

STAR 2006: NOAA Ship *McArthur II*
Weekly Science Report

Jay Barlow, Cruise Leader
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Science Summary: 05 - 11 October 2006

This is our first week on Leg 3 of the STAR06 survey. Our voyage will take us from Manta, Ecuador to Manzanillo, Mexico by a most circuitous route. We spent the first six days of this week on a heading of SSW towards the southern edge of the STAR study area at 15° S. Geographically, we have been well within the tropics for the entire week. A quick look around the flying bridge paints a very different picture. Everybody is bundled up in the warmest gear that they brought, and some are borrowing gloves to help them get through their watches with all digits intact. The water temperature and the air temperature have been hovering around a cool 19-22° C. Clearly we have been gripped by the oceanographic influence of the Humboldt Current – that river of cold Antarctic water that flows up the west coast of South America. Of course the attire on the flying bridge has been influenced somewhat by the 25-30 knot wind chill that results from traveling at 10 knots into a 15-20 knot wind, and by the constant overcast. Fortunately, we received some relief on 11 October when we turned to travel NW ... downwind, down swell, and into warmer offshore waters. We even saw the sun!

The temperate water conditions have been matched with a dolphin species composition that would be characteristics of warm temperate waters off southern California (common dolphins, bottlenose dolphins, blue whales and Risso's dolphins). We saw few if any of the truly tropical species (spotted and spinner dolphins). We were very excited to see blue whales south of the Equator. There are two likely feeding destinations for these blue whales: Chilean coastal waters or Antarctic waters. The winter migratory destinations for both of these populations are largely unknown. We hope that our biopsy sample from one of the animals will determine whether it is destined to return to Chile or Antarctica.

Another pleasant surprise is having sightings of killer whales on each of the last three days. Killer whales tend to be rare in the tropics, and typically we have only one or two sightings per 30-day leg. Seeing three groups in three days is most unusual. This is even more unusual considering the general low density of marine mammal food for them. Killer whales were the second most commonly seen species! Maybe they ate all the other species (one group may have been chasing our second blue whale). More likely, however, is the possibility that they feed on fish or squid. Unfortunately, the weather conspired against our launching a small boat and getting biopsies that could help determine whether they were mammal-eating or fishing-eating whales.

Our two visiting scientists have fit beautifully into the well-oiled science machine that we call the "Mac". Kruger Loor has also been spending much of his time standing watch as independent observer on the flying bridge, and Danna Shulman has been working on her squid projects (see below). Both have been a tremendous help with oceanographic

operations. A debt of gratitude is owed to all the fishermen who have contributed their squid catch to Danna's studies!

Sightings and Effort Summary for Marine Mammals

Date	Start/ Stop Time	Position	Total nm	Average Beaufort
100506	1337	S00:54.80 W080:43.54	28.0 nmi	4.6
	1800	S01:11.69 W081:19.24		
100606	0623	S01:57.53 W082:35.04	95.2 nmi	4.1
	1820	S02:50.28 W084:06.50		
100706	0622	S03:59.54 W084:42.04	81.6 nmi	4.2
	1825	S05:27.40 W085:05.95		
100806	0627	S06:43.88 W085:31.47	95.7 nmi	4.0
	1824	S08:17.83 W086:03.73		
100906	0630	S09:37.85 W086:30.69	91.9 nmi	4.1
	1808	S11:05.67 W087:01.10		
101006	0632	S12:27.41 W087:28.99	95.1 nmi	5.0
	1814	S14:01.10 W088:01.65		
101106	0635	S13:53.37 W089:16.94	108.2 nmi	4.7
	1730	S12:47.96 W090:48.90		

Code	Species	Number of Sightings
002	<i>Stenella attenuata</i> (offshore)	1
013	<i>Stenella coeruleoalba</i>	4
017	<i>Delphinus delphis</i>	1
018	<i>Tursiops truncatus</i>	3
021	<i>Grampus griseus</i>	1
034	<i>Globicephala spp.</i>	1
036	<i>Globicephala macrorhynchus</i>	5
037	<i>Orcinus orca</i>	3
046	<i>Physeter macrocephalus</i>	2
049	Ziphiid whale	1
075	<i>Balaenoptera musculus</i>	2
076	<i>Megaptera novaeangliae</i>	3
079	Unid.large whale	1
099	<i>Balaenoptera borealis/edeni</i>	2
177	Unid.small delphinid	2
Total		31

Biopsies (Suzanne Yin and Erin LaBrecque)

Species	Common Name	Weekly		Total	
		Samples	Takes	Samples	Takes
<i>Balaenoptera edeni</i>	Bryde's whale			1	1
<i>Balaenoptera musculus</i>	Blue whale	1	1	2	2
<i>Delphinus delphis</i>	Short-beaked common dolphin			2	3
<i>G. macrorhynchus</i>	Short-finned pilot whale	1	2	1	2
<i>Stenella attenuata</i>	Pantropical spotted dolphin			1	1
<i>Tursiops truncatus</i>	Bottlenose dolphin	0	1	6	10
Total		2	4	13	19

Photo Project (Isabel Beasley and Jim Cotton)

Blue whales featured again this week for photo-id. Good pictures were taken of three individuals that were surfacing side-by-side in front of the ship - virtually bow-riding blue whales! Although we have sighted three killer whale groups this week, unfortunately all groups were evasive and difficult to photograph.

Species Code	Species	This week	Total
002	<i>Stenella attenuata</i> (offshore)		1
011	<i>Stenella longirostris</i> (whitebelly)		6
101	<i>Stenella longirostris</i> (southwestern)		1
013	<i>Stenella coeruleoalba</i>	2	6
015	<i>Steno bredanensis</i>		1
017	<i>Delphinus delphis</i>	1	7
018	<i>Tursiops truncatus</i>	2	11
026	<i>Lagenodelphis hosei</i>		2
031	<i>Peponocephala electra</i>		1
033	<i>Pseudorca crassidens</i>		4*
036	<i>Globicephala macrorhynchus</i>	6	22*
037	<i>Orcinus orca</i>	3	4*
046	<i>Physeter macrocephalus</i>		1
072	<i>Balaenoptera edeni</i>		6*
075	<i>Balaenoptera musculus</i>		10*
076	<i>Megaptera novaeangliae</i>	1	1
TOTAL		15	84

* Individual whales photographed

Seabird and Marine Debris (Michael Force and Sophie Webb)

We had a week that can be best described as nothing less than remarkable. Departing Manta, Ecuador and transiting through waters strongly influenced by the Peru Current, we had high hopes. Needless to say, we were not disappointed. Avian diversity this week reached phenomenal levels, recording our highest weekly species total of the cruise: an unbelievable 31 species of seabirds were seen this week! Our daily average of 11 species

was well within the norm for the cruise, yet masks alternating days of high and low diversity, another reminder of the patchy distribution of limited resources. We were in seabird heaven on Wednesday, finding three of the eight species that were new for the cruise, providing a partial explanation for such a high weekly species total. We saw eight species of petrels and seven species of storm-petrels; stormies leading the overall abundance on most days, occasionally recording up to five species in a day. They capably make a living where few seabirds choose to. On Wednesday, White-bellied Storm-Petrels seemed to be everywhere, with many birds following the ship and creating a counting conundrum. How to keep track of these endearing storm-petrels as they circled the ship kept us busy for hours. Fortunately, we were pleasantly diverted with Defilippe's Petrels and the occasional White-faced Storm-Petrel. We reached our southernmost point of the cruise, so it was only fitting that we found Cape Petrels and White-chinned Petrels, faithful ship followers very familiar to sea-going visitors to the Antarctic and sub-Antarctic.

The unequivocal highlight for STAR 2006 (yes, we can confidently make this claim, still with seven weeks to go) was not one, but two Chatham Island Petrels (*Pterodroma axillaris*) seen on Wednesday, with one identifiably photographed by Jim Cotton (thanks Jim!). This poorly known seabird nests only on Rangitira Island in the Chatham group, about 350 NM west of New Zealand, and at one time was critically endangered. Elimination of mammalian predators has allowed it to recover slightly, with an estimated world population of up to 800 individuals (Jim Enticott and David Tipling, *Seabirds of the World*, 1997). Its at-sea distribution is a mystery as there are perhaps less than five sightings away from the natal island. Sightings such as this serve to illustrate the importance of these surveys in expanding our understanding of the distribution of these enigmatic seabirds.

For most of the week, in fact for the past month or so, we have been surveying in a trash-free zone; basically nothing but the occasional fishing float and plastic bottle.

Fish Sampled for Diet and Isotope Analysis

Species	Samples	
	Weekly	Total
Wahoo	-	1

Oceanographic Operations (Melinda Kelley)

The first week of leg three has come and gone with everyone settling into their groove. This week, operations were conducted with ease thanks to the wonderful support of the Mac II deck crew, the bridge and Leg 3 visiting scientists, Danna Shulman and Kruger Loor. Danna has ambitiously written this week's report with a summary of oceanographic operations as well as an update on her squid collections. Enjoy!

DateRange	Day	CTD	XBT	Bongo	Manta
Leg 3 10/05 to 10/11	Thursday	1	1	1	1
	Friday	2	3	1	1
	Saturday	2	3	1	1
	Sunday	2	3	1	1
	Monday	2	3	1	1
	Tuesday	2	3	1	1
	Wednesday	2	3	1	1
	Totals	13	18	7	7

Oceanography & Squid Report (Danna Shulman – visiting Scientist)

I'm so grateful to be able to join this boatload of wonderful scientists and crew; there's so much to learn from everybody.

As we headed south, sea surface temperatures dropped from 22° C degrees off the coast of Ecuador down to 19° C. Since we turned around they're already back up to 20° C, and we're looking forward to warmer waters. XBT drops this week have shown a variable thermocline.

Net tows have been routine; I've been sorting the port cod-end of the bongo tow for squid paralarvae and finding anywhere from three to ten every night. The manta tow on the night of the 9th provided a really exceptional animal: a paper nautilus, genus *Argonauta*. The female argonaut was about thumb-sized and in excellent condition, we put her in a dish and took stills and video of her swimming around and climbing in and out of her shell.

Mindy is a champion one-woman oceanography team; fortunately she gets help from Kruger, Ben, Lacey, the bridge and myself. Gratitude is generously distributed.

Squid business has been good! Jigging during the CTD cast has yielded several *Dosidicus* almost every night, and one *Sthenoteuthis* on Wednesday night. Mantle lengths range from 23 to 44 cm and seem entirely uncoupled to sexual maturity; we've found both mature and immature animals of every size. Measurements, stomachs, and tissue samples have been taken from every squid, and the remains go to our chief steward, Art. (Except for Tuesday and Wednesday, when we froze the squid whole for Iliana R.) On the one night (Saturday) that our jigging was unsuccessful, Howie dip netted a lovely little 4.5 cm juvenile *Dosidicus*, which I kept overnight in a fish box turned aquarium (courtesy of the excellent Jim Cotton). The next day found it moribund, so I sacrificed it for tissue samples. I have ideas for improving holding conditions and hope to be able to keep some squid alive longer for behavioral observations. Right now, the only live squid on board the boat are eggs that I artificially fertilized the night of the 9th. In another few days I hope to have hatchlings!

Squeakly Report (Shannon Rankin and Liz Zele)

It's been a diverse week for acoustics; in both what we did hear, and what we did not hear. We had 17 dolphin schools not detected by the observers, and 5 sperm whale groups. We did NOT hear sounds from the following: beaked whales, Risso's dolphins, pilot whales, striped dolphins and even a sperm whale! We DID, however, record sounds from spotted, striped and common dolphins, from pilot whales and killer whales. We also deployed sonobuoys on a blue whale and a Bryde's/sei whale, recording sounds from both sightings. The most surprising recordings were from killer whales-- we rarely (never?) hear them in the tropics. But, as the bundled up observers will remind us, we aren't in the tropics anymore! FINALLY! For the first time in two months, the observers and the acousticians are working in similar habitats (the air conditioning in the dry lab is THAT cold)!

Dippers' Doldrums (Jim Cotton)

Very few flyingfish sightings were recorded during the daylight vigil and at the evening / morning dipping stations this week as we cruised south within the bounds of the Humboldt Current and cooler surface waters.

Lantern fish (*Myctophid* sp.) and Pacific sauries (?) dominated our catch this week as we continued to compete with Swallow-tailed gulls and squids for our samples. Approaching our southern waypoint, the water temperatures dipped to 19° C and we netted a new species for the cruise, tentatively identified as Blotchedwing flyingfish (*Cheilopogon heterurus*). The only other four-winged fliers added to the collection this week was a single Banded flyingfish (*Hirundichthys marginatus*) and three Blackwing types, all captured at our most inshore station in 24° C water. Of the two-winged variety (*Exocetus* sp.), five adults were netted at a single station and a lone juvenile (possible *E. obtusirostris*) at another. It was a very slow week for the dippers!

Dolphin fish, a.k.a. Mahi Mahi, were commonly seen beneath our lights and several showed up on the dinner table along with squid ceviche (*Calimarus ceviches*) thanks to the talents of our stewards department and donations from Stan Sinclair. The Humboldt squid (*Dosiducus gigas*) was present at most of the stations and the purpleback squid (*Stenoteuthis oualaniensis*) was only observed/caught as we headed further westward into an overlap area where both species were present.