California Current Cetacean & Ecosystem Survey (CalCurCEAS):

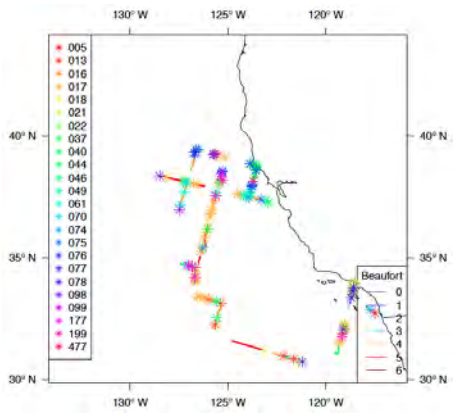
End of Leg 4 Report: 3 November – 12 November, 2014

Barbara L. Taylor, Cruise Leader

Synopsis (Barbara L. Taylor)

Leg 4 tracklines planned above and achieved below with sightings as asterisks

This report marks the end of Leg 4 of this 5-leg, 120-sea day survey of cetaceans and the ecosystem of the California Current. Leg 4 covered all the planned trackline and most in unexpectedly good weather. The second half of this leg was a thorough sampling from the coast out to deep offshore waters in the area just north of San Francisco. Waters were colder in this area with most temperatures around 17C and one cold snap of 13C next to the coast in the only waters not too hot for harbor porpoise.



Common dolphins were indeed common with quite a few schools numbering over 1,000 individuals. Most would find it hard to believe that we might get tired of such beautiful animals but believe it or not counting a single school that ranges over 5 miles of ocean is actually mentally taxing. We were quite ready to move on.

Short-beaked common dolphins (photo Jim Gilpatrick)

Another several hour, long encounter was a 20, mile long stretch of sperm whales comprised single animals that didn't like to get closer to one another than about 5 miles. The acoustics team really was the only way to cover these singletons most of whom were diving for 50+ minutes (and clicking that entire time) and then coming to the surface for about 5 minutes (see acoustic report for the crazy map of this encounter).

Sperm whale (photo: Paula Olson)

This leg was lucky to have 3 killer whale sightings that were all fascinating. In our last episode, we related our first sighting where we witnessed the end of a kill and collected the lungs and heart of the victim of unknown species. We knew these whales were not the usual suspects because they matched no whales in catalogs we carry on the ship of the mammal, eating type (Transient killer whales). With the aid of Alisa Schulman-Janiger we now know that they don't

match any whales from this area including some whales photographed on a cruise in 1997 killing sperm whales that had similar numbers of scars from cookie cutter sharks. They continue to be mystery whales.

Offshore killer whale (photo Adam U)

The middle sighting was identified as Offshore-type whales (thanks to Graeme Ellis who identified the individual in the photo). Less is known about these whales than the Transients or Residents (salmon lovers) but they do seem to eat fish. Indeed, these whales were chasing long slender fish like the Pacific saury caught that night in our bongo-net tow (see photo in Oceanography section).

Our last sighting of killer whales no kill was seen, but an adult male was carrying some red meat and there were many birds including one that stole our biopsy sample right out of the floating biopsy bolt! We expect that these killer whales are Transient killer whales, but that is yet to be confirmed. This was the last sighting of Leg 4 and there was much celebration by whales and scientists alike.

Killer whale (photo Paula Olson)

As the departing chief scientist my sincere thanks goes to this dedicated and extremely skilled team of scientists. Every person worked long hours, saw what needed doing and got it done professionally. An honor to work with all of you and many thanks for your service to marine science and conservation.

Leg 4 scientists: Adam Ü, Jim Gilpatrick, Jennifer Keating, Sarah Mesnick, Mike Force, Barb Taylor, Dawn Breese, Megan Stoltzfus, Brittany Hancock-Hanser, Suzanne Yin, Lilian Carswell, Paula Olson, Alex McHuron, Juan Carlos Salinas, Eric Keen, Emily Griffiths

The survey is truly a team effort made possible by the crew of the R/V Ocean Starr that continues to make every leg a success. Keeping the old girl (the Ocean Starr) running beautifully even in a few rough storms takes constant care and vigilance. And of course, good food makes for happy sailors and we had outstanding fare. 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.

SEARCH EFFORT BY DAY

Date	Start Time Stop	Latitude	Longitude	Total Miles Searched	Average Beaufort
110314	0651	N36:39.25	W125:55.62	52.3 nmi	4.0
	1501	N37:39.74	W125:35.93	20.4 nmi	2.4
	1622	N38:33.93	W125:16.20		
110514	1159	N39:06.79	W125:09.96	6.8 nmi	2.4
	1643	N39:13.67	W125:45.17		
110614	0702	N39:21.04	W126:18.21	58.4 nmi	3.6
	1717	N38:35.02	W126:54.41		
110714	0701	N38:04.10	W127:05.77	65.5 nmi	3.9
	1623	N36:52.85	W127:28.85		
110814	0710	N38:21.95	W128:32.79	64.8 nmi	5.0
	1656	N38:05.85	W127:04.83		
110914	0707	N38:03.17	W126:51.51	28.4 nmi	5.0
	1102	N37:55.80	W126:11.77		
111114	0957	N38:43.60	W123:32.76	61.6 nmi	3.1
	1627	N37:54.42	W123:47.31		
111214	0659	N37:36.53	W124:31.25	33.6 nmi	2.9
	1548	N37:51.58	W123:47.90		

CODE	SPECIES	TOTAL NUMBER SIGHTINGS
013	Stenella coeruleoalba	3
017	Delphinus delphis	23
022	Lagenorhynchus obliquidens	1
037	Orcinus orca	1
040	Phocoena phocoena	4
044	Phocoenoides dalli	5
046	Physeter macrocephalus	5
049	ziphiid whale	3
049	Ziphius cavirostris	2
070	Balaenoptera sp.	6
073	Balaenoptera borealis	1
074	Balaenoptera physalus	2
075	Balaenoptera musculus	6
076	Megaptera novaeangliae	6
077	unid. dolphin	1
078	unid. small whale	1
098	Unid. whale	1
099	Balaenoptera borealis/edeni	2
177	unid. small delphinid	4
477	Unid. porpoise	1
	TOTAL	77

Seabird Observations (Michael Force, Dawn Breese)

Perched on the flying bridge of the R/V Ocean Starr, we have front row seats for the march of fall towards winter. Yes, that's right—winter. Day by day, austral migrants such as Pink-footed Shearwater, so abundant during the summer and early fall months, dwindle to a trickle as the majority rush south to begin a new breeding season on Chilean islands. Jaegers and phalaropes, once so widespread, are now becoming scarce. Red Phalarope, normally reaching triple digits, were down to only 78. The one constant from week to week is Leach's Storm-Petrel, the most abundant bird offshore during this reporting period, followed closely by Cassin's Auklet. Northern Fulmar, a boreal breeder moving south to escape the harsh winter realities of the Gulf of Alaska, is now fairly common. We found another Black-legged Kittiwake (only our second for the cruise), six Laysan Albatrosses, seven Mottled Petrels (first for the cruise), and flocks of southbound Brant, all indications that winter is just around the corner. During the past 10 days we found 37 species, 1341 individuals, 46% being Leach's Storm-Petrel and Cassin's Auklet. Our daily species total (daily average 11) ranged from six to a whopping 24, tying our second highest daily tally set on 13 August! The wide range reflects the stark differences between nearshore and offshore aquatic habitats.

Laysan albatross (photo Mike Force)

Helping to clarify the status of Stejneger's Petrel in California waters was one seen in a feeding flock that included six Cook's Petrels, about 177 nautical miles southwest of Point Arena. Although we have seen seven of these attractive Pterodroma petrels, only two have been within US Territorial waters. Other highlights include a Brown Booby, a holdover from this fall's unprecedented northward dispersal, and a couple of lost, (and quite late!) songbirds: an Orange-crowned Warbler, and a Yellow-rumped (Myrtle) Warbler. We were fairly close to shore when we saw them and perhaps that explains why they didn't linger. We hope their outlook for survival was better than that of the Palm Warbler that visited the ship late last month. Three other lost songbirds far offshore elected not to visit the ship. We know neither their fate nor identity.

For those keeping track, on this fourth leg of the survey we found 50 species, 1998 birds. Many thanks to the mammal observers on the 25x binoculars who alerted us to distant seabirds we would not have otherwise detected.

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

Cruise 1647 End Leg IV Cetacean Biopsy Report for 11/3/2014 to 11/12/2014

Species	Common Name	# Weekly Samples	# Weekly Takes	Total Samples	Total Takes
Balaenoptera borealis	Sei whale	0	0	2	7
Balaenoptera musculus	Blue whale	1	1	3	4
Balaenoptera physalus	Fin whale	0	1	11	37
Bryde's/Sei/Fin whale	Bryde's/Sei/Fin whale	0	0	1	2
Delphinus capensis	Long-beaked common dolphin	0	0	11	13
Delphinus delphis	Short-beaked common dolphin	21	31	126	228
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	0	0	38	65
Lissodelphis borealis	Northern right whale dolphin	0	0	23	49
Megaptera novaeangliae	Humpback whale	0	0	1	2
Orcinus orca	Killer whale	1	9	1	9
Phocoenoides dalli	Dall's porpoise	0	0	16	21
Physeter macrocephalus	Sperm whale	2	3	6	8
Stenella coeruleoalba	Striped dolphin	0	0	9	14
Tursiops truncatus	Bottlenose dolphin	0	0	8	12
Unid squid Architeuthis sp	Giant squid	0	0	1	1
	Grand Total	**25**	**45**	**266**	**491**

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

			03-12 Nov 2014		Cruise totals to-date	
Species Code	Scientific Name	Common Name	# Sightings	# Photos	Total Sightings	Total Photos
13	*Stenella coeruleoalba*	Striped dolphin	2	4	22	827
16	*Delphinus capensis*	LB common dolphin			9	313
17	*Delphinus delphis*	SB common dolphin	18	527	117	4325
18	*Tursiops truncatus*	Bottlenose dolphin			3	396
21	*Grampus griseus*	Risso's dolphin			8	451
22	*Lagenorhynchus obliquidens*	Pacific white-sided dolphin	1	6	13	244
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	478	3	1712
40	*Phocoena phocoena*	Harbor porpoise			1	27
44	*Phocoenoides dalli*	Dall's porpoise			10	121
46	*Physeter macrocephalus*	Sperm whale	3	327	10	2258
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	2	166	11	1580
74	*Balaenoptera physalus*	Fin whale	1	228	65	8435
75	*Balaenoptera musculus*	Blue whale	5	1001	22	2852
76	*Megaptera novaeangliae*	Humpback whale	4	53	20	449
99	*B. borealis/edeni*	Sei or Bryde's whale	2	21	6	200
199	*B. physalus/borealis/edeni*	Fin/Sei/Brydes whale	1	19	4	194

Individual ID's	03-12 Nov 2014	Cruise totals to-date
SF pilot whale		7
Killer whale	5	10
Sperm whale flukes	5	11
Sei whale		8
Fin whale		50
Blue whale	3	17
Humpback flukes	3	12

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

Night operations by Alex and Megan ran smoothly for the most part when time and weather has permitted. Since mid-cruise, we were able to complete seven out of a possible eleven nights of night operations. Time did not allow for any "squidding" during the second half of Leg 4. The bongo tows were highlighted by creatures such as salps (*Pagea conofoederata*) and Pacific saury (*Cololabis saria)*. Brittany and Sarah completed the series of daily XBT drops and Dawn covered the last two of three XBT drops concurrent with the evening CTD casts. On 12 November, the Temperature-Salinity-Graph (TSG) gave out a cryptic error message that was traced back to a computer glitch and fixed by our intrepid birders and the Ocean Starr's star engineers, Rick Wallace and Jerry Taylor.

Pacific saury, Cololabis saria, bongo tow

We spent the second half of Leg 4 surveying the waters between 39.25 °N (the latitude of Pt. Pinos, at the southern end of Monterey Bay) and 39.25°N (the latitude of Ft. Bragg) and out 225 nm. Sea surface temperatures in the survey area fluctuated between 16.5°C – 18.5°C for the most part. On 11 November, our waypoint brought us within 1 nm of the coast near Gualala, CA. Among the Leg's only sightings of harbor porpoise, we recorded our lowest temperatures by far, a chilly 13.5 °C.

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

Totals for Leg 4

XBTs = 37

Bongo Net tows = 7

Vertical Net tows = 7

CTD casts = 7

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.

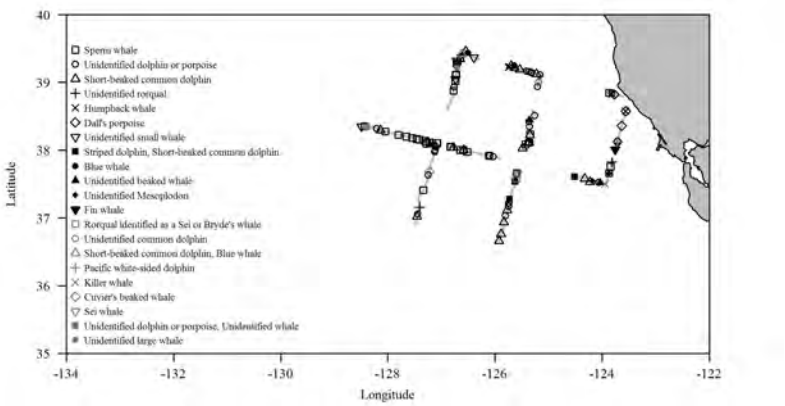


Figure 1. Map of total acoustic detections for the second half of Leg 4 (Nov. 3 - 12). The legend is ranked by number of acoustic detections. Distance traveled: 1105.5 km.

We have had a very productive finish to leg 4! In the final 9 days (72 hours) on effort we have collected over 121 acoustic detections (Fig. 1 & Table 1). Our most common animal detected during the second half of leg 4 was sperm whales, which had up to seven animals vocalizing at the same time (Fig.2).

Of the eleven sonobuoy stations completed we have been able to capture some additional sperm whales and killer whales (Table 2). Also it allowed us to detect long range blue and fin whales what would not have been possible with the towed array alone.

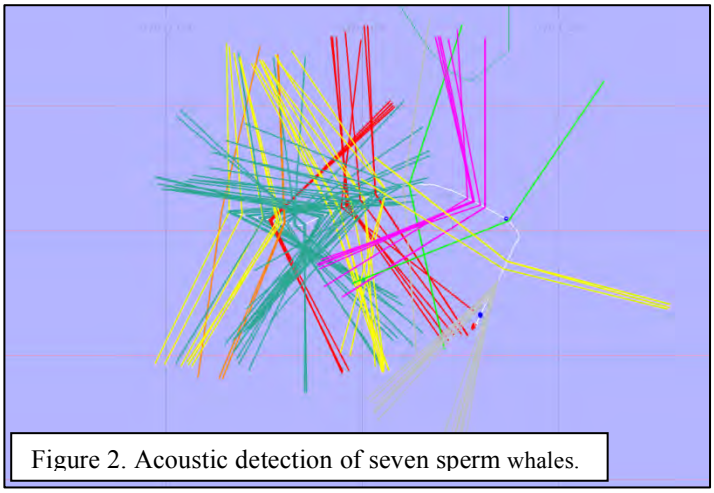


Figure 2. Acoustic detection of seven sperm whales.

Table 1. Summary of visual sightings and acoustic detections.

		# of Schools		
Species Name	**Total Detections**	**Vocal**	**Not Vocal**	**% Vocal**
Sperm whale	37	35	2	95%
Unid. dolphin	28	26	2	93%
Short-beaked common dolphin	21	20	1	95%
Unid. rorqual	4	0	4	0%
Humpback whale	4	0	4	0%
Dall's porpoise	4	1	3	25%
Unidentified small whale	4	3	1	75%
Striped & Short-beaked common dolphin	3	3	0	100%
Blue whale	2	0	2	0%
Unid. beaked whale	4	0	4	0%
Fin whale	1	0	1	0%
Rorqual identified as a Sei or Bryde's whale	1	0	1	0%
Unid. common dolphin	1	1	0	100%
Short-beaked common dolphin & Blue whale	1	1	0	100%

Species Name	# of Schools Total Detections	Vocal	Not Vocal	% Vocal
Pacific white-sided dolphin	1	1	0	100%
Killer whale	1	1	0	100%
Cuvier's beaked whale	1	0	1	0%
Sei whale	1	0	1	0%
Unid. Dolphin & Unid. whale	1	1	0	100%
Unid. large whale	1	0	1	0%
Overall	121	93	28	47%

Table 2. Sonobuoy summary table, estimated detections.

Leg 4	Blue	Fin	Sei	Humpback	Bryde's	Sperm	Killer
definite	5	1	0	2	0	2	1
probable	0	4	1	1	0	0	0
possible	0	0	2	0	0	0	0

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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