California Current Cetacean & Ecosystem Survey (CalCurCEAS):

Middle of Leg 4 Report: 22 October – 2 November, 2014

Barbara L. Taylor, Cruise Leader

Synopsis (Barbara L. Taylor)

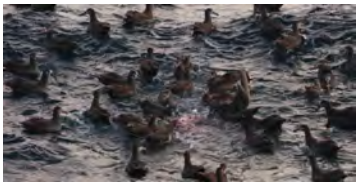
Leg 4 tracklines

This report marks the middle of Leg 4 of this 5-leg, 120-sea day survey of cetaceans and the ecosystem of the California Current. We have ranged from San Diego up to the level of Monterrey Bay with most of the effort on the far outside of the study area. Our sea surface temperatures started unusually high 24.6˚C near the southern boundary of the study area on the Mexican border and ended with a bit of a drop to 17.7˚C 200 miles off Monterrey Bay. Cetacean sightings were the expected high numbers of short-beaked common dolphins and striped dolphins. The dearth of large whales (and no blue whales) was surprising.

Striped dolphin (photo by Paula Olson)

In fact, we know there is one fewer whale because we watched killer whales live up to their name. The ill-fated whale was only seen at a distance. All that remained when the ship arrived at the scene was a large slick on the surface crowded with albatrosses. After a short period the albatrosses were swarmed around some tissue which turned out to be the lungs of the ex-whale. We pulled the lungs aboard to take back to the genetics lab so we can identify the species of the deceased. It turns out, killer whales do not find lungs to be tasty and this same lung removal behavior has been observed with dolphins. It boggles the mind how this small group of killers managed to quickly remove lungs from a sinking carcass. Killer whales are not only exciting to watch but are exciting to biologists because we still don't know how many species and subspecies there are. What we do know about the individuals from this sighting is that they don't match to any west coast photographic catalogs nor to they conform to the coloration patterns and dorsal fin shapes that would identify them as local fish-eating-type killer whales (aka Residents) or the more likely mammal killers (aka Transients). Sadly, the filthy weather and evasive whales did

Killer whales living up to name (Adam U)



not allow us to take biopsy samples, but we did sample the water and hope to get lucky and filter some DNA to get their genetic affiliation. To read more about what photos reveal about what type of killers these are, see the photo report below.

Another highlight of this leg was the recovery of the drifting acoustic recorder release 3 months ago. This exciting new piece of equipment (inventor Jay Barlow the principle investigator of CalCurCEAS) recorded acoustic data for that entire time and we hope will reveal interesting patterns of cetacean detections including the elusive beaked whales that are so difficult to survey visually. It is amazing that out here seemingly in the middle of nowhere we were able to use a satellite position and our big-eye binoculars to locate a needle in a haystack. The retrieval was flawless thanks to the planning of Emily Griffiths, the sharp eyes on the flying bridge and the excellent performance of the ship's crew (more details in the acoustic report below).

Bottlenosed dolphin watching humans (Olson)

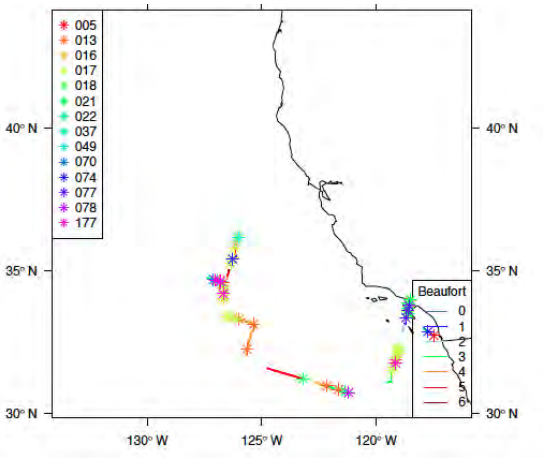
We also had the opportunity to get some very special samples from bottlenosed dolphins for Marisa Trego's graduate study that requires RNA from living dolphins. We had a great team of biopsiers, people to run the samples quickly to the lab and folks in the lab to carry out the special processing. These samples from the only group of bottlenosed dolphins on leg 4 will be critical to Marisa's project.

This cruise has been marked by recording species found in water temperatures not typical of the California current for which the cruise was named. In addition to continued unusual bird sightings including 14 red-tailed tropicbirds in a single day (see bird report below) but also 4 young (30 cm) loggerhead turtles and a pufferfish!

Although this fall portion of the cruise has had good weather (summarized in Search Effort below) we also experience the worst weather of the cruise so far. Halloween came through with some scary weather with 35-40 mph winds and 12 foot seas. We managed to enjoy ourselves nonetheless.

The crew of the R/V Ocean Starr continues to be wonderful despite the change of the season, which makes their job increasingly difficult. Our great thanks to the entire crew: Captain Bill Rothschild, mates Bob Overmon and Jason Giery, engineers Jerry Taylor, Rick Wallace, Don Huffman, deck crew Jason Benton, Jose Valentin, Mohammed Nartey, Armando Urrutia, Adam Gautney, Andrew Eigenraugh and last but not least galley Crystal Nailor and Justice Sagce.

Captain Bill Rothschild and Chief Bosun Jason Benton (Taylor)



Effort and sightings on the first half of Leg 4. The small 'spur' line at about 35N shows our effort following retrieval of the drifting acoustic buoy.

SEARCH EFFORT BY DAY

Date	Start Time Stop	Latitude	Longitude	Total Miles Searched	Average Beaufort
102214	1323	N32:42.07	W117:25.96	30.7 nmi	3.7
	1804	N32:59.18	W117:57.01		
102314	0701	N33:59.60	W118:30.07	51.7 nmi	1.4
	1738	N32:52.24	W118:15.47		
102414	0703	N32:20.53	W119:01.04	63.3 nmi	2.6
	1805	N31:05.00	W119:32.42		
102514	0712	N30:43.36	W121:10.15	73.2 nmi	3.0
	1809	N31:04.76	W122:38.24		
102614	0723	N31:11.48	W123:06.56	84.1 nmi	4.9
	1809	N31:35.33	W124:46.84		
102814	0740	N33:08.56	W125:22.00	61.0 nmi	4.1
	1820	N32:05.26	W125:42.22		
102914	0746	N33:09.45	W125:23.87	56.5 nmi	4.0
	1735	N33:24.30	W126:32.90		
103014	1230	N34:35.74	W126:40.80	66.5 nmi	3.0
	1803	N33:55.52	W126:45.34		
103114	0751	N34:46.91	W126:30.08	29.6 nmi	5.3
	1836	N34:31.46	W121:33.02		
110214	0706	N36:17.92	W126:30.08	41.3 nmi	5.5
	1420	N35:28.95	W126:07.91		

CODE	SPECIES	TOTAL NUMBER SIGHTINGS
005	Delphinus sp.	1
013	Stenella coeruleoalba	13
016	Delphinus capensis	3
017	Delphinus delphis	22
018	Tursiops truncatus	2
021	Grampus griseus	3
022	Lagenorhynchus obliquidens	3
037	Orcinus orca	1
046	Physeter macrocephalus	4
049	ziphiid whale	1
070	Balaenoptera sp.	1
073	Balaenoptera borealis	1
074	Balaenoptera physalus	2
076	Megaptera novaeangliae	1
077	unid. dolphin	3
078	unid. small whale	1
177	unid. Small delphinid	4
	TOTAL	64

Seabird Observations (Michael Force, Dawn Breese)

Leach's Storm-Petrels and Red Phalaropes, our bread and butter in the offshore pelagic habitat, dominated the scene. What would we do without them? Fifty-five percent of the 672 birds we recorded in our strip transect were these hardy denizens of remote offshore waters; one day the percentage was as high as 86%. One might be forgiven for assuming we didn't see much else. On the contrary, we found 34 species of birds, close to the average of our previous six reports, even though the daily average of eight species ties our lowest daily average. That's the way it is out here: relatively low abundance and diversity. Nevertheless, there were many highlights these past 11 days including single Murphy's, Hawaiian, and Stejneger's Petrels (the Murphy's Petrel is only the second of the cruise; the previous sighting was in early August); several Cook's Petrels; two Laysan Albatrosses; and two Brown Boobies. Six Northern Fulmars is a fairly high count this far south, and corresponds with relatively high numbers currently being seen off San Diego. The status of Red-tailed Tropicbird is poorly known off southern California. With scant baseline data, it's hard to know whether 14 represents a high count. Regardless, seeing 11 on a single day in the subtropical eastern Pacific Ocean is quite remarkable. An immature Peregrine Falcon visited the ship one morning

about 250 nautical miles west, southwest of San Miguel Island. It arrived too early to snack on the Palm Warbler that showed up the following day. There wouldn't have been much for the falcon though, considering the emaciated condition this lost eastern Passerine was in. With nothing for the warbler to eat, it perished the following day.

Working the far southwestern portion of the study area, we had to ask ourselves: Were all the Leach's Storm-Petrels (Oceanodroma leucorhoa) we saw actually Leach's Storm-Petrels? The Southern California Bight is visited by two, possibly three, southern subspecies of Leach's Storm-Petrel, which breed on rocky islets off Isla Guadalupe and coastal Baja California. The identification, taxonomic status, and at-sea range of these taxa are poorly known. In fact, they may all represent separate species. We saw several of the dark-rumped form, "Chapman's" Storm-Petrel (Oceanodroma [leucorhoa] chapmani) and at least 75 of the white-rumped form "Townsend's" Storm-Petrel (Oceanodroma [leucorhoa] soccoroensis). In the photo, the bird on the right is clearly smaller, darker, and has a smaller bill, than the typical Leach's Storm-Petrel on the left. These characters all support the identification of this bird, rescued off the deck during night operations, as "Townsend's" Storm-Petrel. Cruises such as ours, working waters rarely visited, provide excellent opportunities to gather valuable temporal and spatial data on this complex situation.

Biopsy Sampling (Juan Carlos Salinas, Suzanne Yin, Adam Ü)

Cruise 1647 Mid-Leg IV Cetacean Biopsy Report for 10/22/2014 to 11/2/2014

Species	Common Name	# Samples 10/22-11/2	# Takes 10/22-11/2	Total Samples	Total Takes
Balaenoptera borealis	Sei whale	0	0	2	7
Balaenoptera musculus	Blue whale	0	0	2	3
Balaenoptera physalus	Fin whale	0	0	11	36
Bryde's/Sei/Fin whale	Bryde's/Sei/Fin whale	0	0	1	2
Delphinus capensis	Long-beaked common dolphin	4	4	11	13
Delphinus delphis	Short-beaked common dolphin	5	15	105	197
Feresa attenuata	Pygmy killer whale	0	0	2	4
Globicephala macrorhynchus	Short-finned pilot whale	0	0	7	15
Lagenorhyncus obliquidens	Pacific white-sided dolphin	8	8	38	65
Lissodelphis borealis	Northern right whale dolphin	0	0	23	49
Megaptera novaeangliae	Humpback whale	0	0	1	2
Phocoenoides dalli	Dall's porpoise	0	0	16	21

Physeter macrocephalus	Sperm whale	0	1	4	5
Stenella coeruleoalba	Striped dolphin	3	7	9	14
Tursiops truncatus	Bottlenose dolphin	8	12	8	12
Unid squid Architeuthis sp	Giant squid	0	0	1	1
	Grand Total	**28**	**47**	**241**	**446**

Cetacean Photographic Sampling (Paula Olson, Adam Ü, Jim Gilpatrick, Suzanne Yin, Lilian Carswell, Brittany Hancock-Hanser)

Four individual killer whales were photo-identified from the feeding group observed on 02 November: two adult males and two whales of undetermined sex. The whales' external characteristics – saddle patch pigmentation, dorsal fin shape -were not consistent with known eco-type populations (i.e. Resident, Transient, Offshore) found in more coastal waters in the northeast Pacific. The whales we observed were more similar to whales seen in the eastern tropical Pacific but an initial comparison of photographs from killer whales from that region did not yield any matches. The saddle patches of three of the whales were narrower than those seen on whales from the known populations in the NE Pacific. All of the saddle patches were brighter than many whales observed in the eastern tropical Pacific or in Hawaiian waters (where saddle patches can be almost non-existent). The dorsal fin shapes were most similar to Transient-type killer whales from the NE Pacific but the atypical saddle patches ruled out the possibility that these whales were from a known Transient population. All four whales exhibited scars from cookie-cutter shark bites, indicating that they spend some time in the warm, pelagic waters that the sharks inhabit. Whales from the coastal NE Pacific populations do not carry these scars. For the moment, the population identity of the whales that we observed remains a mystery.

Adult male with cookie-cutter scars visible on the leading edge of the dorsal fin and in the middle of the white saddle patch (Taylor)

			22 Oct-02 Nov 2014		Cruise totals to-date	
Species Code	Scientific Name	Common Name	# Sightings	# Photos	Total Sightings	Total Photos
13	*Stenella coeruleoalba*	Striped dolphin	9	305	19	822
16	*Delphinus capensis*	LB common dolphin	3	129	9	313
17	*Delphinus delphis*	SB common dolphin	18	576	99	3822
18	*Tursiops truncatus*	Bottlenose dolphin	1	242	3	396
21	*Grampus griseus*	Risso's dolphin	3	59	8	451
22	*Lagenorhynchus obliquidens*	Pacific white-sided dolphin	3	107	12	238
27	*Lissodelphis borealis*	Northern right whale dolphin			6	576
32	*Feresa attenuata*	Pygmy killer whale			1	283
36	*Globicephala macrorhynchus*	Short-finned pilot whale			3	1861
37	*Orcinus orca*	Killer whale	1	986	2	1234
40	*Phocoena phocoena*	Harbor porpoise			1	27
44	*Phocoenoides dalli*	Dall's porpoise			10	121
46	*Physeter macrocephalus*	Sperm whale	1	236	7	1931
49	*Ziphiid whale*	Unidentified beaked whale			1	49
63	*Berardius bairdii*	Baird's beaked whale			4	620
70	*Balaenoptera sp.*	Unidentified rorqual			7	186
71	*Balaenoptera acutorostrata*	Common minke whale			1	2
72	*Balaenoptera edeni*	Bryde's whale			1	19
73	*Balaenoptera borealis*	Sei whale	1	49	9	1414
74	*Balaenoptera physalus*	Fin whale	1	86	64	8207
75	*Balaenoptera musculus*	Blue whale			17	1851
76	*Megaptera novaeangliae*	Humpback whale			16	396
99	*Balaenoptera borealis/edeni*	Sei/Bryde's whale			4	179
199	*B. physalus/borealis/edeni*	Fin/Sei/Brydes whale			3	175

Individual ID's	22 Oct-02 Nov 2014	Cruise totals to-date
SF pilot whale		7
Killer whale	4	5
Sperm whale flukes		6
Sei whale		8
Fin whale		50
Blue whale		14
Humpback flukes		9

Oceanography (Alex McHuron, Megan Stoltzfus, Brittany Hancock-Hanser, Sarah Mesnick and Dawn Breese)

Night ops by Alex and Megan ran smoothly, with successful CTD casts and bongo and vertical tows when weather permitted. Weather, however, has been hit or miss. Since the beginning of Leg 4, we have been able to attempt night ops on only six of twelve nights. Time allowed for one night of "squidding" with no success, but we are looking forward to more opportunities during the remainder of the survey. Brittany and Sarah are taking charge of the daily XBT drops and Dawn covered the first of three XBT drops concurrent with the evening CTD cast.

Throughout the first half of Leg 4, surface water temperatures have generally remained high, 21.5 - 24.6°C (CTD temperatures) except for the two most northerly XBT stations during which temperatures fell to 17.7° C, coincident with our killer whale and Laysan albatross sightings on the last day of this report, 2 November 2014.

A special thank you to the Ocean Starr's night crew including Armando, Jason, Jose and Mo for all their help in ensuring the night operations were a success.

Totals for Leg 4

XBTs = 40

Bongo Net tows = 7

Vertical Net tows = 7

CTD casts = 6

Acoustics (Emily Griffiths, Jennifer Keating and Eric Keen)

The acoustic component of this survey is comprised of three main parts. Chiefly, the bulk of our time is spent monitoring the live feed from the towed hydrophone array 300m behind the Ocean Starr. We not only detect vocalizing animals this way, we can localize their whereabouts as we travel down the transect line. Secondly, we are launching nightly sonobuoy stations, as well as opportunistic buoys during daytime sightings of high priority species (e.g. Bryde's and fin whales). And lastly, we are deploying new autonomous free-floating recording devices, known as DASBRs, to monitor the ocean soundscape at 100 meters depth without constant boat noise interference.

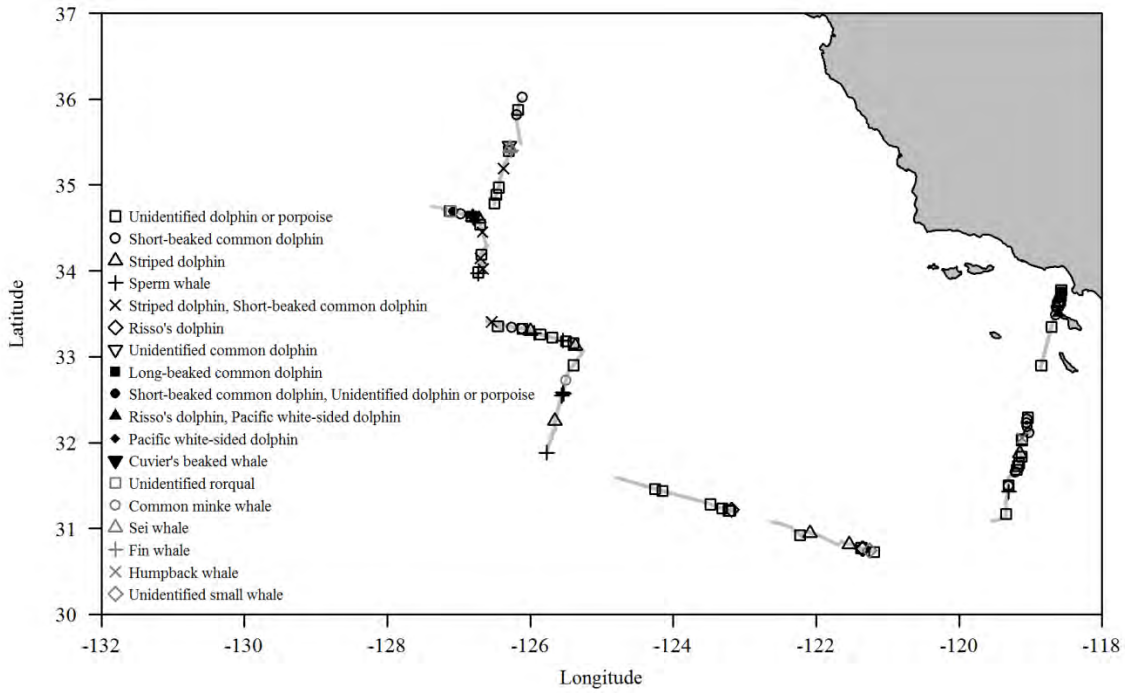


Figure 1. Map of total acoustic detections for Leg 4 so far. The legend is ranked by number of acoustic detections. Distance traveled: 1338.6km.

We have had a very productive start to leg 4! After only 10 days (84 hours) on effort we have collected over 80 acoustic detections. Our most common animal detected has been unidentified dolphin; however we have had many detections of short-beaked common dolphins, striped dolphins, and sperm whales. Of the eleven sonobuoy stations completed we have been able to capture some Sei whale vocals, killer whale whistles fresh after a marine mammal kill, and some other very interesting vocals yet to be assigned to an animal.

Table 1. Sonobuoy summary table, estimated detections.

Leg 4	Blue	Fin	Sei	Humpback	Bryde's	Sperm	Killer
definite	6	4	1	1	0	1	1
probable	0	1	0	0	0	0	0
possible	0	1	2	2	1	0	2

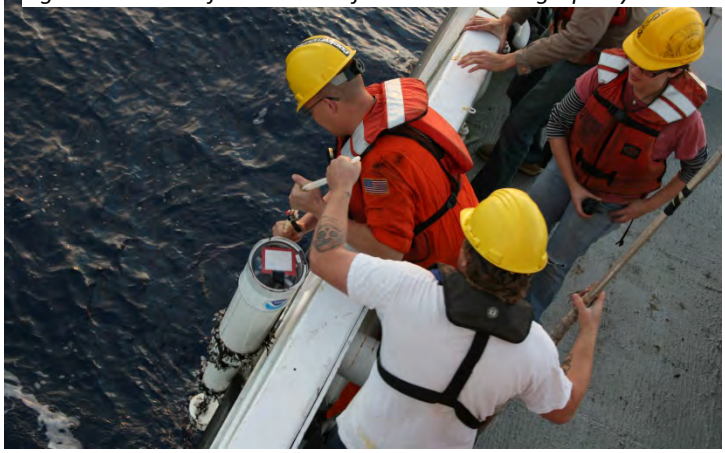
Table 2. Summary of visual sightings and acoustic detections.

Species Name	Total Detections	Vocal	Not Vocal	% Vocal
Unid. dolphin	48	43	5	90%
Short-beaked common dolphin	13	12	1	92%
Striped dolphin	8	8	0	100%
Sperm whale	8	8	0	100%
Striped & Short-beaked common dolphin	5	5	0	100%
Risso's dolphin	3	2	1	67%
Unidentified common dolphin	1	1	0	100%
Long-beaked common dolphin	1	1	0	100%
Short-beaked common & Unid. dolphin	1	1	0	100%
Risso's & Pacific white-sided dolphin	1	1	0	100%
Pacific white-sided dolphin	1	0	1	0%
Cuvier's beaked whale	1	0	1	0%

Species Name	Total Detections	Vocal	Not Vocal	% Vocal
Unid. rorqual	1	0	1	0%
Common minke whale	1	1	0	100%
Sei whale	1	0	1	0%
Fin whale	1	0	1	0%
Humpback whale	1	0	1	0%
Unid. small whale	1	0	1	0%
Overall	97	83	14	58%

We also had a successful DASBR deployment and retrieval. Six days after sending out a freshly revamped DASBR3 on its second voyage from the Ocean Starr we picked up DASBR1, which had been deployed from our ship on August 8th, during leg 1. DASBR1 travelled in gyros in and out of our study area until October 30th, when we picked it up 39.54 nautical miles west of where we had dropped it off.
This unit was retrieved intact and containing data! Preliminary analysis is still running, but this DASBR unit successfully recorded within the epipelagic zone, 350 miles off our coast.

Figure 2. Successful retrieval of DASBR1. Photograph by Sarah Mesnick.



Acknowledgments

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The crew of the *R/V Ocean Starr* have been extraordinarily helpful and delightful to sail with. We gratefully acknowledge their critical support.

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