California Current Cetacean & Ecosystem Survey (CalCurCEAS)
Jay Barlow, Chief Scientist
Mid-Leg Report: Aug 30 – Sep 12, 2014

Synopsis (Eric Archer, Cruise Leader)

Leg 2 of CalCurCEAS successfully left Newport, Oregon on Saturday, August 28th in semi-foggy weather. However, conditions were good enough for a second survey of the BOEM study area immediately outside of Newport Harbor. It was good that we surveyed this region because we ran across what turned out to be a well-known CA transient killer with a distinctively damaged dorsal fin, last sighted with six other whales in Johnstone Strait on 7 July. Alisa Shulman-Janiger was kind enough to provide us with the following summary of this individual's (CA217) sighting history:

> *He was first sighted off of Santa Catalina Island on 13 December 1998. He has been seen as far south as Dana Point and Laguna Beach in southern CA a few times. Nearly all of his sightings have been in Monterey Bay; he was photographed there on many days during October 2013. He was adult-sized when first seen. His dorsal fin was completely collapsed but nearly intact; he had entanglement wounds on his body and near his dorsal fin. It slowly "rotted away" over the next year until he had just half of a fin remaining; it lifted back to an upright position as its became smaller. It healed fairly well. When seen in 2007 he appeared to have suffered a recent injury to his dorsal fin from a propeller, which shredded the fin; it has not healed properly and still has lots of lice in that wound.*


Killer whale CA217, Adam Ü

We also had a sighting of what turned out to be a sei whale (*Balaenoptera borealis*), but had observers guessing for a while due to its fin-whale like lower right-side jaw coloration. We got a biopsy of this animal and will be interested to compare it's genetic markers to known sei and fin whales to see if it is potentially of hybrid origin.


Sei whale, Paula Olson

Our survey continued well for the next day until bad weather put us in station-keeping mode for a few days. This was to be a recurring pattern for the next week. When we got back to work, we were treated to two very busy sighting days. The theme of the first day was all short-beaked common dolphins (*Delphinus delphis*) all the time. During the height of the day, we would have new schools almost every 15-30 minutes, one of which was extremely large. Several of the schools even had a smattering of striped dolphins (*Stenella coeruleoalba*) mixed in to keep the observers on their toes. We were ready for more common dolphins on the following day, but after an early morning encounter with a school of pilot whales (*Globicephala macrorhynchus*), the theme changed to a full day of fin whales (*Balaenoptera physalus*) scattered along the trackline. Hard work and persistence paid off in collecting a nice trifecta of biopsies, acoustic recordings, and photos from a couple of groups. Combinations of data like this will allow us to better understand if there are multiple stocks of fin whales along the eastern north Pacific.

After another stint of windy days, we are back on effort, working our last few northern transects, about 200nm off of Oregon, before we start heading south to a well-deserved rest in San Francisco.

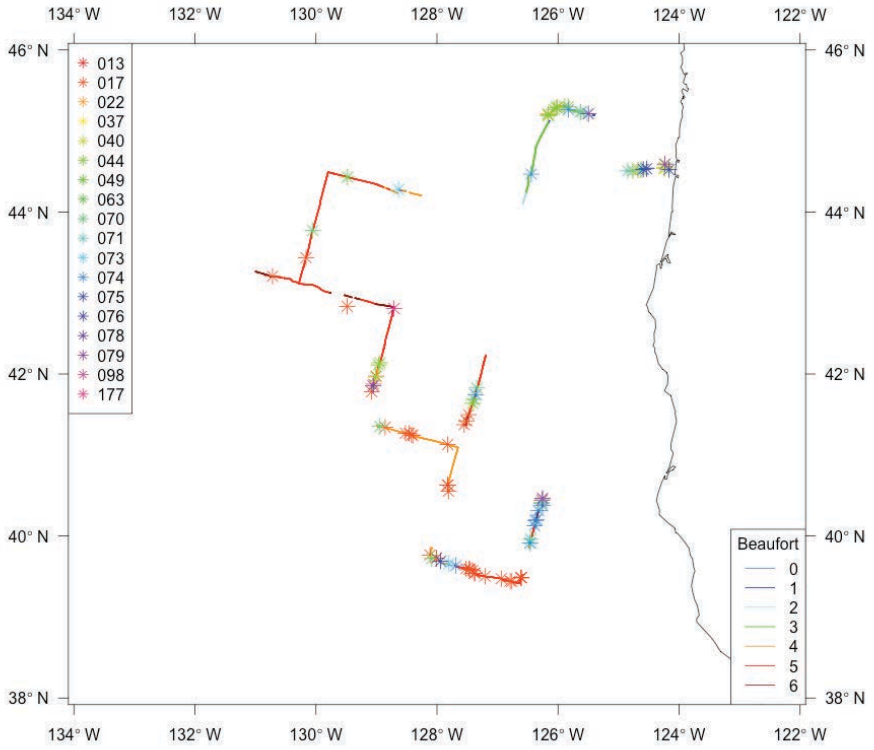
Search Effort by Day (Paula Olson, Juan Carlos Salinas, Suzanne Yin, Adam Ü, Jim Gilpatrick, Jim Caretta, Bennie Johnson, Elanor Miller, Eric Archer)

083014	0938	N44:33.53 W124:07.97	36.5 nmi	3.0
	1838	N44:30.63 W124:53.28		
083114	0634	N45:11.58 W125:24.06	84.7 nmi	2.8
	1955	N44:06.41 W126:34.72		
090114	0654	N44:12.26 W128:15.69	76.9 nmi	4.8
	2002	N44:07.69 W129:55.68		
090214	0717	N44:07.26 W129:55.40	80.9 nmi	5.1
	1806	N43:15.84 W130:59.95		
090314	0711	N43:06.71 W130:16.93	24.0 nmi	5.1
	1004	N43:00.07 W129:45.33		
090614	0717	N42:58.28 W129:31.36	89.3 nmi	4.8
	1940	N41:46.89 W129:04.73		
090714	0742	N41:21.72 W128:59.27	80.4 nmi	4.0
	1924	N40:33.14 W127:48.70		
090814	0715	N39:51.15 W128:05.14	57.0 nmi	4.8
	1908	N39:31.09 W126:35.09		
090914	0705	N39:51.30 W126:28.85	22.6 nmi	5.2
	1814	N40:28.51 W126:15.26		

091214 0917   N41:22.14 W127:33.14   48.9 nmi   5.3
        1700   N42:13.95 W127:11.42

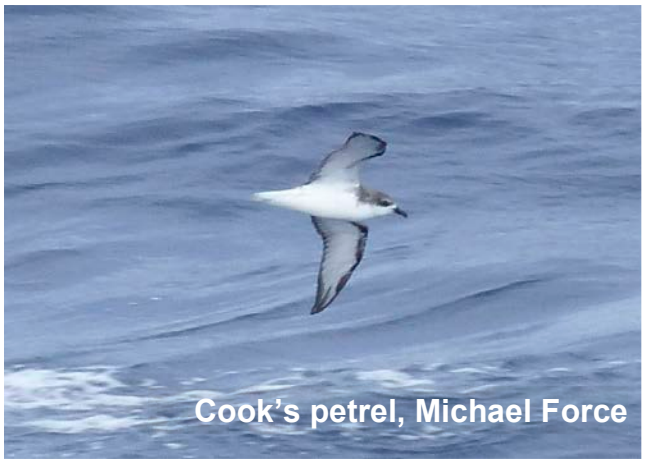
Number of Cetacean Sightings by Species

CODE	SPECIES	TOT#
013	Stenella coeruleoalba	5
017	Delphinus delphis	30
022	Lagenorhynchus obliquidens	2
036	Globicephala macrorhynchus	1
037	Orcinus orca	1
040	Phocoena phocoena	6
044	Phocoenoides dalli	13
046	Physeter macrocephalus	1
049	ziphiid whale	1
063	Berardius bairdii	1
070	Balaenoptera sp.	9
071	Balaenoptera acutorostrata	3
073	Balaenoptera borealis	2
074	Balaenoptera physalus	11
075	Balaenoptera musculus	2
076	Megaptera novaeangliae	2
078	unid. small whale	1
079	unid. large whale	2
098	unid. whale	1
177	unid. small delphinid	1
	TOTAL	95



Seabirds (Michael Force and Dawn Breese)

The seabird team recorded 33 species during the first two weeks of Leg 2, which is close to average for the northern part of the study area. As expected, the nearshore and offshore habitats exhibit large differences in overall abundance and diversity. We spent most of the past two weeks offshore where, on an exceptional day, we could find 90 birds of nine species, dominated by Arctic Terns and Leach's Storm-Petrels. More typically, however, the average was closer to seven species, 60 individuals. The first two days out of Newport were the most productive days of the first half of Leg 2, finding 72% of the 1793 birds we've found so far. In fact, 31 August was exceptional, finding 23 species, our second highest daily species total of the entire cruise. The highlight that day was seeing almost 4000 Arctic Terns in a few hours in the afternoon—a mind-boggling concentration of southbound migrants. We also found in this area both Guadalupe and Scripps's Murrelets (both quite rare off Oregon), a Brown Booby (extremely rare this far north) and the only Laysan Albatross so far of Leg 2. We saw a lot of leaping albacore here that afternoon, as well as at least eight active trollers.



Cook's petrel, Michael Force

Although we were offshore for the final 12 days of this reporting period, and thus didn't have a lot to see, there were many highlights. Exceptionally unusual this far north was a Band-rumped Storm-Petrel, likely the first northeast Pacific Ocean sighting of this warm-water species. Was it from the Hawaiian population or from the Galapagos? Twenty Cook's Petrels seemed like a high count for a species whose true status this far north is unclear, especially at this time of year. Other highlights from a highlight-studded two weeks include our first Red-tailed Tropicbird of the cruise far off California, and three Hawaiian Petrels.

Biopsy (Juan Carlos Salinas, Suzanne Yin, Adam Ü, Eric Archer)

Species	Common Name	# Weekly Samples	# Weekly Takes	Total Samples	Total Takes
Balaenoptera borealis	Sei whale	1	2	2	7
Balaenoptera physalus	Fin whale	2	10	5	22
Delphinus delphis	Short-beaked common dolphin	36	67	39	70
Globicephala macrorhynchus	Short-finned pilot whale	1	3	2	6
Lagenorhyncus obliquidens	Pacific white-sided dolphin	5	10	23	44
Lissodelphis borealis	Northern right whale dolphin	0	0	23	49
Megaptera novaeangliae	Humpback whale	0	0	1	2
Phocoenoides dalli	Dall's porpoise	8	12	14	19
	Grand Total	**53**	**104**	**109**	**219**

Leg 2 by EEZ

Species	Oregon	California	IFS
Balaenoptera borealis	1		
Balaenoptera physalus		2	
Delphinus delphis		23	13
Globicephala macrorhynchus		1	
Lagenorhyncus obliquidens	5		
Phocoenoides dalli	7		1

Cetacean Photographic Sampling (Paula Olson, Adam Ü, Suzanne Yin, Elanor Miller, Bennie Johnson, Jim Caretta, Jim Gilpatrick)

			30 Aug - 12 Sep 2014		Cruise totals to-date	
Species Code	Scientific Name	Common Name	# Sightings	# Photos	Total Sightings	Total Photos
13	*Stenella coeruleoalba*	Striped dolphin	4	19	5	92
17	*Delphinus delphis*	Short-beaked common dolphin	22	951	24	1010
21	*Grampus griseus*	Risso's dolphin			3	256
22	*Lagenorhynchus obliquidens*	Pacific white-sided dolphin	1	28	5	93
27	*Lissodelphis borealis*	Northern right whale dolphin			3	484
36	*Globicephala macrorhynchus*	Short-finned pilot whale	1	557	2	1089
37	*Orcinus orca*	Killer whale			1	248
40	*Phocoena phocoena*	Harbor porpoise			1	27
44	*Phocoenoides dalli*	Dall's porpoise	4	36	7	44
46	*Physeter macrocephalus*	Sperm whale			2	332
63	*Berardius bairdii*	Baird's beaked whale			2	390
70	*Balaenoptera sp.*	Unidentified rorqual			1	15
71	*Balaenoptera acutorostrata*	Common minke whale	1	2	1	2
72	*Balaenoptera edeni*	Bryde's whale			1	19
73	*Balaenoptera borealis*	Sei whale	1	236	4	1003
74	*Balaenoptera physalus*	Fin whale	10	1675	25	2749
75	*Balaenoptera musculus*	Blue whale	1	130	7	325
76	*Megaptera novaeangliae*	Humpback whale			12	277
99	*Balaenoptera borealis/edeni*	Sei or Bryde's whale			1	1

Individual IDs:
Pilot whale: 1
Sei whale: 2
Fin whale: 10
Blue whale: 2


Common dolphins, Elanor Miller

Oceanography (Elan Portner, Gina Lonati, Dawn Breese, Elanor Miller, Eric Archer)

Oceanographers Gina Lonati and Elan Portner joined us on leg 2 and have continued to collect plankton samples using a bongo net during nighttime sampling aboard the Ocean Starr. With this dynamic duo aboard, environmental sampling has expanded to include CTD casts, jigging for squid, and vertical net tows. This increased sampling diversity improves our knowledge of the physical characteristics of our survey area and the distribution of planktonic organisms that support marine mammals as direct or indirect food sources. Our travels have taken us from cool coastal waters at 11.1āāC off of Newport, OR to waters in the current offshore North Pacific warm anomaly at 20.4āāC. The physical characteristics of the water column (temperature, salinity, concentration of dissolved oxygen, and fluorescence) with respect to depth to ~500m are being sampled with a CTD (SeaBird 19plus). Technical difficulties with the deck box used for "real time sampling" as well as issues with "stand alone mode" prevent us from viewing the CTD data at this time, but we are able to communicate with the CTD and see that the tow data *are* being collected. We will continue our attempts to remedy these issues before the next inport. The oceanographic team has had eight weather nights, during which sampling was largely incomplete. In spite of the bad weather, with the help of Jeremy Whaley, Mohammed Nartey, Dawn Breese, Bennie Johnson, and Elanor Miller, 9 bongo tows, 7 vertical net tows, 9 CTD casts, and over 4 hours of squid jigging have been completed. Additionally, Elanor, Elan, and Eric Archer have compled 43 XBT drops. Elan has caught two club-hooked squid, *Onychoteuthis borealijaponicus*, both 27.5cm dorsal mantle length. The first of these squid was an almost mature female, caught the first night out of Newport, OR. The second, a mature male was caught a week later ~200mi off the coast of Southern Oregon Bongo tows are now being split between four labs for various projects. Elan and Gina have been spending weather days and transit hours sorting the leftover plankton samples for squid paralarvae and pteropods. When possible, all oceanographic sampling methods are performed twice each night (this has only happened once so far).

Date	XBTs	Bongo net tows	Vertical net tows	CTD casts
Aug 30 – Sep 12	43	9	7	9

Acoustics (Emily Griffiths, Brian Miller, Kym Collins)

Much like the first leg of our expedition, the acoustic component of this survey is comprised of three main parts. Chiefly, the bulk of our time is spent monitoring the life 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.

Towed Array Summary Table

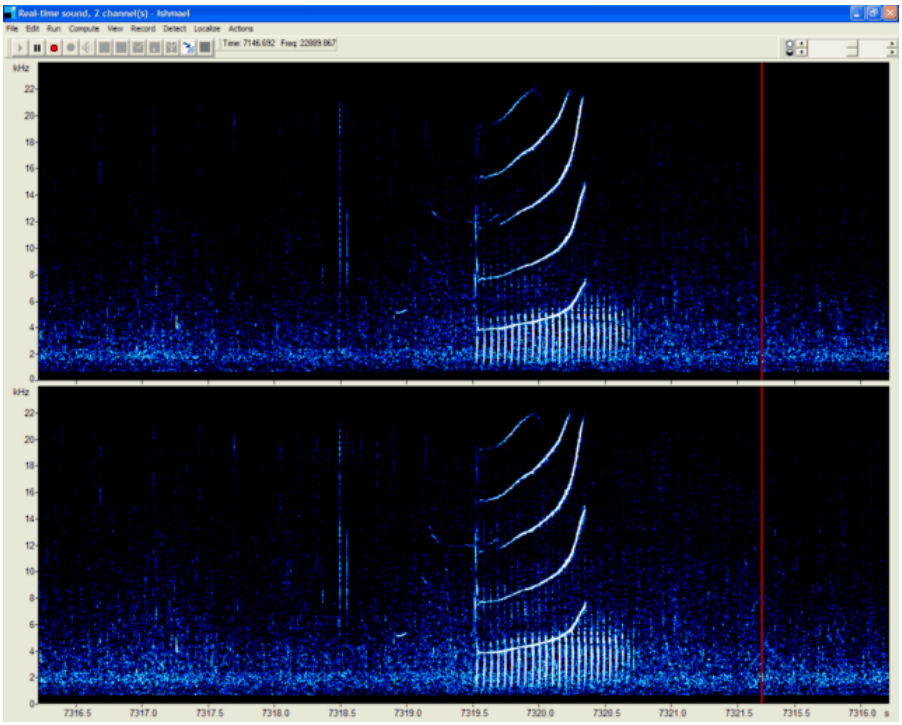
Species	**Detection Count**
Harbor porpoise	2
Dall's porpoise	10
Unid porpoise	1
Pacific white-sided dolphin	1
Unid beaked whale	1
Sperm whale	9
Short-beaked common dolphins	23
Unid Dolphin	23
Stripped and Short-beaked common dolphins	4
Short finned pilot whales	1
Total	**75**

Sonobuoy Summary Table

Leg 2	Blue	Fin	Sei	Humpback	Bryde's	Sperm	Killer
definite	2	5	0	0	0	1	0
probable	4	7	0	0	0	0	0
possible	3	0	6	2	0	0	1

Short-finned pilot whales

Short-finned pilot whales produce clicks, whistles, burst pulses, as well as a variety of sounds that overlap acoustic characteristics from those three major sound groups. Like most blackfish, their calls are lower in frequency then most dolphin species. Many of their whistles are approximately 4-6kHz in range, while many of the dolphin species encountered in the California Current, say for example, the short-beaked common dolphin, range between 8-15kHz. Blackfish tend to produce calls that remind us analysts of familiar sounds from our world. Killer whales have a definite "cat meow" quality to some of their tonal whistles. A bit more out of this world, the pictured call from our encounter with the pilot whales sounds like a warp drive!

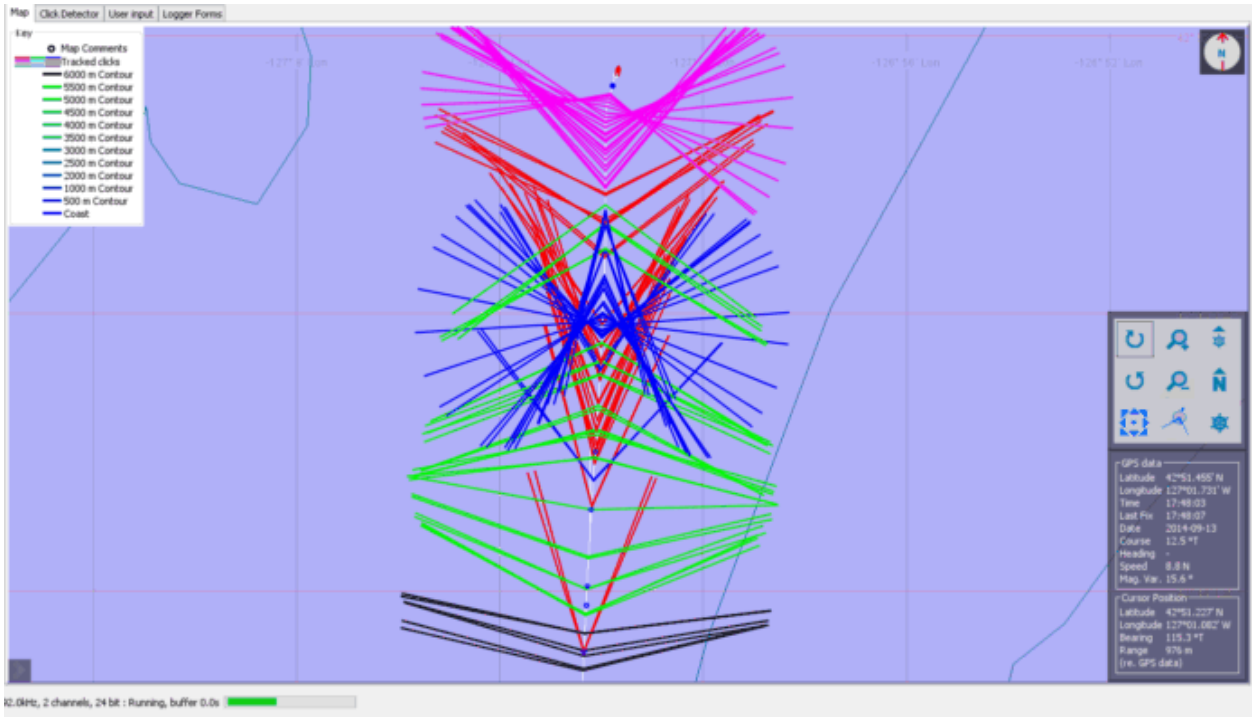


The low click train at ~2kHz thumps in a consistent pattern, like an engine hard at work, while the upsweep whistle adds a 'revving-up' overtone. Certainly an exciting recording!

Sperm Whale Tracking

We've had a bit of bad luck dealing rough weather on this leg. High winds plus a high sea state make it impossible for the visual team to collect reliable data! This is where acoustics can be very useful, for our equipment can still preform in rough seas. On the morning of September 12th, when conditions were still too rough for the visual team to go on effort, the acoustic team detected four separate sperm whales within an hour. Without acoustic data, these whales would have never been detected by this survey.

But how did we know how many sperm whales there were? Simple geometry! The hydrophone array we are towing behind the ship has two sensors in it (hence why it is an array rather than a single hydrophone). Using the time of arrival different of a distinct signal, like a sperm whale click, we can calculate the bearing the whale is vocalizing from.



In the image above shows how we tracked several animals on our transect line. Each color represents a different sperm whale and their bearing towards the ship as we sailed past them. As the vessel transverses down the transect line, we can collect more bearings which help us fine tune where the whales are. With a linear two hydrophone array we cannot determine if the whale is one the left or the right side of the ship. Only if we turn can we resolve what side they are on. However, we can count how many whales are present with this method.

Sonobuoys and DASBRs.

Using GPS trackers, we've been able to monitor the movements of the two DASBR units deployed last leg. Rather than drifting southward along the California Current, as we had hoped, they seem to be drifting in gyres. Due to this, we have halted deploying more DASBR units until we are further south, and therefore will be able to pick them back up!

We've had some fantastic recordings on the sonobuoys, both at our nightly stations, (blue, fin, sei and even a sperm whale!) and those launched opportunistically during the day. Our last opportunistic buoys were launched on fin whales were biopsies were also collected. This joint data collection from the same fin whales in our study area will help us determine if fin whale call diversity can be a marker for distinct genetic populations.

Acknowledgments

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