California Current Cetacean & Ecosystem Survey (CalCurCEAS): Mid-Leg Report: 17 November – 28 November, 2014 (Leg 5)

Synopsis (Karin Forney, Cruise Leader)

Passing under the Golden Gate bridge (Photo: K. Forney)

On Monday, November 17th the R/V *Ocean Starr* passed under the Golden Gate Bridge on a clear, sunny San Francisco day to begin Leg 5 – our final segment of CalCurCEAS. We've had an eventful 12 days off central and southern California as we continue this survey of cetaceans and the ecosystem of the California Current. Several new (and returning) team members joined the cruise in San Francisco: Scott Benson and Morgane Lauf (flying bridge observers), Nicky Beaulieu and Arial Brewer (acousticians), Lori Beraha and Morgan Richie (independent observers), Morgan Arrington and Camillo Saavedra (oceanography sampling), and Karin Forney (cruise leader). The abundance of Morgans aboard ship has required us to rename two of our team members: Morgan-ee (Lauf), and Turbo (Morgan Arrington). During the past 12 days we have completed nearshore and offshore transects from San Francisco to southern California (Figure 1).

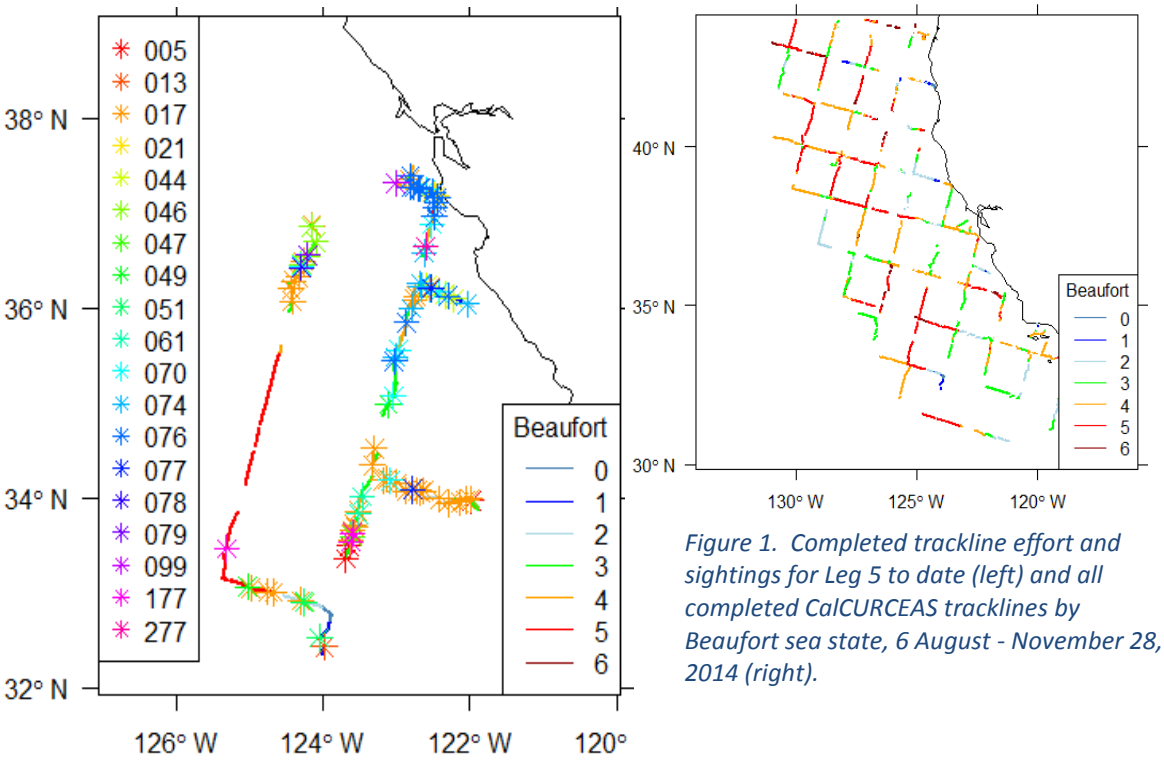

Figure 1. Completed trackline effort and sightings for Leg 5 to date (left) and all completed CalCURCEAS tracklines by Beaufort sea state, 6 August - November 28, 2014 (right).

We have encountered a wide array of species, including sperm whales in offshore waters; fin and humpback whales in nearshore waters; a minke whale; elusive Cuvier's beaked whales, *Mesoplodon* beaked whales, and pygmy sperm whales; and an assortment of striped dolphins, Risso's dolphins, and many, many (too many?) short-beaked common dolphins. Several of the short-beaked common dolphin schools included individuals with a darker coloration pattern (see photo).

Short-beaked common dolphins with normal (front) and dark (rear) coloration pattern (Photo:M. Force)

On Nov 21, we found ourselves in the midst of several subgroups of sperm whales. This species echolocates (clicks) nearly continuously when diving, and the animals were first detected acoustically at the start of effort. We remained in the area for about 90 minutes to wait for the whales to surface and then monitor all subgroups to obtain a reliable estimate of the total number of animals present. Several of the subgroups included young calves, which are always a treat to see (see photo).

Adult sperm whales with calf in foreground (top), and small sperm whale calf observed on 21 November 2014 within a scattered aggregation of many sperm whales (Photos: P. Olson, M. Richie)

While offshore we also encountered several groups of beaked whales (Cuvier's and *Mesoplodon* spp.), as well as two groups of pygmy sperm whales. All of these deep-diving species are difficult to detect unless seas are quite calm. We remained with one group of *Mesoplodon* beaked whales for about two hours, observing four surfacings (separated by 28-minute dives) as we tried to obtain acoustic recordings. Unfortunately, the animals did not appear to initiate a deep foraging dive that would have produced echolocation clicks. However, the nice weather that day also allowed us to document an interesting patch of juvenile loggerhead turtles (see photo), centered at about 32.5° N latitude and 124° W longitude.

Juvenile loggerhead turtle (about 25cm diameter). (Photo: P. Olson)

Lastly, on a more personal note -- the first half of our leg included Thanksgiving, a holiday that most of us spend with our families (and generally eating too much…). Out here aboard a research vessel for nearly four weeks, we tend to become our own family of sorts, and our stewards Crystal and Justice put together an amazing Thanksgiving dinner meal for us all – complete with (non-alcoholic) strawberry mojitos and three different types of pie. It was a delicious feast! Thank you!

<u>Marine Mammal Observations</u> (Paula Olson, Juan Carlos Salinas, Suzanne Yin, Jim Gilpatrick, Scott Benson, Morgane Lauf, Morgan Richie, Lori Beraha, Karin Forney)

Search Effort by Day

Date	Time Start	End	Latitude	Longitude	Nautical Miles Surveyed	Average Beaufort
111714	1538	1654	N37:30.22	W122:45.41 W122:48.91	11.9 nmi	3.8
111814	0657	1538	N36:32.84	W122:37.95 W123:00.40	55.9 nmi	4.0
112014	0723	1552	N36:01.07	W121:56.33 W122:47.43	38.7 nmi	2.5
112114	0705	1654	N36:52.93	W124:08.34 W124:28.15	39.9 nmi	3.0
112214	0710	1705	N35:35.95	W124:33.83 W125:03.03	83.6 nmi	5.0
112314	0708	1700	N33:51.30	W125:08.87 W124:39.90	69.8 nmi	5.0
112514	0702	1658	N35:58.12	W122:49.43 W123:10.80	63.0 nmi	3.4
112614	0703	1653	N34:11.22	W123:11.97 W121:52.56	45.7 nmi	2.3
112714	0703	1703	N34:31.47	W123:18.14 W123:41.11	51.7 nmi	3.1
112814	0659	1706	N32:21.18	W124:00.38 W124:32.67	54.0 nmi	1.2

Number of Cetacean Sightings by Species

CODE	SPECIES	TOT#
005	Delphinus sp.	4
013	Stenella coeruleoalba	5
017	Delphinus delphis	34
021	Grampus griseus	3
044	Phocoenoides dalli	3
046	Physeter macrocephalus	4
047	Kogia breviceps	2
049	ziphiid whale	2
051	Mesoplodon sp.	2
061	Ziphius cavirostris	2
070	Balaenoptera sp.	9
071	Balaenoptera acutorostrata	1
074	Balaenoptera physalus	6
076	Megaptera novaeangliae	14
077	unid. dolphin	4
078	unid. small whale	1
079	unid. large whale	1
098	unid. whale	2
099	Balaenoptera borealis/edeni	1
177	unid. small delphinid	2
277	unid. medium delphinid	1
	TOTAL	103

Seabird Observations (Michael Force, Dawn Breese)

Taking a quick look at the first 12 days of Leg 5, our daily effort appears to change very little. It feels as if winter is almost upon us—mostly California, Herring and Western Gulls, Cassin's Auklets, Northern Fulmars and, of course, Leach's Storm-Petrels. We certainly weren't breaking any daily species records! In fact, some days seemed below average and rather mundane. Yet, our daily average for the first half of leg 5 was 11 species, exactly what our daily average has been when averaged over the entire cruise. However, our species total was an impressive 43, slightly above the average of 37. But, it WAS slow. Looking at daily abundance, the number of birds we saw each day dipped down to 96 birds, our lowest of the cruise. The bottom line: decreased abundance but high diversity. Rather than two to four species being numerically dominant,

Juvenile Long-tailed Jaeger (Photo: M. Force)

we “spread the wealth around” so to speak, with 30 species being represented by less than ten individuals.

There are a plethora of highlights among the 43 species we found this reporting period. We saw our first Thayer’s Gull for CalCurCEAS 2014, several Laysan Albatrosses, our third Flesh-footed Shearwater, a Brown Booby, a southerly Tufted Puffin (our first since mid-September), five Red-tailed Tropicbirds, a single Red-billed Tropicbird (rather unusual far off shore), and our first South Polar Skuas since the middle of October. The status of *Pterodroma* petrels off southern California this late in the year is poorly known. What is normal distribution and timing for species such as Mottled Petrel, Stejneger’s Petrel, Murphy’s Petrel and Cook’s Petrel? We saw 18 Cook’s Petrels, and four Stejneger’s Petrels, the latter considered to be extremely rare in North American waters. Even more surprising was a *Pterodroma* too far to identify. It was either a White-necked Petrel or Juan Fernandez Petrel. The jury of one is leaning towards White-necked Petrel, a central Pacific species unrecorded in North America (Juan Fernandez Petrel has never been confirmed in US waters). If only it was closer...if only it didn’t spend so much time in the trough...if only it didn’t fly into the glare. It’s the one that got away.

One unusual sighting was a domestic turkey. Unfortunately, it was DOA. Fortunately, it was well prepared by our hard-working Galley Crew and happily devoured by all for a traditional Thanksgiving feast. Thanks to Crystal and Justice for a five star dinner on Thursday!

Biopsy (Juan Carlos Salinas & Suzanne Yin)

Weekly Cetacean Biopsy Report for 11/13/2014 to 11/28/2014

Species	Common Name	# Weekly Samples	# Weekly Takes	Total Samples	Total Takes
Balaenoptera borealis	Sei whale	0	0	2	7
Balaenoptera musculus	Blue whale	0	0	3	4
Balaenoptera physalus	Fin whale	2	5	13	42
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	6	15	132	243
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	4	7	5	16
Phocoenoides dalli	Dall's porpoise	0	0	16	21
Physeter macrocephalus	Sperm whale	0	1	6	9
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	**12**	**28**	**278**	**519**

Cetacean Photographic Sampling (Paula Olson, Jim Gilpatrick, Suzanne Yin, Morgane Lauf, Morgan Richie)

Fin whale, showing diagnostic white lower right jaw. The left lower jaw is gray (Photo: P. Olson)

Individual ID's	17-28 Nov 2014	Cruise totals to-date
SF pilot whale		7
Killer whale		12
Sperm whale flukes	1	12
Sei whale		8
Fin whale	7	57
Blue whale		17
Humpback flukes		12

			17-28 Nov 2014		Cruise totals to-date	
Species Code	Scientific Name	Common Name	# Sightings	# Photos	Total Sightings	Total Photos
13	*Stenella coeruleoalba*	Striped dolphin	2	87	24	914
16	*Delphinus capensis*	LB common dolphin			9	313
17	*Delphinus delphis*	SB common dolphin	26	668	143	4993
21	*Grampus griseus*	Risso's dolphin	1	1	9	452
22	*Lagenorhynchus obliquidens*	Pacific white-sided dolphin			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			4	2954
40	*Phocoena phocoena*	Harbor porpoise			1	27
44	*Phocoenoides dalli*	Dall's porpoise			10	121
46	*Physeter macrocephalus*	Sperm whale	1	370	12	2653
47	*Kogia breviceps*	Pygmy sperm whale	1	26	1	26
49	*Ziphiid whale*	Unidentified beaked whale			1	49
51	*Mesoplodon sp.*	Unidentified Mesoplodon	1	130	1	130
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			11	1580
74	*Balaenoptera physalus*	Fin whale	6	1083	71	9518
75	*Balaenoptera musculus*	Blue whale			23	2859
76	*Megaptera novaeangliae*	Humpback whale	1	1	21	450
99	*B. borealis/edeni*	Sei or Bryde's whale			6	200
199	*B. physalus/borealis/edeni*	Fin/Sei/Brydes whale	1	44	5	238

Oceanography and Prey Sampling (Morgan Arrington, Camillo Saavedra, Dawn Breese, Scott Benson)

As we make our way south toward San Diego, Camilo Saavedra, Morgan Arrington and Dawn Breese continue to monitor the physical and biological properties of the pelagic ecosystem along our track lines. We take daily measurements of surface and sub-surface water temperature and salinity, monitor thermocline depth, and conduct nightly bongo net tows targeting the deep-scattering layer for cetacean prey organisms (weather permitting). Since the beginning of leg 5, surface temperatures have fluctuated between 15.1°C and 19.6°C as we have moved inshore/offshore and north to south. We noticed that when surface temperatures rose during days six and seven and we approached the outer edge of the California Current (CC), the flying bridge observers encountered very few cetaceans. Although we were unable to perform bongo tows on both of these nights due to weather conditions, it would have been interesting to see if there were also low densities of mid-trophic level organisms relative to the cooler waters of the CC.

Since the beginning of Leg 5, we have launched a total of 51 expendable bathythermographs (XBTs), performed six bongo tows, and jigged for squid for a total of 2.5 hours. Some of the highlights of our bongo tows so far include a dragon fish, an inch long angler fish, and an open ocean insect, *Halobates* spp. that is normally found farther south in tropical waters. We have had the opportunity to jig for squid on three nights; and although we were visited by a mako shark and caught some lovely specimens of pyrosomes (see photo), we have yet to catch any squid.

Date	XBTs	Bongo Tows
17- 28 November	51	6
Total for Leg 5	**51**	**6**

Pyrosomes caught (for caloric content analysis) during the evening of November 28th, when hundreds of individuals were observed drifting past the ship. (Photo: M. Arrington)

In addition to our standard oceanographic sampling, we have been helping to collect data for two exciting ancillary projects. During our nightly bongo tow we have been collecting a separate sample for Scott Benson, who is co-investigator of the SWFSC's leatherback turtle ecology program. A large area off California and Oregon has been designated as critical habitat for leatherback turtles under the Endangered Species Act, but there is limited information on leatherback prey species in offshore waters. Therefore, Scott is interested in collecting and analyzing the caloric content of pyrosomes— a type of large gelatinous zooplankton that may be an important pelagic prey item for leatherback turtles in this region. Our second ancillary project involves the collection of daily water samples for Scripps Institution of Oceanography Ph.D. student Eiren Jacobson. Eiren is interested in

evaluating the feasibility of using trace amounts of DNA in ocean water (also called eDNA, or environmental DNA) to survey cetacean diversity over a large geographic area. We've collected water samples near fin whales, sperm whales, short-beaked common dolphins, and also loggerhead turtles. We'll be interested to see her results as her research progresses!

Many thanks to Jose Valentin and Adam Gautney for always being willing to lend a helping hand and to the fabulous night crew on board the R/V *Ocean* Starr, who make our night operations safe and successful: Bob Overmon, Armando Urritia, and Andrew Eigenrauch.

<u>Acoustics</u> (Jennifer Keating, Nicky Beaulieu, Arial Brewer)

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.

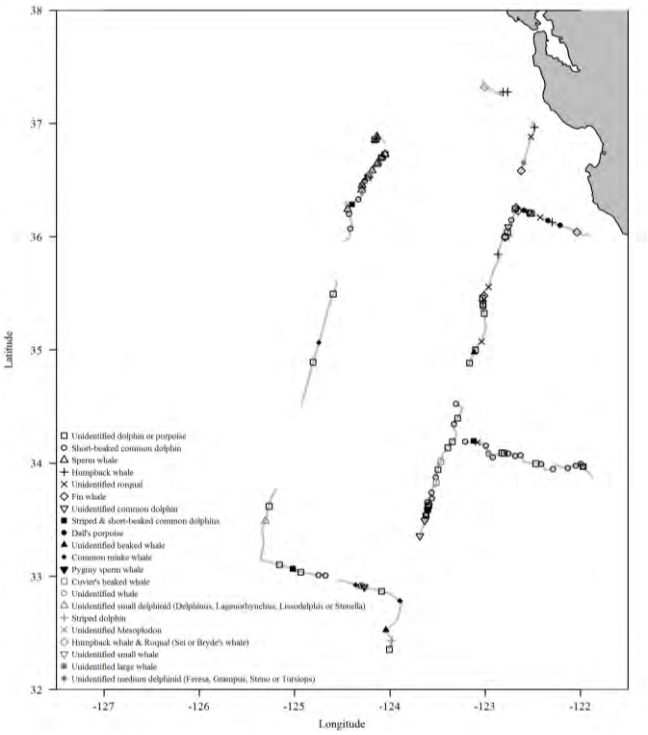

Figure 2. Map of total visual and acoustic detections for the first half of Leg 5 (Nov. 17 - 28). The legend is ranked by number of detections. Distance traveled: 1257 km (acoustic effort).

We have had a very productive first half of leg 5! In the first 11 days (78 hours) on effort we have collected 79 acoustic detections (Fig. 2 & Table 1). Our most common animals detected during the first half of leg 5 were unidentified dolphins and short-beaked common dolphins followed by sperm whales. On November 20th we successfully retrieved a DASBR that had been collecting acoustic recordings since October 10th out in the California Current. Of the nine sonobuoy stations completed we

have been able to capture some fin whale and humpback whale vocalizations during confirmed visual sightings (Table 2). They also allowed us to detect long range blue and fin whales that would not have been possible with the towed array alone.

Table 1. Summary of visual sightings and acoustic detections.

		# of Schools		
Species Name	**Total Detections**	**Vocal**	**Not Vocal**	**% Vocal**
Unid. dolphin or porpoise	33	32	1	97%
Short-beaked common dolphin	30	26	4	87%
Sperm whale	14	12	2	86%
Humpback whale	6	0	6	0%
Unid. rorqual	6	0	6	0%
Fin whale	6	0	6	0%
Unid. common dolphin	5	2	3	40%
Striped & short-beaked common dolphins	3	3	0	100%
Dall's porpoise	3	0	3	0%
Unid. beaked whale	3	0	3	0%
Common minke whale	3	2	1	67%
Pygmy sperm whale	2	0	2	0%
Cuvier's beaked whale	2	0	2	0%
Unid. whale	2	0	2	0%
Unid. small delphinid	2	1	1	50%
Striped dolphin	1	1	0	100%
Unid. Mesoplodon	1	0	1	0%
Humpback whale & Roqual (Sei or Bryde's whale)	1	0	1	0%
Unid. small whale	1	0	1	0%
Unid. large whale	1	0	1	0%
Unid. medium delphinid	1	0	1	0%
Overall	126	79	47	30%

Table 2. Sonobuoy summary table, estimated detections.

Leg 4	**Blue**	**Fin**	**Sei**	**Humpback**	**Bryde's**	**Sperm**	**Killer**
Definite	6	7	0	2	0	0	0
probable	0	0	0	1	0	0	0
possible	0	0	0	0	0	0	0

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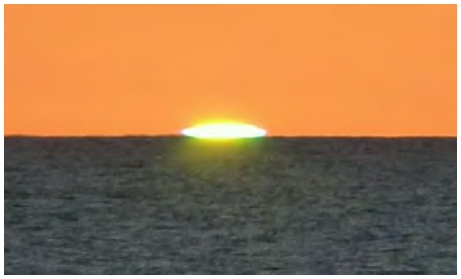

Waiting for the green flash at the end of the day on the flying bridge (Photos: A. Eigenrauch; M. Force)