

Ryan Chouest daily data transmission and report

Period covered: 1000 hrs 07/01/2010-1000 hrs 07/09/2010

992.576 - Nautical miles covered

Vessel science party:

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Cruise notes:

The *Ryan Chouest* cruised about 992.6 nautical miles, from 07/01/2010 to 07/09/2010, along the Alabama and Florida coast, then south past the shelf into the deepwater, around the MC 252 well site and back to the port at Theodore (Figure 1). The vertical cast was deployed at 8 various locations with the aim of testing the vertical distribution of PAH along the water column. The shallow water, underway pump operated virtually throughout the route to facilitate sensor recordings and ultimately detect inferred hydrocarbon level (Figures 2, 3 and 4). The only exception is the dashed path, shown in figure 1, where no data was collected as a result of the GPS and sensor being off or the pump being retrieved to avoid permanent damage to the system under severe weather conditions.

Science results and preliminary interpretation:

Underway fluorometry results

Fluorometry results from the Chelsea and Trios sensors show low levels of inferred poly aromatic hydrocarbons (Figures 2 and 3). The exception to this trend, along the path travelled, is a short segment located northwest of the MC 252 well site, indicating mid-high levels. The Contros sensor results generally show variable but elevated levels of PAH north of the MC 252 well site and low levels of PAH south of the location. The trend of the sensor readings is generally consistent with the ERMA oil slick situational map.

Vertical casts fluorometry results

To get the spatial distribution of PAH along the survey track, a total of 8 vertical casts have been conducted in the vicinity of MC252 well site, the loop current area and the snapper fishery site close to the port of Theodore (Table 1).

Three vertical casts were conducted in the loop current area at the following locations along our planned route, (N 27 08.872, W 084 33.440; N27 08.877, W 085 25.064 and N 27 08.799, W 085 59.819).

The vertical cast pump was lowered to the depth of 120m directly from the surface, sensor readings were taken at 20 meter intervals (120m, 100m, 80m, 60m, 40m, 20m, surface 3m) as the pump was brought up to the surface and stayed for 10min at each sampling depth. Water samples were taken from the tank outlet for further GCMS analysis to obtain more quantitative information on hydrocarbon concentrations. The fluorometer results indicate that all sensor readings along the water column show close to baseline poly aromatic hydrocarbon concentration levels.

Four vertical casts were performed at locations about 10 nautical miles to the south east (A), south west (B), north west (C), north east (D) of the MC 252 well site.

Figure 5A to Figure 5D show the calibrated sensor responses during the vertical casts conducted at four different locations. The following is a brief description of the features of the four vertical profile graphs.

Site A at N 28 36.454, W 088 01.010, south east of the well site: All sensor readings along the water column show close to baseline level of poly aromatic hydrocarbon concentrations.

Site B at N 28 38.174, W 088 26.436, south west of the well site: All sensor readings along the water column show near background level of poly aromatic hydrocarbon concentrations.

Site C at N 28 53.804, W 088 23.755, north west of the well site: Elevated concentration of poly aromatic hydrocarbons were detected starting from around 25 meters, below which all sensors show baseline readings. The vertical distribution of PAH in the water column down to 25 m may indicate the formation of plumes of hydrocarbons in water.

Site D at N 28 53.384, W 088 07.224, north east of the well site: Slightly elevated concentrations of PAH extended to 30m below the sea surface which may suggest the formation of plumes of hydrocarbons in water.

One vertical cast was carried out in the red snapper fishery area. The result from the vertical cast deployed at 1958hrs at N29 49.817, W 088 03.587 indicates that both Chelsea and Trios show slightly higher responses to the subsurface water than to the water more than 10 meters below surface.

Geochemistry

The method currently being utilised involves collection of 1L water samples either from the underway sensor tank or via direct surface sampling. Samples are collected into pre-cleaned 1L glass bottles. Into these, a suite of internal standards and 15mL of dichloromethane (DCM) are added, the sample shaken and the DCM allowed to settle. The DCM is then pipetted into a vial containing anhydrous sodium sulphate to remove entrained water and then a 1mL aliquot is transferred to a sample vial. Prior to analysis another standard is added to facilitate recoveries to be calculated. Analysis of the extract is via a

Hewlett Packard GC-MS operating in either Selected Ion Monitoring (SIM) or full scan mode. Quantitation is by comparison of the areas of individual components with the appropriate internal standard.

Current issues

When analysing at such trace levels contamination is always an issue which will increase the detection limit. Currently we are experiencing some contamination from the collection hose, particularly for the deep casts as this hose is over 100m long. The problem is particularly evident for the single aromatic compounds which are the main components of the contaminant and these values should not be regarded as accurate quantitation. On the poly aromatic hydrocarbon end, the hose may introduce an average of 0.4ppb-0.7ppb of total PAH background noise based on the 10 baseline samples collected. (The total PAH concentration is obtained by adding up the concentrations of all detected poly aromatic hydrocarbons) **At present the data have not been corrected in any way to account for this.**

We proposed two approaches to reduce the background noise level and thus improve the detection limit either by continuously purging the hose when not in use or replacing the current hose with reinforced hose for drinking water delivery.

GCMS analysis of the water samples collected during the vertical cast (#6-C6) conducted at north west of the MC 252 well site is shown in figure 6. Water samples collected below 40m display baseline level (~0.58ppb) of total PAH, starting from 30m, the total PAH of the water samples gradually increases and reaches the maximum value of 7.09ppb of total PAH. The trend is consistent with the corresponding sensor response (Figure 5C).

Ryan Chouest Cruise 6 Status (07/01/2010 1658 CDT - 07/08/2010 2346 CDT)

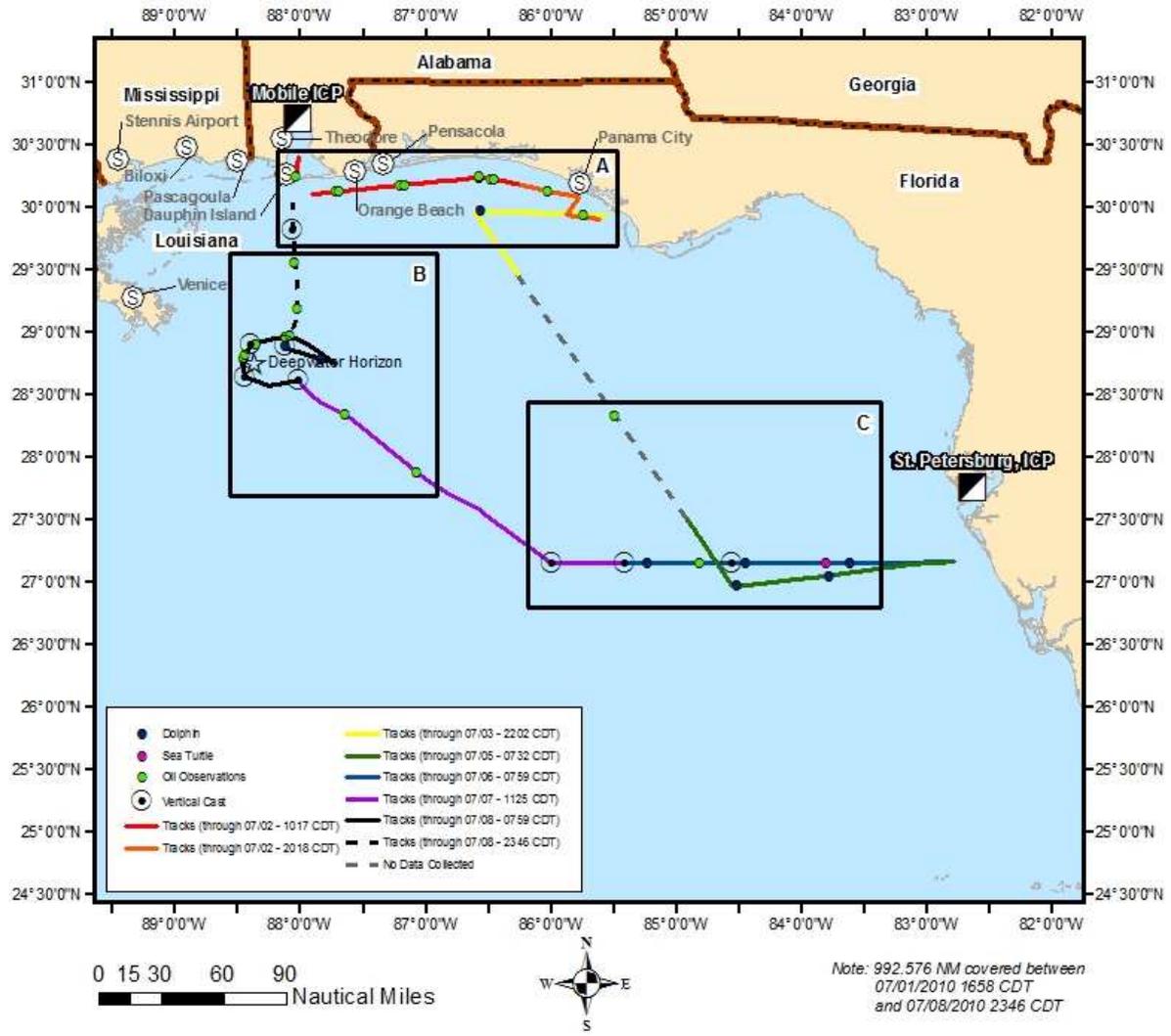


Figure 1. Total travelled track for cruise 6 route from 07/01/2010 to 07/08/2010. The bull's-eye represents vertical cast locations together with vertical cast number, cruise number and record date. The grey dashed line indicates no data collected due to the GPS and sensor being off.

Ryan Chouest Cruise 6 Data Oil Observations - A (07/01/2010 1658 CDT - 07/08/2010 2346 CDT)

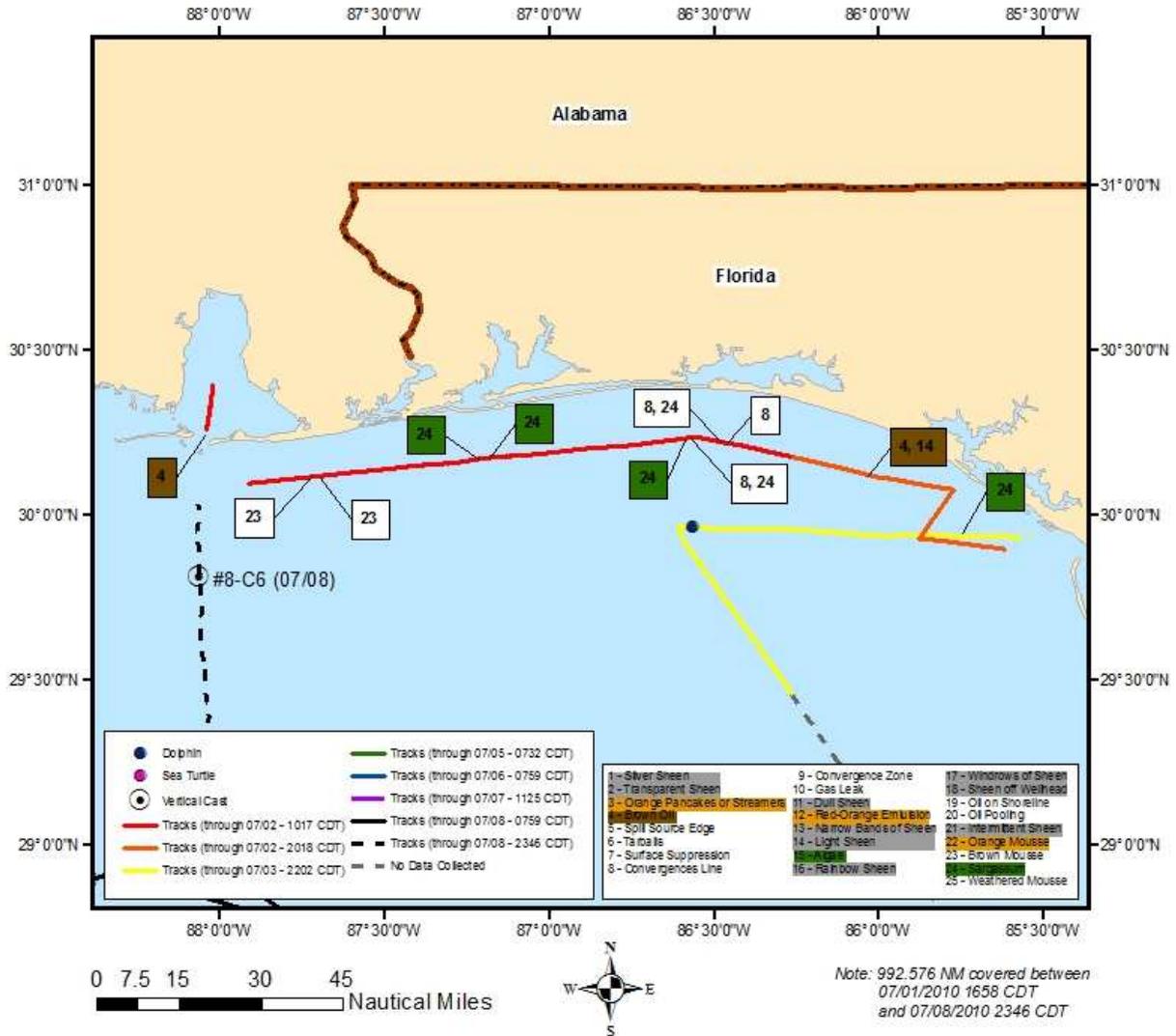


Figure 1A. Large scale map of region A in Figure 1 showing oil slick observations.

Ryan Chouest Cruise 6 Data Oil Observations - B (07/01/2010 1658 CDT - 07/08/2010 2346 CDT)

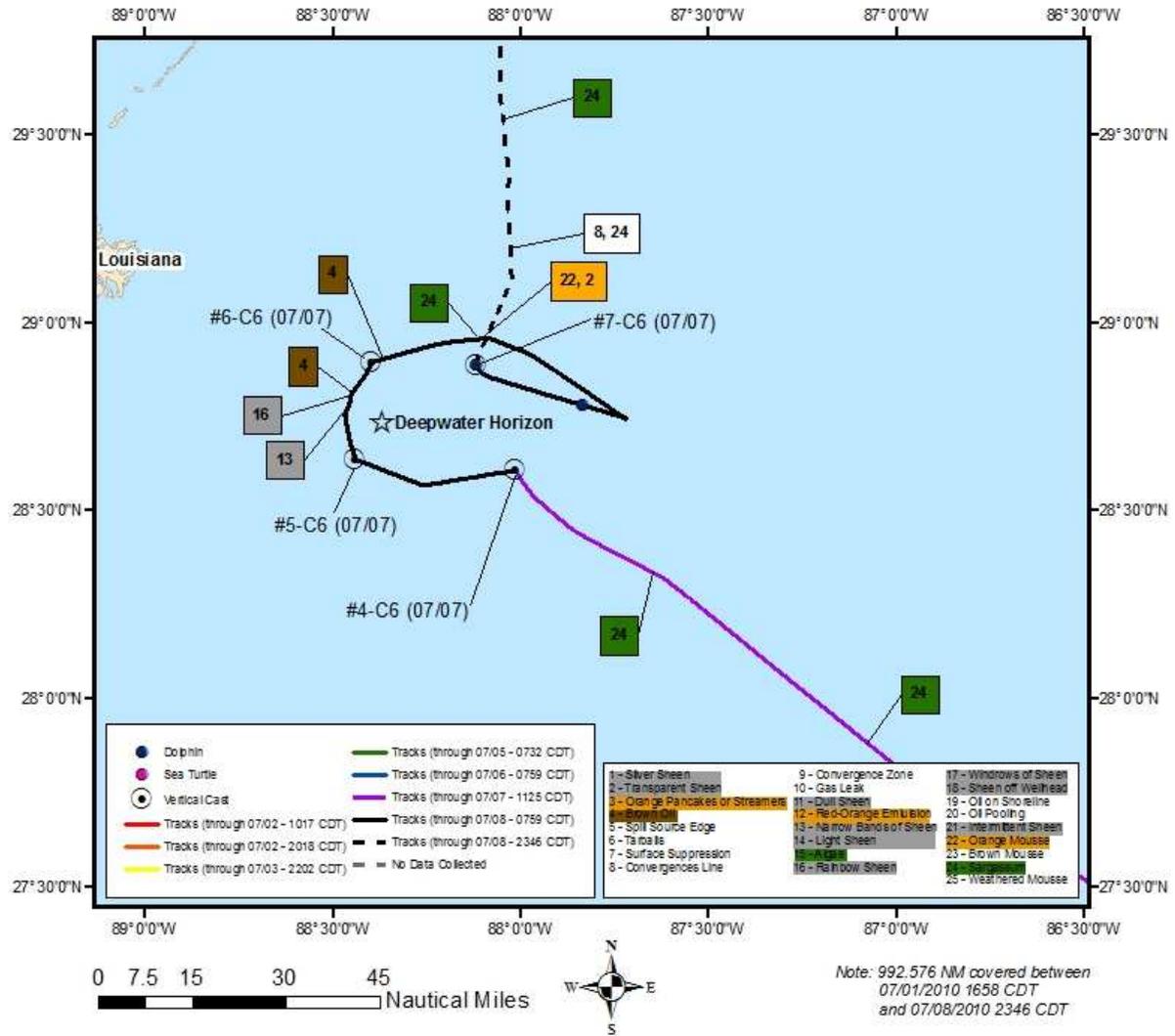


Figure 1B. Large scale map of region B in Figure 1 showing oil slick observations.

Ryan Chouest Cruise 6 Data Oil Observations - C (07/01/2010 1658 CDT - 07/08/2010 2346 CDT)

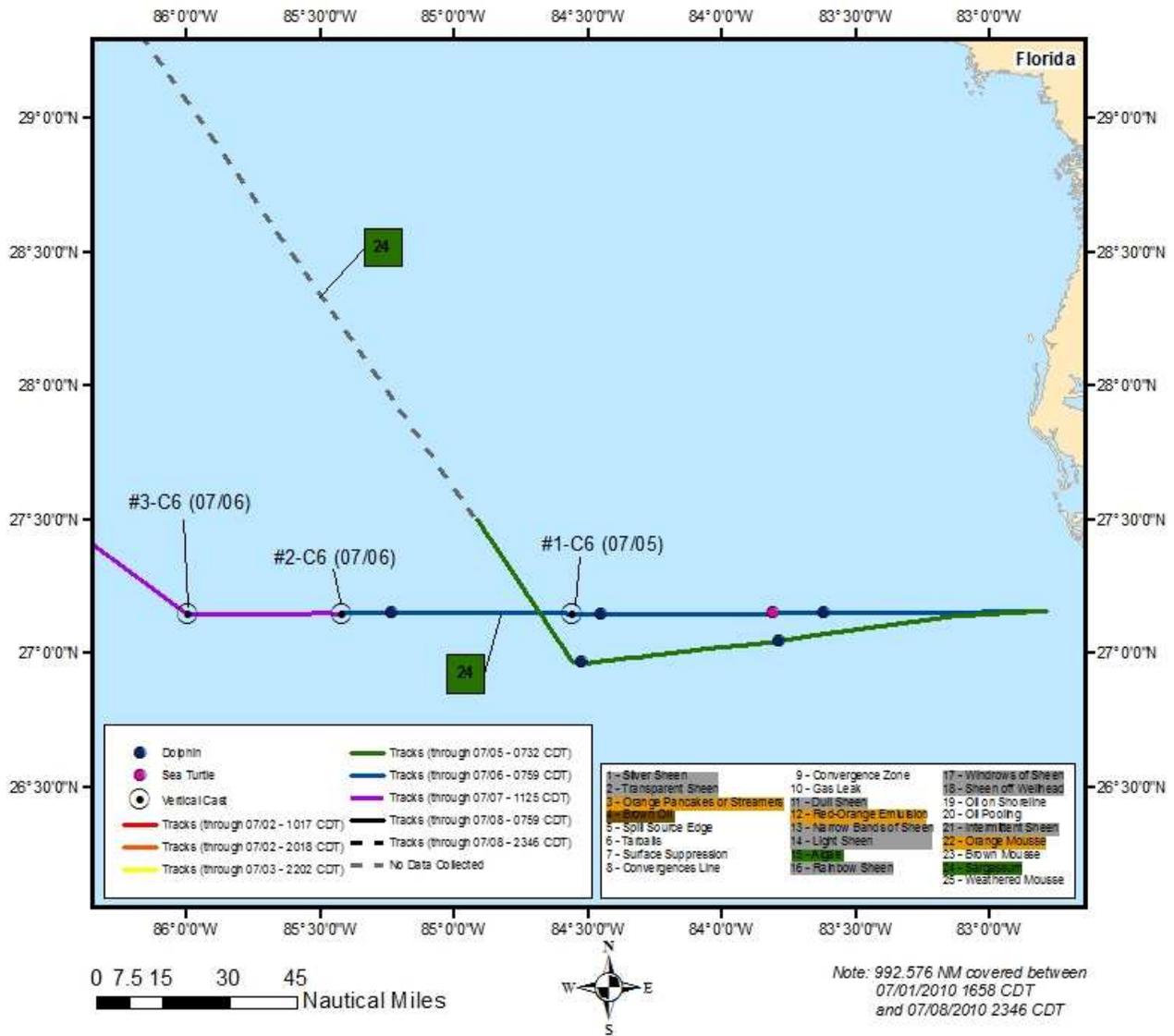


Figure 1C. Large scale map of region C in Figure 1 showing oil slick observations.

Ryan Chouest Cruise 6 Data
 Chelsea- Fluorometer
 (07/01/2010 1658 CDT - 07/08/2010 2346 CDT)

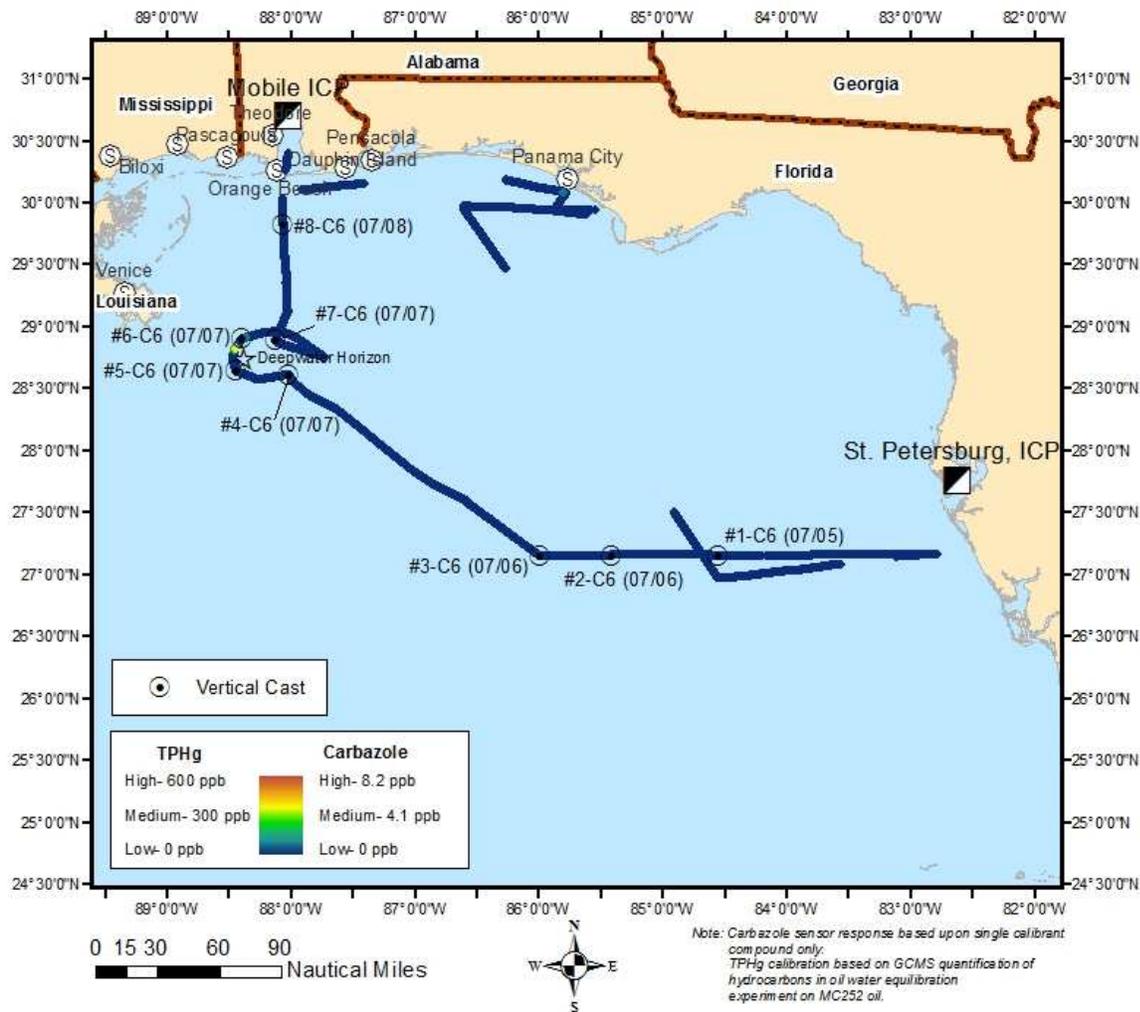


Figure 2. Chelsea fluorometer results plotted with location on cruise 6 track. Breaks in data occur when either data quality is poor or the systems were turned off due to pump problems.

Ryan Chouest Cruise 6 Data
 Trios - Fluorometer
 (07/01/2010 1658 CDT - 07/08/2010 2346 CDT)

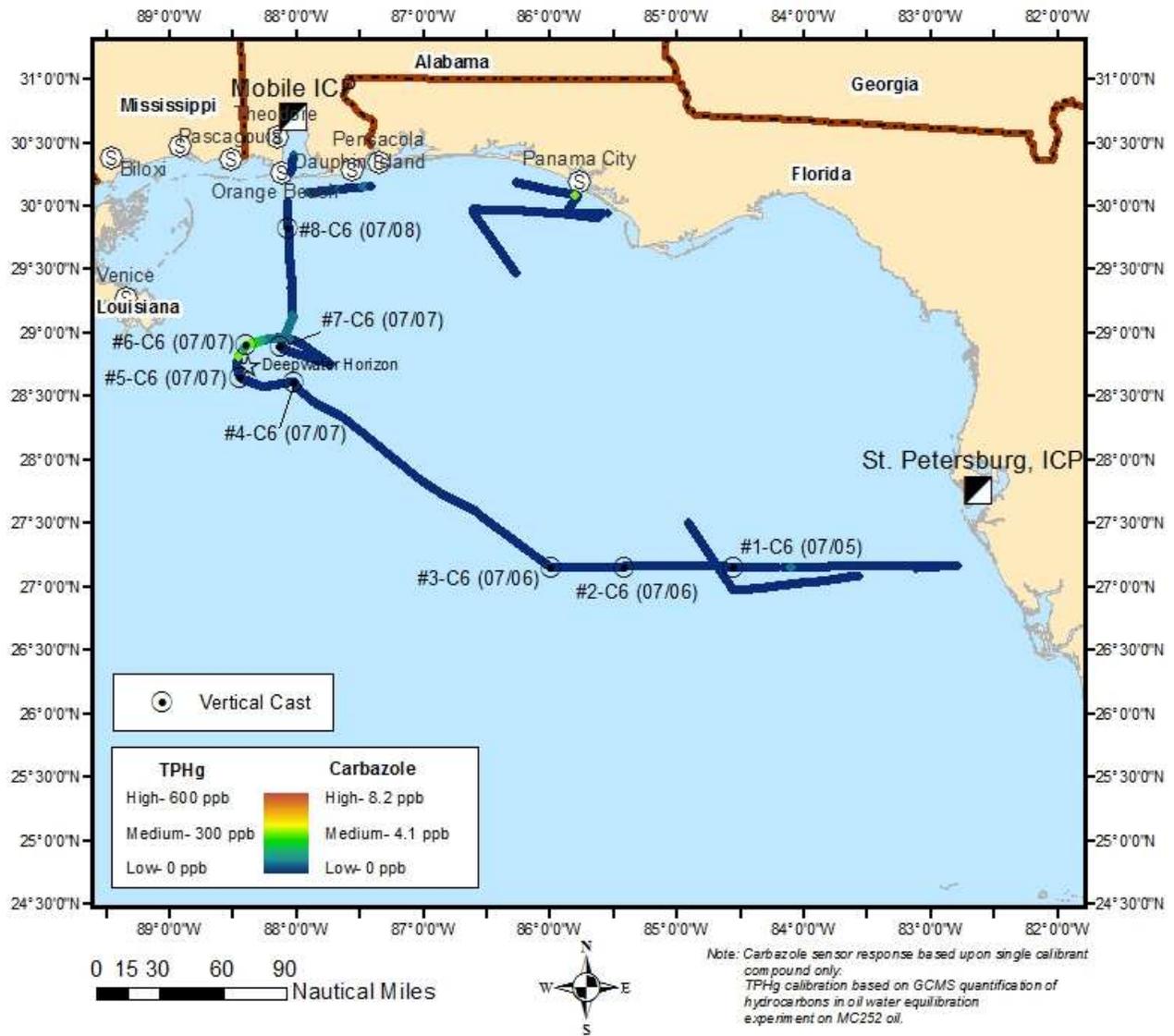


Figure 3. Trios fluorometer results plotted with location on cruise 6 track. Breaks in data occur when either data quality is poor or the systems were turned off due to pump problems.

Ryan Chouest Cruise 6 Data Contros - Fluorometer (07/01/2010 1658 CDT - 07/08/2010 2346 CDT)

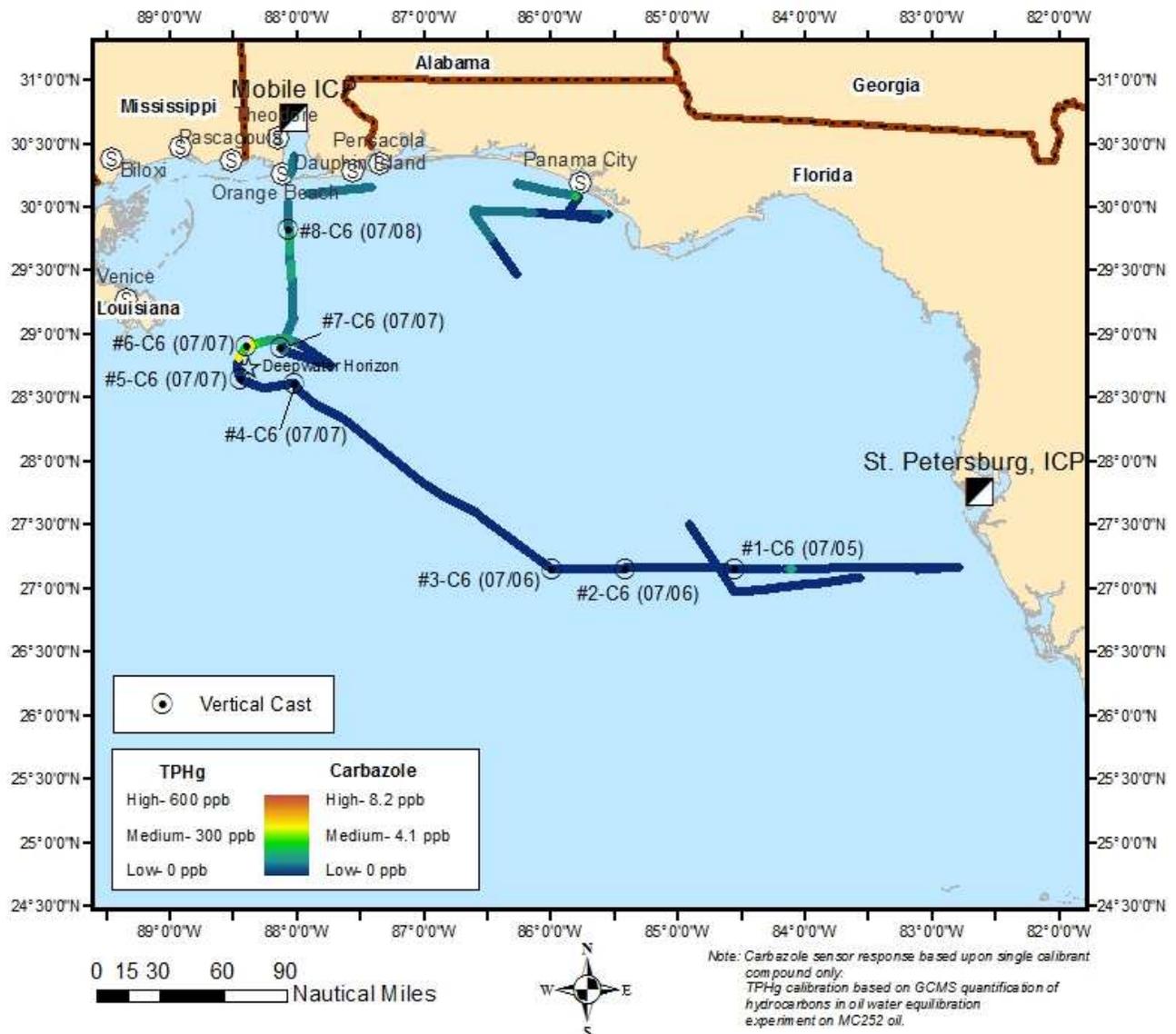


Figure 4. Contros fluorometer results plotted with location on cruise 6 track. Breaks in data occur when either data quality is poor or the systems were turned off due to pump problems.

Table 1. Summary of the vertical casts conducted in cruise 6

Cast number/ Cruise number	Date	Location
Cast #1/Cruise 6	2010/07/05	N 27 08.872 W 084 33.440
Cast #2/Cruise 6	2010/07/06	N 27 08.877 W 085 25.064
Cast #3/Cruise 6	2010/07/06	N 27 08.799 W 085 59.819
Cast #4/Cruise 6	2010/07/07	N 28 36.454 W 088 01.010
Cast #5/Cruise 6	2010/07/07	N 28 38.174 W 088 26.436
Cast #6/Cruise 6	2010/07/07	N 28 53.804 W 088 23.755
Cast #7/Cruise 6	2010/07/08	N 28 53.384 W 088 07.224
Cast #8/Cruise 6	2010/07/08	N 29 49.817 W 088 03.587

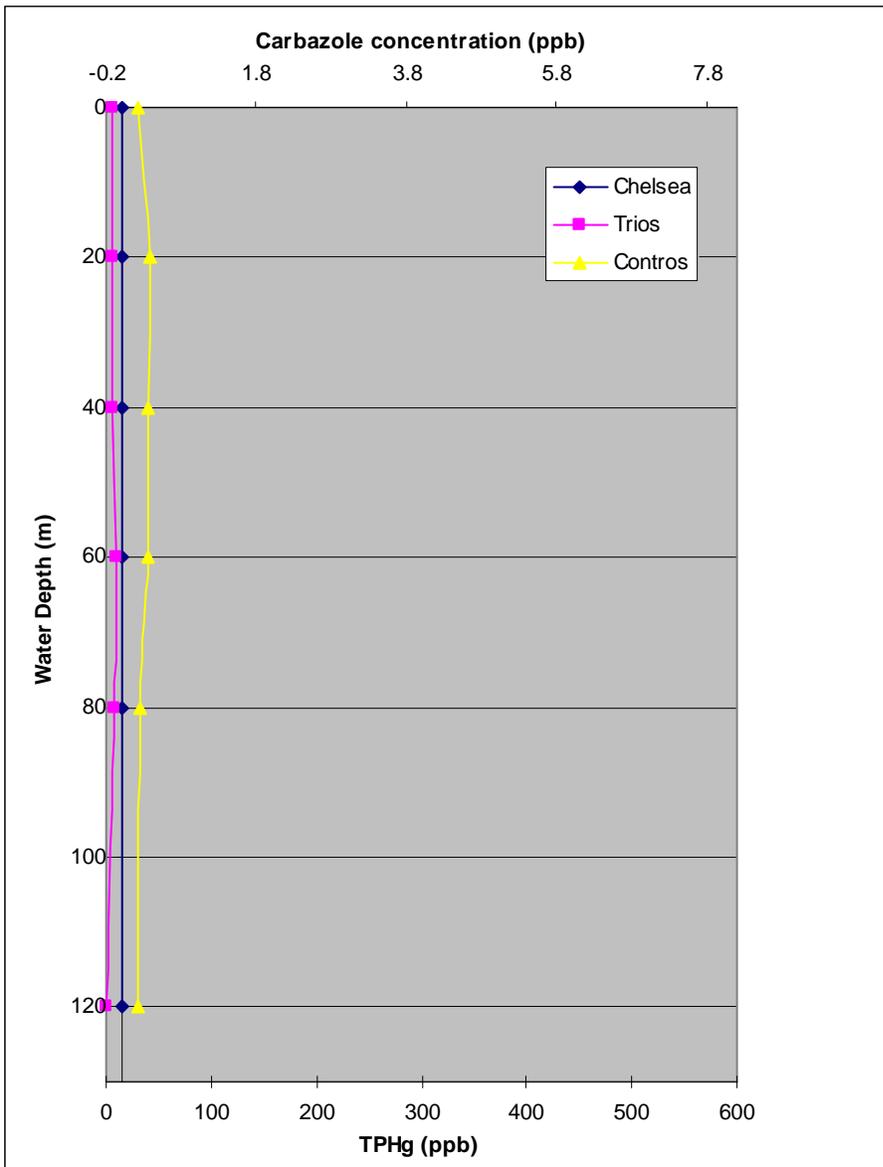


Figure 5A. Fluorometer response vs. water depth for vertical cast # 4 / Cruise 6 conducted on 2010/07/07 at N 28 36.454, W 088 01.010, south east of the well site.

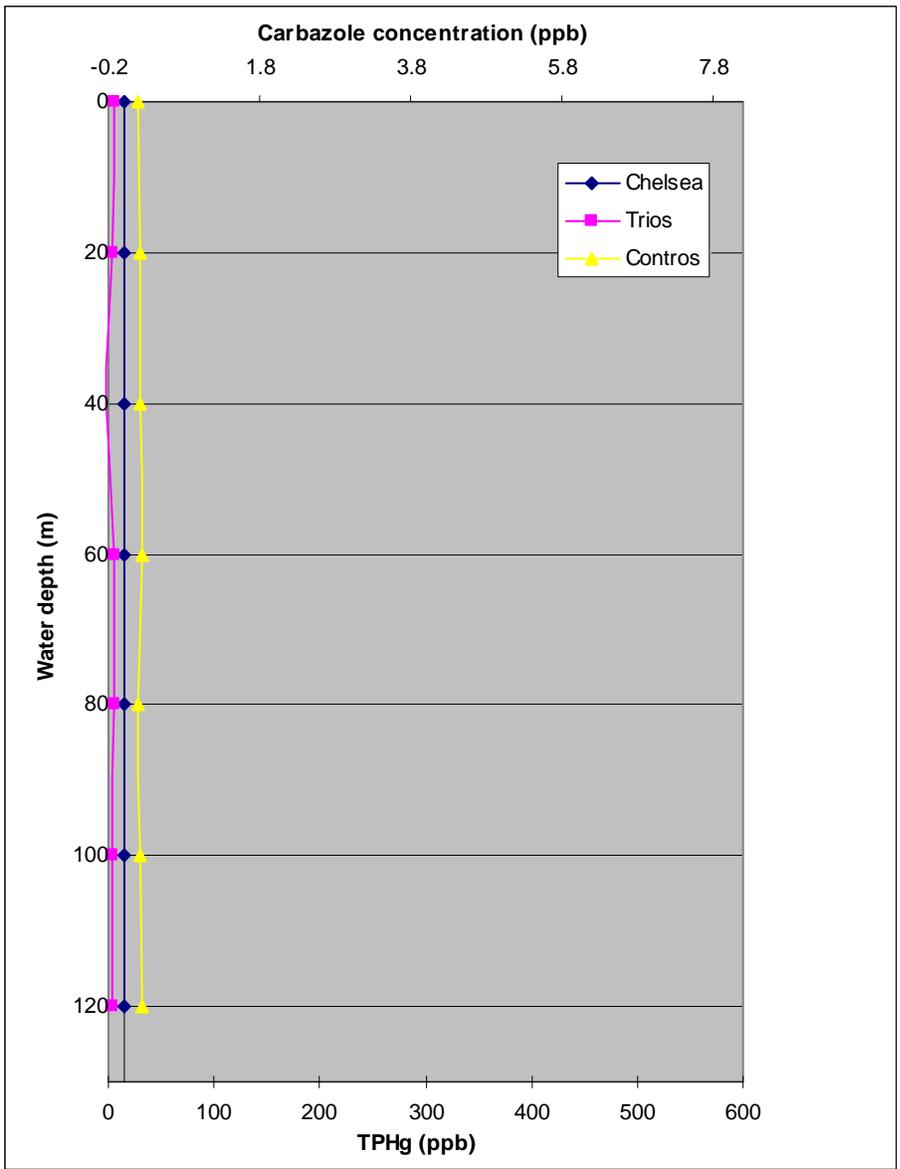


Figure 5B. Fluorometer response vs. water depth for vertical cast # 5 / Cruise 6 conducted on 2010/07/07 at N 28 38.174, W 088 26.436, south west of the well site.

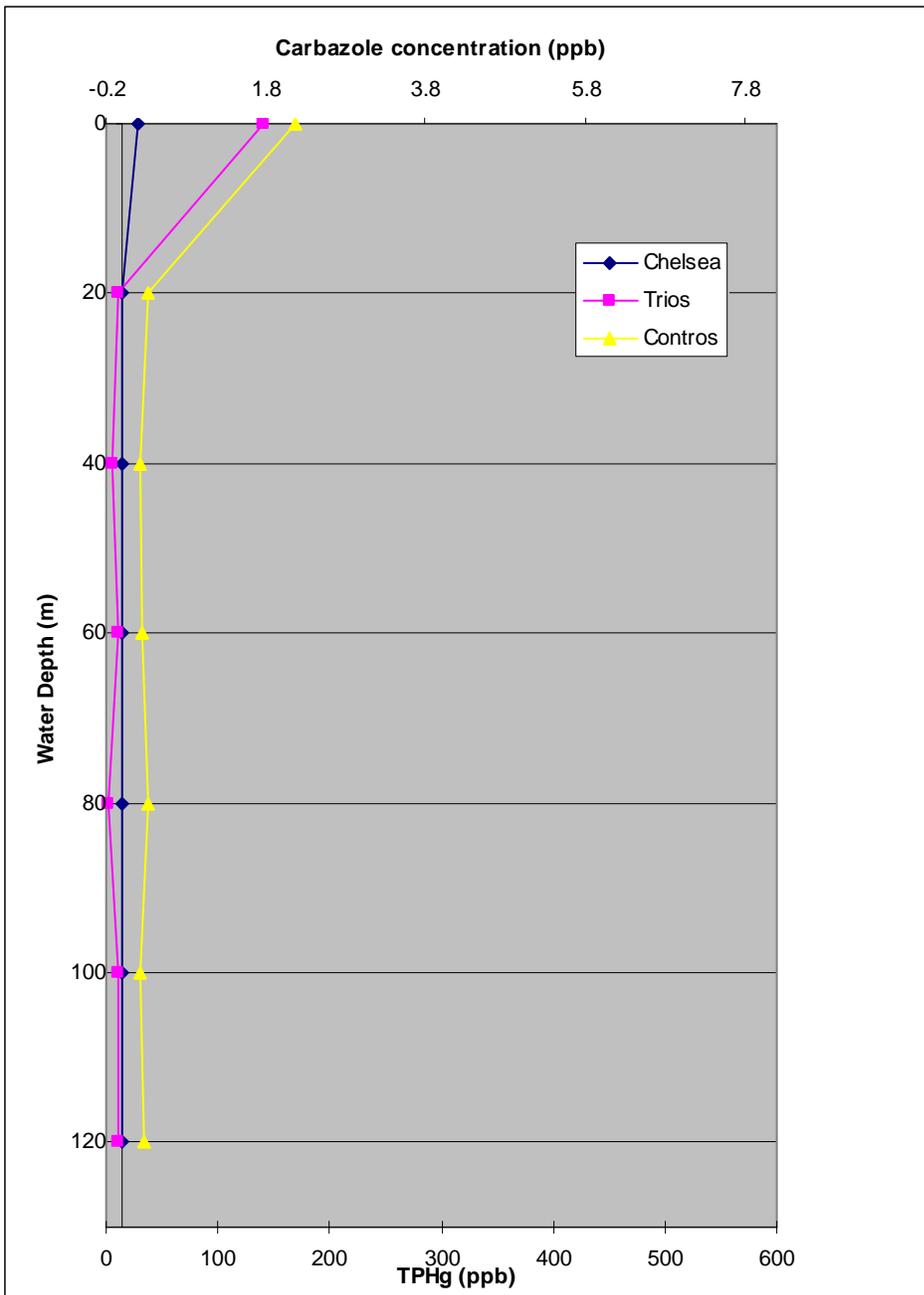


Figure 5C. Fluorometer response vs. water depth for vertical cast # 6 / Cruise 6 conducted on 2010/07/07 at N 28 53.804, W 088 23.755, north west of the well site.

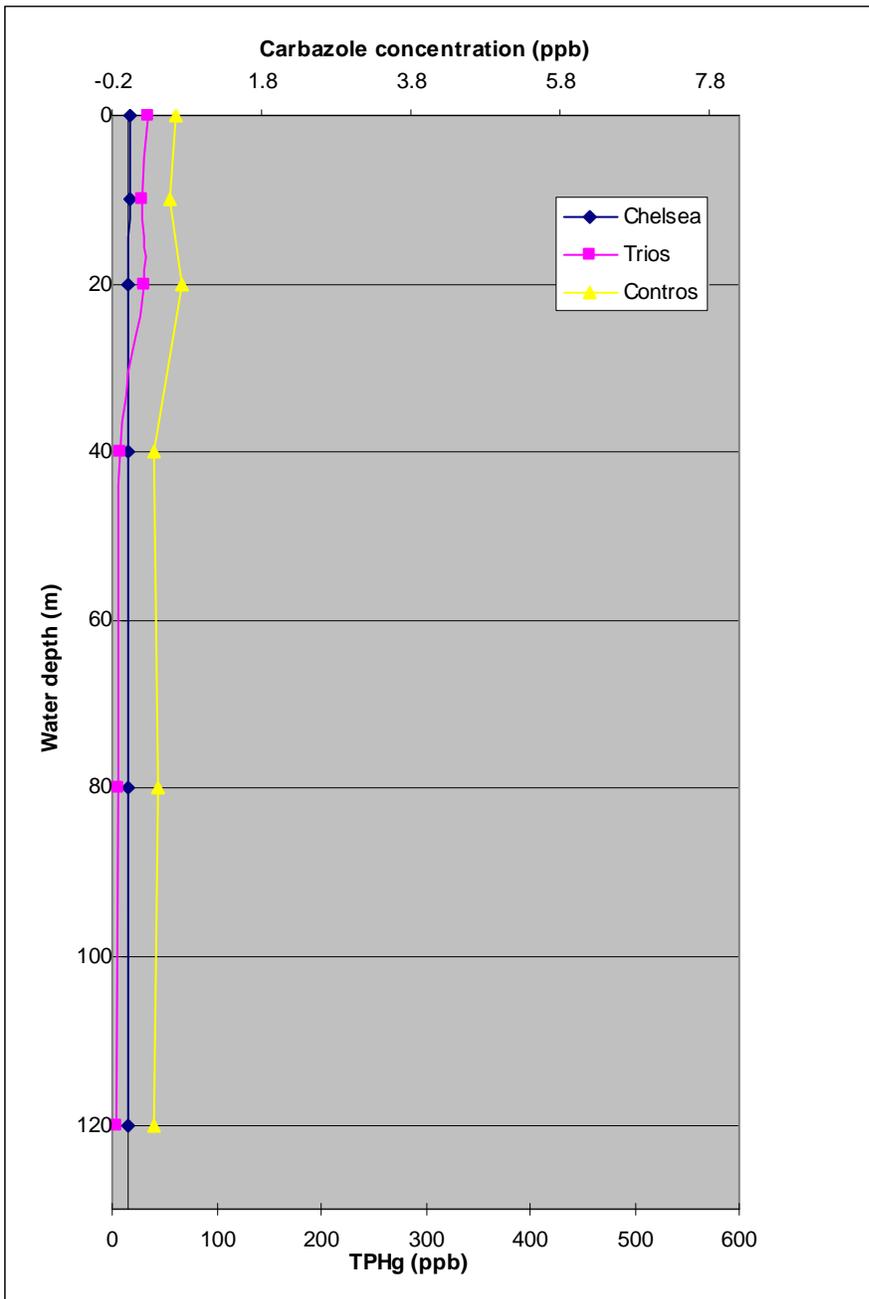


Figure 5D. Fluorometer response vs. water depth for vertical cast # 7 / Cruise 6 conducted on 2010/07/08 at N 28 53.384, W 088 07.224, north east of the well site.

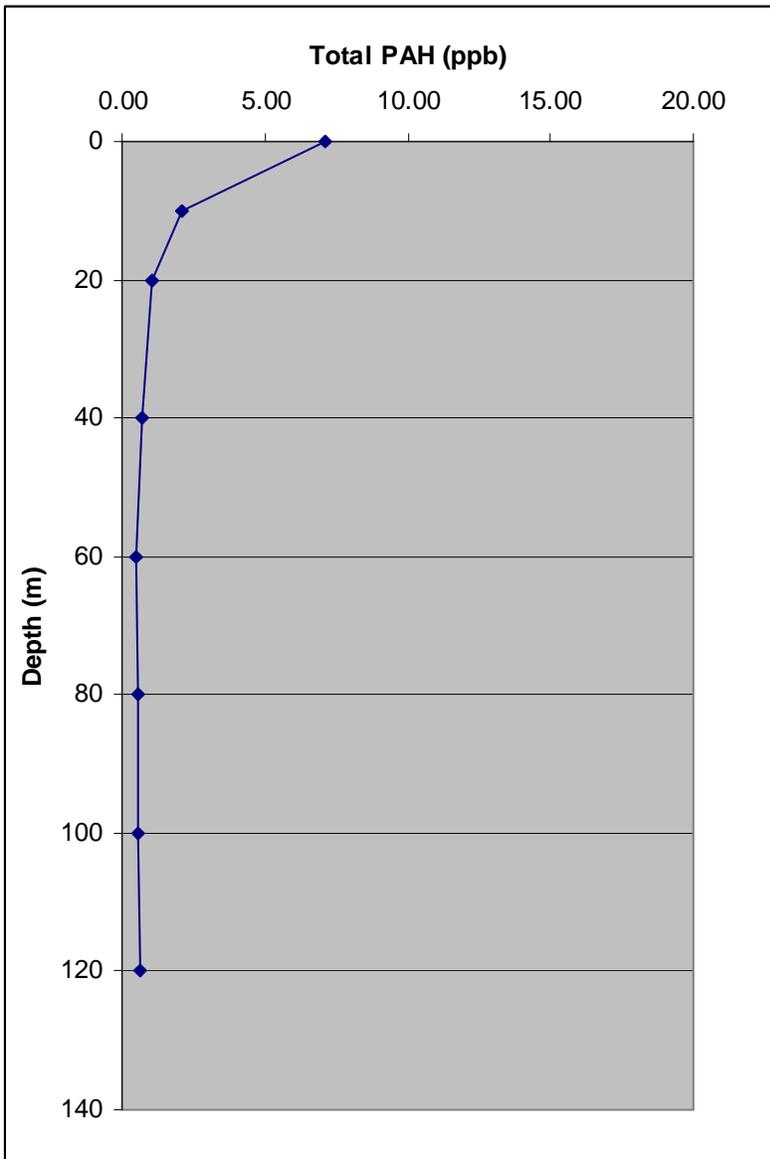


Figure 6. GCMS analysis result of the water samples collected during vertical cast # 6/ Cruise 6 conducted on 2010/07/07 at N 28 53.804, W 088 23.755, north west of the well site. Refer to figure 5C for the corresponding sensor response profile.

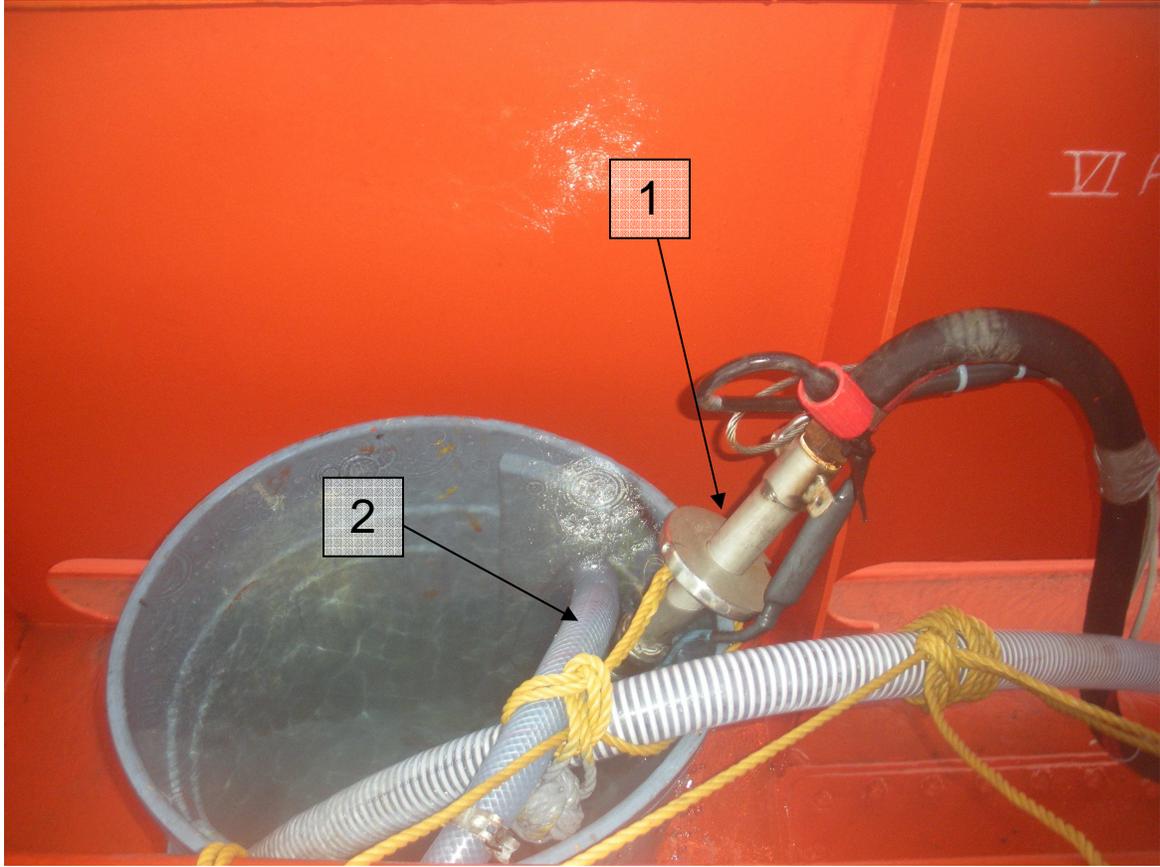


Photo 1. Set up for the long hose (1) purge procedure. Item (2) is the exit hose for the shallow water pump.



Photo 2: New crane configuration after welding sheave assembly and break prior to crane pedestal.

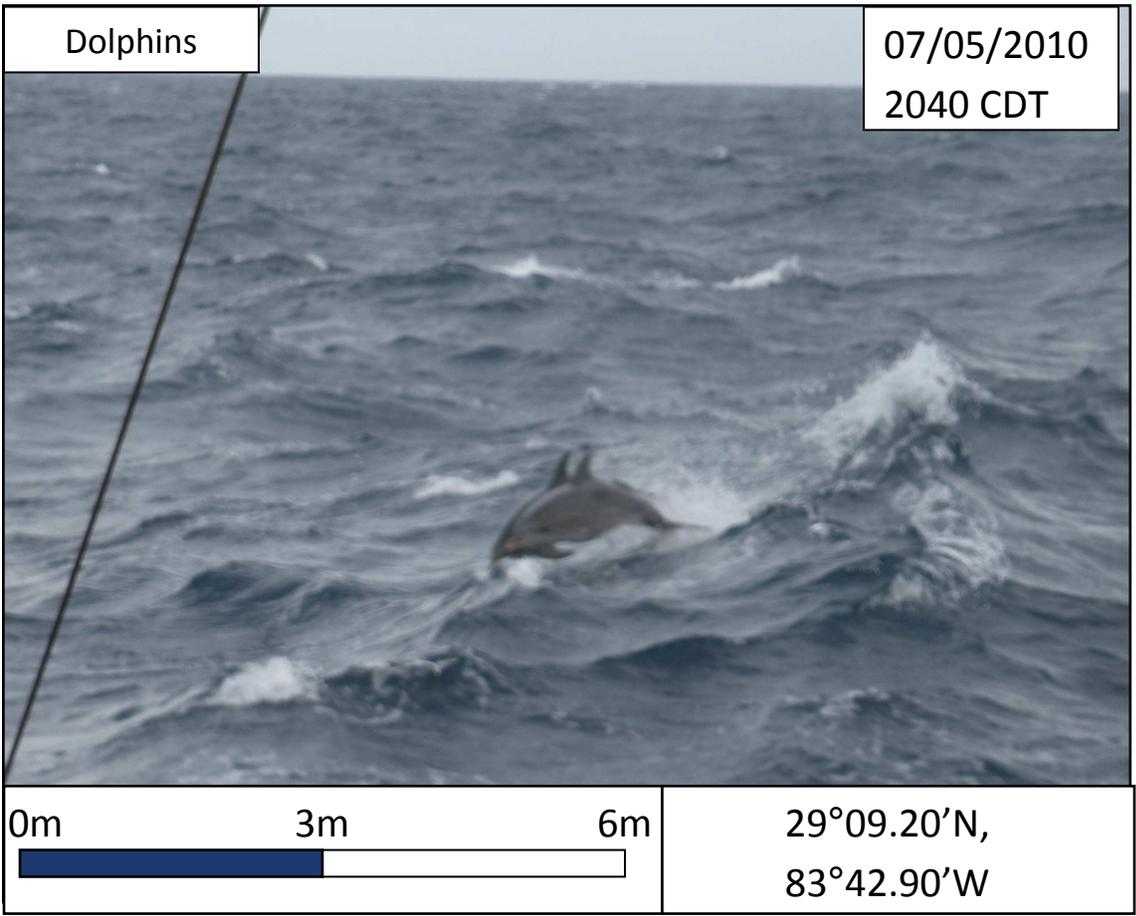


Photo 3. Mammals spotted on path to Cruise track 6.

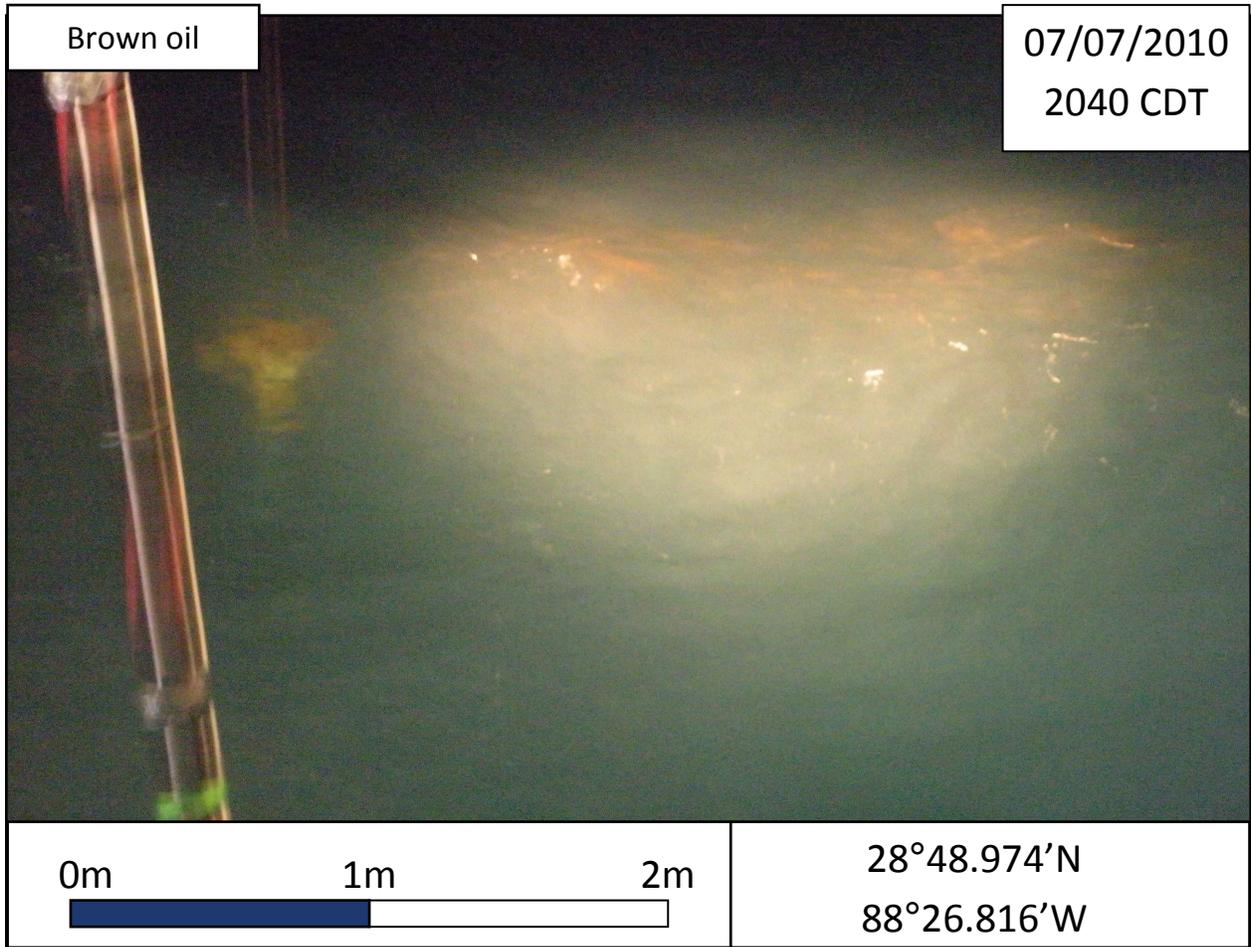


Photo 4. Brown oil observed on water surface approximately 10 miles off MC 252.



Photo 5: Brown mousse and silvery sheen observed along cruise 6 route.

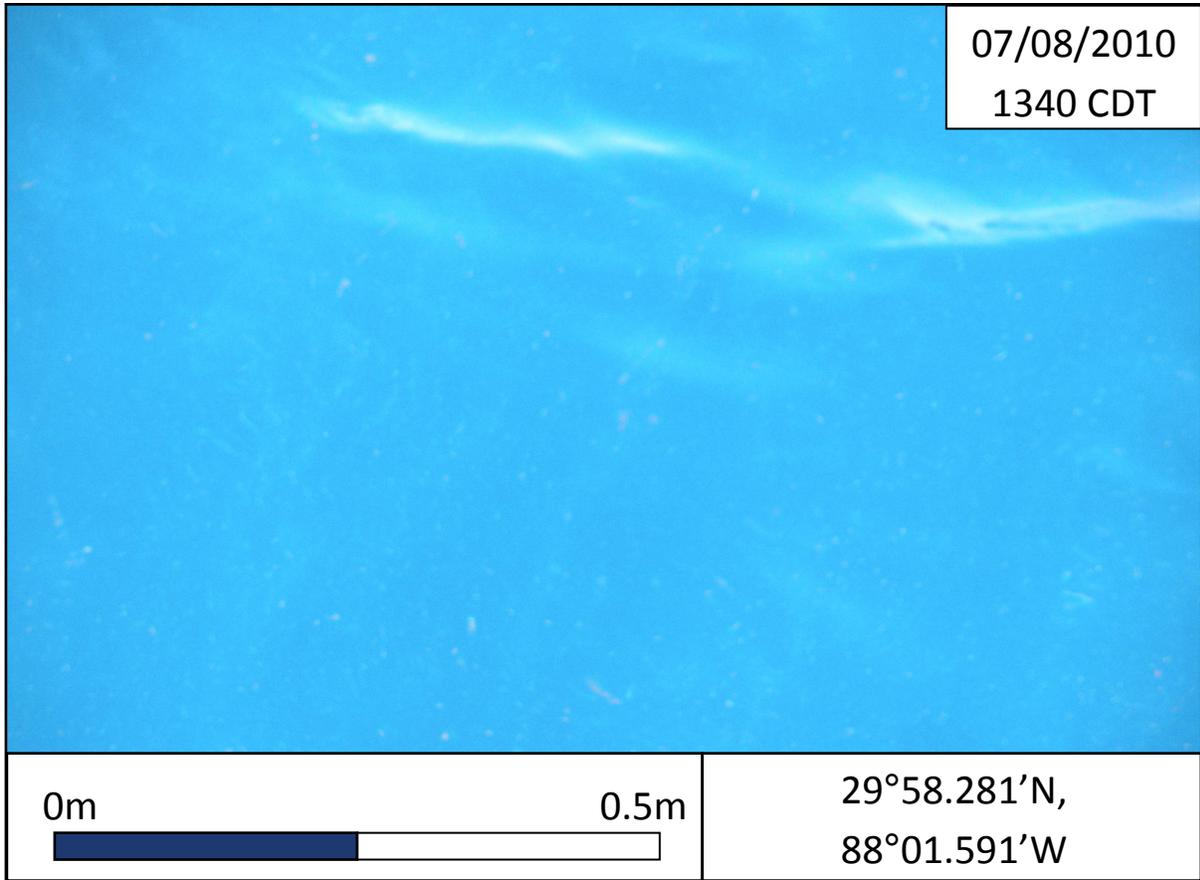


Photo 6: Unknown particulates observed in the proximity of brown mouse location.



Photo 7. Seaweed observed along tide lines.



Photo 8: Jelly fish spotted within the vicinity of the seaweed pattern along tide lines.

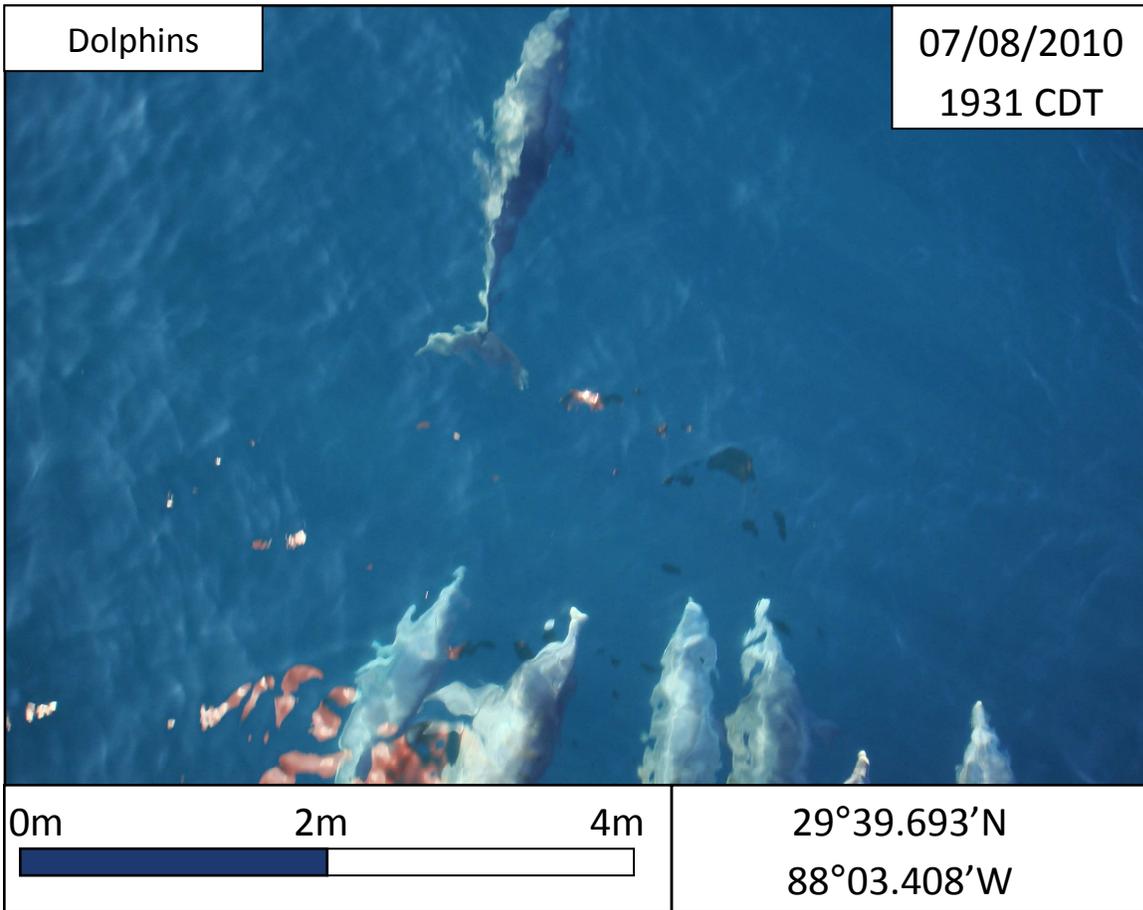


Photo 9: A school of dolphins escorting the *Ryan Chouest* while heading north towards Theodore, AL.

Major improvements:

- 1) A New sampling strategy has been established in order to target key oil slick features and minimise under sampling/over sampling. Sampling is now triggered either upon observation of oil slicks from the bridge or significant sensor responses.
- 2) The GCMS method for detection of aromatic compounds in water samples has been established.
- 3) GPS was relocated to the roof of the lab to enhance the reception from satellites.
- 4) New crane configuration with sheave welded to both sides of the reel was adopted to increase the efficiency of vertical cast deployments.
- 5) One of the CSIRO staff has been assigned to log and manage the daily record of sampling, sensor status, vertical cast log and major events and activities log.
- 6) A network hard drive has been set up for easy data uploading, file sharing and report generation.

Full Crew List:

Glenn Doucet	MASTER
Robert Thompson	ENG
Elijah Benjamin	O/S RIG
Arthur Triggs	OS
Brian Corley	Mate
Eduardo Zepeda	A/B
Patrick Cousin	A/B
Jonathon Kodada	QMED
Steven Morgan	OS/Cook
Andy Revill	CSIRO
Xiubin Qi	CSIRO
Stephane Armand	CSIRO
Charlotte Stalvies	CSIRO
Tosin Majekodunmi	BP
Curtis Walker	Entrix
Michael Griffin	NOAA/CSS
Brian Harmon	C&C
Greg Richard	C&C
Josh Shaw	C-PORT
Larry Luke	C-PORT