

Virginia Capes (VACAPES) Firing Exercise (FIREX) with Integrated Maritime Portable Acoustic Scoring and Simulator (IMPASS)

MARINE SPECIES MONITORING

AERIAL MONITORING SURVEYS

TRIP REPORT



28 – 29 October 2013

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ACRONYMS AND ABBREVIATIONS

BL&P	Blind Loaded and Plugged
BSS	Beaufort Sea State
EDT	Eastern Daylight Time
FIREX	Firing Exercise
hr	hour(s)
ICMP	Integrated Comprehensive Monitoring Program
IMPASS	Integrated Maritime Portable Acoustic Scoring and Simulator
km	kilometer(s)
km ²	square kilometer(s)
m	meter(s)
min	minute(s)
NEPM	Non-Explosive Practice Munition
OPAREA	operating area
SPUE	Sightings Per Unit Effort
U.S.	United States
VACAPES	Virginia Capes

Section 1 Introduction

Aerial marine species monitoring occurred 28 and 29 October 2013 for a Firing Exercise (FIREX) with Integrated Maritime Portable Acoustic Scoring and Simulator (IMPASS) event that occurred in the Virginia Capes (VACAPES) Range Complex off the coast of Virginia within the United States (U.S.) Navy's FIREX 7C/7D training boxes. These types of events occur periodically throughout the year and allow the U.S. Navy to fulfill essential training requirements.

As part of the compliance requirements of the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973, the U.S. Navy developed the Integrated Comprehensive Monitoring Program (ICMP). The ICMP applies by regulation to those activities on U.S. Navy training ranges and operating areas (OPAREAs) for which the U.S. Navy sought and received incidental take authorizations. In order to support the U.S. Navy in meeting regulatory requirements for monitoring established under the Final Rules and to provide a mechanism to assist with coordination of program objectives under the ICMP, monitoring of marine mammals and sea turtles during this exercise included visual surveys from a fixed-wing aircraft.

The results of marine mammal monitoring reported here are part of a long-term monitoring effort under the U.S. Navy's Marine Species Monitoring Program (Contract # N62470-10-D-3011) supported by HDR.

Section 2 Methods

Study Area

The U.S. Navy's VACAPES OPAREA lies off the coast of Virginia. Protected marine species monitoring conducted during the VACAPES FIREX training event was focused on the U.S. Navy's VACAPES OPAREA boxes 7C/7D and 8C/8D (see **Figure 1**). The 7C/7D training exercise area is approximately 22 kilometers (km) offshore, covers an area approximately 1,730 square kilometers (km²) in size, and ranges in bottom depth from 20 to 50 meters (m). The 8C/8D training exercise area is approximately 62 kilometers (km) offshore, covers an area approximately 1,230 square kilometers (km²) in size, and ranges in bottom depth from 35 to 1,300 meters (m).

Event Details

The FIREX event commenced at approximately 09:10 Eastern Daylight Time (EDT) on 29 October 2013, with a total of 38 5-inch Non-Explosive Practice Munition (NEPM) Blind Loaded and Plugged (BL&P) rounds fired. Thus, no live-explosive rounds were used during the FIREX training. Therefore, no animals were exposed to explosive sounds during this FIREX with IMPASS training event.

Aerial-Based Monitoring

Aerial-based monitoring was conducted before and after a FIREX with IMPASS within the VACAPES OPAREA from 28 through 29 October 2013 (see **Figure 1, Table 1**). Survey methods were consistent with currently accepted Distance Sampling theory (Buckland et al.

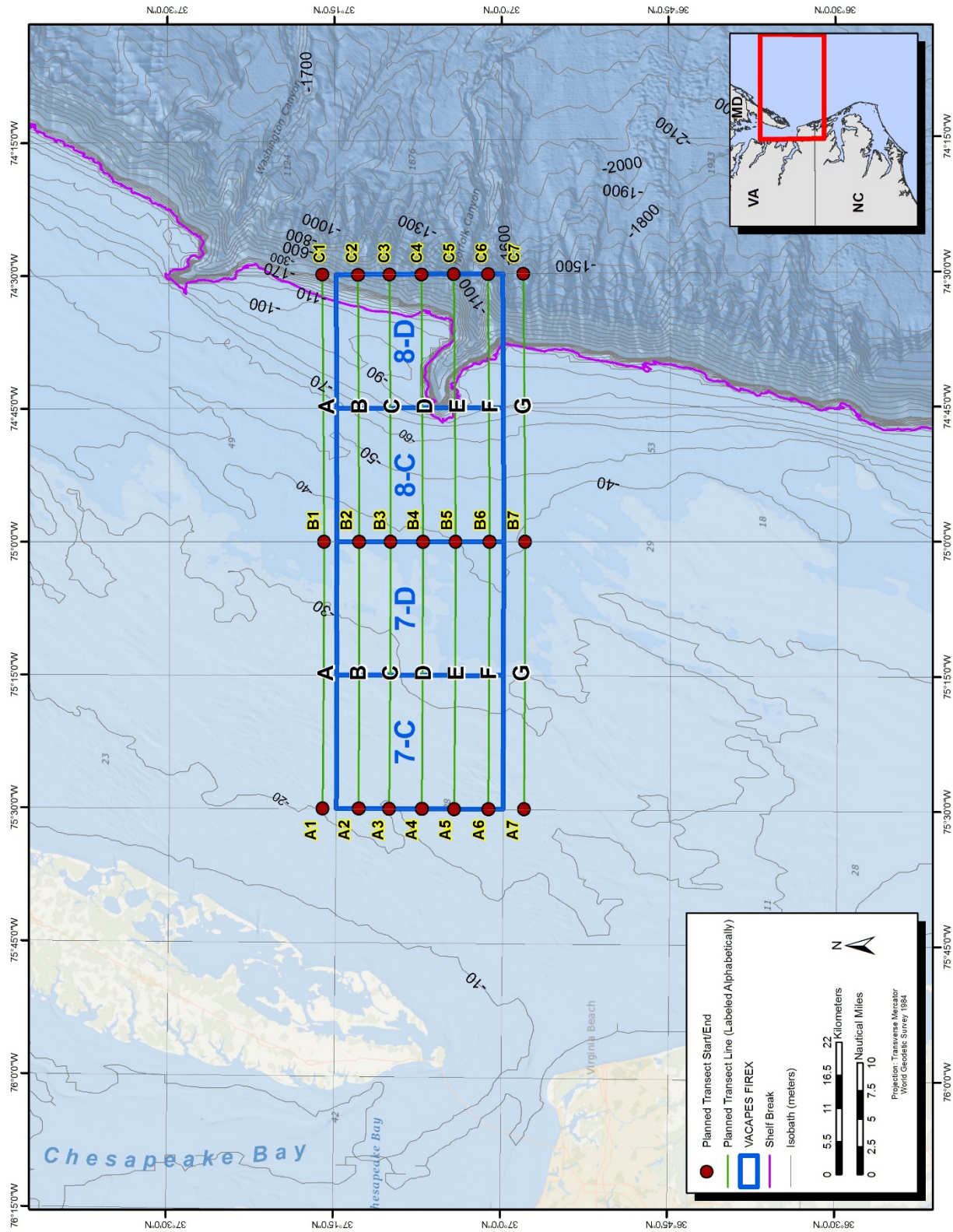


Figure 1. Pre-planned Tracklines for the Survey Effort for VACAPES FIREX Monitoring.

1 **Table 1. Summary of Monitoring Effort for VACAPES FIREX Training**

Date	Description	Start Time	Stop Time	Total Survey Time* (min)	Total On-Effort Time (min)	Trackline On-Effort Distance (km)
28 October	Transect Survey (Pre-Event)	12:35	17:15	280	177	594
29 October	Transect Survey (Post-Event)	13:58	17:18	200	121	437
Total				480 (8.0 hr)	298 (≈5.0 hr)	1,031 km

Note: * Total Survey Time reflects time occupied in the range/area of interest and includes both on-effort (systematic) and off-effort (cross-legs between transects, and circling for focal follows or species ID) total minutes.

2 2001) and followed a well-established protocol used for aerial surveys throughout all U.S. Navy
3 Range Complexes (Smultea and Bacon 2012). A survey altitude of approximately 305 m at a
4 speed of 100 knots was maintained while on-effort, but might have varied slightly based on
5 weather conditions in the area. Once a marine mammal sighting was made and basic sighting
6 information was collected, a focal-follow session was initiated at 305 m or higher if conditions
7 were appropriate (Smultea and Bacon 2012; refer to the survey methods on pages 3 and 4 of this
8 document). When possible, a lower altitude of approximately 214 m was established before or
9 after focal-follow sessions for photography purposes to provide sharper images required for
10 species identification.

11 The observation platform was a Cessna T337H Turbo Skymaster aircraft operating out of
12 Norfolk International Airport in Norfolk, Virginia. Two surveys were conducted following
13 pre-planned transect lines covering and extending approximately 1.8 km beyond the boundaries
14 of the 7C/7D range boxes (see **Figure 1**). Each survey was limited to a 5-hour (hr) maximum
15 flight time window. When possible, aerial surveys were conducted in the primary FIREX region
16 according to the pre-planned transect lines; however, due to: 1) range exclusion by the U.S. Navy
17 in the boxes of interest during the morning of the FIREX event; and 2) a combination of
18 insufficient available lighting and increasing Beaufort Sea State (BSS) conditions, transect lines
19 were sometimes modified or truncated.

20 Both aerial observers (see **Table 2**) were experienced with line-transect survey methodology,
21 had experience in identification of Atlantic marine mammal and sea turtle species, and were
22 knowledgeable of marine mammal biology and behavior.

23 **Table 2. Observers and Roles**

Observer	Role(s)
Carter Esch	Chief Scientist/Observer
Mark Cotter	Observer/Recorder

24 Survey effort attempted to cover the entirety of the 7C/7D and 8C/8D boxes (approximately
25 2,460 km²). Seven parallel tracklines running west-east, measuring 88 km in length and spaced
26 3 nautical miles (5.6 km) apart, were flown during “systematic” efforts throughout the

1 monitoring period. Based on an effective sampling width of approximately 6 km (3 km distance
2 on each side of the transect line to reliably sight a group of 25 or more dolphins in optimal
3 conditions at an altitude of 305 m), the total survey coverage area was 3,168 km² (see **Figure 1**).
4 Planned lines were followed when possible, but exact transects flown for each survey day were
5 subject to modifications as a result of range exclusion by live-fire U.S. Navy exercises in the
6 area, unfavorable weather conditions on the range, or instruction via hourly contact with naval
7 flight operations requiring an increase in the plane's altitude (see **Table 1, Figures 2 through 4**).
8 The following describes the general survey approach:

- 9 1. Pre-planned transect lines and waypoints were followed using methods described by
10 Smultea and Bacon (2012) until a marine mammal/sea turtle group was sighted. Standard
11 environmental and oceanographic parameters such as BSS, glare, visibility, and cloud
12 cover were recorded at the start of each transect line as well as when conditions changed
13 during flight.
- 14 2. Upon sighting a marine mammal/sea turtle group, basic sighting information was
15 recorded per established protocol (see Smultea and Bacon 2012). As outlined in the
16 *VACAPES Range Complex Monitoring Plan*, information included: (1) species
17 identification and group size; (2) location and relative distance from the IMPASS buoy
18 field if available; (3) the behavior of marine mammals and sea turtles; (4) date, time,
19 visual conditions, and environmental and oceanographic parameters associated with each
20 observation; (5) direction of travel relative to true North; and (6) duration of the
21 observation.
- 22 3. If the sighting appeared suitable for a focal follow, the aircraft increased altitude to
23 approximately 365 to 455 m, and radial distance increased to approximately 0.5 to
24 1.0 km. Then, the aircraft circled the sighting to obtain detailed behavioral information as
25 long as possible and logistically feasible. Focal follows were attempted for a minimum of
26 5 minutes (min). When conditions allowed, high-definition video and digital photographs
27 of the group were also collected.
- 28 4. If the sighting was not selected for a focal follow, and species and group size were
29 unknown, the aircraft circled the sighting to obtain digital photographs for species
30 identification confirmation and to estimate group size/composition.

31 Section 3 Results

32 Survey Effort

33 Observers visually surveyed 1,031 km of on-effort trackline and an additional 499 km off-effort
34 trackline (connector lines and transit) during 2 survey days for approximately 5.0 hr of on-effort
35 status (see **Table 1; Figures 2 through 4**). The FIREX event was scheduled for the morning of
36 29 October; a pre-event survey was conducted on 28 October, covering the 7C/7D and 8C/8D
37 boxes (see **Figure 3**). On 29 October, a post-event survey was conducted in the 7C/7D and
38 8C/8D boxes. U.S. Navy operations precluded access to the survey area during the morning and
39 the post-event survey was truncated by two tracklines due to a combination of insufficient
40 available lighting and increasing BSS conditions (see **Figure 4**). BSS ranged from 2 to 5
41 (**Appendix A**), and all sightings were made in BSS between 2 and 4 (see **Table 3**). **Appendix A**
42 contains a detailed description of environmental, oceanographic, and sighting conditions.

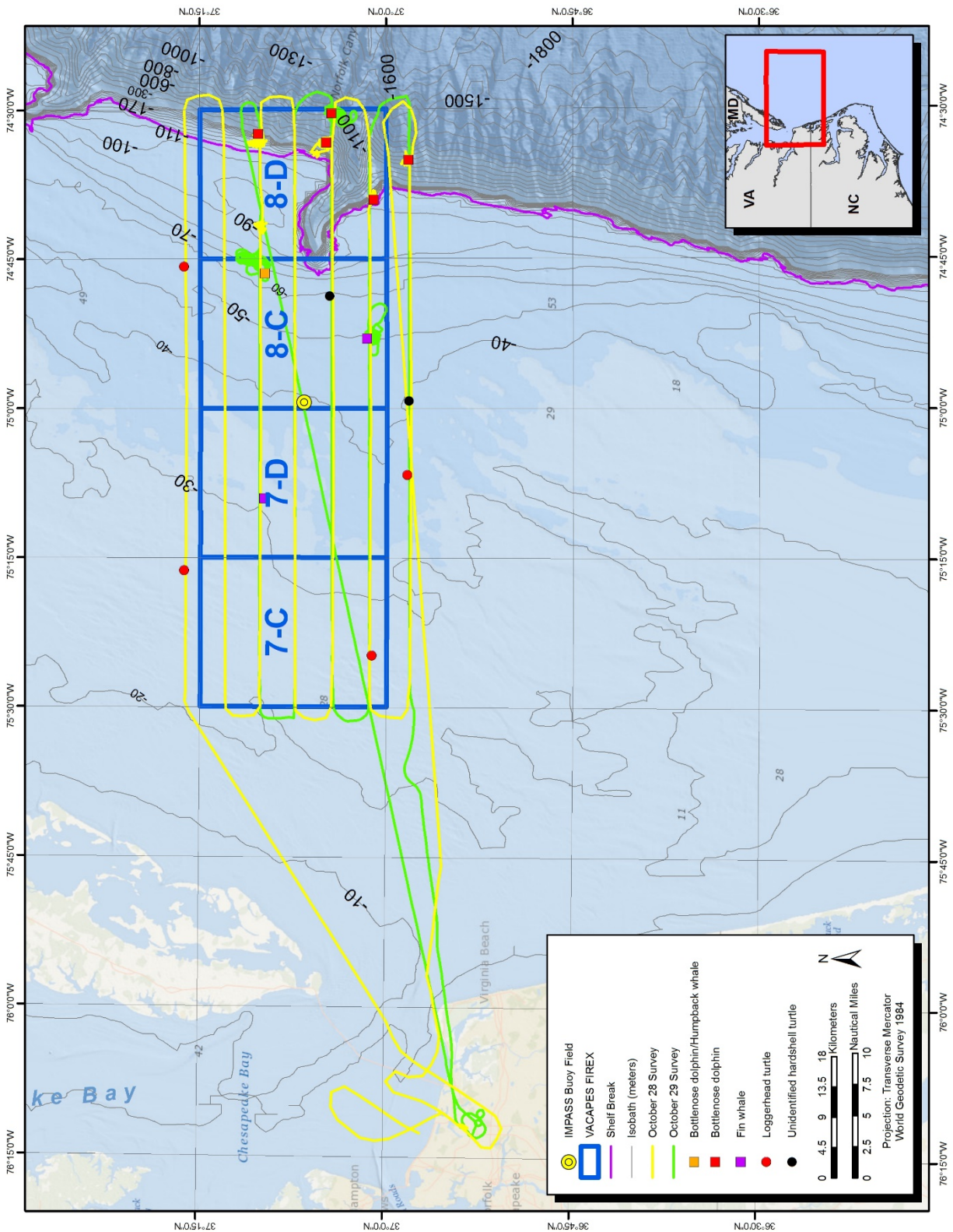


Figure 2. Locations of All Cetacean and Sea Turtle Sightings Seen Throughout the VACAPES FIREX Monitoring Period (28 through 29 October).

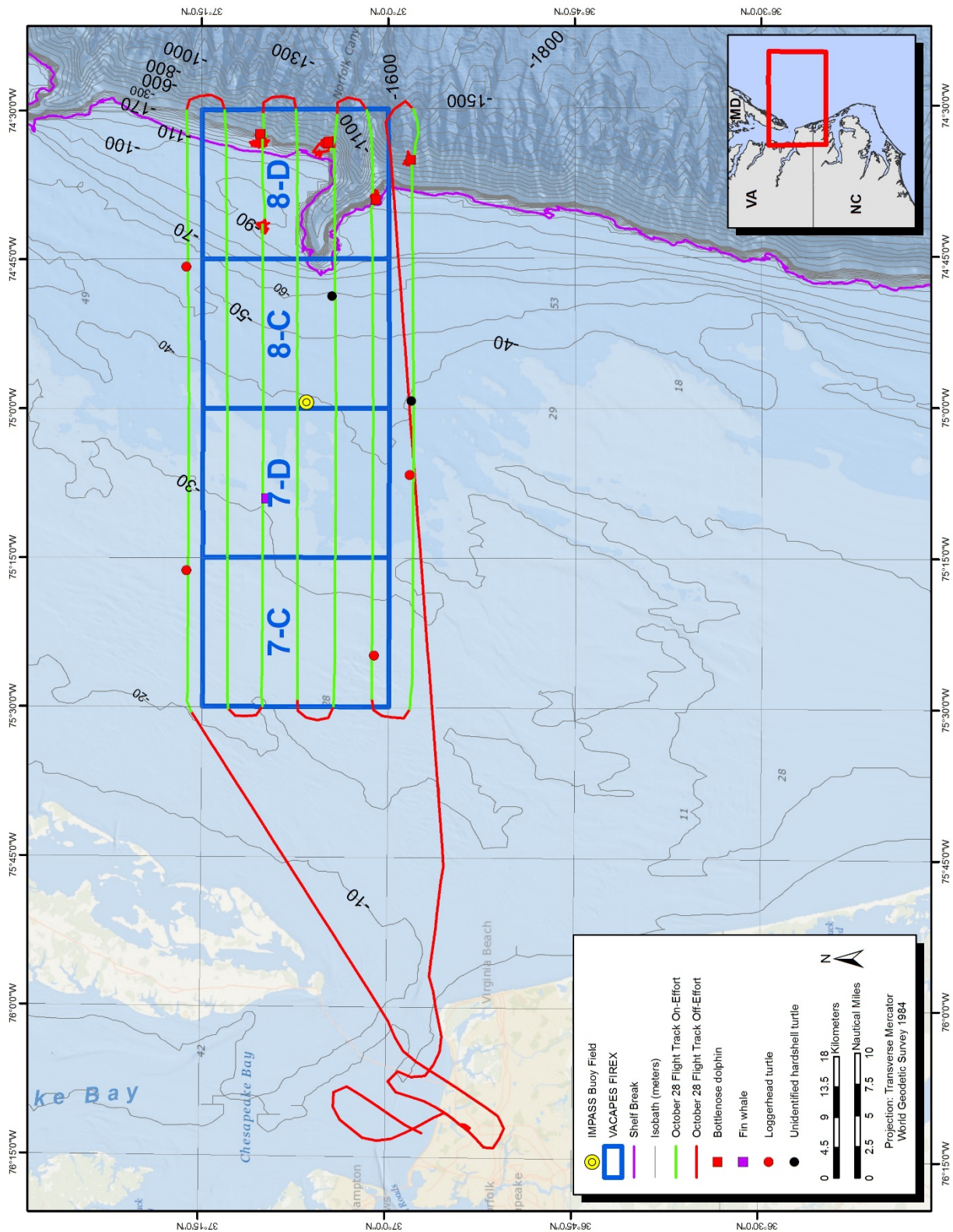


Figure 3. Locations of All Cetacean and Sea Turtle Sightings Seen Throughout the VACAPES FIREX Pre-Exercise Monitoring Period (28 October).

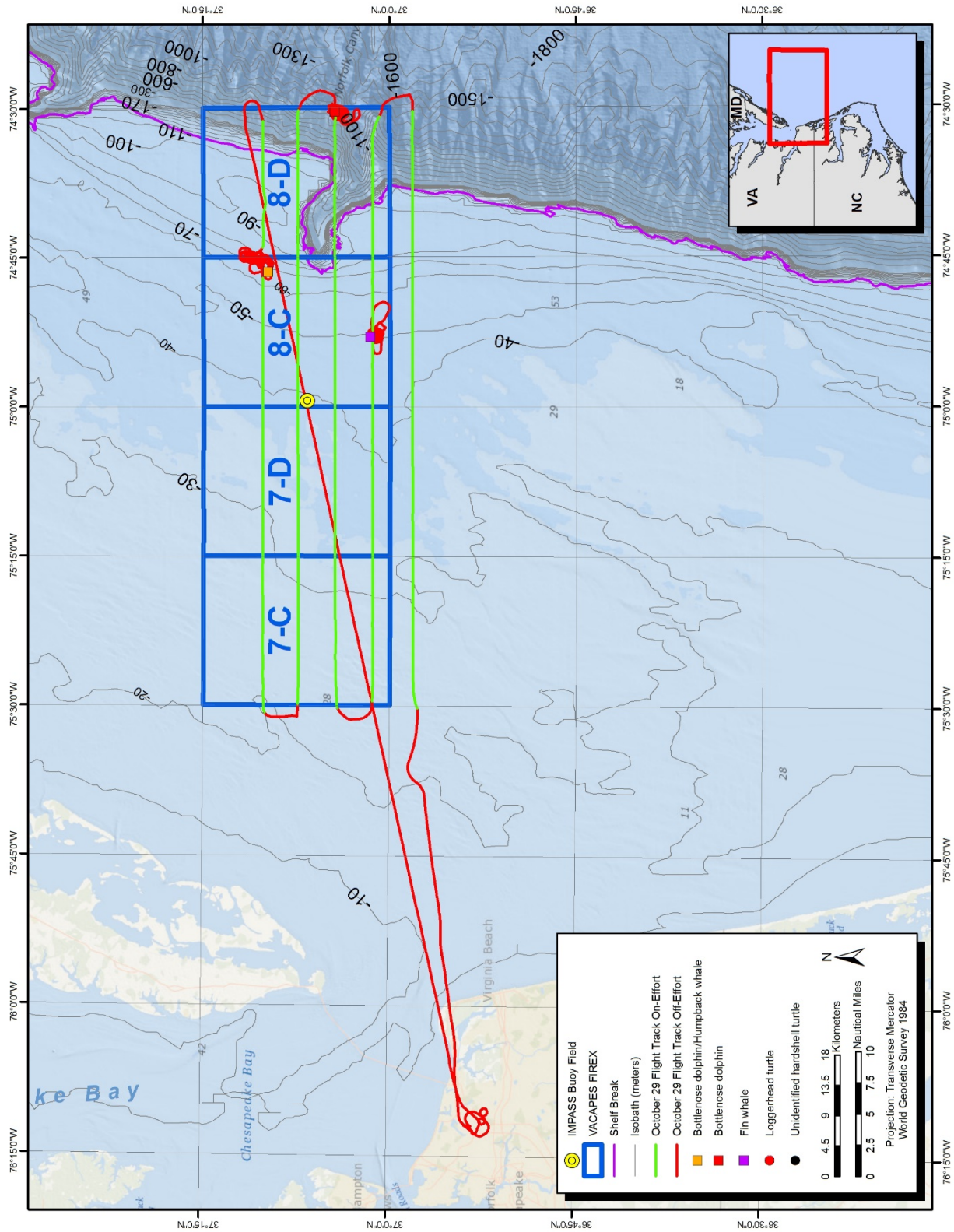


Figure 4. Locations of All Cetacean Sightings Seen Throughout the VACAPES FIREX Post-Exercise Monitoring Period (29 October)

Table 3. Summary of Sightings

Sighting No.	Date	Species	Group Size Best/High/Low			Calves	Start Time	Stop Time	BSS	Latitude	Longitude	Vert. Angle	Bearing Angle	Distance Off Track (km)	Heading	Bottom Depth (m)	Photos/ Video Taken	Focal Follow	Behavioral Summary
Pre-FIREX Sightings – 28 October 2013																			
1	28/10/2013	Cc	1	1	1	-	12:35:42	-	3	37.272	-75.271	48	1	0.28	-	20-30	No/No	No	One loggerhead turtle resting/traveling slow at the surface. No disturbance detected.
2	28/10/2013	Cc	1	1	1	-	12:53:13	-	3	37.272	-74.762	60	359	0.17	-	50-60	No/No	No	One loggerhead turtle resting/traveling slow at the surface. No disturbance detected.
3	28/10/2013	Bp	1	1	1	0	13:51:17	-	3	37.165	-75.150	30	180	0.54	-	30-40	Yes/No	No	One fin whale traveling fast. No disturbance detected.
4	28/10/2013	Tt	45	60	45	0	14:03:54	-	3	37.172	-74.540	50	0	0.25	-	200-300	Yes/Yes	Yes	Forty-five bottlenose dolphins traveling fast. No disturbance detected. See focal follow data in Appendix B .
5	28/10/2013	Unid HST	1	1	1	-	15:25:36	-	3	37.077	-74.812	34	359	0.47	-	50-60	No/No	No	One unidentified hardshell turtle resting/traveling slow at the surface. No disturbance detected.
6	28/10/2013	Tt	35	45	30	0	15:32:08	-	2	37.081	-74.555	20	349	0.86	-	300-400	Yes/No	Yes	Thirty-five bottlenose dolphins milling and active at the surface. No disturbance detected. See focal follow data in Appendix B .
7	28/10/2013	Tt	8	10	8	0	16:05:09	-	2	37.018	-74.651	34	173	0.46	-	120-130	No/No	Yes	Eight bottlenose dolphins traveling and active at the surface. No disturbance detected. Focal follow was attempted, but terminated due to inability to resight group (Appendix B).

Sighting No.	Date	Species	Group Size Best/High/Low			Calves	Start Time	Stop Time	BSS	Latitude	Longitude	Vert. Angle	Bearing Angle	Distance Off Track (km)	Heading	Bottom Depth (m)	Photos/ Video Taken	Focal Follow	Behavioral Summary
Pre-FIREX Sightings – 28 October 2013 (continued)																			
8	28/10/2013	Cc	1	1	1	-	16:30:05	-	2	37.020	-75.413	41	180	0.35	-	20-30	No/No	No	One loggerhead turtle resting/traveling slow at the surface. No disturbance detected.
9	28/10/2013	Cc	1	1	1	-	16:43:51	-	3	36.973	-75.111	28	0	0.58	-	30-40	No/No	No	One loggerhead turtle resting/traveling slow at the surface. No disturbance detected.
10	28/10/2013	Unid HST	1	1	1	-	16:46:58	-	3	36.971	-74.987	43	0	0.33	-	30-40	No/No	No	One unidentified hardshell turtle resting/traveling slow at the surface. No disturbance detected.
11	28/10/2013	Tt	22	25	14	0	16:56:56	-	2	36.971	-74.585	56	0	0.21	-	700-800	No/No	Yes	Twenty-two bottlenose dolphins traveling slow. No disturbance detected. See focal follow data in Appendix B .
Post-FIREX Sightings – 29 October 2013																			
1	29/10/2013	Bp	1	1	1	0	14:34:04	-	4	37.027	-74.883	42	0	0.33	-	40-50	No/No	No	One fin whale traveling fast. No disturbance detected.
2	29/10/2013	Tt	15	20	10	0	15:35:19	-	4	37.074	-74.506	58	358	0.18	135	900-1,000	No/No	No	Fifteen bottlenose dolphins traveling slow. No disturbance detected.
3	29/10/2013	Tt/Mn	8/1**	10/1**	6/1**	0	16:42:32	-	3	37.164	-74.774	22	180	0.76	-	60-70	Yes/No	Yes*	Mixed-species group comprised of approximately eight bottlenose dolphins playing and one humpback whale milling and active at the surface. No disturbance detected.

*Information was lost due to equipment failure.

**Estimates for mixed group presented as estimated number of Tt (bottlenose dolphin) followed by number of Mn (humpback whale)

Key: Bp = Fin whale (*Balaenoptera physalus*); Mn = Humpback whale (*Megaptera novaeangliae*); Tt = Bottlenose dolphin (*Tursiops truncatus*); Cc = Loggerhead turtle (*Caretta caretta*); Unid HST = unidentified hardshell turtle

1 Sightings

2 Eight cetacean groups and six turtles were sighted during approximately 8 hr of total survey
 3 flight time (includes on-effort and off-effort intervals) within the survey area (see **Figure 2,**
 4 **Table 3**). Five cetacean sightings and all six turtle sightings were made on 28 October during the
 5 pre-event survey (see **Figure 3, Table 3**). Three cetacean sightings were made on 29 October
 6 during the post-event survey (see **Figure 4, Table 3**). Sightings over the 2-day period included
 7 five sightings of bottlenose dolphins (*Tursiops truncatus*), two sightings of fin whales
 8 (*Balaenoptera physalus*), one sighting of a mixed-species group of a humpback whale
 9 (*Megaptera novaeangliae*) and bottlenose dolphins, four sightings of loggerhead turtles (*Caretta*
 10 *caretta*), and two sightings of unidentified hardshell turtles. **Table 4** provides a summary of
 11 information on sightings and associated bottom depths. Bottom depths for each sighting were
 12 estimated in 10-m ranges from plots of latitude and longitude for each sighting within a
 13 Geographic Information System.

14 **Table 4. Summary of Sightings and Depths Recorded During Monitoring**
 15 **for VACAPES FIREX Training**

Species	Number of Sightings	Bottom Depth (m)
Bottlenose dolphin	5	120-1,000
Fin whale	2	30-50
Mixed-species group of humpback whale and bottlenose dolphin	1	60-70
Loggerhead turtle	4	20-60
Unidentified hardshell turtle	2	30-60

16 Sightings Per Unit Effort

17 Sightings Per Unit Effort (SPUE) was calculated as the total number of marine mammal ($n=8$) or
 18 turtle ($n=6$) sightings divided by total survey effort (hr and km). For this monitoring effort, the
 19 SPUE for marine mammals ($n=8$) was equal to 1.6 sightings per hr and 0.0078 sightings per km,
 20 and the SPUE for turtles ($n=6$) was equal to 1.2 sightings per hr and 0.0058 sightings per km.

21 Behavior

No visible evidence of unusual behavior was observed during the pre-FIREX or post-FIREX surveys (see **Table 3**). The survey team attempted a total of five focal follows on 28 and 29 October. The first focal follow was a period of 21 min spent with a group of approximately 45 bottlenose dolphins traveling quickly. The second focal follow was a period of 23 min spent with a group of approximately 35 bottlenose dolphins that were milling and active at the surface. The third focal follow was attempted, but terminated after approximately 7 min due to the inability to relocate a group of approximately 8 bottlenose dolphins that were traveling and active at the surface. The fourth focal follow was a period of 7 min spent with a group of approximately 22 bottlenose dolphins traveling slowly. The data for the fifth focal follow, a mixed-species group of a humpback whale and approximately 8 bottlenose dolphins, were lost

due to an equipment malfunction and additional information is not available. Detailed behavioral observations made during the focal follows are presented in **Appendix B**. Photographs of suitable quality for species identification purposes were collected during the majority of sightings. Video also was collected when practicable during focal follows.

1 Section 4 Acknowledgements

- 2 We would like to thank Orion Aviation’s Director Ed Coffman and pilots Robert Stickle and
3 Tom Browne. These data were obtained under National Marine Fisheries Service Permit
4 No. 14451 issued to Joseph R. Mobley, Jr.

5 Section 5 References

- Buckland et al. 2001 Buckland, S.T., D.R. Anderson, K.P. Burnham, J.L. Laake, D.L. Borchers, and L. Thomas. 2001. *Introduction to Distance Sampling: Estimating Abundance of Biological Populations*. Oxford University Press, Oxford, U.K.
- Smultea and Bacon 2012 Smultea, M.A., and C.E. Bacon. 2012. *A Comprehensive Report of Aerial Marine Mammal Monitoring in the Southern California Range Complex: 2008-2012*. Prepared for Commander, U.S. Pacific Fleet, Pearl Harbor, Hawaii. Submitted to Naval Facilities Engineering Command Southwest (NAVFAC SW), EV5 Environmental, San Diego, 92132 under Contract No. N62470-10-D-3011 issued to HDR, Inc., San Diego, California.

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APPENDIX A

Environmental, Oceanographic, and Sighting Conditions

Table A-1 shows the environmental, oceanographic, and sighting conditions encountered by Marine Mammal Observers (MMOs) during the pre-FIREX and post-FIREX monitoring efforts.

Time	Beaufort Left MMO	Glare Left MMO (%)	Visibility Distance Left MMO (km)	Beaufort Right MMO	Glare Right MMO (%)	Visibility Distance Right MMO (km)	Cloud Cover (%)
Pre-FIREX Survey Effort – 28 October 2013							
12:35	3	<50	2	3	<50	2	100
12:59	4	<10	1.5	4	<10	1.5	100
13:00	4	<10	1.5	4	<10	1.5	100
13:02	4	<50	1	4	<50	1	90
13:28	4	<50	1	4	<50	1	90
13:30	3	<50	1	3	<50	1	100
13:51	3	<50	1	3	<50	1	100
14:01	3	<10	1.5	3	<10	1.5	100
14:37	3	<10	1.5	3	<10	1.5	100
14:38	3	<10	1.5	3	<10	1.5	100
14:40	3	<10	1.5	3	<10	1.5	100
15:06	3	<10	1.5	3	<10	1.5	100
15:08	3	<10	2	3	<10	2	100
15:31	2	<10	2	2	<10	2	100
15:32	2	<10	2	2	<10	2	100
15:58	2	<10	2	2	<10	2	100
16:00	2	<10	2	2	<10	2	100
16:02	2	<10	2	2	<10	2	100
16:05	2	<10	2	2	<10	2	100
16:12	2	<10	2	2	<10	2	100
16:32	2	<10	2	2	<10	2	100
16:35	3	<10	1.25	3	<10	1.25	100
16:49	2	<10	1.5	2	<10	1.5	100
16:57	2	<10	1.5	2	<10	1.5	100
17:13	2	<10	1.5	2	<10	1.5	100
Post-FIREX Survey Effort – 29 October 2013							
13:58	2	0	1.5	2	<50	1.5	25
14:04	4	0	1.5	4	<50	1.5	25
14:23	4	0	1.5	4	<50	1.5	25
14:25	4	0	1.5	4	0	1.5	25
14:34	4	0	1.5	4	0	1.5	25
14:53	3	0	1.5	3	0	1.5	25

Time	Beaufort Left MMO	Glare Left MMO (%)	Visibility Distance Left MMO (km)	Beaufort Right MMO	Glare Right MMO (%)	Visibility Distance Right MMO (km)	Cloud Cover (%)
Post-FIREX Survey Effort – 29 October 2013 (continued)							
15:09	3	0	1.5	3	0	1.5	25
15:11	3	0	1.5	3	<50	1.5	25
15:21	4	0	1.5	4	<50	1.5	25
15:35	4	0	1.5	4	<50	1.5	25
15:56	4	0	1.5	4	<50	1.5	25
15:59	4	0	1.5	4	0	1.5	25
16:08	3	0	1.5	3	0	1.5	25
16:23	3	0	1.5	3	0	1.5	25
16:25	3	0	1.5	3	<50	1.5	25
16:43	3	0	1.5	3	<50	1.5	25
17:12	5	0	1.5	5	<10	1.5	25

APPENDIX B

Focal-Follow Data

1
2
3
4
5 **Table B-1** shows the focal-follow behavioral data from the VACAPES FIREX training 2013
6 monitoring efforts—all within the survey area. Four focal-follow events were conducted on
7 28 October 2013 and one on 29 October 2013; four were with bottlenose dolphins and one was
8 with a mixed-species group of bottlenose dolphins with a humpback whale. The third (Sighting 7
9 on 28 October 2013) was attempted, but terminated due to the inability to resight the group. The
10 data for the fifth (Sighting 3 on 29 October 2013) focal follow were lost due to an equipment
11 malfunction.

Record Number	Time	Date	Latitude	Longitude	Recorded Behavior
Sighting Number 4					
Species: <i>Tursiops truncatus</i>. Group size: ≈45.					
1	14:11:44	10/28/13	37.183	-74.555	Fast travel. Minimum (min) Dispersal = 0.5; Maximum (max) Dispersal = 1.
2	14:14:56	10/28/13	37.179	-74.554	Fast travel. Min Dispersal = 0.5; Max Dispersal = 1. Just discovered another 2 subgroups. This brings the total animals to a min of 45.
3	14:17:02	10/28/13	37.181	-74.553	Fast travel. Min Dispersal = 0.5; Max Dispersal = 2.
4	14:20:12	10/28/13	37.176	-74.557	Surface active mill. Min Dispersal = 0.5; Max Dispersal = 3. The animals have gotten tighter.
5	14:25:00	10/28/13	37.178	-74.554	Surface active travel. Min Dispersal = 0.5; Max Dispersal = 3.
6	14:29:47	10/28/13	37.173	-74.555	Surface active travel. Min Dispersal = 0.5; Max Dispersal = 3. Back to 2 clumped groups.
7	14:32:37	10/28/13	37.173	-74.555	Surface active travel. Min Dispersal = 0.5; Max Dispersal = 3. Overall herd movement has been a steady 210-220 degree heading.
8	14:36:19	10/28/13	37.165	-74.560	Surface active travel. Min Dispersal = 0.5; Max Dispersal = 3.
Sighting Number 6					
Species: <i>Tursiops truncatus</i>. Group size: ≈35.					
1	15:32:49	10/28/13	37.087	-74.551	Surface active mill. Min Dispersal = 0.5; Max Dispersal = 2. We are currently at the edge of the 15 nautical mile range limit that warship 51 has asked for.

Record Number	Time	Date	Latitude	Longitude	Recorded Behavior
Sighting Number 6 (continued)					
2	15:39:52	10/28/13	37.081	-74.556	Diving. Min Dispersal = 0.5; Max Dispersal = 2. Animals dove/we lost them for about 3 circles.
3	15:40:38	10/28/13	37.082	-74.562	Surface active mill. Min Dispersal = 0.5; Max Dispersal = 4. Group is still tightly clumped. They are milling and have only moved roughly 100 or so meters.
4	15:42:24	10/28/13	37.085	-74.555	Diving. Min Dispersal = 0.5; Max Dispersal = 4. Group is currently on a dive.
5	15:45:42	10/28/13	37.079	-74.560	Surface active mill. Min Dispersal = 0.5; Max Dispersal = 10.
6	15:47:16	10/28/13	37.087	-74.567	Min Dispersal = 0.5; Max Dispersal = 10. Lost group again.
7	15:55:38	10/28/13	37.095	74.571	Surface active travel. Min Dispersal = 0.5; Max Dispersal = 6. Resighted animals. Now in 2 distinct subgroups which are both tightly clumped.
Sighting Number 7					
Species: <i>Tursiops truncatus</i>. Group size: ≈8.					
1	16:08:03	10/28/13	37.022	-74.644	Surface active travel. Min Dispersal = 0.5; Max Dispersal = 1. Group is very tight and traveling fast. Focal follow was attempted, but terminated after this entry due to inability to resight group.
Sighting Number 11					
Species: <i>Tursiops truncatus</i>. Group size: ≈22.					
1	17:01:44	10/28/13	36.971	-74.583	Medium travel. Min Dispersal = 2; Max Dispersal = 6. Two small subgroups.
2	17:03:42	10/28/13	36.971	-74.592	Milling. Min Dispersal = 0.5; Max Dispersal = 15. Animals are milling.
3	17:08:50	10/28/13	36.975	-74.585	Milling. Min Dispersal = 0.5; Max Dispersal = 15. Still continuing to mill.
Sighting Number 3*					
Species: <i>Tursiops truncatus</i>/<i>Megaptera novaeangliae</i>. Group size: ≈8/1**.					

*Data lost due to equipment malfunction

**Group estimate presented as approximate number of bottlenose dolphin/number of humpback whale