Protected Species Mitigation and Monitoring Report

United States Geological Survey Low-Energy Marine Geophysical Survey in the Northwest Gulf of Mexico

18 April 2013 - 3 May 2013

R/V Pelican

Prepared for

United States Geological Survey
384 Woods Hole Road
Woods Hole, MA 02543

And

National Marine Fisheries Service
Office of Protected Resources
1315 East-West Hwy
Silver Spring, MD 20910-3282

Project No.	**UME04165**	**RPS**	
Vessel Name	**USGS Pelican**	**411 N. Sam Houston Parkway E.**	
Author(s)	**Richardson, Jessica**	**Houston, Texas 77060, USA**	
	Schaefer, Vicki	**Tel**	**: (281) 448-6188**
Reviewer(s)	**Bostwick, Angela**	**Fax**	**: (281) 448-6189**
Submittal Date	**May 3, 2013**	**E-mail**	**: angela.bostwick@rpsgroup.com**
		Web	**: www.rpsgroup.com**

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES:

1. EXECUTIVE SUMMARY

The Louisiana Universities Marine Consortium-owned research vessel, (R/V) *Pelican*, operated by the United States Geological Survey (USGS), conducted a seismic survey in the Green Canyon 955 and Walker Ridge 313 lease blocks in the Northwestern Gulf of Mexico from 18 April until 2 May 2013. The purpose of the survey was to develop technology and to collect data to assist in the characterization of marine gas hydrates in order to better understand their potential as an energy resource and their impact on seafloor stability.

The *Pelican* left Cocodrie, Louisiana at 22:20 UTC on 18 April 2013. The *Pelican* began deploying Ocean Bottom Seismometers (OBSs) on 19 April 2013. A single airgun was deployed for testing on 20 April 2013; the airgun was retrieved after testing was completed. The hydrophone streamer and airgun array were deployed on 21 April 2013 to begin seismic survey operations. Both the streamer and the airgun array were again retrieved on 21 April 2013 to continue with OBS deployment. Seismic equipment was redeployed later on 21 April 2013 and survey operations continued early on 22 April 2013. The streamer and airgun array were again retrieved and redeployed on 22 April 2013, and operations recommenced late on 22 April 2013. On 23 April 2013, the streamer and airgun were retrieved and redeployed, with operations picking back up on 23 April 2013. The airgun and streamer were also retrieved and later redeployed on 24 April 2013 with operations restarting late on 24 April 2013. On 25 April 2013, survey operations at Green Canyon were completed and both airgun and streamer were retrieved and stored on deck until arrival at the next survey location.

The *Pelican* arrived at the Walker Ridge survey location on 26 April 2013 and began deploying Ocean Bottom Seismometers (OBSs). The hydrophone streamer and airgun were deployed at 21:40 UTC on 26 April 2013 to begin seismic survey operations. Both the streamer and the airgun were retrieved on 27 April 2013 to continue with OBS deployment. Seismic equipment was redeployed later on 27 April 2013 and survey operations continued. The streamer and airgun were again retrieved on 28 April 2013 to complete OBS deployment; equipment was redeployed on 28 April 2013 and survey operations recommenced. On 29 April 2013, the streamer and airgun were retrieved and redeployed for reconfiguration, with operations picking back up soon after on 29 April 2013. On 30 April 2013, the airgun and streamer were recovered to begin OBS retrieval. The airgun and streamer were redeployed later on 30 April 2013 to continue production. The airgun and streamer were also retrieved and later redeployed on 1 May 2013 to continue with OBS retrieval, with operations resuming late on 1 May 2013. On 2 May 2013, survey operations at Walker Ridge were completed and both airgun and streamer were retrieved and stored on deck to complete OBS retrieval. The *Pelican* arrived at the port at LUMCON at 12:10 UTC on 3 May 2013.

The USGS submitted an application to the National Marine Fisheries Service (NMFS) for a permit to harass marine mammals, incidental to the marine geophysical survey. An Incidental Harassment Authorization (IHA) was granted on 16 April 2013 (Appendix A), listing mandatory mitigation measures for minimizing potential impacts to marine mammals throughout the duration of the survey. Mitigation measures included, but were not limited to, the use of NMFS-approved Protected Species Observers (PSOs) for visual monitoring, establishment of safety radii, and implementation of ramp-up and shut-down procedures.

RPS was contracted by USGS to fulfill the environmental regulatory requirements pertaining to protected species monitoring, mitigation, and reporting mandated by NMFS in the IHA. Two PSOs were present on board the *Pelican* throughout the survey and monitored during a 30

minute minimum pre ramp up clearance period and during all airgun activity. Ramp ups were performed if airguns were silent for 15 minutes or longer, provided the entire exclusion zone had been visible for 30 minutes prior. Following a shut down due to mitigation, airgun activity did not resume until protected species had been observed to leave the exclusion zone or had not been seen in the zone for at least 15 minutes (small odontocetes) or 30 minutes (for mysticetes or large odontocetes). PSOs also monitored during the deployment and retrieval of airguns and streamers, and also during some other periods of airgun silence (to establish baseline wildlife data). PSOs undertook dedicated visual watches for a total of 42 hours 30 minutes of visual observations over the course of this survey period.

This visual monitoring effort produced one protected species detection record of cetaceans. This record was of odontocetes, and consisted of pantropical spotted dolphins. There were no detections of sea turtles during this survey period. Passive acoustic monitoring was not implemented during the survey.

The detection of a protected species resulted in a mitigation action being implemented on 22 April 2013. During the visual detection, the protected species were within the 180 dB exclusion zone (70m) during full power firing resulting in a shutdown of operations. Ten pantropical spotted dolphins were observed to be exposed to received sound levels equal to or greater than 160 dB (670m from the airguns) of sound from the airgun array, which is the level B harassment zone as defined by NMFS.

A project summary sheet of observation, detection, and operational totals can be found in Appendix B. Detailed data for operations, effort, wildlife sightings, etc. are also available in the excel files that accompany this report (UME04165 USGS RV Pelican 20 April- 2 May 2013_PSO Data Form-FINALREPORT, UME04165 USGS RV Pelican PSO Daily Logs 20 April-2 May 2013-FINALREPORT).

2. INTRODUCTION

The following report details protected species monitoring and mitigation as well as seismic survey operations undertaken as part of the USGS low-energy seismic survey on board the *R/V Pelican* from 18 April to 3 May 2013 in the Green Canyon and Walker Ridge areas of the northwest Gulf of Mexico.

This document serves to meet the reporting requirements dictated in the IHA issued to USGS by NMFS on 16 April 2013. The IHA authorized non-lethal takes of Level B harassment of specific marine mammals incidental to a marine seismic survey program. NMFS has stated that seismic source received sound levels greater than 160 dB could potentially disturb marine mammals, temporarily disrupting behavior, such that they could be considered as "takes" of these exposed animals. Potential consequences of Level B harassment taking could include effects such as temporary or permanent hearing threshold shifts, behavior modification and other reactions. It is unknown to what extent cetaceans exposed to seismic noise of this level would express these effects, and in order to take a precautionary approach, NMFS requires that provisions such as safety radii, ramp ups and shut downs be implemented to mitigate for these potential effects.

2.1. PROJECT OVERVIEW AND LOCATION

The survey was conducted in the Green Canyon 955 and Walker Ridge 313 lease blocks in the northwestern Gulf of Mexico. The survey took place in the approximate area 26 to 27.0° North and 90 to 91° West, where water depths ranged from approximately 1500m to 2000m (Figure 1). The *Pelican* deployed an array of two low-energy Sercel Generator Injector (GI) airguns, each with a discharge volume of 105 cubic inches (total volume 210 cubic inches). The receiving system consisted of one 450 meter hydrophone streamer. As the airgun array was towed along the survey lines, the hydrophone streamer received the returning acoustic signals and transferred the data to the onboard processing system.

The total survey effort consisted of approximately 813 km of survey lines. The *Pelican's* cruising speed was about 9 knots during transits and about 5 knots during the seismic survey. Seismic acquisition began on 20 April 2013 and continued with breaks until 2 May 2013.

The cruise was conducted in order to develop technology and collect data to assist in the characterization of marine gas hydrates in order to better understand their potential as an energy resource and their impact on seafloor stability.

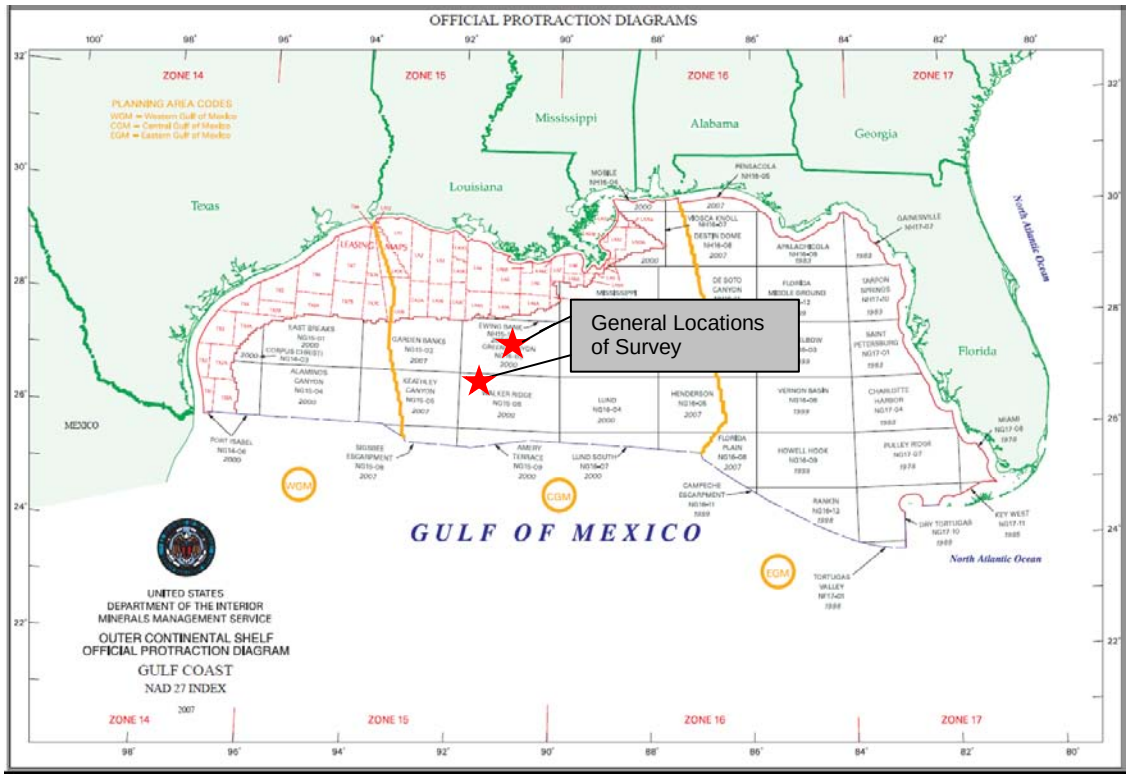

Figure 1. Location of the USGS low-energy marine geophysical survey.

2.1.1. Energy Source

The acoustic source consisted of one towed airgun array and one hydrophone streamer cable. Twenty-one ocean bottom seismometers (OBSs) were also deployed. The array was deployed centrally astern, towed at a depth of three meters and situated 21 meters behind the vessel. The source array consisted of a low-energy Sercel Generator Injector (GI) 2-airgun array, each with a source volume of 105in^3. The full power source of the two airgun array had a total discharge volume of 210 in^3.

The shot point interval for the survey was originally estimated at 14-23m which produced shots every six to ten seconds at typical survey speed. However, due to mechanical malfunctions with one of the compressors the shot intervals actually ranged from six to fifteen seconds. The sound signal receiving system during the acquisition of the transect lines consisted of a single 450 meter long hydrophone streamer, which received the returning acoustic signals and transferred the data to the processing system located on board the vessel. Due to the length and placement of the cables, the manoeuvrability of the vessel was limited while the gear was being towed.

3. MITIGATION AND MONITORING METHODS

The PSO monitoring program on the *Pelican* was established to meet the IHA requirements that were issued to the USGS by NMFS, which included both monitoring and mitigation objectives. The survey mitigation program is designed to minimize potential impacts of the *Pelican*'s seismic program on marine turtles, marine mammals, and other protected species of interest. The following monitoring protocols were followed to meet these objectives:

- Visual observations were established to provide real-time sighting data, allowing for the implementation of mitigation procedures as necessary.
- Ascertain the effects of marine mammals and marine turtles exposed to sound levels constituting a "take".

In addition to the mitigation objectives outlined in the IHA, PSOs collected and analyzed necessary data mandated by the IHA for this report including but not limited to:

- Dates, times and locations, heading, speed, weather, sea conditions (including Beaufort sea state and wind force), and related activities during all seismic operations and marine mammal detections.
- Species, number, location, distance from the vessel, and behavior of any marine mammals, as well as associated seismic activity including the number of power-downs and shut-downs, were observed and logged throughout all monitoring actions.
- An estimate of the number, decided by species, of marine mammals that: (A) are known to have been exposed to the seismic activity (based on visual observation) at received levels greater than or equal to 160 dB re 1 µPa (rms), 180 dB re 1 µPa (rms) and/or 190 dB re 1 µPa (rms) along with a discussion of any specific behaviors those individuals exhibited; and (B) may have been exposed (based on modeling results) to the seismic activity at received levels greater than or equal to 160 dB re 1 µPa (rms), 180 dB re 1 µPa (rms) and/or 190 dB re 1 µPa (rms) along with a discussion of the plausible consequences of that exposure on the individuals that were within the safety radii.
- A description of the implementation and effectiveness of the: (A) terms and conditions of the ITS and (B) mitigation measures of the IHA.

3.1. VISUAL MONITORING SURVEY METHODOLOGY

There were two trained and experienced PSOs on board to conduct the monitoring for marine mammals and sea turtles, record and report on observations, and request mitigation actions in accordance to the IHA. The PSOs on board were NMFS-approved and held certifications from a recognized Joint Nature Conservation Committee (JNCC) course and/or approved Bureau of Ocean Energy Management (BOEM) course. Visual monitoring was conducted from the bridge of the vessel, where the eye level is about 13 meters above sea level and offers a full 360° view.

Visual monitoring methods were implemented in accordance with the survey requirements outlined in the IHA. At least one PSO watched for marine mammals and sea turtles at all times while airguns operated during daylight and occasionally while the vessel was underway when the airguns were not firing.

When the airgun ramp up began from silence, PSOs maintained a two-person watch for 30 minutes prior to the activation of the airgun array and through the completion of ramp up. Visual watches commenced each day before sunrise, beginning as soon as the safety radii were

visible, and continued past sunset until the safety radii became obscured. Start of observation time was 11:10 UTC (06:10 local time), while end of observation times ranged from 00:50 to 01:00 UTC (19:50 to 20:00 local time).

A visual monitoring schedule was established by the PSOs where each observer completed visual observations typically two to three hours in length, three times a day, for a total of seven to eight hours of visual monitoring per day. This schedule was arranged to ensure that one PSO was on visual observation duty at all times during daytime hours.

Observations were focused forward of the vessel and to the sides with regular sweeps through the area around the active airgun array. PSOs searched for blows indicating the presence of a marine mammal, splashes or disturbances to the sea surface, the presence of large flocks of feeding seabirds and other sighting cues indicating the possible presence of a protected species.

Upon the visual detection of a protected species, PSOs would first identify the animals range to the airgun arrary while identifying the observed animal (cetacean or sea turtle). The visual PSOs would then notify the main science lab that there was an animal inside or outside of the safety radius. If the animal was observed inside the safety radius and a mitigation action was necessary the seismic technician would be notified. Table 1 describes the various exclusion zone radii applied to cetaceans, as well as what constituted the Level-B harassment zone.

Table 1. Exclusion zone (EZ) radii for triggering mitigation.

Source and Volume	Array Tow Depth (m)	Water Depth (m)	Shut-down EZ for Cetaceans and turtles 180 dB (m)	Level-B Harassment Zone 160 dB (m)
2 GI airguns (210 in^3)	3	Deep (>1,000)	70	670

When a protected species was observed, range estimations were made using the naked eye, and by relating the animal to an object at a known distance, such as the acoustic array located 21 meters astern. Specific species identifications were made whenever distance, length of sighting, and visual observation conditions allowed. PSOs observed anatomical features of animals sighted with the naked eye and binoculars, noting behavior of the animal or group. The camera used was a Nikon D70 with an 18-200mm lens. Marine mammal and sea turtle identification manuals were consulted and photos were examined during visual watch breaks to confirm identifications.

During or immediately after each sighting event, PSOs recorded data points requested per the IHA, including the position, time at first and last sighting, number of animals present (adults and juveniles), the initial and any subsequent behaviors observed, the initial range, bearing and movement of the animal(s), airgun activity at the initial and final detections and any mitigation measures that were applied. Specific information regarding the animal(s) closest approach to the vessel, airguns, and the airgun output at the closest approach were recorded to determine if the animals had been exposed to 160 dB and/or 180 dB of sound from the source during the sighting event. Additionally, the vessel position, water depth, vessel heading and speed, the wind speed and direction, Beaufort sea state, swell level, visibility and glare were recorded for

each sighting event as well as every hour at minimum or every time environmental conditions, vessel, or seismic activity changed.

4. MONITORING EFFORT SUMMARY

4.1. SURVEY OPERATIONS SUMMARY

The *R/V Pelican* departed LUMCON Harbor in Cocodrie, Louisiana for the first seismic survey site at 22:20 UTC on 18 April 2013. After deployment of ocean bottom seismometer (OBS) equipment, the seismic gear was deployed and use of the airguns commenced at 21:15 UTC on 20 April 2013. Acquisition began on the first survey line at 01:33 UTC on 21 April 2013 and surveying was completed, with daily breaks in operations for OBS deployment and mechanical issues, at 10:43 UTC on 25 April 2013. The airguns were disabled shortly after at 10:44 UTC on 25 April 2013. At this time the seismic gear was retrieved and the *Pelican* began retrieving OBS equipment before beginning transit to the second survey site. The *R/V Pelican* arrived at the Walker Ridge survey location on 26 April 2013. After deployment of some ocean bottom seismometer (OBS) equipment, the seismic gear was deployed and use of the airguns commenced at 23:39 UTC on 26 April 2013. Acquisition began on the first survey line at 01:33 UTC on 21 April 2013 and surveying was completed, with daily breaks in operations for OBS deployment and mechanical issues, at 5:53 UTC on 2 May 2013. The airguns were disabled upon completion of the last survey line at 5:53 UTC on 2 May 2013. At this time the seismic gear was retrieved and the *Pelican* began retrieving OBS equipment before beginning transit back to port at LUMCON in Cocodrie, LA. Table 2 outlines the dates and times of acquisition for each survey line.

Table 2. USGS low-energy marine geophysical survey multi-channel seismic lines acquired in the Green Canyon and Walker Ridge areas of the northwestern Gulf of Mexico.

Survey Line	Date Acquisition Commenced	Time Acquisition Commenced	Date Acquisition Completed	Time Acquisition Completed
Green Canyon 111	2013-04-21	01:33	2013-04-21	02:04
GC 129	2013-04-21	02:11	2013-04-21	02:44
GC 153	2013-04-21	02:54	2013-04-21	03:19
GC 123	2013-04-21	03:29	2013-04-21	04:01
GC 157	2013-04-21	04:14	2013-04-21	04:39
GC 117	2013-04-21	04:52	2013-04-21	05:24
GC 151	2013-04-21	05:38	2013-04-21	06:02
GC 261	2013-04-21	06:30	2013-04-21	06:56
GC 273	2013-04-21	07:11	2013-04-21	07:52
GC 287	2013-04-21	08:10	2013-04-21	08:48
GC 115	2013-04-21	09:22	2013-04-21	10:20
GC 207	2013-04-21	10:56	2013-04-21	11:47
GC 245	2013-04-22	00:24	2013-04-22	01:17
GC 225	2013-04-22	01:17	2013-04-22	02:14
GC 265	2013-04-22	02:14	2013-04-22	03:33
GC 237	2013-04-22	03:33	2013-04-22	04:34
GC 217	2013-04-22	04:34	2013-04-22	05:53
GC 249	2013-04-22	05:53	2013-04-22	06:46
GC 211	2013-04-22	06:46	2013-04-22	08:07
GC 233	2013-04-22	08:07	2013-04-22	09:03
GC 253	2013-04-22	09:03	2013-04-22	10:11
GC 229	2013-04-22	10:11	2013-04-22	11:16
GC 215	2013-04-22	11:16	2013-04-22	12:15
GC 155	2013-04-22	12:15	2013-04-22	13:36

Survey Line	Date Acquisition Commenced	Time Acquisition Commenced	Date Acquisition Completed	Time Acquisition Completed
GC 127	2013-04-22	13:36	2013-04-22	14:46
GC 159	2013-04-22	14:46	2013-04-22	15:27
GC 321a	2013-04-22	19:16	2013-04-22	21:47
GC 312	2013-04-22	23:18	2013-04-23	01:21
GC 302	2013-04-23	02:33	2013-04-23	05:09
GC 331a	2013-04-23	06:10	2013-04-23	06:49
GC 331b	2013-04-23	06:53	2013-04-23	08:45
GC 321b	2013-04-23	09:40	2013-04-23	11:18
GC 119	2013-04-23	14:28	2013-04-23	15:08
GC 145	2013-04-23	15:19	2013-04-23	15:48
GC 125	2013-04-23	16:00	2013-04-23	16:33
GC 155	2013-04-23	16:45	2013-04-23	17:30
GC 127b	2013-04-23	17:44	2013-04-23	18:21
GC 127b	2013-04-23	18:21	2013-04-23	18:30
GC 165	2013-04-23	18:43	2013-04-23	19:18
GC 135	2013-04-23	19:34	2013-04-23	20:29
GC 175	2013-04-23	21:21	2013-04-23	21:25
GC 175	2013-04-23	21:25	2013-04-23	21:44
GC 131	2013-04-23	22:07	2013-04-23	22:39
GC_CSEM_A	2013-04-23	22:57	2013-04-23	23:42
GC 241	2013-04-24	00:25	2013-04-24	00:56
GC 221	2013-04-24	01:26	2013-04-24	01:59
GC 203	2013-04-24	02:14	2013-04-24	03:00
GC 235	2013-04-24	03:22	2013-04-24	03:57
GC 223	2013-04-24	04:18	2013-04-24	04:48
GC 269	2013-04-24	05:17	2013-04-24	05:49
GC 227	2013-04-24	06:10	2013-04-24	06:41
GC 225	2013-04-24	07:21	2013-04-24	08:07
GC 103	2013-04-24	23:23	2013-04-25	00:15
GC 107	2013-04-25	00:43	2013-04-25	01:32
GC 161	2013-04-25	01:51	2013-04-25	02:35
GC 169	2013-04-25	03:45	2013-04-25	04:19
GC 129a	2013-04-25	04:34	2013-04-25	05:04
GC 147	2013-04-25	05:16	2013-04-25	05:44
GC 187	2013-04-25	06:08	2013-04-25	06:43
GC 143	2013-04-25	07:14	2013-04-25	07:52
GC 127	2013-04-25	08:07	2013-04-25	08:41
GC 153a	2013-04-25	09:01	2013-04-25	09:28
GC 139	2013-04-25	09:37	2013-04-25	10:07
GC 157	2013-04-25	10:18	2013-04-25	10:43
Walker Ridge 341	2013-04-27	00:00	2013-04-27	00:43
WR 342	2013-04-27	01:02	2013-04-27	01:41
WR 343	2013-04-27	01:55	2013-04-27	02:32
WR 241	2013-04-27	02:41	2013-04-27	04:34
WR 348	2013-04-27	05:04	2013-04-27	05:45
WR 141	2013-04-27	06:06	2013-04-27	06:50
WR 129	2013-04-27	07:09	2013-04-27	07:47
WR 215	2013-04-27	22:14	2013-04-27	23:36

Survey Line	Date Acquisition Commenced	Time Acquisition Commenced	Date Acquisition Completed	Time Acquisition Completed
WR 231	2013-04-27	23:57	2013-04-28	01:10
WR 223	2013-04-28	01:27	2013-04-28	02:44
WR 237	2013-04-28	03:02	2013-04-28	04:13
WR 227	2013-04-28	04:31	2013-04-28	05:50
WR 233	2013-04-28	06:02	2013-04-28	07:22
WR_CSEM_A	2013-04-28	08:02	2013-04-28	09:05
WR 347	2013-04-28	19:27	2013-04-28	20:26
WR 205	2013-04-28	20:57	2013-04-28	21:38
WR 344	2013-04-28	22:21	2013-04-28	23:30
WR 346	2013-04-28	23:54	2013-04-29	01:01
WR 137	2013-04-29	01:21	2013-04-29	02:28
WR 345	2013-04-29	02:51	2013-04-29	03:34
WR 133	2013-04-29	03:54	2013-04-29	04:35
WR_CSEM_B	2013-04-29	05:15	2013-04-29	06:29
WR 229	2013-04-29	07:00	2013-04-29	08:26
WR 228	2013-04-29	08:49	2013-04-29	10:12
WR 230	2013-04-29	10:41	2013-04-29	12:01
WR 229a	2013-04-29	12:26	2013-04-29	13:53
WR 228a	2013-04-29	14:21	2013-04-29	15:36
WR 341a	2013-04-29	16:23	2013-04-29	17:03
WR 332	2013-04-29	19:09	2013-04-29	21:51
WR 321	2013-04-29	22:59	2013-04-30	01:11
WR 311	2013-04-30	02:20	2013-04-30	04:40
WR 301	2013-04-30	05:58	2013-04-30	08:29
WR 331	2013-04-30	09:33	2013-04-30	11:13
WR 321N	2013-04-30	20:27	2013-04-30	21:54
WR 137a	2013-04-30	23:06	2013-05-01	00:13
WR 345a	2013-05-01	00:39	2013-05-01	01:24
WR 342a	2013-05-01	01:51	2013-05-01	02:34
WR 332a	2013-05-01	03:20	2013-05-01	05:12
WR 331a	2013-05-01	05:35	2013-05-01	07:13
WR 229b	2013-05-01	07:32	2013-05-01	07:55
WR 312	2013-05-01	22:32	2013-05-02	00:01
WR 229c	2013-05-02	01:41	2013-05-02	03:22
WR 233a	2013-05-02	03:52	2013-05-02	05:53

The airguns were in operation for a combination of 155 hours nine minutes; one hour and seven minutes conducting ramp up, 100 hours 40 minutes in full volume production, and 47 hours eight minutes at non-production full volume (Figure 3). There were 14 ramp ups over the course of the current survey period in order to commence full power survey operations (Table 3). All ramp ups were conducted from silence over the duration of 5 minutes (by turning on the first GI airgun and waiting five minutes before adding the second GI airgun).

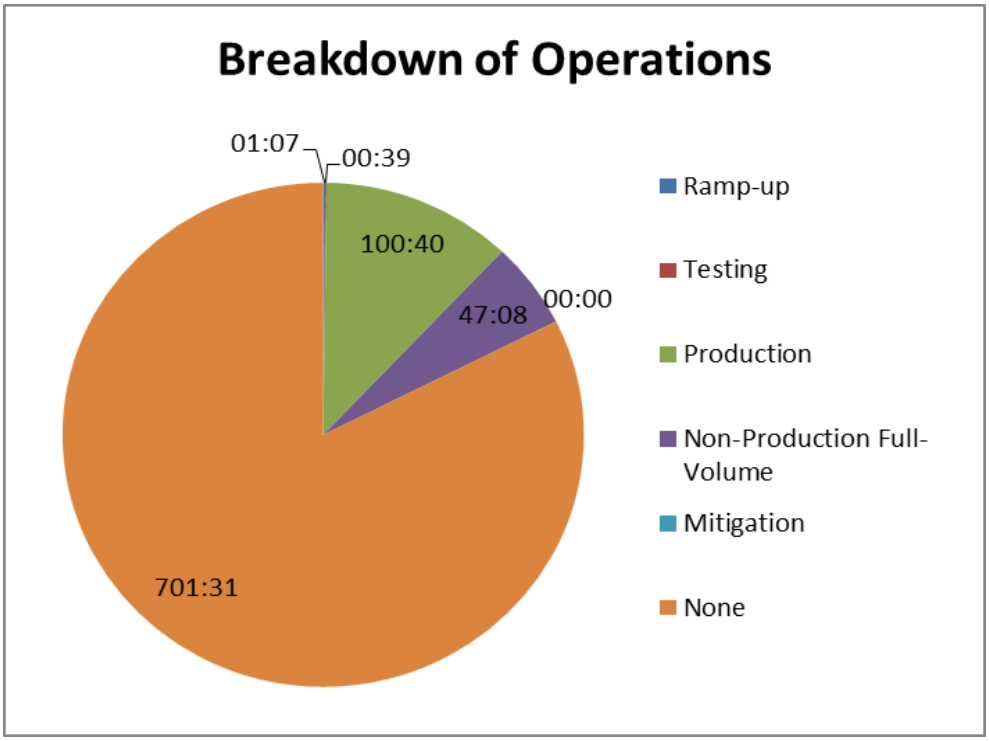

Figure 2. Airgun operational times during the USGS low energy marine geophysical survey in the Green Canyon and Walker Ridge areas of the northwestern Gulf of Mexico.

Table 3. Total airgun operations during the USGS low-energy marine geophysical survey in the Green Canyon and Walker Ridge areas of the northwestern Gulf of Mexico.

Airgun Operations	Number	Duration (hh:mm)
Gun Tests		**00:39**
Ramp-ups	**14**	**01:07**
Day time ramp-ups from silence	**14**	
Day time ramp-ups from mitigation	**0**	
Night time ramp-ups from mitigation	**0**	
Full power survey acquisition		**100:40**
Full power line changes		**47:08**
Total time airgun array was active		**155:09**

4.2. VISUAL MONITORING SURVEY SUMMARY

Visual observations began prior to the deployment of the seismic gear on 20 April 2013. Although the airguns were not in operation at this time, observations were performed to collect baseline data about protected species abundance in the area. Visual monitoring began at 21:15 UTC on 20 April 2013 and continued during daytime production hours until 1:00 UTC on 2 May 2013. Visual monitoring was conducted over a period of about 12 days. Monitoring was conducted by at least one PSO each day between just before dawn until just after dusk, when it became too dark for the entire safety radius to be visible.

Visual observations were conducted by one PSO except for ramp up pre surveys or in the event of a sighting when a second PSO was notified and immediately joined to assist observations.

The airguns were active during a little more than half of the visual monitoring (65%), as shown in Figure 3.

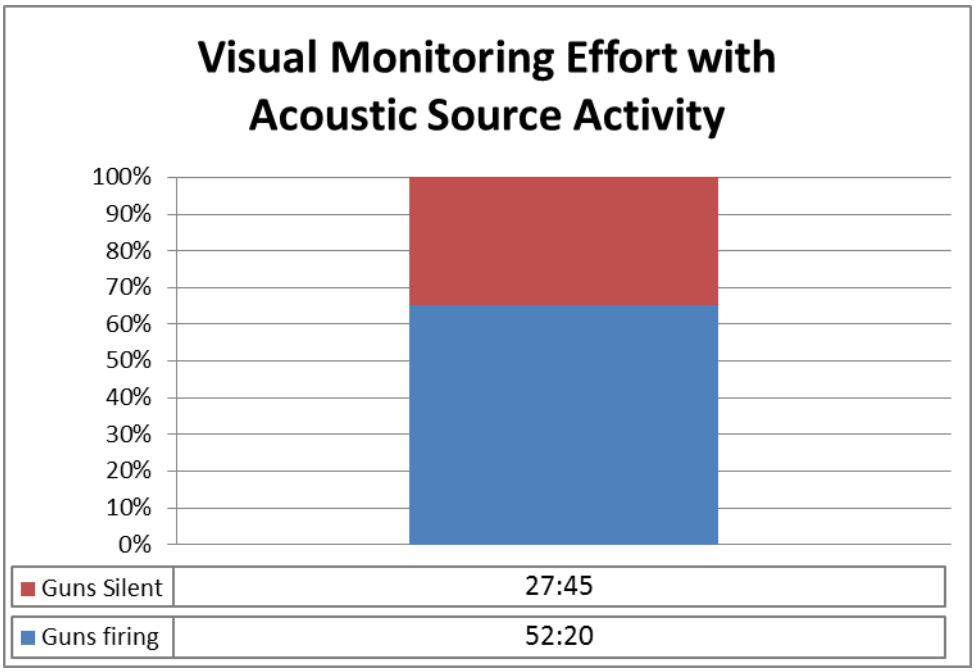

Figure 3. Duration of visual monitoring effort while airguns were active vs. silent.

Total visual monitoring effort, differentiated by monitoring effort while the airguns were active and monitoring effort while airguns were silent, is listed in Table 4.

Table 4. Total visual monitoring effort.

Visual Monitoring Effort	Duration (hh:mm)
Total monitoring while airguns were active	**52:20**
Total monitoring while airguns were silent	**27:45**
Total monitoring effort	**80:05**

4.3. ENVIRONMENTAL CONDITIONS

A majority of visual monitoring effort was conducted during moderate weather conditions. There were no periods where visibility was obscured by precipitation or fog. Visibility remained clear, with a range of five kilometers or more for the entirety of the current survey period.

The Beaufort Sea state ranged from 2 through 6, but generally remained between 3 and 5 (Figure 4). Wind forces remained relatively stable throughout the survey with a minimum of 4 knots to a maximum of 23 knots. Forces from 7 to 20 knots were the average during the cruise (Figure 5).

Swell height remained less than 2 meters for 61 hours 25 minutes, while reaching heights of 2-4 meters for only 17 hours 52 minutes (Figure 6). Swells did not increase to greater than 4 meters during visual observations.

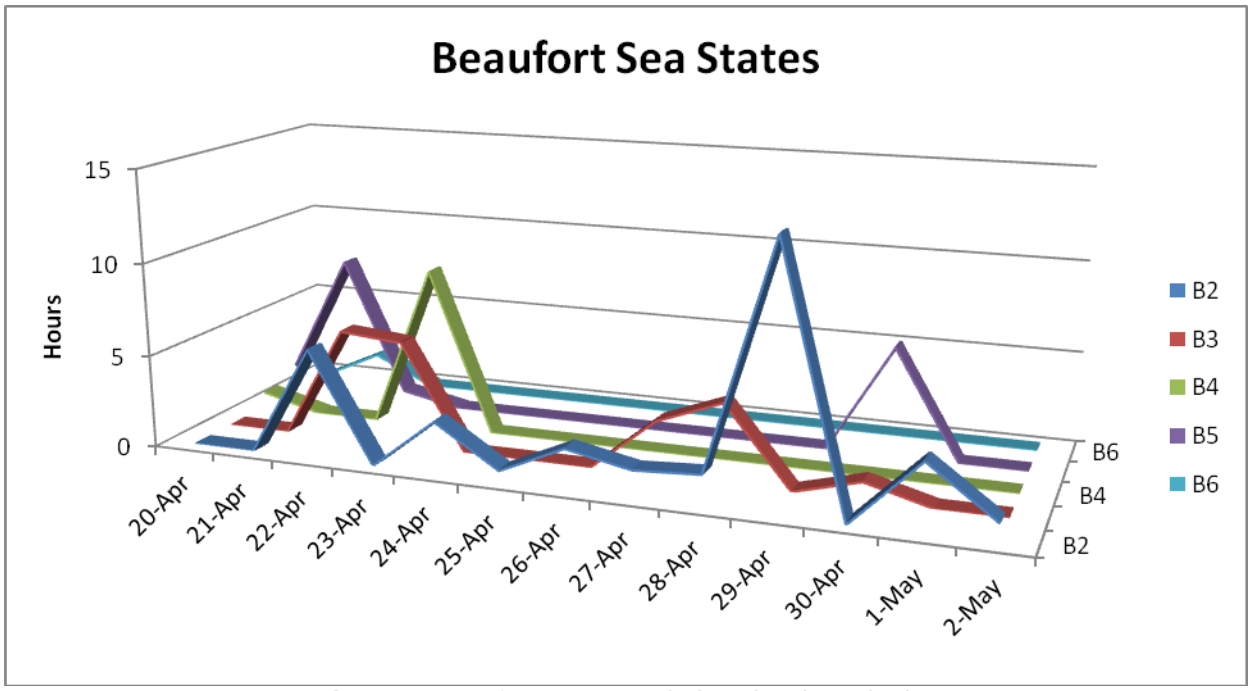

Figure 4. Beaufort sea state during visual monitoring.

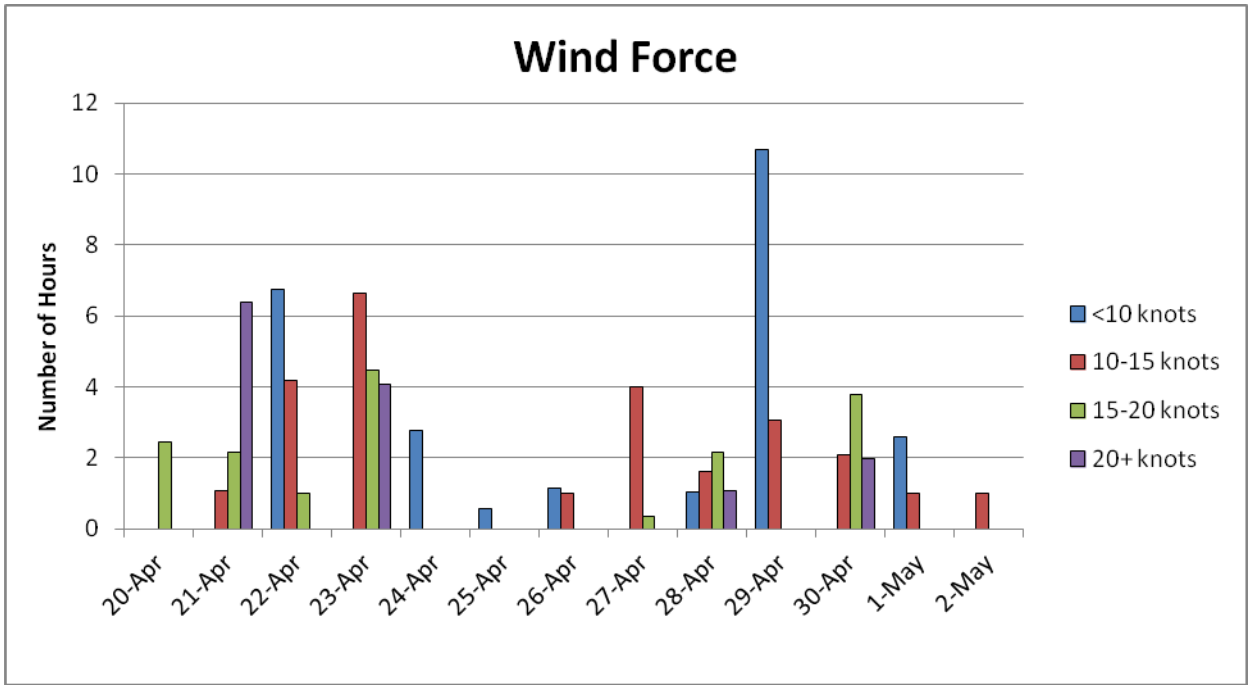

Figure 5. Average wind force during visual monitoring.

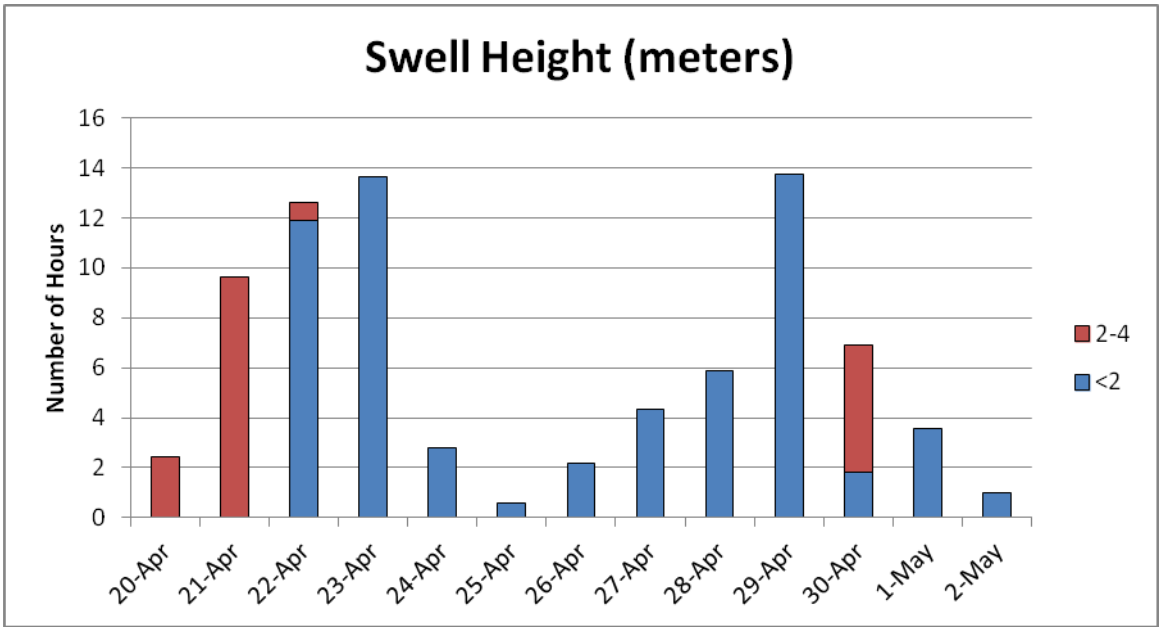

Figure 6. Swell heights during visual monitoring.

5. MONITORING AND DETECTION RESULTS

5.1. VISUAL DETECTIONS

Visual monitoring conducted during this survey resulted in one record of detection for protected species (summarized in Appendix C), which was positively identified as pantropical spotted dolphins. The total number of detection events and the total number of animals recorded by species is described in Table 5.

A complete list of bird species observed and identified in addition to the approximate number of individuals observed and the number of days on which they were observed can be found in Appendix D.

Table 5. Number of visual detection records collected for each protected species.

	Total Number of Detection Records	Total Number of Animals Recorded
Odontocetes		
Pantropical spotted dolphins	1	10
TOTAL		

There was only one sighting of a protected species during this survey, occurring on 22 April 2013 (Figure 7).

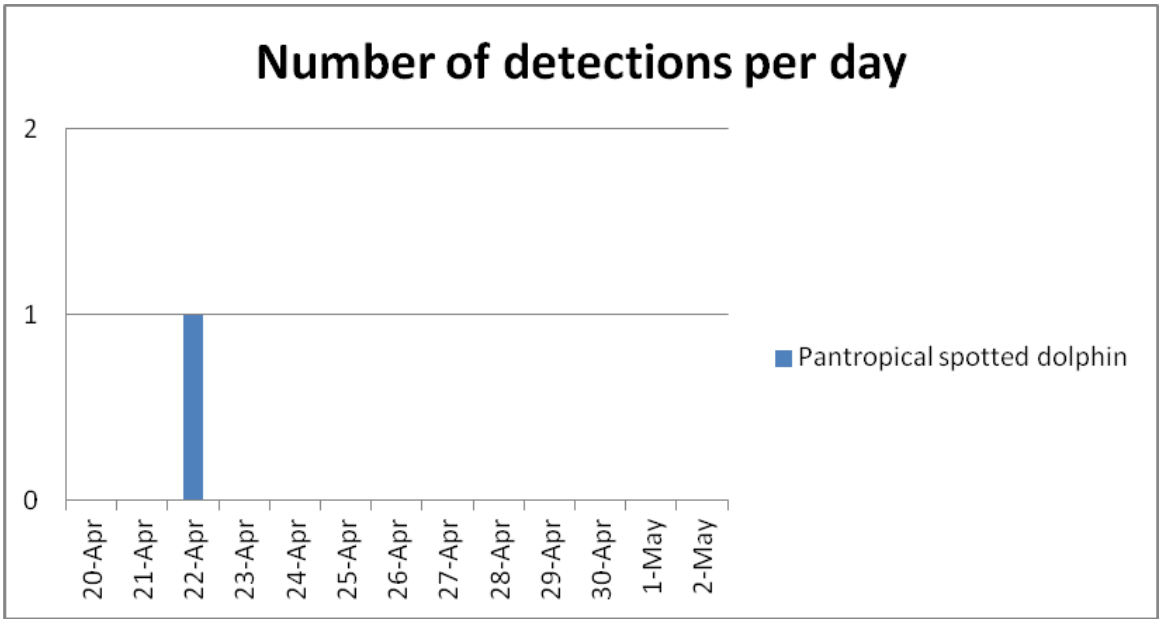

Figure 7. Number of protected species detections per day during the USGS low-energy marine geophysical survey in the Green Canyon and Walker Ridge areas of the northwestern Gulf of Mexico.

This detection event occurred while the airguns were active. Figure 8 shows the detected species' average distance to airgun activity.

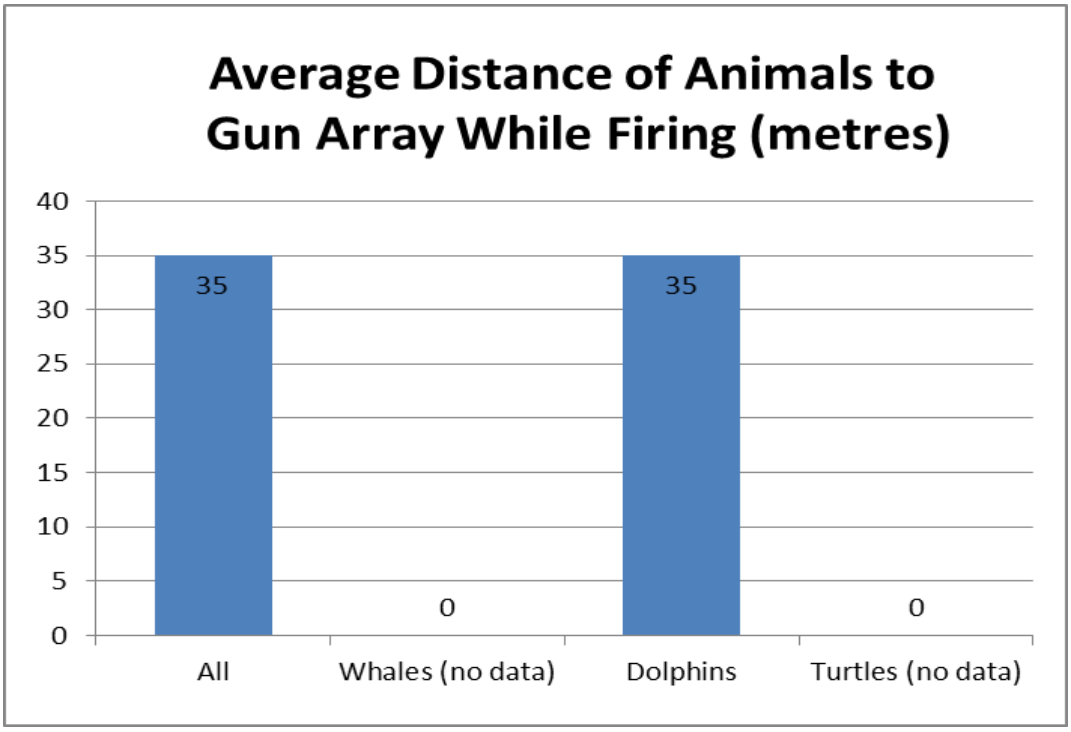

Figure 8. Average distance of animals to airgun array while firing

Table 6 demonstrates the average closest approach of protected species to the airguns at various volumes.

Table 6. Average closest approach of protected species to airgun array at various volumes.

Species Detected	Full Power (210 in³)		Ramp-up		Not Firing	
	Number of detections	Average closest approach to source (meters)	Number of detections	Average closest approach to source (meters)	Number of detections	Average closest approach to source (meters)
Pantropical spotted dolphin	1	35	-	-	-	-

The only detection record for this survey was of cetaceans. Pantropical spotted dolphins were the only protected species detected, accounting for one visual detection of ten individuals. The spatial distribution of marine mammal detections can be seen in Figure 9.

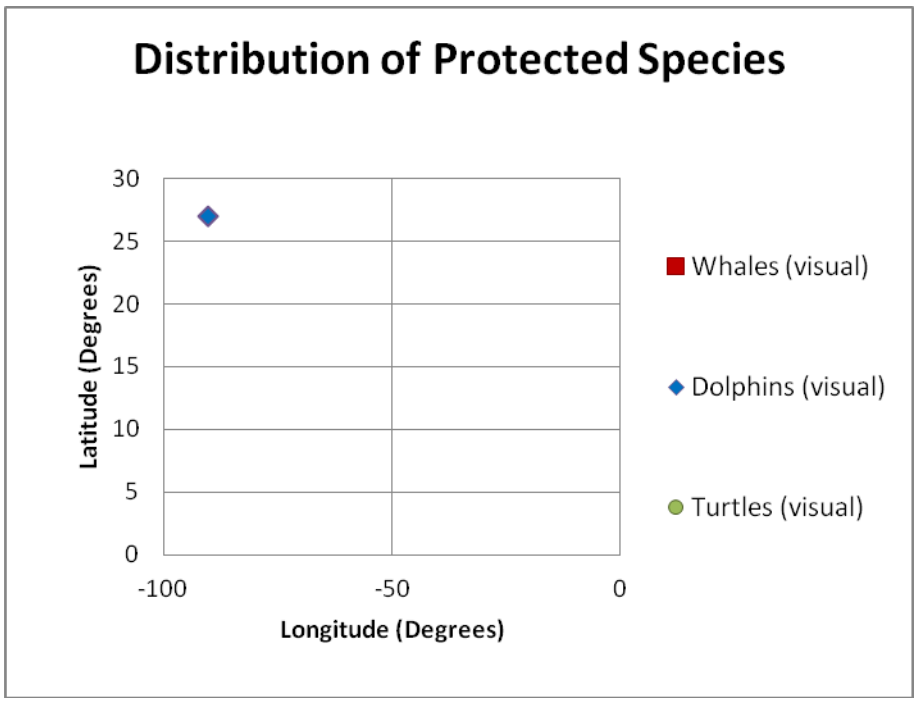

Figure 9. Marine mammal spatial distribution of detections from 18 April 2013 – 3 May 2013 on board the *R/V Pelican*.

5.1.1. Cetacean Detections

5.1.1.1. Pantropical spotted dolphin

On 22 April 2013 at 20:54 UTC there was a very brief sighting of pantropical spotted dolphins within the 180dB exclusion zone. The pod was composed of ten adults and no juveniles. The dolphins were first observed from sub-surface movement and a light discoloration of the water off the port side of the vessel during continuous visual watch. Animals were observed surfacing approximately 30 meters off the port side of the vessel (20° bearing), swimming rapidly towards the vessel with a heading of 200 degrees. The animals approached the vessel and some individuals were seen bow riding while others swam alongside the boat (Figure 10), changing direction to the same heading as the boat, 100 degrees. This detection occurred while the *Pelican* was firing at full power (210 in³), travelling with a heading of 100 degrees at about 4.4 knots. Beaufort sea state was B3 with swells less than two meters. Winds were 13 knots from the NNE and a moderate sun glare was observed at the stern of the vessel. Guns were shut down for mitigation since the animals were within the 180 dB exclusion zone, with their closest approach to the airguns at 35 meters. Animals were last sighted at 20:58 UTC about 40 meters off the port side of the vessel swimming away from the vessel in the same direction from which they approached (heading of 20 degrees).

Figure 10. Pantropical spotted dolphins (*Stenella attenuata*) 22 April 2013. Photo Jessica Richardson

6. MARINE MAMMALS KNOWN TO HAVE BEEN EXPOSED TO 160 DB OF RECEIVED SOUND LEVELS

NMFS granted an IHA to the USGS for the low-energy marine seismic survey in the Gulf of Mexico, allowing Level B harassment takes (exposure to sound pressure levels greater than or equal to 160 dB re: 1 µPa (rms) for odontocete and mysticete species listed below. There was one direct visual observation recorded by PSOs of one species of marine mammal for which takes were granted in the IHA; 10 pantropical spotted dolphins (*Stenella attenuata*) were observed within the 180 dB exclusion zone.

During this low-energy marine geophysical survey in the Gulf of Mexico one protected species was observed within the 180/190 dB safety radius, where Level B harassment is expected to occur, while the airgun array was active (Table 7).

Table 7. Level B Harassment Takes authorized by NMFS IHA for the USGS low-energy marine geophysical survey in the northwestern Gulf of Mexico and number of known individuals exposed to 160 dB and 180/190 dB through visual observations.

Species	IHA Authorized Takes	Number of animals exposed to 180 dB or greater (at or within the 70m exclusion zone for the airgun array)	Number of animals exposed to 160 dB or greater (at or within 670m of the airgun array)
Mysticetes			
Blue whale	0	0	0
Bryde's whale	0	0	0
Fin whale	0	0	0
Humpback whale	0	0	0
Minke whale	0	0	0
Northern Right whale	0	0	0
Sei whale	0	0	0
Odontocetes			
Sperm whale	13	0	0
Kogia spp.	2	0	0
Unidentified beaked whale (Cuvier's, Blainvilles, Gervais', Sowerby's)	2	0	0
Killer whale	0	0	0
Rough-toothed dolphin	16	0	0
Bottlenose dolphin	18	0	0
Atlantic spotted dolphin	15	0	0
Pantropical spotted dolphin	259	10	10
Spinner dolphin	99	0	0
Striped dolphin	45	0	0
Clymene dolphin	20	0	0
Fraser's dolphin	117	0	0
Risso's dolphin	9	0	0
Melon-headed whale	118	0	0
False killer whale	36	0	0
Pygmy killer whale	0	0	0
Short-finned pilot whale	19	0	0

These numbers are possibly an underestimate and provide the absolute minimum number of animals actually exposed, due to the airguns firing at night time when no visual observations or passive acoustic monitoring were held.

6.1. IMPLEMENTATION AND EFFECTIVENESS OF THE BIOLOGICAL OPINION'S ITS AND IHA

In order to minimize the Level-B incidental taking of marine mammals and sea turtles during the Gulf of Mexico marine geophysical survey, mitigation measures were to be implemented whenever these protected species were seen near or within the safety radii designated in the IHA. Because of the minimal use of the airgun array and small safety radii only one mitigation action was necessary during this survey; guns were shut down for a pod of pantropical spotted dolphins that entered the 180/190 dB exclusion zone during full power firing at 20:54 UTC on 22 April 2013.

APPENDIX A: Incidental Harassment Authorization for the USGS low-energy marine geophysical survey in the northwestern Gulf of Mexico

Incidental Harassment Authorization

U.S. Geological Survey, 384 Woods Hole Road. Woods Hole, Massachusetts 02543, is hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA) (16 U.S.C.1371 (a)(5)(D)). to harass small numbers of marine mammals incidental to a low-energy marine geophysical (seismic) survey conducted by the R/V *Pelican (Pelican)* in the deep water of the northwest Gulf of Mexico. April to May 2013:

1. This Authorization is valid from April 17 through June 10, 2013.

2. This Authorization is valid only for the *Pelican's* activities associated with low-energy seismic survey operations that shall occur in the following specified geographic area:

> In the deep water of the northwestern Gulf of Mexico, at study sites GC955 (i.e. Green Canyon lease block 955) and WR313 (i.e. Walker Ridge 1ease block 313). Water depths in the survey area general range from approximately 1.500 to 2,000 meters (m) (4,921.3 to 6,561.7 feet [ft]). The low-energy seismic survey will be conducted in the U.S. Exclusive Economic Zone (EEZ), as specified in U.S. Geological Survey (USGS) Incidental Harassment Authorization application and the associated Environmental Assessment.

3. Species Authorized and Level of Takes

> (a) The incidental taking of marine mammals, by Level B harassment only, is limited to the following species in the waters of the deep water of the Gulf of Mexico:
>
> > (i) Mysticetes -see Table 2 (attached) for authorized species and take numbers.
> >
> > (ii) Odontocetes -see Table 2 (attached) for authorized species and take numbers.
> >
> > (iii) If any marine mammal species are encountered during seismic activities that are not listed in Table 2 (attached) for authorized taking and are likely to be exposed to sound pressure levels (SPLs) greater than or equal to 160 dB re 1 µPa (rms), then the Holder of this Authorization must alter speed or course or shut down the airguns to avoid take.
>
> (b) The taking by injury (Level A harassment), serious injury, or death of any of the species listed in Condition 3(a) above or the taking of any kind of any other species of marine mammal is prohibited and may result in the modification, suspension or revocation of this Authorization.

4. The methods authorized for taking by Level B harassment are limited to the following acoustic sources without an amendment to this Authorization:

> (a) A two Generator Injector (GI) airgun array (each with a discharge volume of 105 cubic inches [in^3]) with a total volume of 210 in^3 (or smaller);

(b) A single 35 in^3;

(c) A sub-bottom profiler; and

(d) An acoustic release transponder used to communicate with ocean bottom seismometers (OBS).

5. The taking of any marine mammal in a manner prohibited under this Authorization must be reported immediately to the Office of Protected Resources, National Marine Fisheries Service (NMFS), at 301-427-8401.

6. Mitigation and Monitoring Requirements

The Holder of this Authorization is required to implement the following mitigation and monitoring requirements when conducting the specified activities to achieve the least practicable adverse impact on affected marine mammal species or stocks:

(a) Utilize one, NMFS-qualified, vessel-based Protected Species Observer (PSO) to visually watch for and monitor marine mammals near the seismic source vessel during daytime airgun operations (from nautical twilight-dawn to nautical twilight-dusk) and before and during ramp-ups of airguns day or night. The *Pelican's* vessel crew shall also assist in detecting marine mammals, when practicable. PSOs shall have access to reticle binoculars (7 x 50 Fujinon), big-eye binoculars (25 x 150), optical range finders, and night vision devices. PSO shifts shall last no longer than 4 hours at a time. PSOs shall also make observations during daytime periods when the seismic system is not operating for comparison of animal abundance and behavior, when feasible.

(b) PSOs shall conduct monitoring while the airgun array and streamer(s) are being deployed or recovered from the water.

(c) Record the following information when a marine mammal is sighted:

(i) Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from seismic vessel, sighting cue, apparent reaction to the airguns or vessel (e.g., none, avoidance, approach, paral1eling, etc., and including responses to ramp-up), and behavioral pace; and

(ii) Time, location, heading. speed, activity of the vessel (including number of airguns operating and whether in state of ramp-up or shut-down), Beaufort sea slate and wind force, visibility, and sun glare; and

(iii) The data listed under Condition 6(c)(ii) shall also be recorded at the start and end of each observation watch and during a watch whenever there is a change in one or more of the variables.

(d) Visually observe the entire extent of the exclusion zone (180 dB re 1 μPa [rms] for cetaceans: see Table 1 [attached] for distance) using NMFS-qualified PSOs, for at least 30 minutes prior to starting the airgun array (day or night). If the PSO finds a marine mammal within the exclusion zone, USGS must delay the seismic survey until the marine mammal(s) has left the area. If the PSO sees a marine mammal that surfaces, then dives below the surface, the PSO shall wait 30 minutes. If the PSO sees no marine mammals during that time, they should assume that the animal has moved beyond the exclusion zone. If for any reason the entire radius cannot be seen for the entire 30 minutes (i.e. rough seas, fog, darkness), or if marine mammals are near, approaching, or in the exclusion zone, the airguns

may not be ramped-up. If one airgun is already running at a source level of at least 180 dB re 1μPa (rms), USGS may start the second airgun without observing the entire exclusion zone for 30 minutes prior provided no marine mammals are known to be near the exclusion zone (in accordance with Condition 6[f] below).

(e) Establish a 180 dB re 1 μPa (rms) exclusion zone for cetaceans before the one (35 in^3) or two GI airgun array (210 in^3 total) is in operation. See Table 1 (attached) for distances and exclusion zones.

(f) Implement a "ramp-up" procedure when starting up at the beginning of seismic operations or anytime after the entire array has been shut-down for more than 15 minutes, which means starting with a single GI airgun and adding a second GI airgun after five minutes. During ramp-up, the PSOs shall monitor the exclusion zone, and if marine mammals are sighted, a shut-down shall be implemented as though the full array (both GI airguns) were operational. Therefore, initiation of ramp-up procedures from shut-down requires that the PSOs be able to view the full exclusion zone as described in Condition 6(d) (above).

(g) Alter speed or course during seismic operations if a marine mammal, based on its position and relative motion, appears likely to enter the relevant exclusion zone. If speed or course alteration is not safe or practicable, or if after alteration the marine mammal still appears likely to enter the exclusion zone, further mitigation measures, such as a shut-down, shall be taken.

(h) Shut-down the airgun(s) if a marine mammal is detected within, approaches, or enters the relevant exclusion zone (as defined in Table 1, attached). A shut-down means all operating airguns are shut-down (i.e. turned off).

(i) Following a shut-down, the airgun activity shall not resume until the PSO has visually observed the marine mammal(s) exiting the exclusion zone and is not likely to return, or has not been seen within the exclusion zone for 15 minutes for species with shorter dive durations (small odontocetes) or 30 minutes for species with 1onger dive durations (mysticetes and large odontocetes, including sperm, pygmy sperm, dwarf sperm, killer, and beaked whales).

(j) Following a shut-down and subsequent animal departure, airgun operations may resume following ramp-up procedures described in Condition 6(f). .

(k) Marine seismic surveys may continue into night and low-light hours if such segment(s) of the survey is initiated when the entire relevant exclusion zones are visible and can be effectively monitored.

(I) No initiation of airgun array operations is permitted from a shut-down position at night or during low-light hours (such as in dense fog or heavy rain) when the entire relevant exclusion zone cannot be effectively monitored by the PSO(s) on duty.

(m) If a Northern right whale *(Eubalaena glacialis)* is visually sighted, the airgun array, shall be shut-down regardless of the distance of the animal(s) to the sound source. The array shall not resume firing until 30 minutes after the last documented whale visual sighting.

(n) To the maximum extent practicable schedule seismic operations (i.e., shooting airguns) during daylight hours and OBS operation (i.e., deploy/retrieve) to nighttime hours.

7. Reporting Requirements

The Holder of this Authorization is required to:

(a) Submit a draft report on all activities and monitoring results to the Office of Protected Resources, NMFS, within 90 days of the completion of the *Pelican's* deep water Gulf of Mexico cruise. This report must contain and summarize the following information:

(i) Dates, times, locations, heading, speed, weather, sea conditions (including Beaufort sea slate and wind force), and associated activities during all seismic operations and marine mammal sightings;

(ii) Species, number, location, distance from the vessel, and behavior of any marine mammals, as well as, associated seismic activity (number of shut-downs), observed throughout all monitoring activities.

(iii) An estimate of the number (by species) of marine mammals that: (A) are known to have been exposed to the seismic activity (based on visual observation) at received levels greater than or equal to 160 dB re 1 µPa (rms) and/or 180 dB re 1 µPa (rms) for cetacean with a discussion of any specific behaviors those individuals exhibited; and (B) may have been exposed (based on modeled values for the two GI airgun array) to the seismic activity at received levels greater than or equal to 160 dB re 1 µPa(rms) and/or 180 dB re 1 µPa (rms) for cetaceans with a discussion of the nature of the probable consequences of that exposure on the individuals that have been exposed.

(iv) A description of the implementation and effectiveness of the: (A) terms and conditions of the Biological Opinion's Incidental Take Statement (ITS) (attached); and (B) mitigation measures of the Incidental Harassment Authorization. For the Biological Opinion, the report shall confirm the implementation of each Term and Condition, as well as any conservation recommendations, and describe their effectiveness, for minimizing the adverse effects of the action on Endangered Species Act-listed marine mammals.

(b) Submit a full report to the Chief, Permits and Conservation Division, Office of Protected Resources, NMFS, within 30 days after receiving comments from NMFS on the draft report. If NMFS decides that the draft report needs no comments, the draft report shall be considered to be the final report.

8. In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by this Authorization, such as an injury (Level A harassment), serious injury or mortality (e.g., ship-strike, gear interaction, and/or entanglement), USGS shall immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Jolie.Harrison@noaa.gov and Howard.Goldstein@noaa.gov and the NMFS Southeast Region Marine Mammal Stranding Network at 877-433-8299 Stranding Coordinators (Blair.Mase@noaa.gov and Erin.Foligeres@noaa.gov (Florida Marine Mammal Stranding Hotline at 888-404-3922). The report must include the following information:

(a) Time, date, and location (latitude/longitude) of the incident; the name and type of vessel involved; the vessel's speed during and leading up to the incident; description of the incident; status of all sound source use in the 24 hours preceding the incident; water depth; environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover and visibility); description of marine mammal

observations in the 24 hours preceding the incident: species identification or description of the animal(s) involved; the fate of the animal(s); and photographs or video footage of the animal (if equipment is available).

Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS shall work with USGS to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. USGS may not resume their activities until notified by NMFS via letter, email, or telephone.

In the event that USGS discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), USGS will immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401, and/or by email to Jolie.Harrison@noaa.gov and Howard.Goldstein@noaa.gov, and the NMFS Southeast Region Marine Mammal Stranding Network (877-433-8299) and/or by email to the NMFS Southeast Regional Stranding Coordinator (Blair.Mase@noaa.gov) and Southeast Regional Stranding Program Administrator (Erin.Fourgeres@noaa.gov). The report must include the same information identified in Condition 8(a) above. Activities may continue while NMFS review the circumstances of the incident. NMFS will work with USGS to determine whether modifications in the activities are appropriate.

In the event that USGS discovers an injured or dead marine mammal and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in Condition 2 of this Authorization (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), USGS shall report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401, and/or by email to Joli.Harrison@noaa.gov and Howard.Goldstein@noaa.gov, and the NMFS Southeast Region Marine Mammal Stranding Network (877-433-8299) and/or by email to the Southeast Regional Stranding Coordinator (Blair.Mase@noaa.gov) and Southeast Regional Stranding Program Administrator (Erin.Fourgeres@noaa.gov), within 24 hours of the discovery. USGS shall provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. Activities may continue while NMFS reviews the circumstances of the incident.

9. USGS is required to comply with the Terms and Conditions of the ITS corresponding to NMFS's Biological Opinion issued to both USGS and NMFS's Office of Protected Resources (attached).

10. A copy of this Authorization and the ITS must be in the possession of all contractors and PSOs operating under the authority of this Incidental Harassment Authorization.

Helen M. Golde
Acting Director
Office of Protected Resources
National Marine Fisheries Service

Attachment

Table 1. Exclusion and buffer zone radii for triggering mitigation. USGS will use the distances for the two 105 in^3 and single 35 in^3 GI airguns for the exclusion and buffer zones.

Source and Volume	Tow Depth (ill)	Water Depth (m)	Predicted RMS Radii Distances (m)	
			Shut-down Exclusion Zone for Cetaceans 180 dB	Level-B Harassment Zone 160 dB
Two Generator Injector (Gl) airguns 105 in3 (210 in3 total)	3	Deep (> 1,000)	70	670

Table 2. Authorized take numbers for each marine mammal species in the deep water of the Gulf of Mexico.

Species	IHA Authorized Takes
Mysticetes	
Northern right whale (*Eubalaena glacialis*)	0
Humpback whale (*Megaptera novaeangliae*)	0
Minke whale (*Balaenoptera acutorostrata*)	0
Bryde's Whale (*Balaenoptera edeni*)	0
Sei whale (*Balaenoptera borealis*)	0
Fin whale (*Balaenoptera physalus)*	0
Blue whale (*Balaenoptera musculus*)	0
Odontocetes	
Sperm whale (*Physeter macrocephalus*)	13
Kogia spp. (Pygmy sperm whale [*Kogia breviceps*] and Dwarf sperm whale [*Kogia sima*])	2
Unidentified beaked whale (Cuvier's beaked whale [*Ziphius cavirostris*], Blainville's beaked whale [*Mesoplodon densirostris*], Gervais' beaked whale [*Mesoplodon europaeus*], Sowerby's beaked whale [*Mesoplodon bidens*])	2
Rough-toothed dolphin (*Steno bredanensis*)	16
Bottlenose dolphin (*Tursiops truncatus*)	18
Risso's dolphin (*Grampus griseus*)	9
Pantropical spotted dolphin (*Stenella attenuata*)	259
Atlantic spotted dolphin (*Stenella frontalis*)	15
Spinner dolphin (*Stenella longirostris*)	99
Striped dolphin (*Stenella coeruleoalba*)	45
Clymene dolphin (*Stenella clymene*)	20
Fraser's dolphin (*Lisodelphis hosei*)	117
Melon-headed whale (*Peponocephala electra*)	118
Pygmy killer whale (*Feresa attenuata*)	0
False killer whale (*Pseudorca crassidens*)	36
Killer whale (*Orcinus orca*)	0
Short-finned pilot whale (*Globicephala macrorhynchus*)	19

APPENDIX B: Basic Summary Data Form

BASIC DATA FORM				
RPS Project Number		UME04165		
Seismic Contractor		US Geological Survey		
Area Surveyed During Reporting Period		Green Canyon and Walker Ridge		
		Corner	**Latitude**	**Longitude**
		Green Canyon 869	27.09889°N	090.33389°W
		Green Canyon 865	27.09889°N	090.52778°W
		Walker Ridge 077	26.90333°N	090.33389°W
		Walker Ridge 073	26.90333°N	090.52778°W
		Walker Ridge 183	26.75633°N	091.57567°W
		Walker Ridge 179	26.75633°N	091.77283°W
		Walker Ridge 404	26.55917°N	091.57567°W
		Walker Ridge 400	26.55917°N	091.77283°W
Survey Type		Low-energy seismic		
Vessel and/or Rig Name		*R/V Pelican*		
Permit Number		IHA granted by NMFS on 16 April 2013		
Location / Distance of Airgun Deployment		21 meters astern		
Water Depth	**Min**	~1500m		
	Max	~2000m		
Dates of project		18 April 2013	THROUGH	3 May 2013
Total time airguns operating – all power levels:		155:09		
Time airguns operating at full power on survey lines:		100:40		
Time airguns operating at full power on line changes:		47:08		
Amount of time mitigation gun (35 in³) operations:		0		
Amount of time in ramp-up:		06:02		
Number daytime ramp-ups:		14		
Number of night time ramp-ups:		0		
Number of ramp-ups from mitigation source:		0		
Amount of time conducted in airgun testing:		00:39		
Duration of visual observations:		80:05		
Duration of observations while airguns firing:		52:20		
Duration of observation during airgun silence:		27:45		
Lead Protected Species Observer:		Jessica Richardson / Vicki Schaefer		
Protected Species Observers:				
Number of Marine Mammals Visually Detected:		10		
Number of Sea Turtles detected:		0		
List Mitigation Actions (e.g. Power-downs, shut-downs, ramp-up delays)		Shut down for dolphins		
Duration of operational downtime due to mitigation:		00:19		

APPENDIX C: Summary of visual detections of protected species during the USGS low-energy marine geophysical survey in the northwestern Gulf of Mexico.

Record No.	Date	Time (UTC)	Species	Group Size	Vessel Position	Source Activity Initial Detection	Movement/ Behaviour		CPA Source / Source Activity	Mitigation Action	Comments
1	22-Apr	20:54	Pantropical spotted dolphin	10	26.99818°N 090.40815°W	Firing	Toward vessel	Bow riding	35m Firing	Shut down	Animals approached, swam/bow ride along with vessel momentarily then left

APPENDIX D: Species of birds and other wildlife observed during the USGS low-energy marine geophysical survey in the northwestern Gulf of Mexico.

Common Name	Family	Genus	Species	Approximate Number of Individuals Observed	Approximate Number of Days Species Was Observed
Barn swallow	Hirunidae	*Hirundo*	*rustica*	87	8
Brown Pelican	Pelecanidae	*Pelecanus*	*occidentalis*	7	2
Cattle egret	Ardeidae	*Bubulcus*	*Ibis*	3	2
Great blue heron	Ardeidae	*Ardea*	*Herodias*	1	1
Laughing gull	Laridae	*Larus*	*Atricilla*	2	2
Magnificent frigatebird	Fregatidae	*Fregata*	*Magnificens*	1	1
Cliff swallow	Hirunidae	*Petrochelidon*	*Pyrrhonota*	1	1
Royal tern	Laridae	*Sterna*	*maxima*	1	1
Peregrine falcon	Falconidae	*Falco*	*peregrinus*	1	1
Hummingbird	Trochilidae	*n/a*	*n/a*	1	1

Common Name	Family	Genus	Species	Approximate Number of Individuals Observed	Approximate Number of Days Species Was Observed
Flying Fish	Exocoetidae	*n/a*	*n/a*	219	7

Common Name	Family	Genus	Species	Approximate Number of Individuals Observed	Approximate Number of Days Species Was Observed
Portuguese man of war	Physaliidae	*Physalia*	*Physalis*	8	3