Ecosystem Survey of *Delphinus* Species

22 November 2009

Weekly Report No. 9: 12-21 November 2009

Jim Carretta, Cruise Leader

The third and final leg of the *Delphinus* cruise began when the NOAA ship *McArthur II* left San Diego on November 12th with familiar old friends and new team members Amanda Bowman (Southwest Fisheries Science Center), Jodie Morgan (Areté Associates), and Adam Knudsen (Areté Associates). Amanda is the manager for the SWFSC genetics laboratory and a great addition to our genetics-focused sampling mission. Adam and Jodie are working with the ship's radar and our visual observer team to develop detection tools that may one day aid in preventing large whale ship strikes. We've been very busy with a good share of decent weather. Among our highlights has been a group of killer whales near Santa Barbara Island, blue and fin whales around Long Beach, Cuvier's beaked whale, and more common dolphins than we could ever want.

Male killer whale.

NOAA FISHERIES SERVICE

Southwest Fisheries Science Center

Protected Resources Division

CHIEF SCIENTIST:
Susan Chivers

CRUISE LEADER:
Jim Carretta

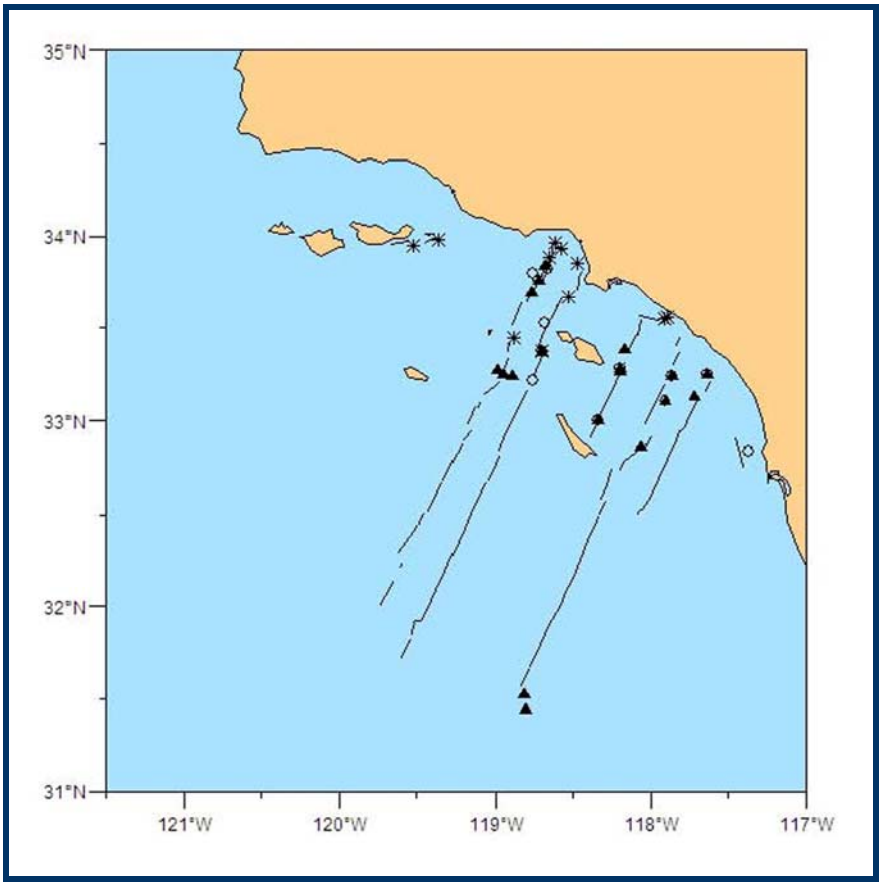
At-Sea Scientists (A-Z)
Amanda Bowman
James Cotton
Michael Force
Justin Garver
Candice Hall
Adam Knudson
Jodie Morgan
Rich Pagen
Richard Rowlett
Juan Carlos Salinas
Corey Sheredy
Ernesto Vázquez
Sophie Webb
Suzanne Yin

Aerial Team
James Gilpatrick
Morgan Lynn
Fionna Matheson
Wayne Perryman (Program Lead)

Additional PRD Information:
http://swfsc.noaa.gov/prd.aspx

Additional Cruise Information:
http://swfsc.noaa.gov/prd-delphinus.aspx

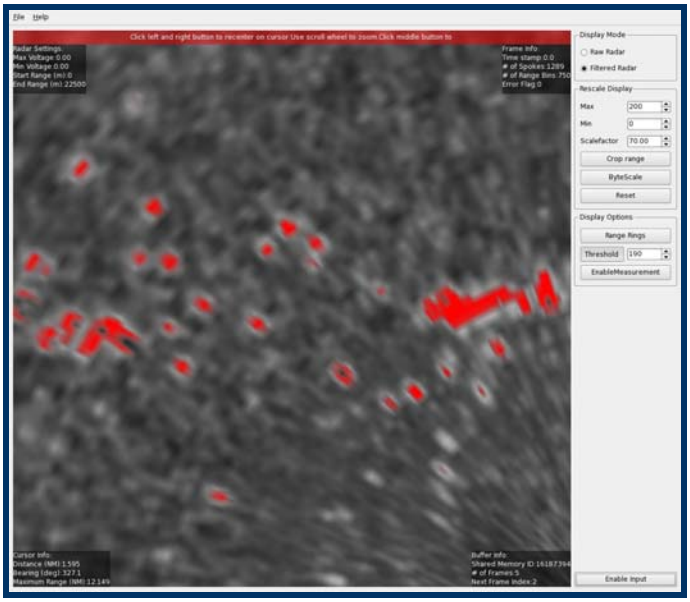
We have collected biopsy samples from five paired sampling events, including a group of *Delphinus delphis* in the extreme southwest corner of the study area. Nearly 200 common dolphin biopsies have been collected this week, in addition to biopsies from other species for tissue culture (2 *D. delphis*, 1 *D. capensis*, and 1 *Tursiops*). The difference between short- (*Delphinus delphis*) and long-beaked (*Delphinus capensis*) common dolphins is sometimes striking, but often subtle, which led one scientist to refer to a particular group as *Delphinus capelphis*! The biopsy samples and photographs collected during this cruise will yield insights into the stock structure of common dolphin along Alta and Baja California. The NOAA ship *McArthur II* rates right up there with the best I've sailed on, with a great crew and command to make our job safe and enjoyable.



Common sightings and transect effort, 12-21 November. ▲= *Delphinus delphis*; *=*Delphinus capensis*; ○ = unidentified common dolphin.

Radar tracking of marine mammals – Adam Knudson and Jodie Morgan

This represents the first (and only leg) for the radar group, and we are very grateful for the opportunity. We'd also like to thank everyone for their cooperation in helping us get the data we need. Our work is an ONR sponsored project with the ultimate goal of detecting and tracking whales using standard ship's radar. Detection of marine mammals at long range is critical for two important problems: collision avoidance and area clearance. The aim of this particular outing is to collect radar data at different resolutions and different sea states and to test our display software. To date the effort has been going very well, with almost 1 TB of data collected in two different radar modes and over a wide range of sea states. We've also had success with our display software. While it is not yet a finished product, some simple processing of the radar data is in place which allows us to see whale detections on the radar after being alerted by the marine mammal observers. However, other noise sources are still an issue which is why we continue to refine and test our detection and tracking algorithms on the stored data. With a terabyte of data already collected and more coming in every day we've got plenty to keep us busy.



Radar display showing a large school of dolphins.

Seabird Report – Michael Force & Sophie Webb

Looking at the calendar and pondering the lateness of the season, it seemed reasonable to set our sights lower for Leg 3. It is, after all, late fall, and many seabirds are, or should be, heading south. We certainly weren't expecting the high diversity we found during this 10 day "week". We'll let the numbers speak for themselves: The 45 species we saw is only four below our highest ever, and that was during a nine day reporting period over a month ago. Amazing what an extra day can do! Our daily average of 16 species is fairly typical, although we reached a stratospheric 23 one day. Not immediately evident, however, is the dichotomy between "offshore" and "nearshore" habitats.

Brown Pelican.

The outer regions of the study area are quite bereft of birds while nearshore, on the continental shelf, abundance can exceed our ability to keep up with the data entry. When we encounter a flock, usually over dolphins, it can be a mother lode of diversity. One such flock over long-beaked common dolphins had 19 species of hungry seabirds, including a remarkable six species of shearwaters. That easily doubles what we find in an entire day offshore!

Numerous highlights stand out this week. Santa Monica Bay one afternoon held an impressive 25,000 to 50,000 Bonaparte's Gulls. An immature Brown Booby was seen in a feeding flock of gulls and 3000 Black-vented Shearwaters just off Anacapa Island. This bird was likely a visitor from the expanding Los Coronados Islands population, just south of San Diego. Buller's Shearwater put in an appearance this week, after being absent from our sight since late September (of course, Leg 2 was off Baja California, where we didn't expect to see any); we saw several locally rare Flesh-footed

Shearwaters, and a couple of Short-tailed Shearwaters; a flock of 2000 Pink-footed Shearwaters is a high number for this time of year. Northern Fulmar, a northern breeder, was unusually abundant—one day we saw well over a hundred. A mystery shearwater, too far to identify with 100% confidence, was very likely a Streaked Shearwater, a west Pacific species very rare in the eastern Pacific Ocean. Another one that got away! A Townsend's Warbler and White-crowned Sparrow were clearly lost and late for the party.

Oceanographic and Mid-trophic Project Report – Candice Hall, Justin Garver, Corey Sheredy, Amanda Bowman, Jim Carretta and SST Lacey O'Neal

The Friday after we sailed from San Diego provided huge seas, which are always exciting for those of us not prone to seasickness! While standing on the main deck (the one with the labs), the 10 – 12 foot swells were head high for me. We've also experienced high winds this week. Seas such as these make for interesting over-the-side oceanographic operations; conditions where the sea temperature dropped over 3°C in an hour as we maneuvered to shelter.

Our track line also took us over the Cortes Bank this week, which is a submerged mountain range 17 miles in length with peaks 3 feet below the sea surface. The dramatic change in depth was evident in the full suite of our measurable variables, including an obvious increase in wave chop that was probably a function of the shallow depth and not wind. Lastly, we would like to introduce and thank our two new mid-trophic assistants, Amanda Bowman and Jim Carretta.

We've had two interesting, non-mammal sightings this week. Firstly, we sailed past the USS Green Bay (LPD 20 San Antonio class of amphibious transport dock ships). What a ship! Her surface is comprised of flat planes to reduce her radar impact (which we confirmed, it looked about the size of a fishing boat). She also has some fascinating looking sensors on each mast, and a fighter jet was practicing vertical take-off and landings on the stern. Secondly, we had a terrific view of the Leonid meteor shower on Tuesday night. The meteors were so bright that they left light trails lasting a few seconds after disintegration.

We have had quite a bit of excitement this week in the mid-trophic department. The squid jigging efforts have been rewarded this week with large squid caught at 2 stations. During our first station with squid, we managed to wrestle 3 squid onboard weighing 23, 30 and 40 pounds. The 40 pound squid is the largest that we have caught so far and was quite an impressive sight to see. Our good fortune returned two nights later, when we caught another 23 pound squid. This has been a pretty good run for our jiggers and we are hopeful that we will continue to catch squid on a regular basis through the remainder of the leg.

Jumbo flying squid, Candice and Justin - don't try this at home!

With the assistance of the Deck department replacing the block, the nets tows have been continuing without a hitch. Many of our earlier issues with deployment have been resolved. We would like to sincerely thank both the

Deck and Engineering departments, who have assisted in improving the mid-trophic projects.

Aerial Photograpmmmetry Report – Morgan Lynn, James Gilpatrick, Fionna Methason & Wayne Perryman

The aerial photogrammetric effort for *Delphinus* 2009 ended with a last flight on 11/17 (began on 9/16). We flew just over 90 hours and the total number of sightings photographed was 155 with 12 schools to be used as ship observer calibrations. Breakdown by species is as follows:

Species	Sightings photographed
Long-beaked common dolphin	61
Short-beaked common dolphin	24
Delphinus sp.	32
Risso's dolphin	8
Bottlenose dolphin	3
Blue whale	13
Fin whale	5
Humpback whale	3
Bryde's whale	2
Minke whale	2
Killer whale	1
Pacific white-sided dolphin	1
Total	**155**

Outreach and Education Report – Siri Hakala

On November 10th, during the second San Diego inport, we gave ship tours to middle school classes from Olive Pierce Middle School (in Ramona) and Faith Lutheran (in Vista). The students had been following the wiki and were prepared with questions! They saw the flying bridge, bridge, bow, a scientist's stateroom, the mess and galley, the lounge, exercise room, wet and dry labs, and the fantail complete with IKMT and Bongo nets. We also presented a workshop to a group of high school seniors from the BEWiSE program (Better Education for Women in Science and Engineering). This group of students did a mini-net tow and compared the plankton from the harbor with that caught out at sea, they learned how to assess the chlorophyll levels in the water, and received mini-lectures on photo id matching, species identification and line-transect sampling. Liz Zele, Jessica Lipsky, Susan Chivers, Annette Henry, and Gabriela Serra-Valente were all involved in the tours and the workshop. Thank you everyone!

You can check out our wiki at the following website: http://www.sbsd.k12.ca.us/groups/noaa/.
Username: noaaproject
Password: read

Long-beaked common dolphin and calf.

Line-transect Survey Report: Juan Carlos Salinas, Jim Cotton, Rich Pagen, Richard Rowlett, Ernesto Vázquez & Suzanne Yin

Summary of Marine Mammal Effort

Date	Time	Position		On Effort Survey Miles (nm)	Average Beaufort
111209	1546	N32:45.27	W117:24.33	9.4	3.0
	1640	N32:54.29	W117:27.36		
111309	0634	N33:16.16	W117:38.03	45.1	4.3
	1200	N32:30.48	W118:05.13		
111409	1527	N33:34.03	W118:04.19	40.8	2.3
	1628	N33:32.54	W117:53.69		
111509	0636	N33:26.82	W117:49.21	44.3	2.0
	1629	N32:34.97	W118:19.30		
111609	0633	N32:34.36	W118:17.77	64.1	3.0
	1406	N31:30.28	W118:48.25		
111709	0639	N31:43.63	W119:35.72	90.0	4.0
	1638	N33:09.74	W118:48.12		
111809	0705	N33:14.86	W118:45.06	41.1	3.2
	1638	N33:46.88	W118:41.31		
111909	1407	N33:24.99	W118:54.58	35.1	1.9
	1633	N33:08.84	W119:04.71		
112009	0642	N33:05.76	W119:06.01	57.0	2.9
	1630	N32:00.70	W119:43.88		
112109	1210	N33:57.26	W119:39.68	5.8	1.8
	1245	N33:58.35	W119:32.85		

Summary of Marine Mammal Sightings

Species	Number of groups
Delphinus sp.	12
Delphinus capensis	11
Delphinus delphis	18
Tursiops truncatus	1
Grampus griseus	10
Lagenorhynchus obliquidens	5
Lissodelphis borealis	1
Orcinus orca	1
Ziphius cavirostris	3
Berardius bairdii	1
Balaenoptera sp.	7
Balaenoptera acutorostrata	1
Balaenoptera physalus	17
Balaenoptera musculus	3
Megaptera novaeangliae	1
Unid dolphin	2
Unid. large whale	3
Unid cetacean	1
Unid. small delphinid	13
Unid. medium delphinid	1
Total	**112**

Photographs Taken – James Cotton, Suzanne Yin, Corey Sheredy & Sophie Webb

Species	Common Name	No. of Sightings this week	No. of Photos this week	Total No. of Sightings	Total No. of Photos
Stenella attenuata (offshore)	Offshore pantropical spotted dolphin	0	0	10	211
Stenella longirostris orientalis	Eastern spinner dolphin	0	0	5	125
Stenella coeruleoalba	Striped dolphin	0	0	3	39
Steno bredanensis	Rough-toothed dolphin	0	0	1	2
Delphinus capensis	Long-beaked common dolphin	4	631	59	9,888
Delphinus delphis	Short-beaked common dolphin	5	502	26	4,309
Tursiops truncatus	Bottlenose dolphin	0	0	15	934
Grampus griseus	Risso's dolphin	2	8	6	24
Lagenorhynchus obliquidens	Pacific white-sided dolphin	1	7	12	268
Globicephala macrorhynchus	Short-finned pilot whale	0	0	8	859
Balaenoptera edeni	Bryde's whale	0	0	1	67
Balaenoptera physalus	Fin whale	0	0	1	442
Balaenoptera musculus	Blue whale	0	0	7	1,864
Balaenoptera borealis/edeni	Rorqual identified as a Sei or Bryde's whale	0	0	5	27
	Total	**12**	**1,148**	**159**	**19,059**

Biopsy Samples Collected – Juan Carlos Salinas, Ernesto Vázquez & Rich Pagen

Species	Common Name	Weekly No. of Samples	Weekly No of Takes	Total No. of Samples	Total No. of Takes
Balaenoptera musculus	Blue whale	0	0	4	4
Balaenoptera physalus	Fin whale	0	0	3	3
Delphinus capensis	Long-beaked common dolphin	103	138	617	946
Delphinus delphis	Short-beaked common dolphin	93	157	552	910
Globicephala macrorhynchus	Short-finned pilot whale	0	0	2	5
Lagenorhyncus obliquidens	Pacific white-sided dolphin	0	0	18	28
Lissodelphis borealis	Northern right whale dolphin	0	0	1	1
Orcinus orca	Killer whale	0	0	8	9
Stenella attenuata	Pantropical spotted dolphin	0	0	1	1
Stenella coeruleoalba	Striped dolphin	0	0	1	2
Stenella longirostris subsp.	Unidentified spinner dolphin	0	0	2	6
Tursiops truncatus	Bottlenose dolphin	9	13	58	84
	Total	**62**	**77**	**1,062**	**1,691**

Oceanography Samples Collected and Stations Completed – Candice Hall, Justin Garver, Corey Sheredy, Amanda Bowman, Jim Carretta & SST Lacey O'Neal

Date	CTD	Surface Chlorophyll	HAB	UCTD (XBT)	Squid Stations	Bongo Tows	IKMT
11/12/09	0	2	1	(2)	1	1	1
11/13/09	0	6	4	(6)	0*	0*	0*
11/14/09	1**	6	4	(4)	1	1	1
11/15/09	1**	6	4	3(2)	1	1	1
11/16/09	2**	6	4	4***	1	1	1
11/17/09	2**	6	4	6	1	1	1
11/18/09	2**	5	4	4	1	1	1
11/19/09	2**	6	4	4***	1	1	1
11/20/09	2**	6	4	4***	1	1	1
11/21/09	0*(1**)	5	4	2(2)*	1	1	1
Week Total	13	55	36	27 (16)	9	9	9
Grand Total	63	348	238	265(80)	56	55	50

* Cancelled ops or XBT replacement of UCTD due to weather conditions.

** CTD profile only, no bottle samples due to system error

*** The profile obtained from the sunset CTD tests replaced the UCTD as the last water column profile of the day (increase accuracy of dual sensors setup).