Dolphin (60), California Sea Lion (7)	32.6338	-118.0311	cold	E of SCI
11/18/08	11:52:57	California Sea Lion (7), Common Dolphin sp. (50)	32.5905	-117.9241	cold	E of SCI
06/06/09	14:12:06	Fin Whale (2), Northern Right Whale Dolphin (700)	32.9104	-119.1821	warm	W of SCI
06/07/09	13:36:43	Risso's Dolphin (60), Common Dolphin sp. (52)	32.6056	-117.8228	warm	E of SCI
06/11/09	8:59:04	Fin Whale (1), Blue Whale (1)	33.1191	-117.4537	warm	E of SCI
07/20/09	12:32:39	Unidentified Dolphin (30), Unidentified Dolphin (2)	32.9488	-117.7831	warm	E of SCI
07/25/09	15:04:44	Fin Whale (1), Fin/Sei Whale (3)	33.0234	-118.9897	warm	W of SCI
07/27/09	15:33:37	Short-beaked Common Dolphin (230), California Sea Lion (1)	32.8971	-118.1566	warm	E of SCI
05/17/10	17:06:00	Common Dolphin sp. (500), California Sea Lion (4), Pacific White-Sided Dolphin (26)	32.9492	-117.9017	warm	E of SCI
05/17/10	12:48:55	Bottlenose Dolphin (12), Risso's Dolphin (35)	33.1511	-117.4551	warm	E of SCI
05/17/10	10:24:43	Risso's Dolphin (28), California Sea Lion (1), Unidentified Dolphin (90)	32.9385	-118.1627	warm	E of SCI
05/17/10	16:40:26	Risso's Dolphin (44), California Sea Lion (1)	32.8721	-118.2795	warm	E of SCI
07/27/10	15:24:12	Blue Whale (6), Fin Whale (2)	32.8287	-117.3788	warm	E of SCI
07/28/10	15:45:49	Blue Whale (5), Fin Whale (3)	32.6433	-117.3460	warm	E of SCI
07/31/10	17:41:28	Blue Whale (1), Fin Whale (1)	33.0567	-117.3682	warm	E of SCI
08/02/10	14:52:58	Common Dolphin sp. (300), Blue Whale (3)	32.9122	-117.3052	warm	E of SCI
09/24/10	12:40:16	California Sea Lion (30), Unidentified Dolphin (4)	32.9785	-119.2063	warm	W of SCI
09/24/10	14:16:14	Risso's Dolphin (2), Long-Beaked Common Dolphin (250)	32.9922	-118.3178	warm	W of SCI
09/25/10	10:32:58	Risso's Dolphin (10), Common Dolphin sp. (700)	32.9450	-117.6785	warm	E of SCI
04/01/11	9:17:28	Risso's Dolphin (20), Northern Right Whale Dolphin (8)	32.9515	-118.6773	cold	W of SCI
04/01/11	9:58:38	Risso's Dolphin (11), Northern Right Whale Dolphin (2)	33.0015	-118.7087	cold	W of SCI
04/18/11	13:19:59	Bottlenose Dolphin (5), Risso's Dolphin (250)	33.0802	-117.6663	cold	E of SCI
05/10/11	15:46:27	Fin Whale (2), Blue Whale (2)	32.8778	-117.3047	warm	E of SCI
05/11/11	13:58:19	Risso's Dolphin (32), Bottlenose Dolphin (8)	32.6730	-117.5750	warm	E of SCI
05/14/11	10:41:28	Risso's Dolphin (11), Sperm Whale (24), Northern right whale dolphin (50)	32.6228	-117.7247	warm	E of SCI
01/30/12	15:56:00	Gray Whale (4), Bottlenose Dolphin (2)	32.9204	-117.2956	cold	E of SCI
02/02/12	12:49:52	Risso's Dolphin (75), Bottlenose Dolphin (25)	33.4176	-118.1176	cold	E of SCI
02/04/12	14:27:51	Risso's Dolphin (48), Northern Right Whale Dolphin (1)	32.8099	-118.6381	cold	W of SCI
03/13/12	11:39:17	Risso's Dolphin (7), Bottlenose Dolphin (5)	32.6263	-118.0023	cold	E of SCI
03/14/12	13:40:36	Risso's Dolphin (15), Bottlenose Dolphin (25)	32.6669	-117.5390	cold	E of SCI
03/28/12	16:44:16	Fin Whale (2), Common Dolphin sp. (125)	33.2272	-117.5354	cold	E of SCI
03/30/12	11:38:40	Gray Whale (2), Long-Beaked Common Dolphin (50)	32.7349	-117.7448	cold	E of SCI
03/30/12	11:16:47	Risso's Dolphin (15), California Sea Lion (1)	32.6312	-118.0085	cold	E of SCI

Why do Different Marine Mammals Species Associate?*

- Increased protection from predators via dilution
 - Increased prey detection/consumption
 - Larger group size increases predator confusion (similar to fish schools)
 - Play
 - Social interactions
 - Kleptoparasitism
 - Communal foraging
- *see references section

Highlights:

- Thirty-six (2%) of the total sightings (n = 2,151) were mixed-species associations
- At least 11 species involved
- Greatest number of species seen together was 3 on 3 different occasions:
 - Sperm whales, Risso's dolphins, and northern right whale dolphins
 - Risso's dolphins, California sea lions, and unidentified dolphins
 - Pacific white-sided dolphins, common dolphins, and California sea lions
- Risso's dolphins were most frequently associated with another marine mammal:
 - 19 or 7% of 283 total sightings of this species
 - seen with 1-2 other species



Mixed-species sightings in the southern California study area 2008-2012. Light-colored lines indicate all survey effort 2008-2012. See key for species codes corresponding to sighting locations on the map.

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