Ecosystem Survey of *Delphinus* Species

20 September 2009

Weekly Report No. 2: 13-19 September 2009

Susan Chivers, Cruise Leader

Wow what a week. This was another productive and interesting week for us. We collected lots of data that will help us meet our cruise objectives, which include better understanding the biology of these two common dolphin species, and their role in the ecosystem.

Our first survey line of the week took us from offshore to inshore over the shelf off Pt. Arguello, which is just north of Pt. Conception. Along this line, we sighted numerous groups of dolphins, lots of humpback whales, a few blue whales and a group of killer whales. The seas were calm and so we were able to collect many biopsy samples and photos of the dolphins – mostly common dolphins – and killer whales. The killer whales were our first of the cruise. They were 'transient' or mammal-eating whales, and when we saw them they were busy feeding on a pinniped. We observed the highest density of cetaceans here relatively near shore where there is a productive upwelling zone created by the California Current meeting the Southern California Countercurrent at the northern edge of the Southern California Bight. This is a regular oceanographic feature around Pt. Conception.

Common dolphins of both species were our most frequently sighted cetacean this week. While most sightings were of pure schools of each species that were most often in close proximity to one another, there were also a few mixed species schools observed. Mixed species schools have been previously reported but not documented, and this week we obtained photo documentation of their occurrence. What we saw in the mixed species groups were relatively small numbers of tightly associated long-beaked common dolphins among larger schools of short-beaked common dolphins.

NOAA FISHERIES SERVICE

Southwest Fisheries Science Center

Protected Resources Division

CHIEF SCIENTIST:
Susan Chivers

CRUISE LEADER:
Susan Chivers

AT-SEA SCIENTISTS (A-Z)
James Cotton
Michael Force
Justin Garver
Siri Hakala
Candice Hall
Nick Kellar
Rich Pagen
Robert Pitman
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

Killer Whales

Killer whales are the most widespread animal on the planet (after humans!), and until recently they were all considered to be a single species. In the last 20 yrs or so different 'ecotypes' of killer whales have been identified that have different feeding habits and preferred prey, different acoustic signaling and social behavior. Most importantly there is no social intermingling among these types and there is no evidence for interbreeding. Recent genetic evidence now supports what the field observations have been telling us for some time: there is more than one species of killer whale out there, and probably several.

Two ecotypes of killer whales occur off Southern California. Offshores inhabit the outer continental shelf and are known to feed mainly on fish; their teeth are often worn to the gum line and sharks, with their sandpaper skin, are suspected to be a major prey item. This last week we came across our first group of killer whales for the trip: 10 or so Transients - these are mammal-eaters. They had a freshly killed pinniped, probably an elephant seal, opened up at the surface that they were feeding on. Killer whales travel in family units and we got to see a mother carrying around a chunk of flesh and feeding her excited young calf. Some die that others may live.

As we continued working our survey grid to the south, but still in the northern part of the Southern California Bight, we were also able to document long-beaked common dolphin schools farther southwest of the northern Channel Islands than has been previously recorded. We enjoyed consistently good weather throughout the week allowing us to collect a full suite of data from most schools, including estimates of school size, biopsy samples and photos.

Wednesday, the NOAA Twin Otter joined us. We will be working with the airplane for the rest of Leg 1 and into Leg 2. The plane will be used to take vertical aerial photographs of dolphin schools, which will be used to count how many dolphins are in each school and to measure individual dolphins. Calves will be identified in the photographs, and the number of calves observed will be used to estimate calf production while measurements of length will be used to back-calculate birth dates to determine each species' breeding season.

With the aerial team joining us this week, the scientific personnel for Leg 1 is now complete. Aboard the NOAA ship *McArthur II* are the Marine Mammal Observers: Jim Cotton, Rich Pagen, Richard Rowlett, Juan Carlos Salinas, Ernesto Vázquez and Suzanne Yin; Seabird Observers: Michael Force and Sophie Webb; Oceanographers: Justin Garver and Candy Hall; Project Specialists: Siri Hakala, Nick Kellar, Bob Pitman and Corey Sheredy; Aerial Team: Jim Gilpatrick, Morgan Lynn, Fionna Matheson and Wayne Perryman.

More information about individual projects, including summaries of data collected, follows.

Transient killer whales.

Photography Report – James Cotton, Suzanne Yin, Sophie Webb & Nick Kellar

Coordinated biopsy sampling is another key aspect to the *Delphinus* Cruise. There are two types of these exercises: the small/large vessel tandem sampling and the plane/vessel simultaneous sampling. In the tandem vessel exercise, one of the vessels samples a school for 15 biopsies and then after the other vessel samples for 15 (which vessel samples first will be switched throughout the cruise). The intent is to investigate potential sex biases and, more widely, overall demographic selectivity in samples obtained at the bow of the large vessel. The rationale is that the samples collected from the bow of the large research vessel are disproportionately composed of animals that demonstrate bow-riding behavior (often a more extreme version of this behavior in which dolphins briefly leave their schools to ride the bow). If this behavior is not uniform across demographic groups, then biopsies gathered from the bow are not a random sample of the school/stock/population. On the other hand, because the small boat can more freely drive through a school of animals to obtain biopsies, the samples obtained from the small boat are less reflective of this behavior and, therefore, potentially a more random sample of the population. We have collected data for the small/large vessel tandem comparison from three schools so far.

We'll delve into the description of the novel protocol for simultaneous sampling from the plane and vessel next week, in which scientists on water will photograph dolphins from the ship while scientists in the air will take aerial images from the Twin Otter at 500 feet above the school. Stay tuned.

Short-beaked common dolphins. Photo credit: Sophie Webb

Aerial Photography Report – Wayne Perryman, Morgan Lynn, Jim Gilpatrick & Fionna Matheson

This turned out to be a tough week for the aerial team after a great start. We had a successful test flight during the ground breaking ceremony for the new Southwest Fisheries Science Center building on 9/15, got a calibration flight and passes on five dolphin schools and a blue whale during the transit to Santa Barbara on 9/16. The calibration flight was a school of *Delphinus delphis* photographed off Santa Cruz Island. For these flights, we work in tandem with the ship to get observer estimates of school size to compare a count of the number of dolphins in the school. One of the other common dolphin schools photographed south of Santa Cruz was excellent with many measurable adults and calves present. This is our first completely digital mission for cetaceans, and the system is working really well. We flew 1.2 hrs on the 17th trying to find a hole in the fog but didn't find one. We are still waiting for a break in the weather.

Long-beaked common dolphins.

Seabird Report – Michael Force & Sophie Webb

High abundance but relatively low diversity was the seabird theme this week, at least compared to last week. Most of our survey effort was in the Santa Barbara Channel, where species diversity was lower than areas surveyed farther north. Seabirds appeared to be everywhere there were dolphins. One enormous flock contained almost 10,000 birds, mostly Western Gulls, and Black-vented and Sooty Shearwaters aggressively feeding on small fish, most certainly anchovies. One of the Sooty Shearwaters had an almost completely white head and a bluish-gray bill, an aberrant plumage pattern one won't find in the books. Sooty and Black-vented Shearwaters, and Western Gulls were numerically dominant, both in the flocks and in our strip transect,

followed closely by Pink-footed Shearwater. The latter species was more commonly encountered beyond the Channel Islands, effectively replacing Black-vented Shearwater, which is generally far more coastal. Looking at total species as a rough measure of diversity, we found 33 species this week, compared to 39 the previous week, and a daily average of 15 (20 last week).

Oceanography Report – Candice Hall, Justin Garver, Siri Hakala & Corey Sheredy

This week in mid-trophic net tows we have seen a dramatic increase in both larval fish as well as cephalopods. During the last three stations we have caught multiple squid and octopi. In the picture (above) of one of our recent IKMT tows, we have multiple larval fish, including a larval flat fish. The larger cephalopod appears to be a squid, based on the fact it has eight tentacles as well as two considerably longer arms. The other two are octopi.

On Wednesday we found a large school of feeding dolphins and birds. This provided a perfect opportunity for us to conduct a day-time IKMT tow in an attempt to validate what our acoustic backscatter is detecting, ultimately providing information on the *Delphinus* food source.

On the oceanographic side of things, the water temperature has oscillated between 16 and 20 °C, a difference that is directly proportional to shorts or long pants on the boat! Friday was foggy so we took the opportunity to sample fine scale variability while waiting for the skies to clear. This involves repeatedly sending our UCTD probe down to a depth of 450m while stationary, taking approximately 10 minutes per drop. We plan to do this twice a leg (normally at night so as not to interrupt day time operations), allowing us to gather six sets of variability stations.

Outreach and Education Report – Siri Hakala

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

This week I gathered footage for the upcoming posts on Oceanography and Navigation. Lt. Petersen, Ens. Lomnickey, GVA Tim Sinquefield, and 3rd Mate John Forgione offered their expertise on plotting location and course, avoiding hazards, communications, and the history of navigation. Oiler Phil Bianco gave Corey Sheredy and me a tour of the engine room. As ever, I'm running around with a video and still camera swinging from my shoulder. I've included a couple of my pics from last week – the sunset below and jar showing a night's net tow 'catch.'

Nick Kellar at sunset. Photo Credit: Siri Hakala

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

The survey tracklines we covered this week were predominantly around the northern Channel Islands from Pt. Arguello to just south of Anacapa Island and out to about 119o West Longitude. Our survey grid provides more detailed coverage of this area than is typically done our SWFSC, Protected Resources Division's West Coast cruises. We saw many schools of our study species: long- and short- beaked common dolphins in small, medium and large schools that are tightly aggregated and relatively distant from other schools, in many scattered small groups easily seen to be in close proximity to each other, and in mixed species schools.

Summary of Marine Mammal Effort

Date	Time	Position		On Effort Survey Miles	Average Beaufort
091309	0703	N34:20.64	W120:57.01	45.5	1.9
	1903	N34:21.91	W120:37.98		
091409	0654	N34:17.60	W120:40.81	65.2	5.1
	1645	N34:12.24	W120:09.15		
091509	0644	N33:53.02	W119:57.31	39.7	2.9
	1709	N33:57.36	W119:36.35		
091609	0644	N33:18.41	W119:50.48	34.4	2.4
	1515	N34:01.74	W119:25.69		
091709	0655	N34:01.90	W119:24.62	69.9	3.0
	1841	N34:09.79	W120:10.16		
091809	0655	N34:03.73	W119:06.42	6.0	2.0
	1208	N33:54.47	W119:12.45		
091909	0939	N32:56.87	W119:26.82	47.1	2.7
	1813	N33:33.38	W118:51.42		

Summary of Marine Mammal Sightings

Species	Number of groups
Delphinus sp.	14
Delphinus capensis	27
Delphinus delphis	22
Tursiops truncatus	4
Grampus griseus	12
Lagenorhynchus obliquidens	5
Orcinus orca	1
Phocoena phocoena	6
Phocoenoides dalli	1
Balaenoptera sp.	5
Balaenoptera acutorostrata	3
Balaenoptera physalus	9
Balaenoptera musculus	15
Megaptera novaeangliae	12
Unid. dolphin	3
Unid. large whale	1
Unid. small delphinid	5
Total	145

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

Species	Common Name	Weekly No. of Samples	Weekly No of Takes	Total No. of Samples	Total No. of Takes
Balaenoptera physalus	Fin whale	0	0	1	1
Delphinus capensis	Long-beaked common dolphin	140	240	205	349
Delphinus delphis	Short-beaked common dolphin	130	196	183	311
Lagenorhynchus obliquidens	Pacific white-sided dolphin	5	5	9	15
Lissodelphis borealis	Northern right whale dolphin	0	0	1	1
Orcinus orca	Transient killer whale	6	7	6	7
Tursiops truncatus	Bottlenose dolphin	14	20	14	20

Oceanography Samples Collected and Stations Completed – Candice Hall, Justin Garver, Siri Hakala & Corey Sheredy

Date	CTD	Surface Chlorophyll	HAB	UCTD (XBT)	Squid Stations	Bongo Tow	IKMT
09/13/2009	1	6	4	4 (2)	1	1	0
09/14/2009	1	6	4	2 (4)	0	1	Test
09/15/2009	1	6	4	4 (1)	1	1	1
09/16/2009*	1	5	4	3 (1)	1	1	1
09/17/2009**	1	6	4	4 (2)	0	1	1
09/18/2009***	1	5	4	17	1	1	1
Total	6	40	24	22 (10)	4	6	4

* Leg 1 day-time IKMT tow on a feeding school of dolphins and bird flock
** High winds prohibited a stationary squid station
*** Leg 1 UCTD Yo-Yo station (13 continuous casts)

For Additional Information about the Protected Resources Division, Please Visit:
http://swfsc.noaa.gov/prd.aspx

Additional Cruise Information can be found at:
http://swfsc.noaa.gov/prd-delphinus.aspx