

California Current Cetacean & Ecosystem Survey (CalCurCEAS): Mid-Leg Report: Aug 5-15, 2014

Jay Barlow, Cruise Leader

Synopsis

The California Current Cetacean and Ecosystem Assessment Survey (CalCurCEAS) is a multi-disciplinary expedition to estimate the abundance of cetacean species in the California Current and study their ecosystem. The survey is being conducted by the Southwest Fisheries Science Center aboard the chartered vessel *R/V Ocean Starr*. Work

is being supported by NOAA's National Marine Fisheries Service, the U.S. Navy, and the Bureau of Ocean Energy Management. The 120-day survey is divided into 5 legs of approximately 24 days. This is the mid-leg report of progress and data collected on Leg 1.

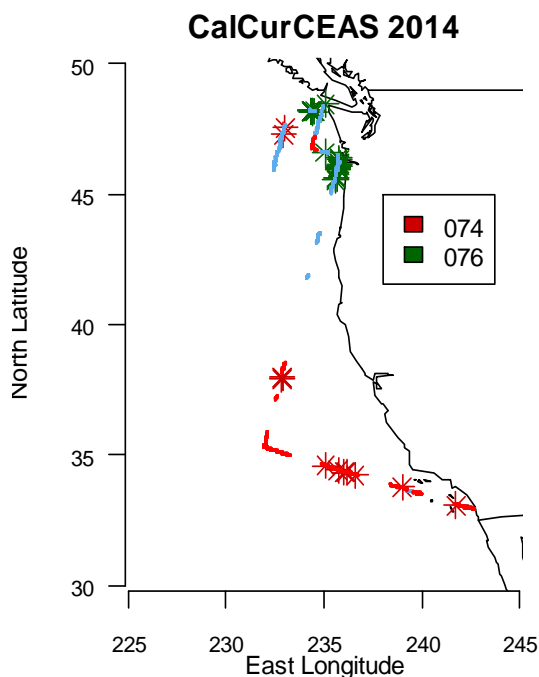


Figure 1. Transect lines completed in the first half of Leg 1 in calm seas (blue lines) and rough seas (red lines) and sightings of fin whales (code 074) and humpback whales (code 076).

During Leg 1, we departed from San Diego and proceeded in a generally northward direction until we reached the most northern point in our survey grid at Cape Flattery, Washington. Weather has been generally favorable, but high winds in northern California and fog in northern Washington resulted in some lost transect lines. Our general plan for the rest of the survey will be to fill out a pre-determined grid of transect lines that uniformly covers the entire west-coast study area out to 300 nmi from shore. Our immediate goal for the remainder of Leg 1 is to complete most of the transect lines off of Washington and northern Oregon.

This report is divided into several sections detailing various aspects of the ongoing survey efforts. We provide some low-resolution graphics for illustrative purposes, but must limit our graphics due to low internet bandwidth.

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Marine Mammal Observations (Paula Olson, Juan Carlos Salinas, Adam U, Suzanne Yin, Jeff Moore, Morgane Lauf, Yaiyr Astudillo-Scalia, Bennie Johnson and Jay Barlow)

The visual survey of cetaceans (whales, dolphins and porpoises) is considered our daily bread and butter. The major reason we get funding for surveys such as this is to estimate the abundance of marine mammals. Every morning, at dawn, our dedicated team of marine mammal observers starts work by uncovering their giant “big eyes” (25-power pedestal-mounted binoculars) and firing up their computerized data entry system. Observers stand and search from dawn ‘til dusk for the tell-tail signs of marine mammals ... a faint blow, a glint of sun off the side of a whale, or a dolphin’s splash. In good conditions, they can see a single dolphin jump at the horizon, six miles away. A team of six skilled observers rotates among the three observation stations, working two hours on and two hours off throughout the day. Once a cue is confirmed, the ship is directed toward the group to accurately determine what species are present and to estimate group size. This is the fun stuff. Every day we see things that most people don’t get to see in their lifetimes. Blue whales ... the largest animal that ever lived on earth. Dall’s porpoise a black and white flash of pure energy. Northern right whale dolphins ... the most sleek, elegant dolphin that you can imagine. If the conditions are right and the animals are cooperative, we take photographic samples to study variation in color patterns and to identify individuals that have been previously photographed and cataloged by other researchers. We also use crossbows to take biopsy samples – tiny bits of skin and blubber for genetic analyses of population structure and a dozen other analyses.

Fin whale photograph by Adam U



Search Effort by Day

Date	Time Start	Time End	Latitude	Longitude	Nautical Miles Surveyed	Average Beaufort
080514	1245	1910	N32:53.15	W117:18.02	41.7 nmi	4.2
080614	0621	1805	N33:06.13	W118:16.93	54.9 nmi	3.8
080714	1737	1955	N33:29.19	W119:59.80	81.3 nmi	5.3
080814	0719	1937	N33:50.16	W121:33.01	89.1 nmi	4.6
080914	0649	1719	N34:33.03	W124:45.58	26.0 nmi	5.3
081114	0646	1859	N34:57.88	W126:42.98	26.5 nmi	2.9
081214	1649	1907	N35:51.20	W127:49.79	71.6 nmi	1.8
081314	0626	1929	N37:06.89	W127:24.79	91.9 nmi	3.0
081414	0626	2007	N38:29.20	W126:57.98	13.1 nmi	1.9
081514	0626	2015	N41:46.14	W125:48.19	92.9 nmi	2.7
			N43:28.62	W125:09.97		
			N46:06.92	W124:14.06		
			N46:26.89	W124:15.64		
			N46:33.09	W124:42.75		
			N47:52.39	W125:09.53		
			N47:56.37	W125:06.15		
			N48:11.97	W125:41.02		
			N47:35.98	W126:56.76		
			N45:51.97	W127:31.67		

Number of Cetacean Sightings by Species

CODE	SPECIES	TOT#
013	<i>Stenella coeruleoalba</i>	1
017	<i>Delphinus delphis</i>	11
021	<i>Grampus griseus</i>	3
022	<i>Lagenorhynchus obliquidens</i>	5
027	<i>Lissodelphis borealis</i>	2
036	<i>Globicephala macrorhynchus</i>	1
040	<i>Phocoena phocoena</i>	26
044	<i>Phocoenoides dalli</i>	19
046	<i>Physeter macrocephalus</i>	1
063	<i>Berardius bairdii</i>	2
070	<i>Balaenoptera sp.</i>	14
071	<i>Balaenoptera acutorostrata</i>	1
072	<i>Balaenoptera edeni</i>	1
074	<i>Balaenoptera physalus</i>	12
075	<i>Balaenoptera musculus</i>	10
076	<i>Megaptera novaeangliae</i>	28
077	unid. dolphin	1
096	unid. cetacean	1
099	<i>Balaenoptera borealis/edeni</i>	1
477	unid. porpoise	6
	TOTAL	146

Seabird Observations (Michael Force, Dawn Breese)

The rich diversity of the California Current's avifauna was clearly evident during the first half of CalCurCEAS Leg 1. We found 44 species on our 300 metre strip transect survey—an impressive total, though perhaps expected considering we covered a wide range of pelagic and neritic (continental shelf) marine habitats transiting from southern California to the northernmost point of the study area off Cape Flattery. We encountered the highest abundance of seabirds off of coastal Washington, with a mix of local breeders, such as Common Murre, Leach's Storm-Petrel and Fork-tailed Storm-Petrel, and migrants from the Southern Hemisphere, such as Sooty Shearwater and Pink-footed Shearwater. The four most common birds, in terms of overall abundance, were Sooty Shearwater, Pink-footed Shearwater, Common Murre and Leach's Storm-Petrel. These four species comprised 66% of the 2847 birds we recorded on survey effort. Furthermore, mixed seabird feeding flocks over small tuna in this region were also dominated by Sooty Shearwaters.

Tufted puffin photo by Paula Olson



The contrast between neritic and pelagic habitats was striking. Our daily average species total during our surveys in the deep blue offshore waters was five, compared with 19 species in neritic waters. That being said, the highlight of these past 11 days was seen well offshore: a couple of Juan Fernandez Petrels, loosely associating with a group of Striped Dolphins, about 263 nautical miles west-southwest of Pigeon Point, California. This species, which nests on the Juan Fernandez Islands off Chile, is a common non-breeding visitor to the Eastern Tropical Pacific. Sightings this far north are extremely rare and there are no confirmed sightings for the United States or Canada. Other highlights include several Scripps's Murrelets off Washington and a pair of probable

Guadalupe Murrelets about 125 nautical miles west of Grey's Harbour. Another highlight, obviously because it's the world's most beautiful shearwater, was Buller's Shearwater. We saw 151 of these stunning breeders from New Zealand. For many on board though, Tufted Puffin took top billing. After all, who can argue the point—a dapper seabird dressed like the King of Clowns.

Biopsy (Juan Carlos Salinas & Suzanne Yin)

Species	Biopsy	Locality
Delphinus delphis	3	California
Globicephala macrorhynchus	1	California
Lagenorhynchus obliquidens	1	Oregon
Megaptera novaeangliae	1	Oregon
Grampus griseus	0	Washington
Lissodelphis borealis	5	Washington
Lagenorhynchus obliquidens	4	Washington
Phocoenoides dalli	5	Washington
Balaenoptera physalus	0	Washington
TOTAL	20	

Cetacean Photographic Sampling (Paula Olson)

Species Code	Scientific Name	Common Name	# Sightings	# Photos	# Individual IDs	Total Sightings	Total Photos	ID photos with biopsy
13	Stenella coeruleoalba	Striped dolphin	1	73		1	73	
17	Delphinus delphis	Short-beaked common dolphin	1	3		1	3	
21	Grampus griseus	Risso's dolphin	3	256		3	256	
22	Lagenorhynchus obliquidens	Pacific white-sided dolphin	2	54		2	54	
27	Lissodelphis borealis	Northern right whale dolphin	1	51		1	51	
36	Globicephala macrorhynchus	Short-finned pilot whale	1	532	1	1	532	1
40	Phocoena phocoena	Harbor porpoise	1	27		1	27	
44	Phocoenoides dalli	Dall's porpoise	2	6		2	6	
63	Berardius bairdii	Baird's beaked whale	1	89		1	89	
72	Balaenoptera edeni	Bryde's whale	1	19		1	19	
74	Balaenoptera physalus	Fin whale	4	69		4	69	
75	Balaenoptera musculus	Blue whale	5	78		5	78	
76	Megaptera novaeangliae	Humpback whale	9	146	1	9	146	1
99	Balaenoptera borealis/edeni	Sei or Bryde's whale	1	1		1	1	
	No. of ID photos							
	Blue = 3							
	Fin = 2							
	Humpback (flukes) = 5							

Oceanography (Annette Henry, Dawn Breese, Yaiyr Astudillo-Scalia, and Bennie Johnson)

As we traveled from San Diego, CA to the northern most point of our tracklines off Washington, we have been monitoring the physical properties of the ocean. Sea surface temperature off of San Diego was 23.4°C and dropped to 12.0°C off of northern Washington. Water temperatures now, at 150 miles off of Oregon, have has returned to the 18 °C range, matching the air temperature. Oceanographic sampling on Leg 1 of CalCurCEAS includes collecting sea surface temperature, salinity, thermocline depth, and information about the prey base of cetaceans using active acoustics (ER-60 echosounder) and bongo net tows. Nighttime operations are extremely smooth thanks to the expertise of Armando Urrutia and Bobby Motherwell of the Ocean Starr.

Date	XBTs	Bongo Tows
5-15 August	43	8
Total	43	8

Surface feeding humpback whale photo by Paula Olson



Acoustics (Emily Griffiths, Susannah Calderan & Eiren Jacobson)

During CalCurCEAS, we are towing a hydrophone array behind the ship to listen for sounds made by whales, dolphins and porpoises that might have been missed by the visual search team. We are also dropping Navy sonobuoys at regular nightly stations to determine the distribution and relative abundance of calling whales. Finally, we are deploying free-floating buoy recorders that will drift and record cetacean sounds and ocean noise for two months.

Tetrahedral array (nickname: X-array)

The X-array is a new type of hydrophone array being developed jointly by the SWFSC, Pacific Islands Fishery Science Center, and Scripps's Institution of Oceanography. The array is comprised of four potted HTI-96-min hydrophone elements, two at the front of the array positioned in an upper/lower arrangement, and two one meter aft in a port/starboard arrangement (see Figure 1). Using the x-array hydrophone configuration, analysts can perform localization to generate accurate 3-D bearings to the vocalizing animal(s).

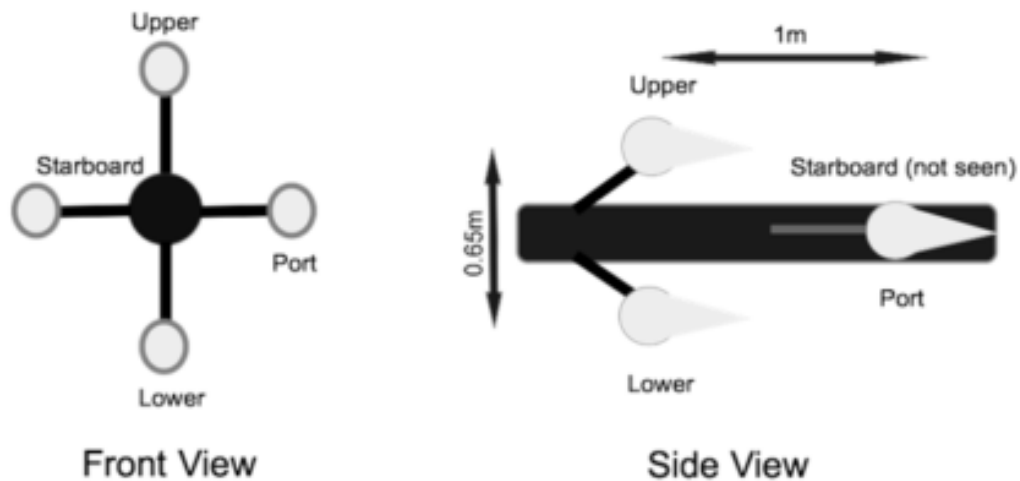


Figure 1. Front and Side view schematic of the tetrahedral array, or x-array, with hydrophones in the Upper, Lower, Port and Starboard locations.

When towed 200 meters behind the vessel, the x-array produced a relatively noise free sound signal from all four hydrophones. However, even though the lower hydrophone was weighted with lead, the x-array spun in the water at a rate of 2-3 cycles per second. At risk of damaging our tow cable, the x-array has been retired until improvements can be made to stop the array from spinning.

Baird's Beaked Whale

On our second day out (August 6th), we encountered several groups of Baird's beaked whales and were able to complete an Acoustic Pass on one group. These animals were documented socializing and breaching. During the pass, we made some great recordings of echolocation clicks and burst pulses (Fig. 2). We even recorded some low-frequency whistles (Fig. 3) which had been documented previously but are seldom heard. Over half of the Baird's beaked whale whistles had 3-4 harmonics visible.

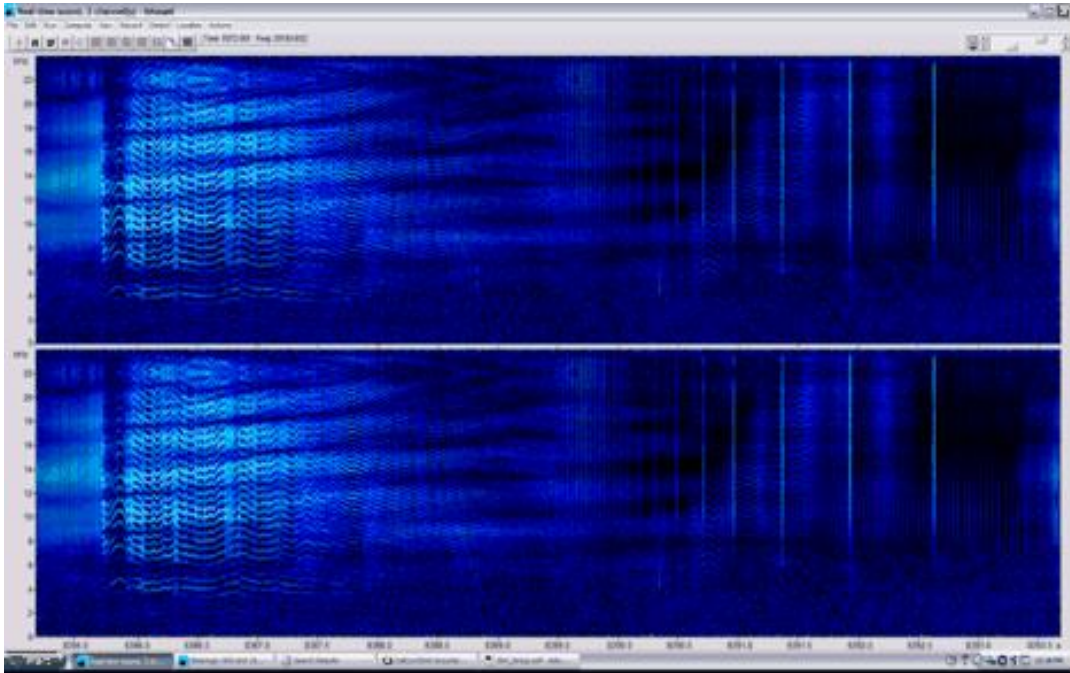


Figure 2. Spectrogram of Baird's beaked whale burst pulses and echolocation clicks as viewed in Ishmael.

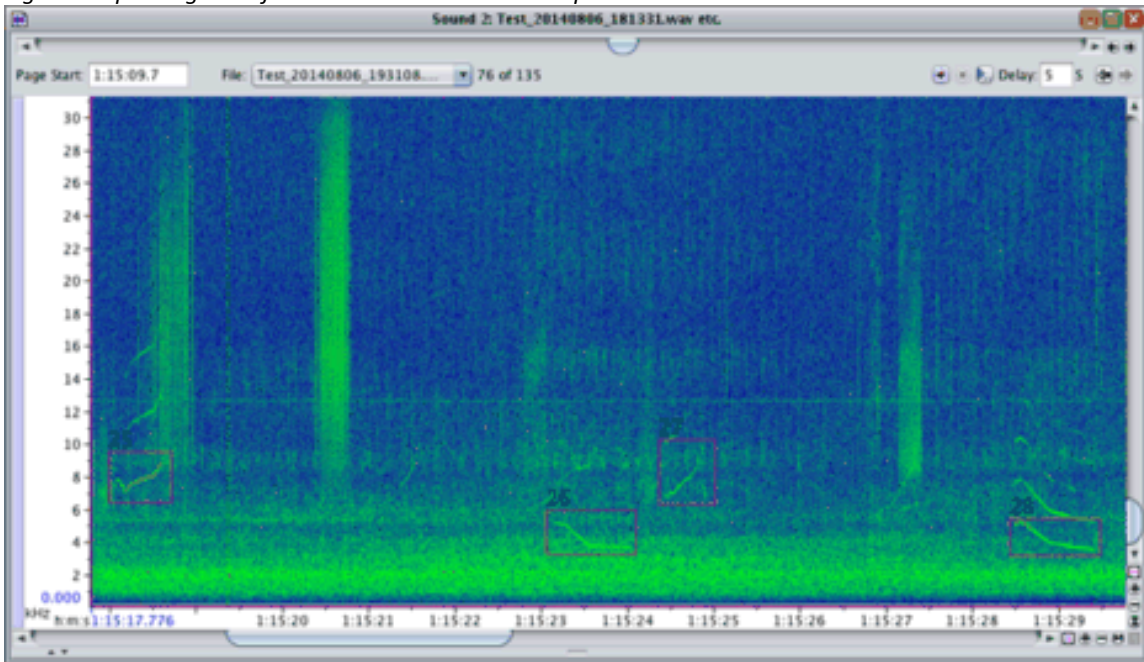


Figure 3. Spectrogram of Baird's beaked whale whistles, burst pulses, and echolocation click in Raven Pro.

Porpoise

During the first leg of the CalCurCEAS marine mammal survey, we came across both species of porpoises expected on the cruise, Dall's and harbor porpoises. We at first attempted to use our harbor porpoise click detector parameters to detect Dall's porpoise echolocation clicks, but quickly learned to tell the differences between the two species. We developed click detectors specific to each species and are using these detectors in real time.

Sonobuoys

We have been deploying sonobuoys nightly and have had great success in recording vocalizations from blue, fin and humpback whales. We even managed to pick up some Risso's dolphin clicks on the evening of August 14th. An opportunistic sonobuoy was deployed during a daytime Bryde's whale sighting on August 8th. Unfortunately, this whale wasn't in a particularly vocal mood, but we did record a couple of whale calls.

Acknowledgments

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