STAR 2006: NOAA Ship *David Starr Jordan*
Weekly Science Report

Robert L. Pitman, Cruise Leader
28 September 2006

Science Summary: 21-27 September 2006

So, here we are at the dock in Puerto Quetzal, Guatemala, for our third pitstop for refueling, reprovisioning and restaffing. The entire scientific party has scattered to the four winds, mostly on various eco-adventures, but the winner for the most frequent flyer miles goes to Rich Pagen flying off to Belgium for a wedding during the in-port. (I guess the space station was booked). Lindsey led a group off to visit a sea turtle nesting beach south of here (Monterrico). Last week we collected data from 51 olive ridleys that averaged somewhere over 50 lbs apiece, which means we wrestled with well over a ton of snapping, flailing sea turtles – you would think that the science party would be ready for something a little more turtle-free on their days off, but not our devoted caguama crew.

This last week we had great weather as we crossed the Costa Rica Dome (CRD) – an oceanographic feature in the eastern Pacific that enriches the ocean for 1000s of square kms. When nutrients meet sunshine in the ocean the water turns green, the color of your lawn, and on the CRD the green water gives rise to a signature fauna: *Delphinus* is the common dolphin and blue whales are big on it too. This week we had 48 schools of striped and common dolphins, and just 2 schools of offshore spotted dolphins; next leg we get into blue water further north and the order will be reversed. To the untrained eye, it might appear that we travel the same ocean every day, but even subtle changes in the marine habitat can have important ecological consequences, as evidenced by the fact that we don't find a random mix of animals out here.

Once again we must say Good-bye to short-timers who came out to spend one leg with us. Anna Núñez was an international observer from Panama – I think she may be ready to give up her desk job now and devote her life to marine biology; like the rest of the tortugueros, she is proud to show off her turtle scars. Mateo Lopez-Victoria was our Colombian observer and a co-principal investigator on the Nazca Booby food habits study on Malpelo Island. His scientific talent and concern for preservation of tropical ecosystems is an inspiration to all. Tim Gerrodette, our Visiting Scientist on this leg, uses the data we collect on these cruises to estimate the number of dolphins in the eastern tropical Pacific. His job is the real reason we are out here and it is always good to have him out here looking over our shoulders to make sure we are on track.

This is my last report as cruise leader on the *David Starr Jordan,* covering the first half of the STAR cruise. It takes a lot of people working together to make a project like this happen and I would like to thank the crew and officers of the DSJ for their enthusiastic support of all our efforts out here: my opinion is there is no better ship in the NOAA fleet to work on. I would also like to thank the entire scientific party for their hard work and professionalism during the cruise: it is a long trip, on a small boat, with a lot of people, but you make it easy. Thank you all.

Sightings and Effort Summary for Marine Mammals

Date	Start/ Stop Time	Position	Total nmi	Average Beaufort
092106	0674	N09:51.89 W088:42.38	62.1 nmi	3.8
	1830	N08:28.57 W089:24.15		
092206	0648	N07:32.46 W090:04.36	66.9 nmi	2.7
	1825	N06:12.97 W090:52.39		
092306	0653	N06:59.73 W091:36.06	42.8 nmi	1.7
	1856	N08:18.70 W091:50.33		
092406	0652	N08:44.48 W090:45.36	41.4 nmi	2.3
	1824	N09:55.66 W090:45.82		
092506	0650	N10:19.11 W089:52.91	46.8 nmi	2.9
	1840	N11:17.56 W089:18.74		
092606	0654	N11:58.13 W090:05.81	42.9 nmi	3.9
	1729	N13:10.61 W089:59.79		
092706	0701	N13:21.09 W090:39.62	20.8 nmi	2.4
	1006	N13:48.68 W090:44.39		

Code	Species	Number of Sightings
002	*Stenella attenuata* (offshore)	2
003	*Stenella longirostris* (unid. subsp.)	1
006	*Stenella attenuata graffmani*	2
013	*Stenella coeruleoalba*	17
015	*Steno bredanensis*	3
017	*Delphinus delphis*	31
018	*Tursiops truncatus*	20
036	*Globicephala macrorhynchus*	7
037	*Orcinus orca*	1
048	*Kogia sima*	1
049	ziphiid whale	1
051	*Mesoplodon* sp.	1
061	*Ziphius cavirostris*	2
075	*Balaenoptera musculus*	3
077	unid. dolphin	11
078	unid. small whale	3
099	*Balaenoptera borealis/edeni*	1
Total		107

Photography (Cornelia Oedekoven and Laura Morse)

Until this week, Leg 3 had been notable for the lack of opportunities for photo ID work. But this week we had one sighting of 3 killer whales, all of which were photographed, and 3 blue whale sightings, of which we were able to photo-identify 3 individuals.

Code	Common Name	Weekly Photographs		Total Photographs	
		Individuals	Schools	Individuals	Schools
002	Spotted dolphin (offshore)		1		11
003	Spinner dolphin (unid)		1		6
006	Spotted dolphin (coastal)		1		10
010	Spinner dolphin (eastern)				4
013	Striped dolphin		2		11
015	Rough-toothed dolphin				6
017	Short-beaked common dolphin		11		29
018	Bottlenose dolphin		9		32
021	Risso's dolphin				12
032	Pygmy killer whale				6
036	Short-finned pilot whale		6		11
037	Killer whale	3		4	
046	Sperm whale				1
049	Unidentified beaked whale			20	
063	Baird's beaked whale			1	
072	Bryde's whale			1	
074	Fin whale			5	
075	Blue whale	3		18	
076	Humpback whale			15	
099	Sei/Bryde's whale	1		6	
	Total	7	31	70	139

Biopsy (Juan Carlos Salinas Vargas and Ernesto Isaac Vázquez Morquecho)

Species	Common Name	Weekly		Total	
		Samples	Takes	Samples	Takes
Stenella attenuata	Pantropical spotted dolphin			12	23
S. attenuata graffmani	Coastal spotted dolphin	3	3	21	31
Stenella longirostris orientalis	Eastern spinner dolphin			6	20
Stenella longirostris subsp.	unidentified spinner	4	9	25	42
Stenella coeruleoalba	Striped dolphin			2	8
Delphinus delphis	Short-beaked common	3	7	18	39
Steno bredanensis	Rough-toothed dolphin	3	3	7	18
Tursiops truncatus	Bottlenose dolphin	5	7	42	68
Globicephala macrorhynchus	Short-finned pilot whale	28	58	61	135
Orcinus orca	Killer whale	1	7	1	7
Physeter macrocephalus	Sperm whale			8	8

Species	Common Name	Weekly		Total	
		Samples	Takes	Samples	Takes
Megaptera novaenagliae	Humpback whale			2	5
Balaenoptera edeni	Byrde's whale			3	3
Balaenoptera musculus	Blue whale	1	1	9	17
Total		48	105	217	424

Bird Buzz (Rich Pagen and Chris Cutler)

One day this week we found ourselves in Beaufort 0 conditions, where a whole new world opened up for those of us looking closely from the flying bridge. Schools of hundreds of *Exocetus* flyingfish were clearly visible below the water's surface, a few of them taking to the air as the ship passed by. These same conditions left many of the tubenoses up the proverbial creek without a paddle. Tahiti Petrels, which rely heavily on the wind to propel themselves, were grounded by the lack of wind and spent most of the day loafing on the water. The Tahiti Petrels were often joined in these rafts by Galapagos Storm-Petrels, bringing to mind the mental picture of ducks on a lake keeping a watchful eye over their tiny chicks.

Flocks this week were remarkably similar in composition; most consisted of two Nazca Boobies as ring leaders, accompanied by an entourage of 10-15 Arctic Terns (or Black Terns in nearshore waters), with maybe a Jaeger or Red-footed Booby thrown in for good measure. At times, one flock was so similar to another that we had left an hour ago that it made us wonder if we had just gone in a big circle.

The regular staple of migrant landbirds and shorebirds continued this week, including Bank, Barn and Cliff Swallows. Guatemala now looms outside the porthole, and our thoughts are drifting somewhat away from seabirds, and more towards terms like "cloud forest", "ATM machine" and even "trans-Atlantic flight".

Turtle Operations (Lindsey Peavey, *et al.*)

This week we collected data from a whopping 51 sea turtles, over 20 more turtles than our previous weekly high that occurred while sailing in the Sea of Cortez. The coastal waters of Costa Rica, Nicaragua and Guatemala were speckled with olive ridleys. On 24 September, we had a beautiful Beaufort 0 morning and captured turtles of all sizes, as large as 68.2 cm straight carapace length (SCL), and as tiny as 17.4 cm SCL. The smallest turtles are perhaps the most interesting and perplexing. Little is known about the first few years of a turtle's life, coined by Archie Carr as the "lost years." It is estimated that around 1% of one clutch's hatchlings will survive to adulthood. We know a fair amount about nesting turtles, and are starting to get a handle on the adults and sub-adults inhabiting coastal areas and foraging grounds. However, we know almost nothing about how a turtle gets from the hatchling life stage to the juvenile life stage. Although in certain pelagic areas, such as the mouth of the Gulf of California and pelagic areas off Central America, we see a good number of small (20-30 cm SCL) olive ridleys, catching a turtle as small as 17.4 cm is rare. This could mean that +/-1 year old turtles are already around 20 cm SCL in size, or that our sampling is still missing the "lost years" of olive ridleys.

We observed a lot of feeding activity this week too, which made this another great area to deploy a remote sensing device to record dive time and depths of an adult female. Now halfway through the cruise, we have successfully surpassed our goal of tagging 120 turtles the first half of the cruise, and are on track for processing around 240 turtles for the entire survey. The crew of the DSJ is absolutely dynamite when it comes to small boat operations and capturing turtles to bring back to the ship for work up. Even the officers on the bridge are excitedly notifying the flying bridge when they spot a turtle near

our track line. When a turtle (often times more than one at a time) comes on board the Jordan, I am surrounded by scientists and crew alike offering a helping hand. I could not collect data from nearly as many turtles without their help, and I am truly grateful for everyone's never-ending energy and enthusiasm for this project. To quote my good friend and crew member Jose Coito, "We don't make much money, but we sure do have a good time!"

Species	**Common name**	**Number sampled**	
		Weekly	**Total**
Caretta caretta	Loggerhead	0	8
Eretmochelys imbricata	Hawksbill	0	1
Lepidochelys olivacea	Olive ridley	51	125
Total		51	134

Fish Sampled for Diet and Isotope Analysis

Species	Samples	
	Weekly	Total
Yellowfin tuna	1	22
Skipjack*	2	13
Wahoo		3
Mahi mahi		11

*includes black skipjack

Oceanographic Operations (Candy Hall)

Arguably the most important oceanographic feature of this region is fashioned almost entirely by the NECC (North Equatorial Countercurrent). Upon approaching the Central American shelf, the NECC flows northwards, causing the water close to the continent to upwell dramatically. This particular oceanographic feature, consisting of a rise or doming of the thermocline (the layer where temperature changes most rapidly with depth), is known as the Costa Rica Dome in this region. Such a feature will exert a multi-faceted effect on all that resides here, as the upwelled water provides a spectacular array of nutrients available to an expectant food chain. During this exciting oceanographic zone our XBT and CTD traces have provided proof of the shallowing of the thermocline, and our fluorometer has measured chlorophyll-a levels of triple the amount previously recorded on this 2006 cruise. As reported in my colleagues' sections this week, the Costa Rican Dome really is a hot spot for a thriving food web. Viva la Costa Rican Dome!

Date	**CTD**	**XBT**	**Bongo tow**	**Manta tow**
21 Sept	2	3	1	1
22 Sept	2	3	1	1
23 Sept	2	3	1	1
24 Sept	2	3	1	1
25 Sept	2	3	1	1
26 Sept	2	3	1	1
27 Sept*	1	0	0	0

Total	13	18	6	6
Grand Total	88	153	35	37

* arrived Puerto Quetzal, Guatemala