

**STAR-LITE 2007: NOAA Ship *David Starr Jordan*
Weekly Science Report**

*Susan Chivers, Cruise Leader
07 October 2007*

Science Summary: 30 September – 06 October

Leg 2, Take 2 of STAR-LITE 2007 ended this week. And it was a very successful leg. We completed all transects of the diamond pattern designed for this project, and we collected lots of great data. Although the weather was good this entire leg and definitely contributed to our success, we could not have met our objectives without the hard work and cooperation of the entire ship's complement. I extend a BIG thank you to all on board the R/V McArthur II – the command, the crew and the scientists – for a job well done. Now we are on our way to Manzanillo, Mexico for our next inport where everyone will have time to enjoy a little rest and relaxation.

Did I mention the weather? And that it was great? I do not think any of us could quite believe how consistently great the weather was this leg. It was amazing and really helped us to get a good look at this piece of the ocean, especially the cetacean and seabird inhabitants that live here. But just to remind us that it is not always so nice, the winds kicked up to around 20kts on our last day of survey effort, and numerous rain squalls caused us to go on and off effort during the course of our last day. Oh well, it was just one day.



Spotted dolphin (*Stenella attenuata*). Photo: Adam Ü

The calm seas allowed us to get some good looks at several species that are difficult to see when the seas are the least bit rough, including beaked whales, dwarf sperm whales (*Kogia sima*), Risso's dolphins (*Grampus griseus*) and pygmy killer whales (*Feresa attenuata*). While even in good conditions many beaked whales are difficult to identify in the field, our sightings this week included *Mesoplodon*

peruvianus and Cuvier's beaked whale (*Ziphius cavirostris*). We got a particularly good look at one small group of Cuvier's beaked whales that included a mother and calf pair. Also among our sightings were three groups of pygmy killer whales. Two of the groups were reasonably approachable, and we were able to photograph them but could not collect a biopsy sample. We will try again. Another interesting sighting was of a group of Risso's dolphins that we saw one afternoon. Coincidentally, we also observed a significant change in the depth of the mixed layer and the deep scattering layer (DSL). Surprisingly, the DSL was much closer to the surface than it normally is during daylight hours. Were the Risso's dolphins following this feature and feeding? Maybe.

The name of the game out here is variability. Everything is patchy: prey and predators alike. And each day spent surveying was slightly different even along the same transect, and each transect was different from the others. The differences in cetacean sightings are seen primarily in the distribution and density of spotted dolphin groups and the species diversity seen along a transect. However this day-to-day and transect-to-transect variability is seen in all data being collected, and the seabird observers and dipnet team make note of the variability they observed in their weekly reports included below. It will be interesting to see what patterns emerge as the third and fourth trips around the diamonds are conducted during Legs 3 and 4, respectively. Stay tuned.

Congratulations to the winners of this leg's team cribbage tournament: Greg Hubner and Lacey O'Neal, and the runners up: Mary Barber and Josh Slater.

Sightings and Effort Summary for Marine Mammals (Jim Cotton, Richard Rowlett, Juan Carlos Salinas, Suzanne Yin, Ernesto Vázquez, Adam Ü)

Date	Start/ Stop Time	Position	Total nm	Average Beaufort	Mode of Operations
093007	0911	N13:44.01 W103:39.15	56.3	2.2	Closing
	1938	N14:53.31 W104:22.11			
100107	0925	N14:57.72 W104:31.66	97.5	2.8	Passing
	1900	N13:35.82 W105:26.17			
100207	0856	N14:59.85 W104:30.06	53.6	2.5	Closing
	1950	N13:46.57 W105:20.62			
100307	0917	N14:50.00 W105:24.14	100.2	3.3	Passing
	1900	N16:14.16 W106:20.53			
100407	0856	N14:49.95 W105:24.03	78.0	4.7	Closing
	1900	N16:05.13 W106:17.06			
100507	In transit to Manzanillo, Mexico				
100607	In port, Manzanillo, Mexico				

Code	Species	Number of Sightings
001	<i>Mesoplodon peruvianus</i>	1
002	<i>Stenella attenuata</i> (offshore)	18
003	<i>Stenella longirostris</i> (unid. subsp.)	1
010	<i>Stenella longirostris orientalis</i>	4
013	<i>Stenella coeruleoalba</i>	4

Code	Species	Number of Sightings
015	<i>Steno bredanensis</i>	1
018	<i>Tursiops truncatus</i>	1
021	<i>Grampus griseus</i>	1
032	<i>Feresa attenuata</i>	3
048	<i>Kogia sima</i>	2
049	Ziphiid whale	1
051	<i>Mesoplodon</i> sp.	2
061	<i>Ziphius cavirostris</i>	2
077	Unid. dolphin	5
096	Unid. cetacean	5
177	Unid. small delphinid	25
277	Unid. medium delphinid	1
Total		77

The locations of *Stenella attenuata*, *S. longirostris*, *Grampus griseus*, *Feresa attenuata*, *Orcinus orca*, and unidentified small delphinid sightings are plotted in the cetacean sighting maps included at the end of this report.

Photography (Adam Ü)



Pygmy killer whale (*Feresa attenuata*). Photo: Adam Ü

This week has been quite exciting on the photography front (if you ignore us getting skunked by Stenellids) for not only did we add Risso's dolphins to our catalog but we've had three successful pygmy killer whale approaches from both the *McArthur II* and the small boat. These little blackfish are now in second place behind spotted dolphins in terms of photographic encounters but numero uno in terms of individual frames taken. Special guest photographer Fiona Matheson also added some quality images

(including a handful of laser dot shots) of bottlenose dolphins that were kind enough to ride the bow of the *McArthur II* while the small boat worked a group of pygmy killer whales.

Species	Common Name	Weekly photographs		Total photographs	
		Individuals	Schools	Individuals	Schools
<i>Stenella attenuata</i>	Pantropical spotted			10	226
<i>Stenella longirostris</i>	Eastern spinner dolphin			2	38
<i>Stenella coeruleoalba</i>	Striped dolphin			2	20
<i>Tursiops truncates</i>	Bottlenose dolphin	1	67	2	74
<i>Grampus griseus</i>	Risso's dolphin	1	42	1	42
<i>Feresa attenuate</i>	Pygmy killer whale	3	262	5	304
<i>Pseudorca crassidens</i>	False killer whale			1	26
Total		5	371	23	730

Biopsy (Juan Carlos Salinas, Ernesto Vásquez, and Suzanne Yin)

Species	Common Name	Weekly		Total	
		Samples	Takes	Samples	Takes
<i>Pseudorca crassidens</i>	False killer whale	0	0	1	4
<i>Stenella attenuata</i>	Pantropical spotted dolphin	0	0	2	10
<i>Tursiops truncatus</i>	Bottlenose dolphin	1	1	2	8
Total		1	1	5	22

Acoustic Squeakly (Shannon Rankin)

In the last squeakly report, we ended the week with the frustrating static indicating the premature death of an array. It is a sound I know all too well. Somewhere along that 800m of cable was a small cut, allowing water to intrude into the cable and wreck havoc in the wiring. Vicki Pease and Fiona Matheson braved heat exhaustion, bruises and splinters while helping me unspool, inspect, and respool cable. The break occurred at a splice in the cable, and I was able to cut out the splice, the first set of hydrophones, and 500m of cable to rebuild the array as a simple 3-element array. After a long night of splicing and dicing, the array was back in the water the following day.

Monday was an interesting day, with only six matches of a total of 37 dolphin schools (26 acoustic detections and 11 visual detections). Wednesday was more typical, with 16 acoustic detections, of which eight matched visual sightings. Wednesday marked the final day of full acoustic effort for this survey, and in total I have recorded 266 acoustic detections of dolphin schools during this cruise, with 117 matches to visual sightings.

See plots included at the end of this report for the location of acoustic detections of dolphins and of the acoustic detections that were matched to visual sightings.

Seabird Report (Michael Force and Sophie Webb)

This week appears at first glance to be a repeat of the previous one. However, the patchy distribution of resources that characterises the pelagic ecosystem ensures that each week is unique in some small way. There are days when we can barely keep up with the computerized data entry under the onslaught of feeding flocks and simultaneously trying to avoid missing birds wandering in and out of our 300 metre strip transect. Then there was that rare day when birds were almost non-existent. Wednesday was such a day. It was our busiest day for flying fish; the slowest one for birds. Why were there so many flying fish to count while the ocean around us was almost devoid of birds? Even the boobies, who love eating flying fish, were practically AWOL that day. Go figure. But then again, that's why we're out here: to seek answers to this question and many others like it. Another question comes to mind: Why does a South Polar Skua beat up Red-footed Boobies? Answer: Because it can. One of these marauding kleptoparasitic seabirds charged into our complacent booby flock raising havoc as well as some of their flyingfish lunches, providing a quick meal for the hungry skua. Harassing seabirds, often larger than themselves, to regurgitate their hard-earned food, is a common feeding strategy for skuas, jaegers and other seabirds such as frigatebirds.

Again, as in previous weeks, the species diversity remains essentially unchanged at 22 species. Juan Fernandez Petrel wins Commonest Seabird Award by a landslide followed by Wedge-tailed Shearwater, although both have decreased from last month. Non-marine species seen this week include Wandering Tattler, Cliff and Bank Swallow, Yellow Warbler and our first Cattle Egret. A trip to the eastern tropical Pacific just isn't complete without the requisite Cattle Egret! We want to thank Susan Chivers, our outgoing Cruise Leader, for her attention to the small details necessary to keeping everything running smoothly this leg.

See plots included at the end of this report for location of seabird flocks recorded. Only the key indicator species of flocks are plotted.



Flying bridge operations (Sophie Webb, left, and Richard Rowlett, right). Photo: Adam Ü

Oceanographic Operations (Candice Hall, Ryan Driscoll, Fionna Matheson and Vicki Pease)

This week may have been short but it was certainly action-packed! We commenced with an evening of Yo-Yo casts, plummeting the CTD from the surface to 200m, 13 times, as Sunday night stretched into Monday morning. Two more casts were conducted in the wee hours before the habitual morning oceanography shenanigans began. With any luck our all night efforts will reveal internal waves. We'd like to thank the rotating *McArthur II* crew and Trader Joe's Dark Chocolate Covered Espresso Beans for helping us through the night.

Our second coup de grace this week was the fortuitous confluence of an XBT cast, chlorophyll sample and strong acoustic backscatter cluster, all as a pod of *Grampus* drifted along our starboard side. Gee whilikers! I done dang near dropped the XBT on 'em critters! Incidences like these demonstrate how PRDs ecosystem-wide sampling strategy helps us understand the complex dynamics of our research region.

Just as we become accustomed to the plankton collected in our nightly tow, we begin to see the new and unusual critters that we may have previously overlooked. *Zoea*, for instance, is a larval crab with large spines on its carapace for protection and floatation. But this week, not all the newcomers were of a diminutive nature. Three adult *Exocoetus* were caught; two in the Bongo and one in the Manta. Negotiations commenced upon their capture for the return of the ingested plankton. It was a 'bad cop, bad cop' situation. As in the latest Bruce Willis drama, it was pretty much a story of 'Live free or die hard'.

Date	CTD	XBT	Bongo tow	Manta tow
093007	2*	5**	4	1
100107	2	4	4	1
100207	2	4	4	1
100307	2	4	4	0***
100407	2	4	4	1
100507	1	In transit to Manzanillo		
100607	In port Manzanillo, Mexico			
Total	33	64	63	12

* CTD operations included one "Yo-Yo" night of 13 casts followed by two post-Yo-Yo casts. These casts were in addition to the regular evening and morning operations, equaling a total of 17 CTD casts for the 12 hour period.

** Additional XBT drop in conjunction with CTD cast.

*** J-Frame malfunction resulted in no net tows one evening.

Flyingfish Report (Jim Cotton, Juan Carlos Salinas, Ernesto Vázquez, Adam Ü, Ryan Driscoll)

It was another productive week for the dippers with 79 flyingfish collected and 58 stomach samples preserved. At two of the seven stations this past week the Two-winged flyingfish (*Exocoetus* sp.) were super abundant and then strangely absent along with all other species the night when thousands were seen during the daytime observations, again attesting to the patchiness of their distribution.

This report marks the midpoint of the cruise for the fish collection with a total of 333 specimens in the freezer. Flyingfish, the main focus of our efforts, accounted for 249 of the total. The Short-winged flyingfish (*Oxyporhamphus*), which is more closely related to halfbeaks (Hemiramphidae) than any other

flyingfish, are represented by 74 samples. Only seven Lantern fish (Myctophidae) have been collected this year and are underrepresented in the collection compared to past years.

Other animals seen beneath the dipping lights this week but not collected were: one juvenile turtle (*Lepidochelys olivacea*), two pelagic crabs, one unidentified juvenile fish, a few salps and the omnipresent purple-back squids (*Sthenoteuthis*).

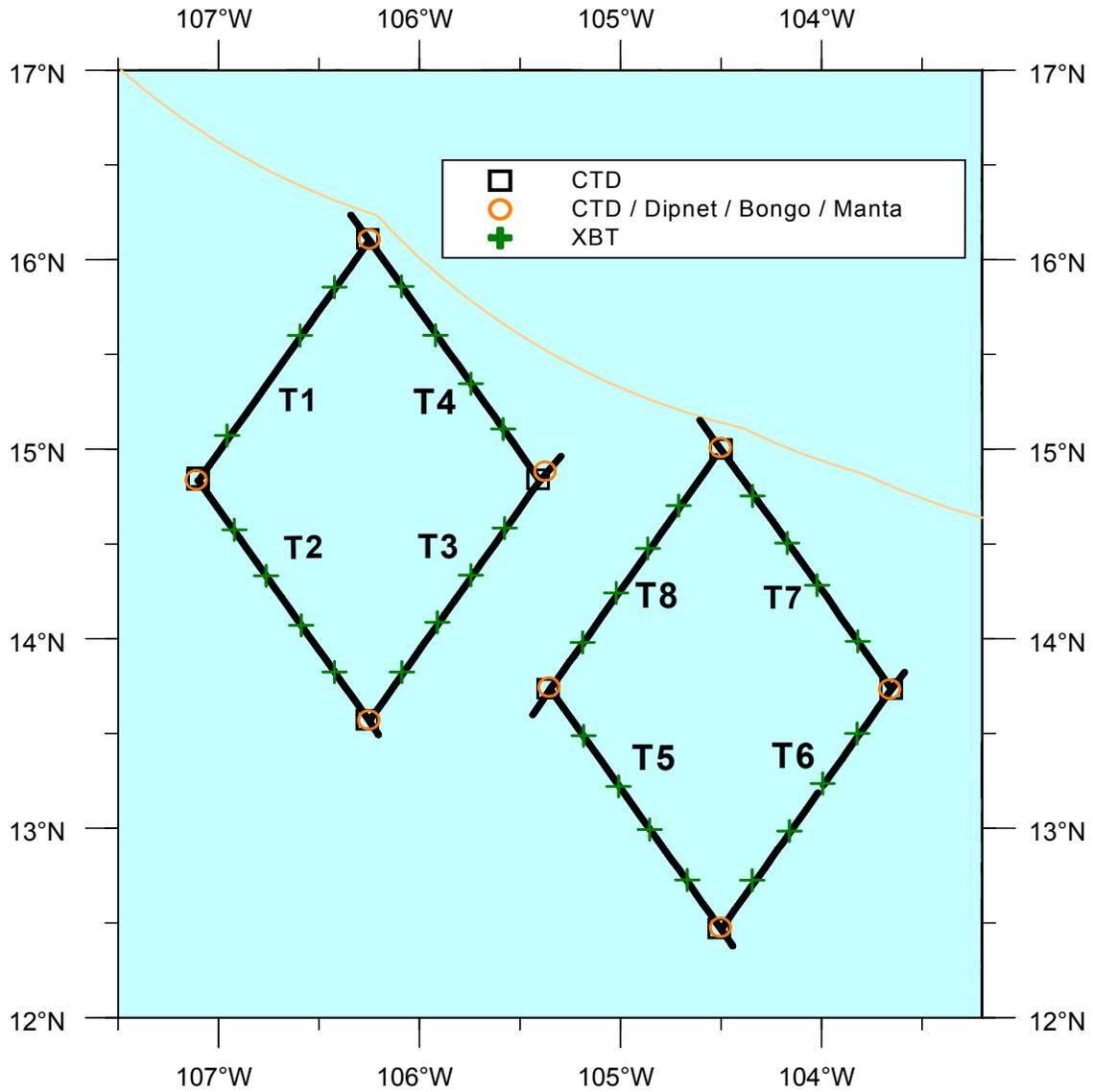
Fish collected	Weekly total	Grand total
Two-winged flyingfish (<i>Exocoetus</i> sp.)	47	161
Four-winged flyingfish (<i>Cheilopogon</i> , <i>Hirundichthys</i> , <i>Prognichthys</i>)	18	88
Short-winged flyingfish (<i>Oxyporhamphus</i>)	14	74
Lantern fish (Myctophidae)	0	7
Unidentified fish	0	3
Total	79	333

Stomach samples collected	Weekly total	Grand total
Two-winged flyingfish (<i>Exocoetus</i> sp.)	42	113
Four-winged flyingfish (<i>Cheilopogon</i> , <i>Hirundichthys</i> , <i>Prognichthys</i>)	16	56
Short-winged flyingfish (<i>Oxyporhamphus</i>)	0	1
Total	58	170



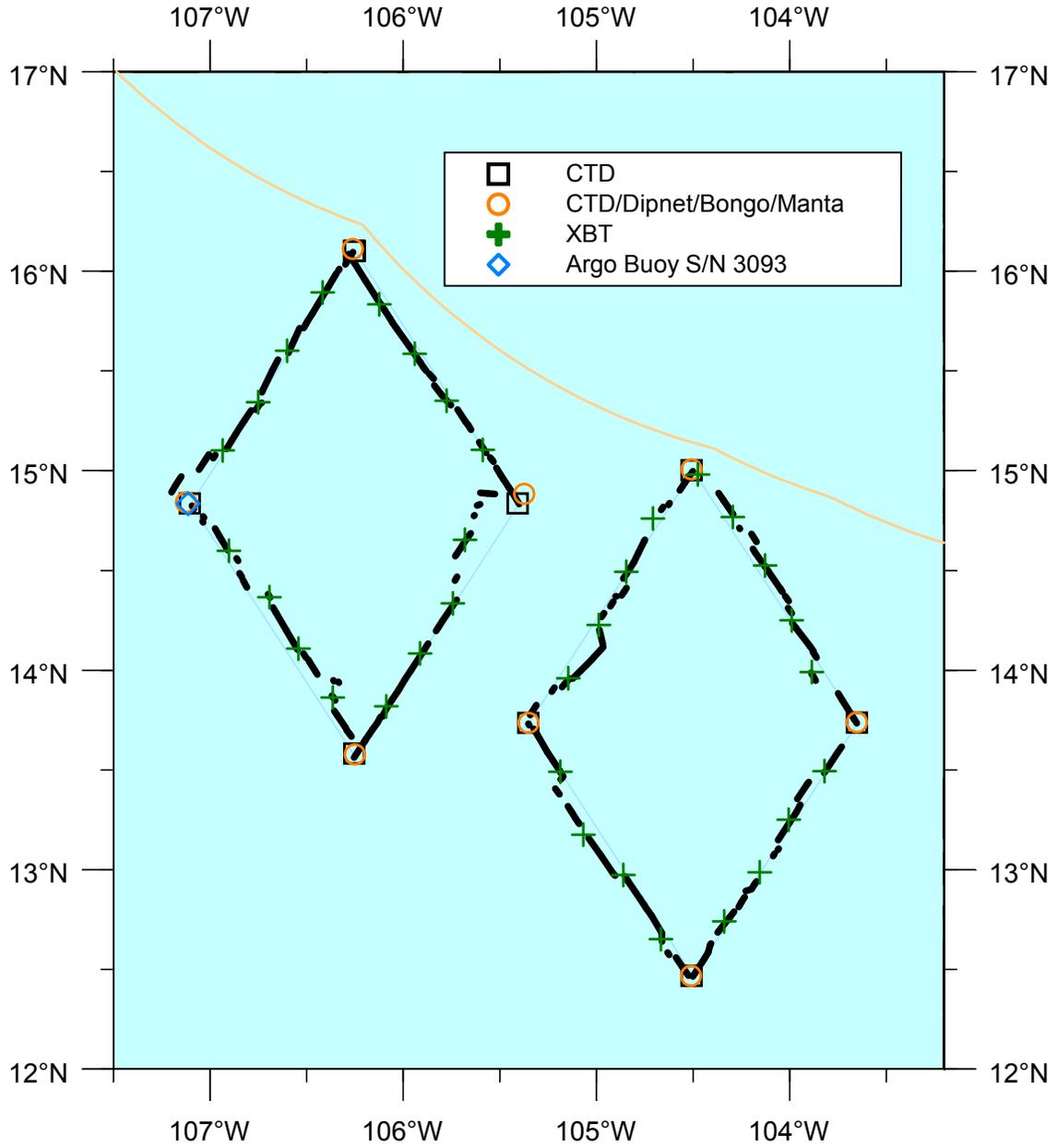
Adam Ü with squid. Photo: SWFSC.

Sampling effort; Passing mode

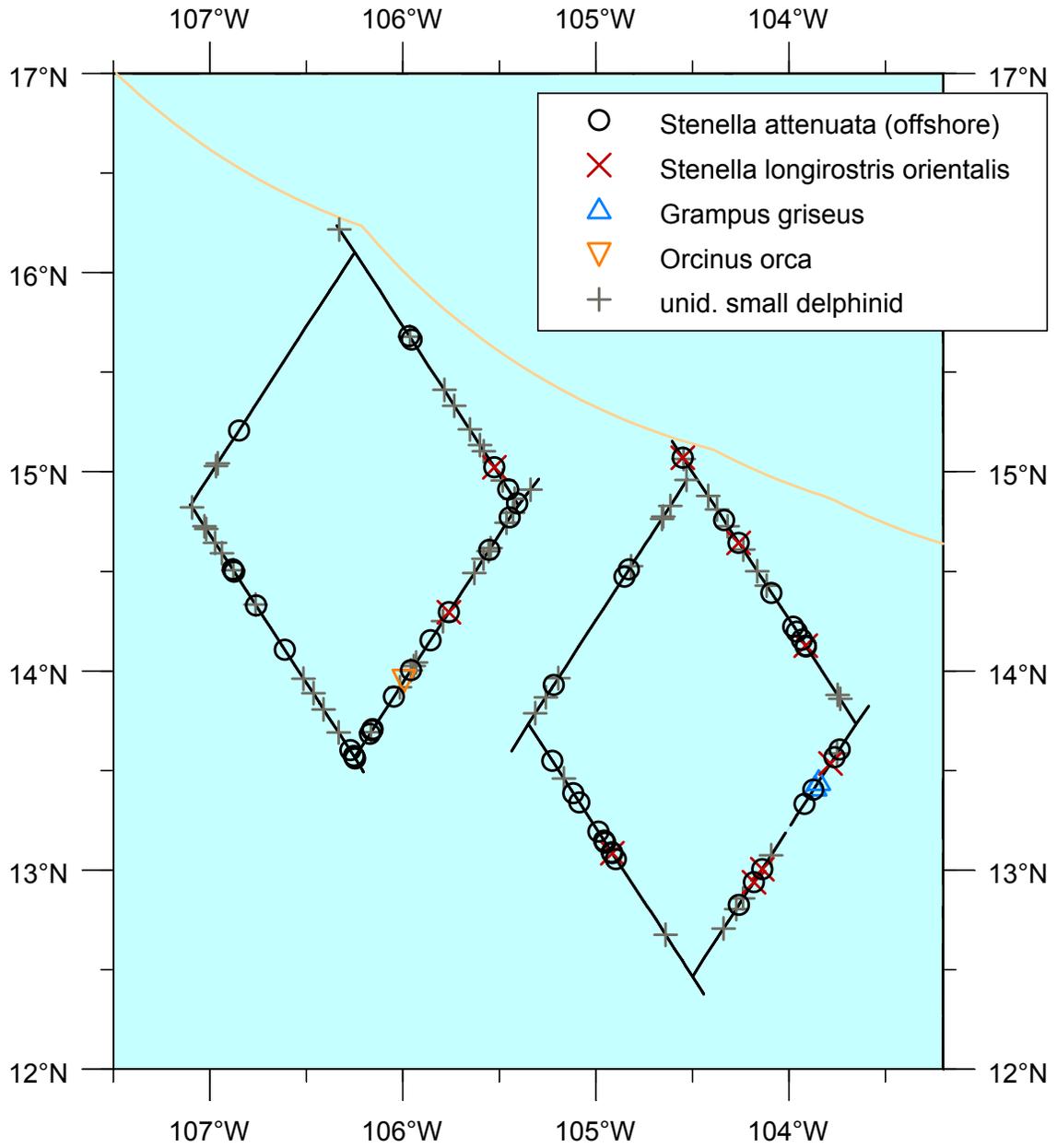


Leg 2 survey coverage: Transects T1 and T2 were completed week 1: 16-22 September 2007, transects T3, T5, T6 and T7 (passing mode only) were completed week 2: 23-29 September 2007, and T7 (closing mode only), T8 and T4 (in that order) were completed this week.

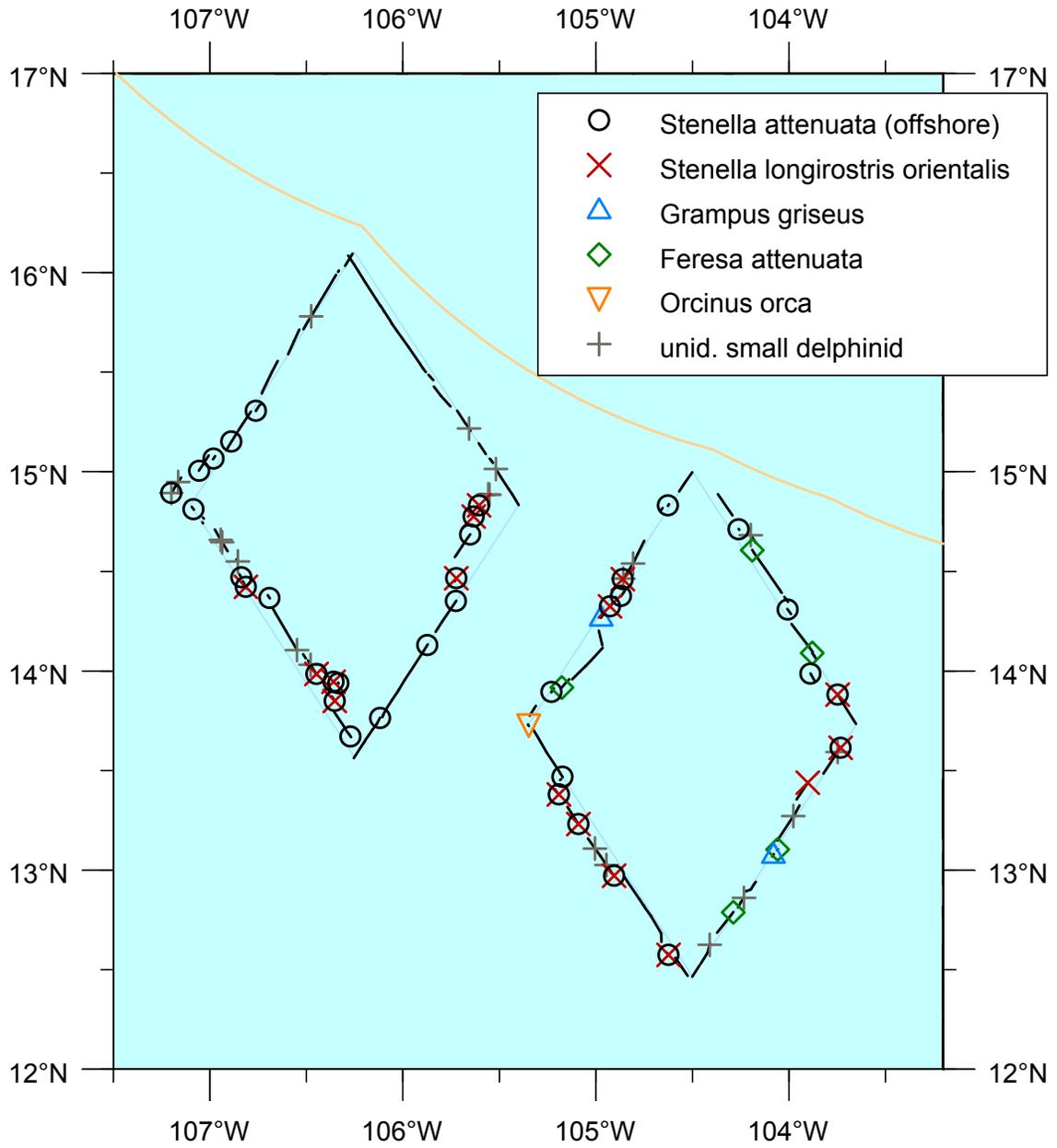
Sampling effort; Closing mode



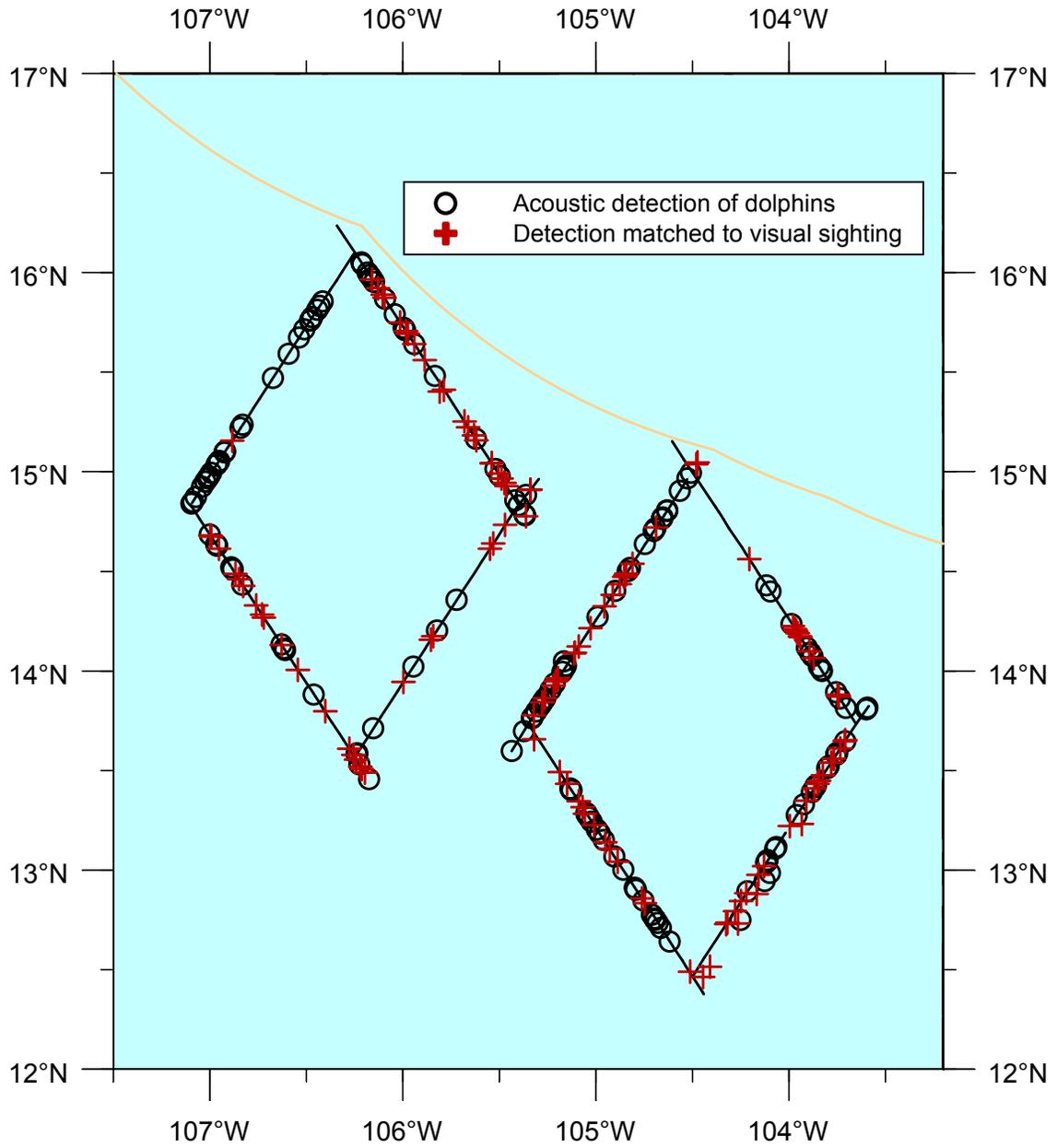
Cetacean sightings; Passing mode



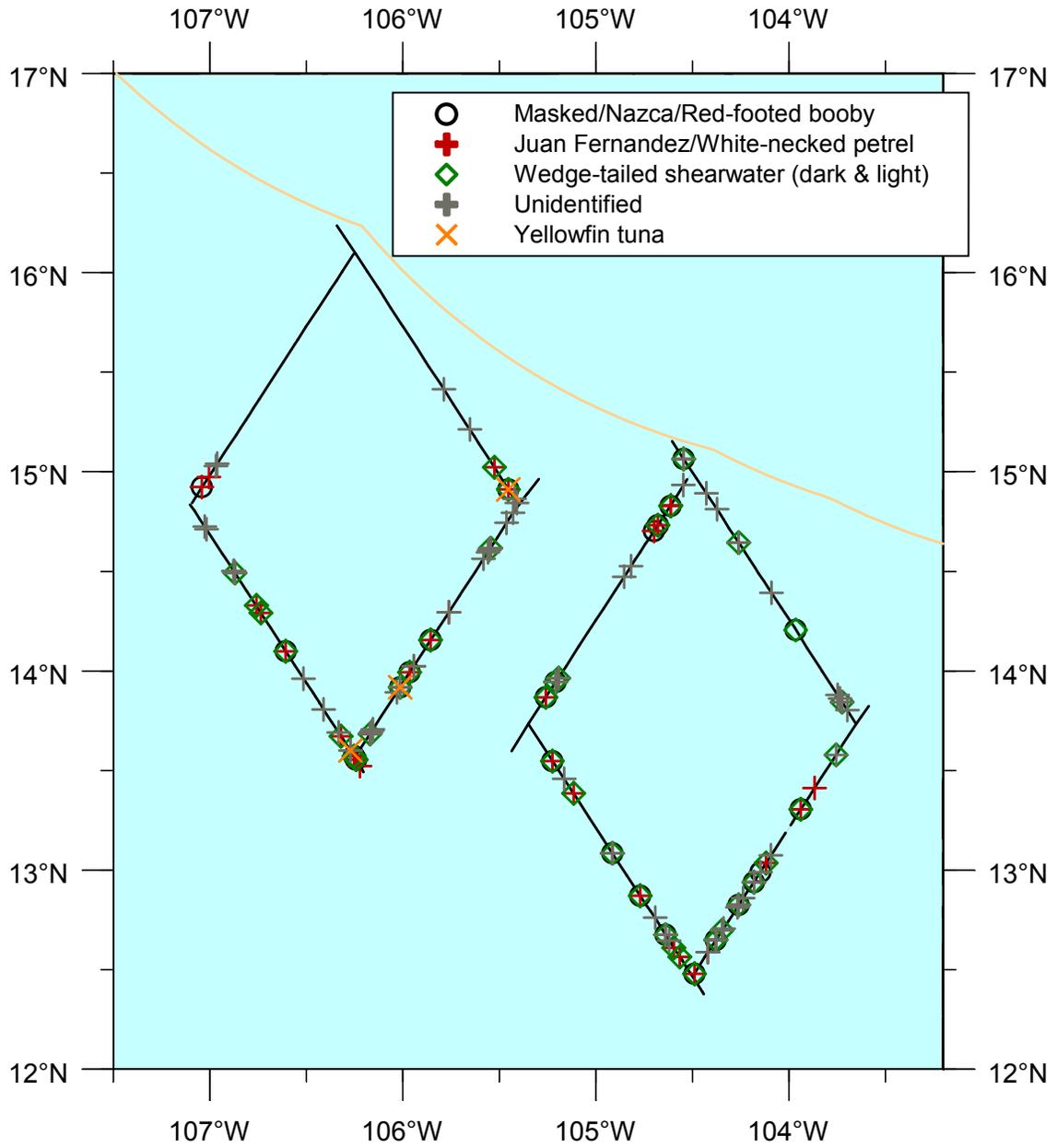
Cetacean sightings; Closing mode



Acoustic detections; Passing mode



Seabird Flocks; Passing mode



Seabird flock; Closing mode

