

# Jacksonville (JAX) Anti-Submarine Warfare Exercise (ASWEX)

## Marine Species Monitoring

### AERIAL MONITORING SURVEYS

### TRIP REPORT



15-20 September 2011

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Pilot whales off of JAX, photo taken under NOAA Permit 14551

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## Acronyms and Abbreviations

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AMAR	Autonomous Multi-channel Acoustic Recorder
ASWEX	Anti-Submarine Warfare Exercise
GIS	Geographic Information System
HDR EOC	HDR Environmental, Operations and Construction, Inc.
ICMP	Integrated Comprehensive Monitoring Program
JAX	Jacksonville
km	kilometer(s)
km <sup>2</sup>	square kilometer(s)
m	meter(s)
MMO	marine mammal observer
NM	nautical mile(s)
OPAREA	operating area
SPUE	Sightings Per Unit Effort
U.S.	United States
USWTR	Undersea Warfare Training Range

## Section 1 Introduction

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Aerial marine species monitoring occurred between 15 and 20 September 2011 for an Anti-Submarine Warfare Exercise (ASWEX) training event that occurred in the Jacksonville (JAX) Range Complex off the eastern coast of Florida within the United States (U.S.) Navy's proposed Undersea Warfare Training Range (USWTR) box. ASWEX 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, U.S. Navy 2010). 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) issued to HDR Environmental, Operations and Construction, Inc. (HDR EOC).

## Section 2 Methods

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### Study Area

The U.S. Navy's JAX OPAREA lies off the eastern coast of the Georgia/Florida border. Protected marine species monitoring conducted during the JAX ASWEX event was focused on the southeastern corner of the USWTR box within the JAX OPAREA. The JAX ASWEX monitoring area is approximately 105 to 133 kilometers (km) offshore, covers an area approximately 900 square kilometers (km<sup>2</sup>) in size, and ranges in bottom depth from 40 to 500 meters (m).

### Aerial-Based Monitoring

Aerial-based monitoring was performed on 15 to 20 September 2011 during and after the ASWEX training event within the JAX OPAREA (see **Figure 1**, **Table 1**). Survey methods were consistent with currently accepted Distance Sampling theory (Buckland et al. 2001) and followed a well-established protocol used for aerial surveys throughout all Navy Range Complexes (Smultea et al. 2009). A survey altitude of approximately 305 m at 185 km per hour was maintained while on-effort but might have varied slightly based on weather conditions in the area. Once a marine mammal sighting was made, a focal-follow circling session was attempted at 305 m or higher if conditions were appropriate (Smultea et al. 2009; refer to the survey methods on page 4 of this document). A lower altitude of approximately 213 to 244 m was established after focal-follow sessions for photography purposes to provide sharper images required for species identification.

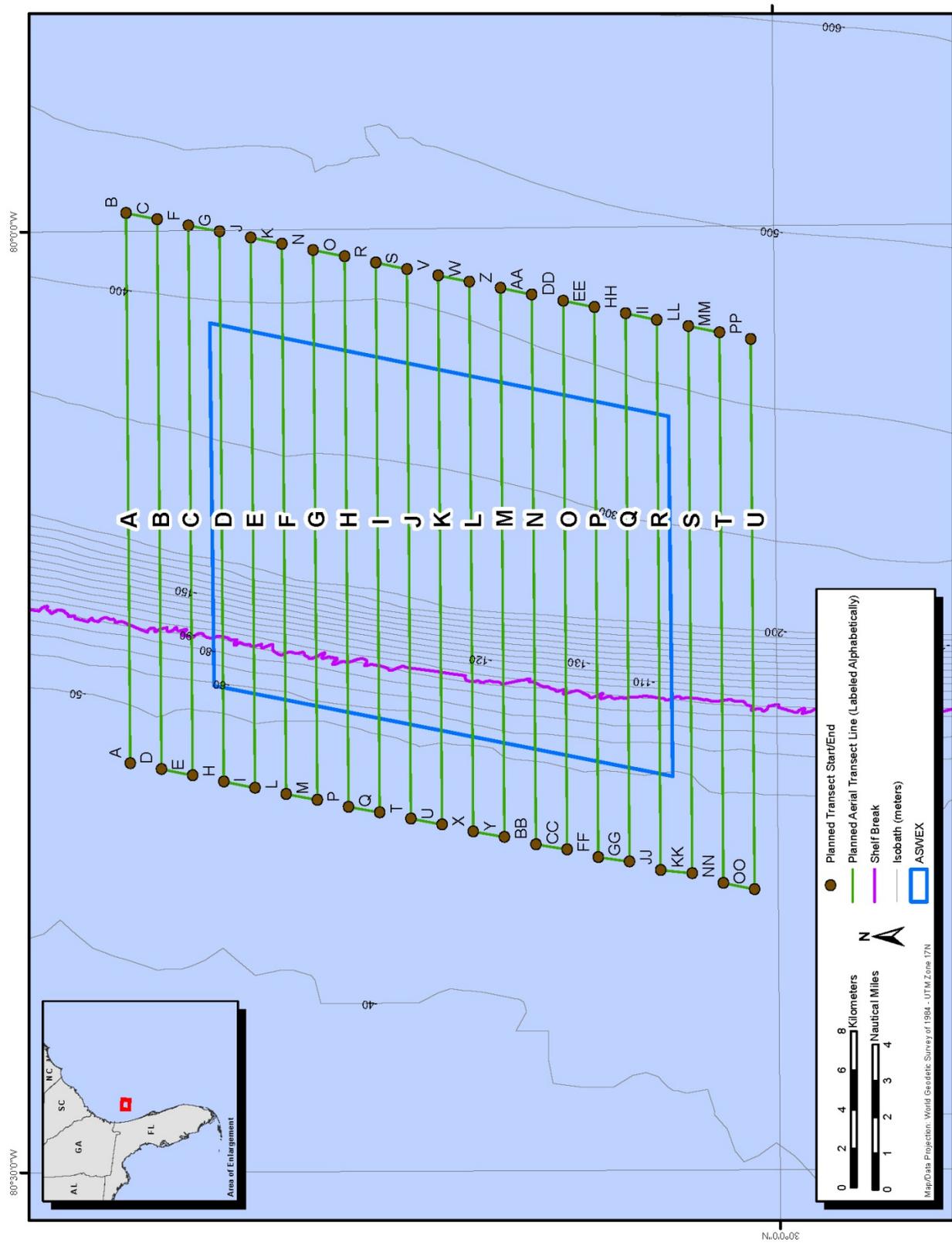


Figure 1. Pre-planned Tracklines for the Survey Effort for JAX ASWEX Monitoring.

**Table 1. Summary of Monitoring Effort for the JAX ASWEX Training.**

Date	Description	Start Time	Stop Time	Total Survey Minutes*	Total On-Effort Minutes	Trackline On-Effort Distance (km)
15 September	Transect survey (During Event)	12:06	15:33	207	186	627
16 September	Transect survey (During Event)	8:30	12:52	262	188	637
16 September	Transect survey (During Event)	15:15	17:33	138	104	330
17 September	Cancelled due to low visibility and ceiling associated with poor weather conditions					
18 September	Transect survey (During Event)	12:35	14:22	108	84	283
19 September	Cancelled due to low visibility and ceiling associated with poor weather conditions					
20 September	Transect survey (Post-Event)	12:55	16:09	193	174	579
<b>Total</b>				<b>908 (≈15.1 hrs)</b>	<b>736 (≈12.3 hrs)</b>	<b>2,456 km</b>

Note: \* Total Survey Minutes reflect minutes flown in the range/area of interest and include both on-effort (systematic) and off-effort (connector and circling) total minutes.

The observation platform was a Cessna T337H Turbo Skymaster aircraft operating out of Fernandina Beach Municipal Airport in Fernandina Beach, Florida. Five surveys were conducted following pre-planned transect lines covering and extending approximately 5 km (2.6 nautical miles [NM]) beyond the boundaries of the ASWEX box (see **Table 1**, **Figure 1**). Each survey was limited to a 5-hour maximum flight time window.

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

**Table 2. Observers and Roles.**

Observer	Role(s)	Participation Dates
Dan Engelhaupt	Chief Scientist/Observer	15 – 17 September
Lenisa Blair	Observer	15 – 20 September
Mark Cotter	Observer	18 – 20 September

Survey effort was designed to include the entirety of the ASWEX exercise area (approximately 900 km<sup>2</sup>). Twenty-one parallel tracklines running east-west, measuring 28 km long and spaced approximately 1.5 km apart, were flown during “systematic” efforts throughout the monitoring period and providing a total survey coverage area of approximately 900 km<sup>2</sup> (see **Figure 1**). On optimal sighting condition days, an additional transect line east of the primary area of interest

and over deeper water was also surveyed (see **Figure 2**). Planned lines were followed when possible, but exact lines flown for each survey day were subject to modifications as a result of range exclusion and unfavorable weather conditions (see **Table 1, Figures 2 through 7**).

The general survey approach was:

1. Pre-planned transect lines and waypoints were followed using methods described by Smultea et al. (2009) until a marine mammal/sea turtle group was sighted. Variables such as sea state, glare, and visibility were recorded for each transect flown and whenever conditions changed.
2. Upon sighting a marine mammal/sea turtle group, basic sighting information was recorded per established protocol (see Smultea et al. 2009). As outlined in the JAX Range Complex Monitoring Plan February 2009 (U.S. Navy 2009), information included (1) species identification and group size; (2) location and relative distance from the ASWEX site if available; (3) the behavior of marine mammals and sea turtles; (4) standard environmental and oceanographic parameters; (5) date, time, and visual conditions associated with each observation; (6) direction of travel relative to true North; and (7) duration of the observation.
3. If the species appeared suitable for a focal follow, the aircraft increased altitude to approximately 365 to 455 m, and maintained a radial distance of approximately 0.5 to 1.0 km. Then, the aircraft circled the sighting to obtain detailed behavior information as long as possible and logistically feasible. Focal follows occurred for a minimum of 5 minutes, including an observer taking video and digital photographs when possible.
4. If the sighting was not selected for a focal follow, and species and group size were unknown, the aircraft circled the sighting to obtain digital photographs for confirmation of species identification and estimation of group size/composition.

### **Passive Acoustic Monitoring**

In addition to visual aerial survey monitoring, 12 Autonomous Multi-channel Acoustic Recorders (AMARs) from JASCO Applied Sciences were deployed in conjunction with this ASWEX event. The AMARs were deployed as three individual arrays of four units each. Each array included a pinger located at the approximate middle for synchronization (see **Figure 8**), which allows for localization and tracking of marine mammals and acoustic sources during analysis. Each AMAR was configured with a 128-kiloHertz sampling rate and recorded continuously from 31 August 2011 through 29 September 2011. The passive-acoustic data collected will be analyzed along with visual survey and operational data and results presented in a future report.

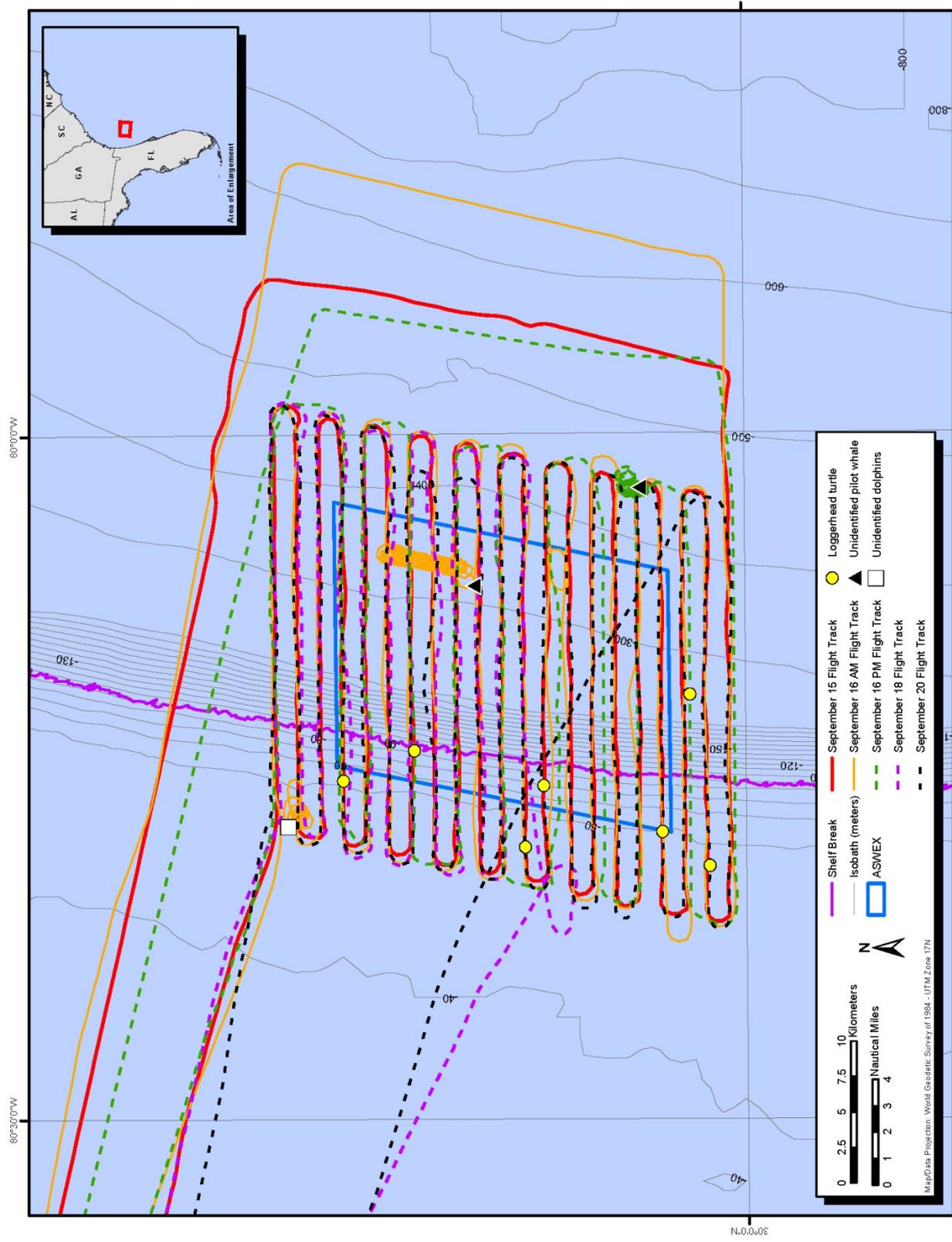


Figure 2. Locations of All Cetacean and Sea Turtle Sightings Seen During JAX ASWEX Monitoring (15-20 September).

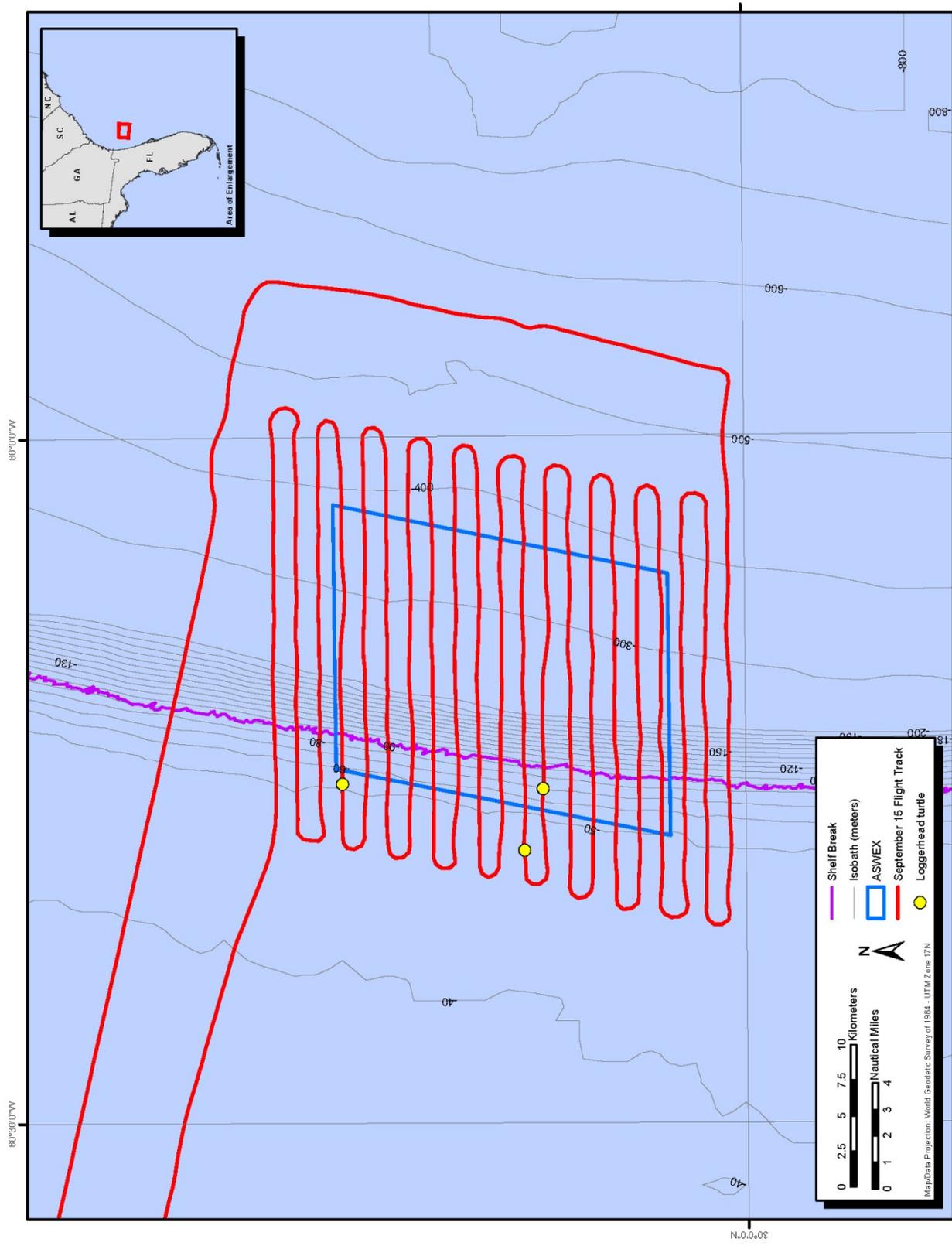


Figure 3. Locations of Cetacean and Sea Turtle Sightings Seen During ASWEX Training (15 September).

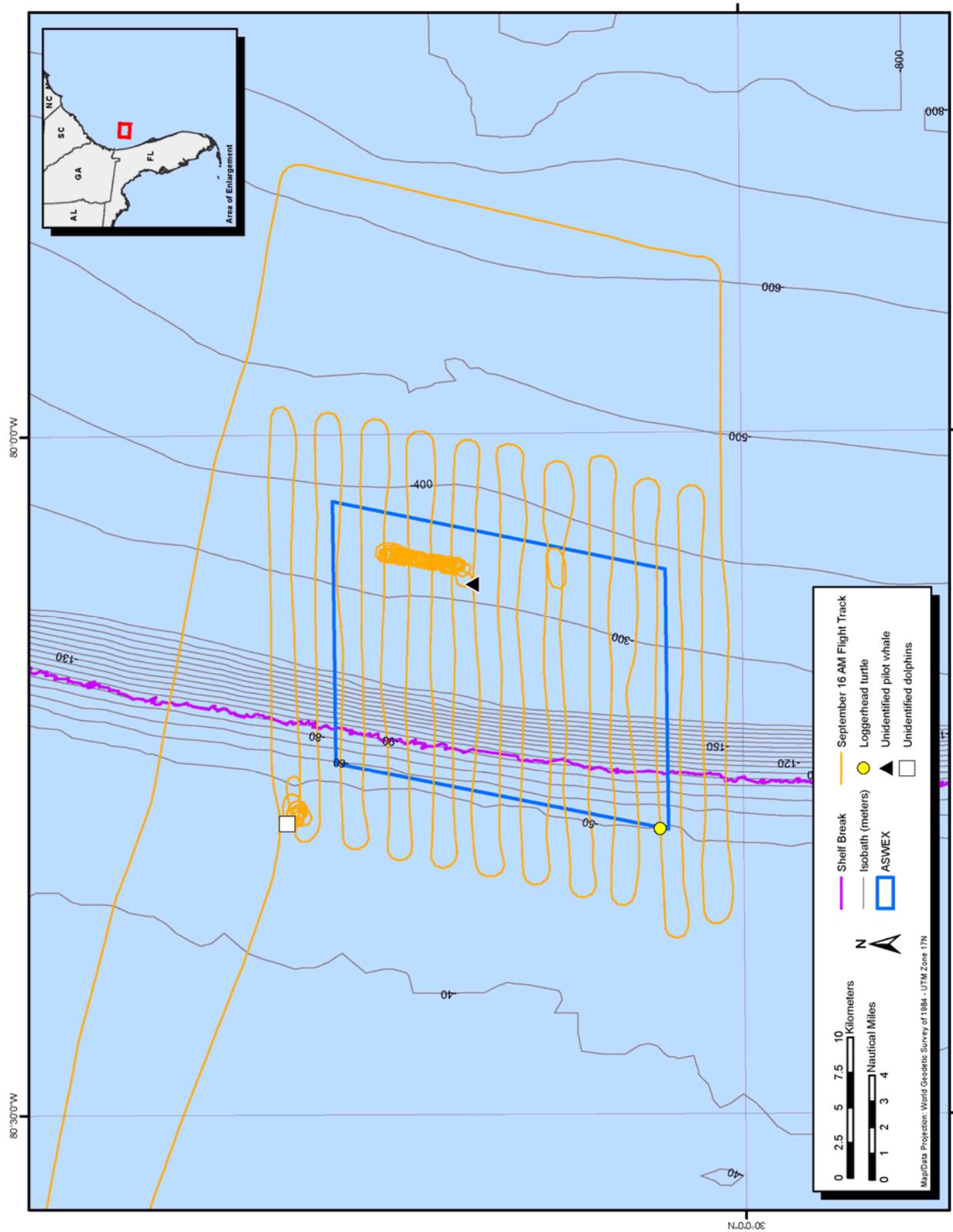


Figure 4. Locations of Cetacean and Sea Turtle Sightings Seen During ASWEX Training (16 September – Morning).

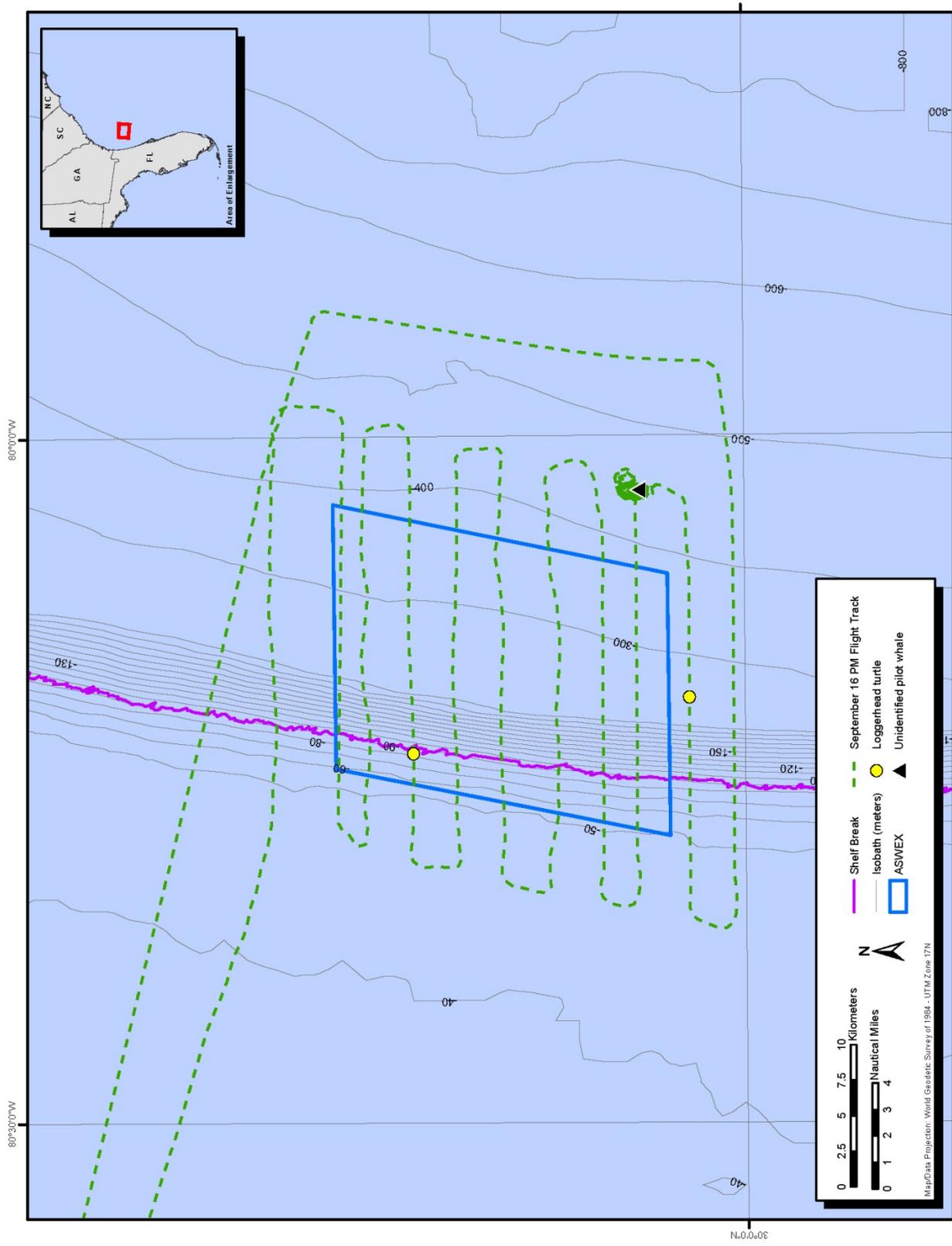


Figure 5. Locations of Cetacean and Sea Turtle Sightings Seen During ASWEX Training (16 September – Afternoon).

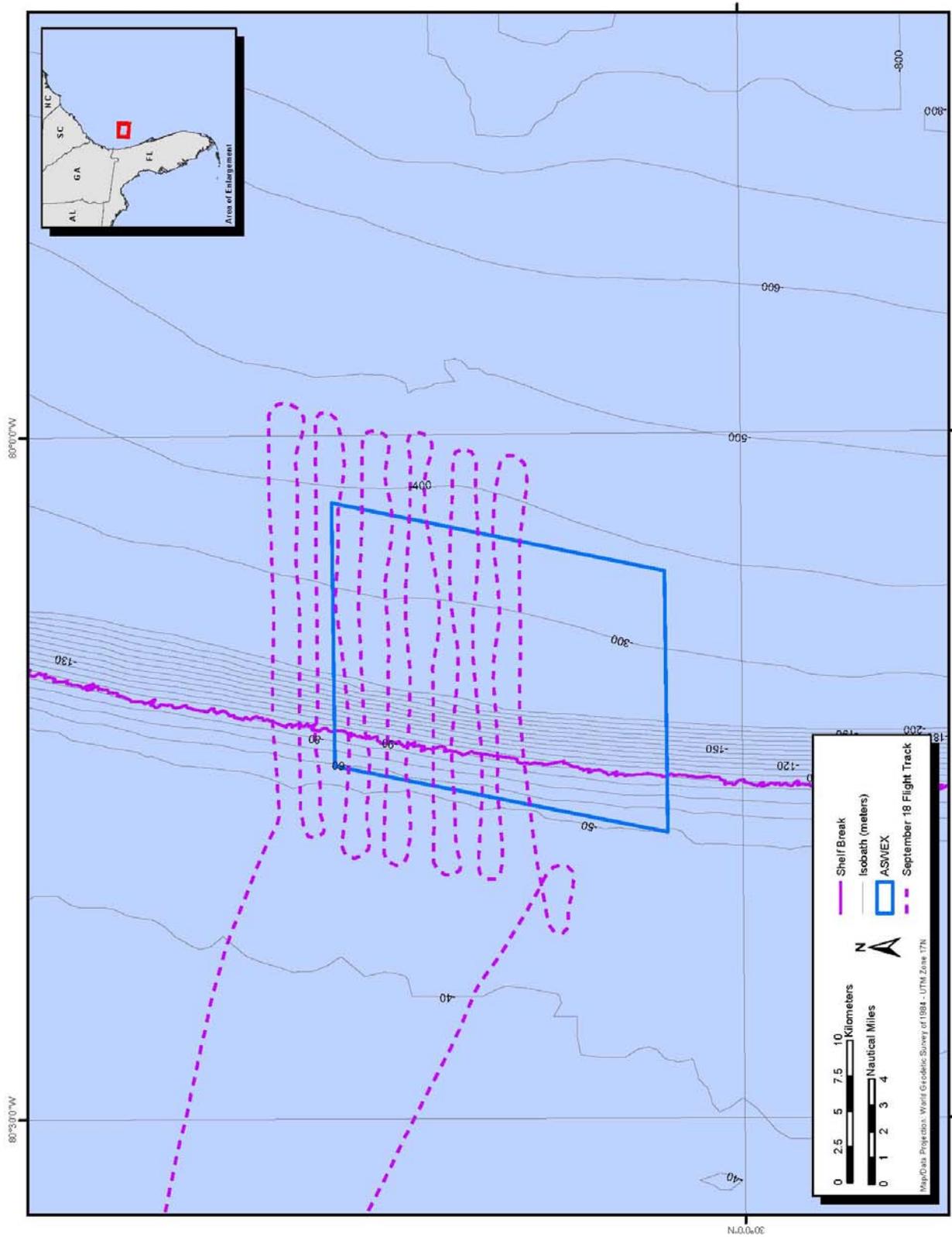


Figure 6. Aircraft Track Conducted During ASWEX Training (18 September).

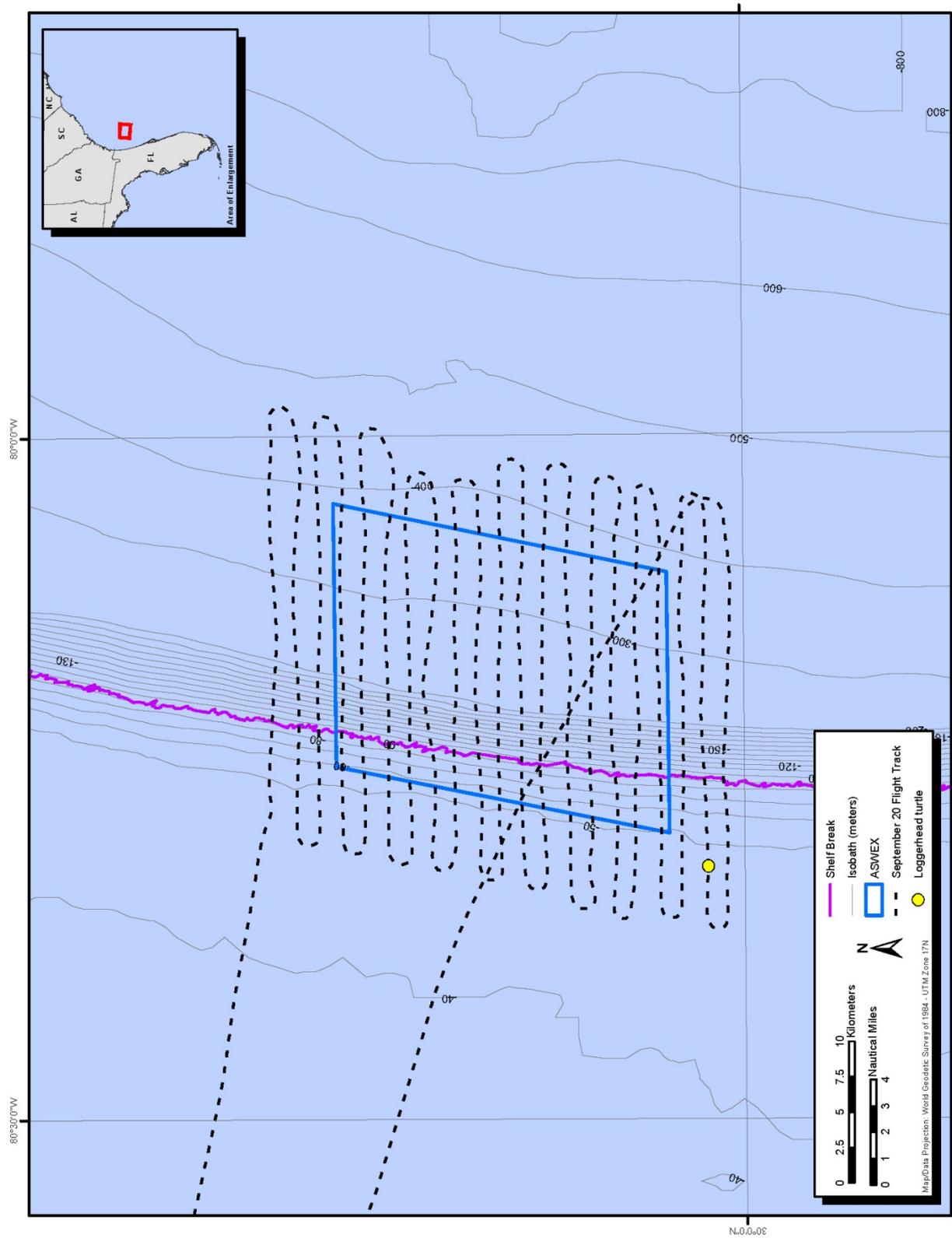


Figure 7. Locations of Cetacean and Sea Turtle Sightings Seen After ASWEX Training (20 September).

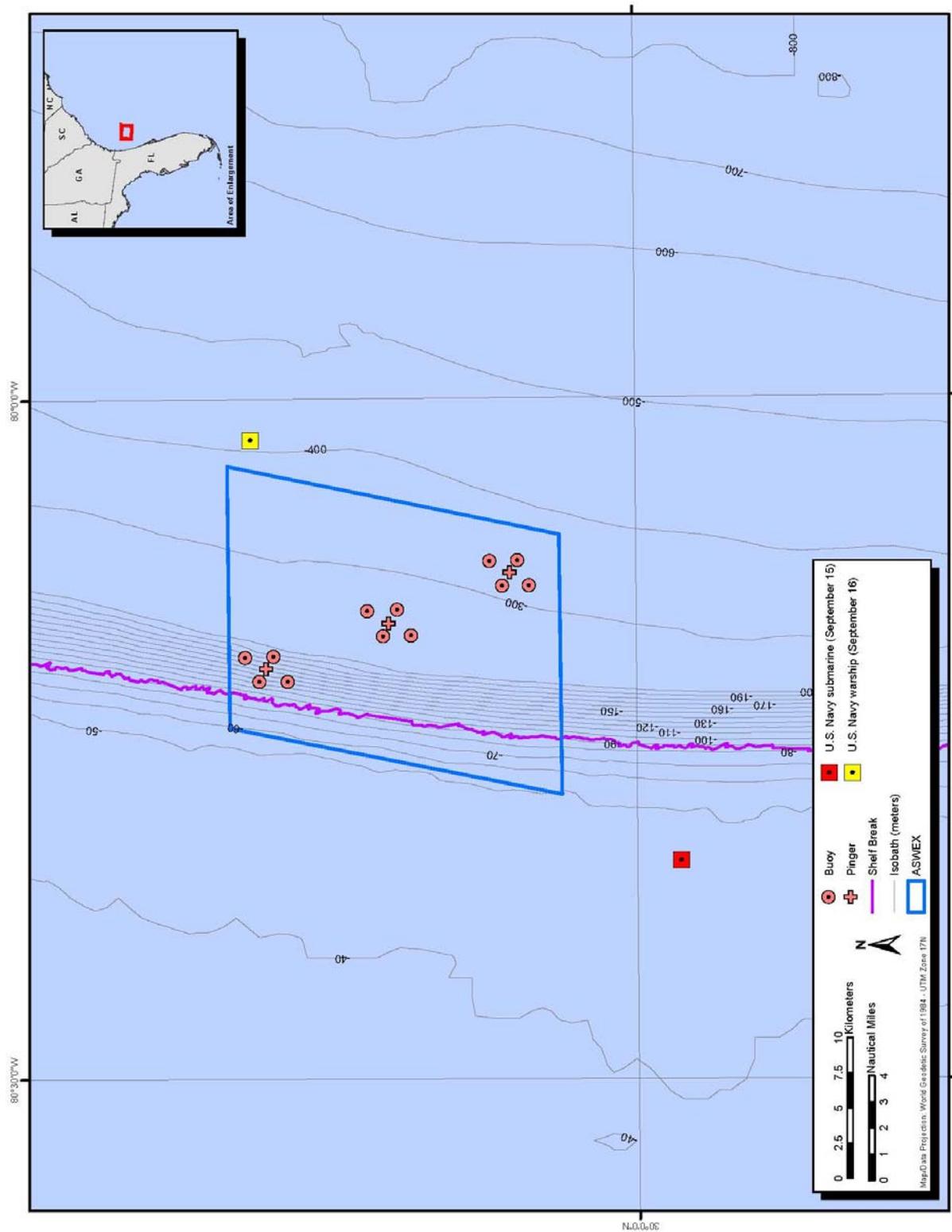


Figure 8. Locations of Deployed AMARs and U.S. Navy Vessels and Submarines Sighted in Conjunction with the ASWEX Training.

## Section 3 Results

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### Survey Effort

Observers visually surveyed approximately 2,456 km of on-effort tracklines and an additional 666 km off-effort (connector lines and circling for focal follow or species ID) during 4 survey days (five surveys total) over a 6-day period, for approximately 12.3 hours of on-effort status (see **Table 1**). Beaufort sea state ranged from 2 to 6, and all sightings were made in Beaufort sea states between 2 and 3 (see **Table 3**). This survey was hindered at times by low cloud ceilings (305 m or lower) restricting both visibility and safe flying conditions. **Appendix A** contains a detailed description of environmental, oceanographic, and sighting conditions.

### Sightings

Three sightings of cetaceans and seven sightings of sea turtles were recorded during 15.1 hours of total survey flight time (includes on-effort and off-effort intervals) within the survey area covering a 6-day period (see **Figure 2, Table 3**). Sightings Per Unit Effort (SPUE) was calculated as the total survey effort (hours/km/NM) divided by the total number of marine mammal sightings ( $n=3$ ) or sea turtle sightings ( $n=7$ ). For this monitoring effort, the SPUE for marine mammals was equal to one sighting per 5.0 hours, 1,041 km, and 562 NM, and the SPUE for sea turtles was equal to one sighting per 2.2 hours, 446 km, and 241 NM.

Three sightings of marine mammals and six sightings of sea turtles were made throughout the 4-day during-ASWEX survey period (see **Figure 3 through Figure 6, Table 3**). One sighting of a sea turtle was made during the post-ASWEX survey on 20 September (see **Figure 7, Table 3**).

Sightings over the 6-day period included two sightings of unidentified pilot whales, one sighting of unidentified dolphins, and seven sightings of loggerhead sea turtles. Due to difficulties associated with relocating small groups of marine mammals in a high Beaufort sea state and heavy glare, digital photographs to determine or confirm species identification were not collected for the unidentified dolphin sighting. **Table 4** provides a summary of sightings information and environmental data. Bottom depths for each sighting were estimated in 10-m ranges from plots of latitude and longitude for each sighting within a Geographic Information System (GIS).

GIS maps were also created to examine sightings related to AMARs and to plot sightings of naval assets during ASWEX training (see **Figure 8**). Sightings were made of cetaceans in close proximity to buoy and pinger locations (see **Figure 9**). Additionally, the focal follow of unidentified pilot whales during the aerial survey was made in proximity to buoy and pinger locations (see **Figure 10**). Multiple sightings of U.S. Navy P-3 and P-8 aircraft and U.S. Navy helicopters, one U.S. Navy warship, and one U.S. Navy submarine were recorded within or near the survey area during aerial surveys (see **Figure 11**).

Table 3. Summary of Sightings.

Sighting No.	Date	Species	Group Size Best/High/Low			Calves	Start Time	Stop Time	Beaufort Sea State	Latitude	Longitude	Vert. Angle	Distance off Track (km)	Heading	Bottom Depth (m)	Behavioral Summary
<b>During ASWEX Sightings – 15 September 2011</b>																
1	9/15/11	CC	1	1	1	-	12:42	-	3	30.256	-80.253	043	0.3	097	50	Loggerhead turtle resting at the surface. No disturbance detected.
2	9/15/11	CC	1	1	1	-	13:58	-	3	30.141	-80.302	035	0.4	125	40	Loggerhead turtle resting at the surface. No disturbance detected.
3	9/15/11	CC	1	1	1	-	14:01	-	2	30.129	-80.257	035	0.4	170	70	Loggerhead turtle resting at the surface. No disturbance detected.
<b>During ASWEX Sightings – 16 September 2011 (Morning)</b>																
1	9/16/11	Unid	8	10	3	-	8:48	8:57	3	30.291	-80.286	050	0.3	270	40	Small group of dolphins sighted travelling in chop, not able to identify species. Not able to relocate during circling for focal follow.
2	9/16/11	GS	24	30	16	1	10:07	10:37	3	30.173	-80.111	013	1.3	000	300	Multiple subgroups of unidentified pilot whales travelling north with varying group structure. See <b>Appendix B</b> for focal follow data.
3	9/16/11	CC	1	1	1	-	12:08	-	3	30.054	-80.291	022	0.8	090	50	Loggerhead turtle resting at the surface. No disturbance detected
<b>During ASWEX Sightings – 16 September 2011 (Afternoon)</b>																
1	9/16/11	CC	1	1	1	-	15:51	-	3	30.211	-80.231	055	0.2	068	80	Loggerhead turtle resting at the surface. No disturbance detected.
2	9/16/11	GS	16	20	12	0	16:42	16:57	2	30.068	-80.040	040	0.4	045	400	Tightly packed group of unidentified pilot whales travelling NE, then N. Another small subgroup approximately 20 body lengths away. Attempted focal follow, but group too elusive. A military helicopter within 1 NM of group.
3	9/16/11	CC	1	1	1	-	17:07	-	2	30.036	-80.191	035	0.4	090	200	Loggerhead turtle resting at the surface. No disturbance detected.

Sighting No.	Date	Species	Group Size Best/High/Low			Calves	Start Time	Stop Time	Beaufort Sea State	Latitude	Longitude	Vert. Angle	Distance off Track (km)	Heading	Bottom Depth (m)	Behavioral Summary
<b>Post ASWEX Sightings – 20 September 2011</b>																
1	9/20/11	CC	1	1	1	-	15:57	-	3	30.024	-80.316	Unk.	Unk.	113	40	Loggerhead turtle resting at the surface. No disturbance detected.

Key:

CC = loggerhead sea turtle (*Caretta caretta*)

GS = Unidentified pilot whale (*Globicephala* sp.)

Unid = Unidentified dolphin

**Table 4. Summary of Sightings and Depth Recorded during Monitoring for JAX ASWEX Training.**

Species	Number of sightings	Bottom Depths
Unidentified pilot whale	2	300-400
Unidentified dolphin	1	40
Loggerhead turtle	7	40-200

## Behavior

No visible evidence of unusual behavior was observed for the during-ASWEX or post-ASWEX surveys (see **Table 3**). The survey team conducted one focal follow on 16 September. The focal follow was a period of 21 minutes spent with a group of approximately 24 unidentified pilot whales. Detailed behavioral observations made during the focal follow are presented in **Appendix B**. Photographs of suitable quality for species identification purposes were collected during the sighting. No video was collected during focal follows.

## Section 4 Acknowledgements

We would like to thank Orion Aviation's Director Ed Coffman and pilots Stan Huddle and Ryan MacGregor. These data were obtained under National Marine Fisheries Service Permit No. 14451 issued to Joseph R. Mobley, Jr.

## Section 5 References

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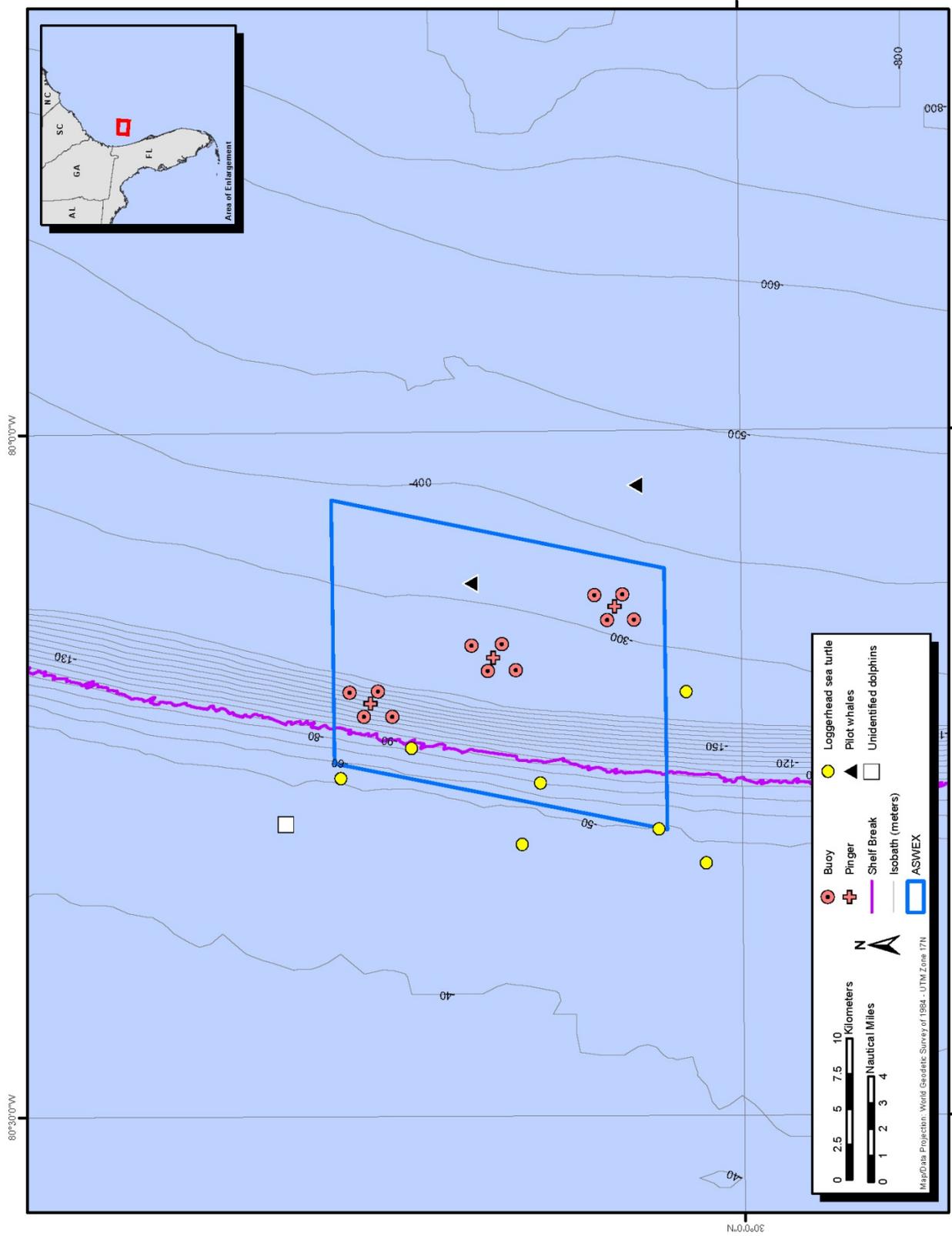


Figure 9. Sightings of Cetacean and Sea Turtle Species During ASWEX Monitoring in Relation to Deployed AMARs.

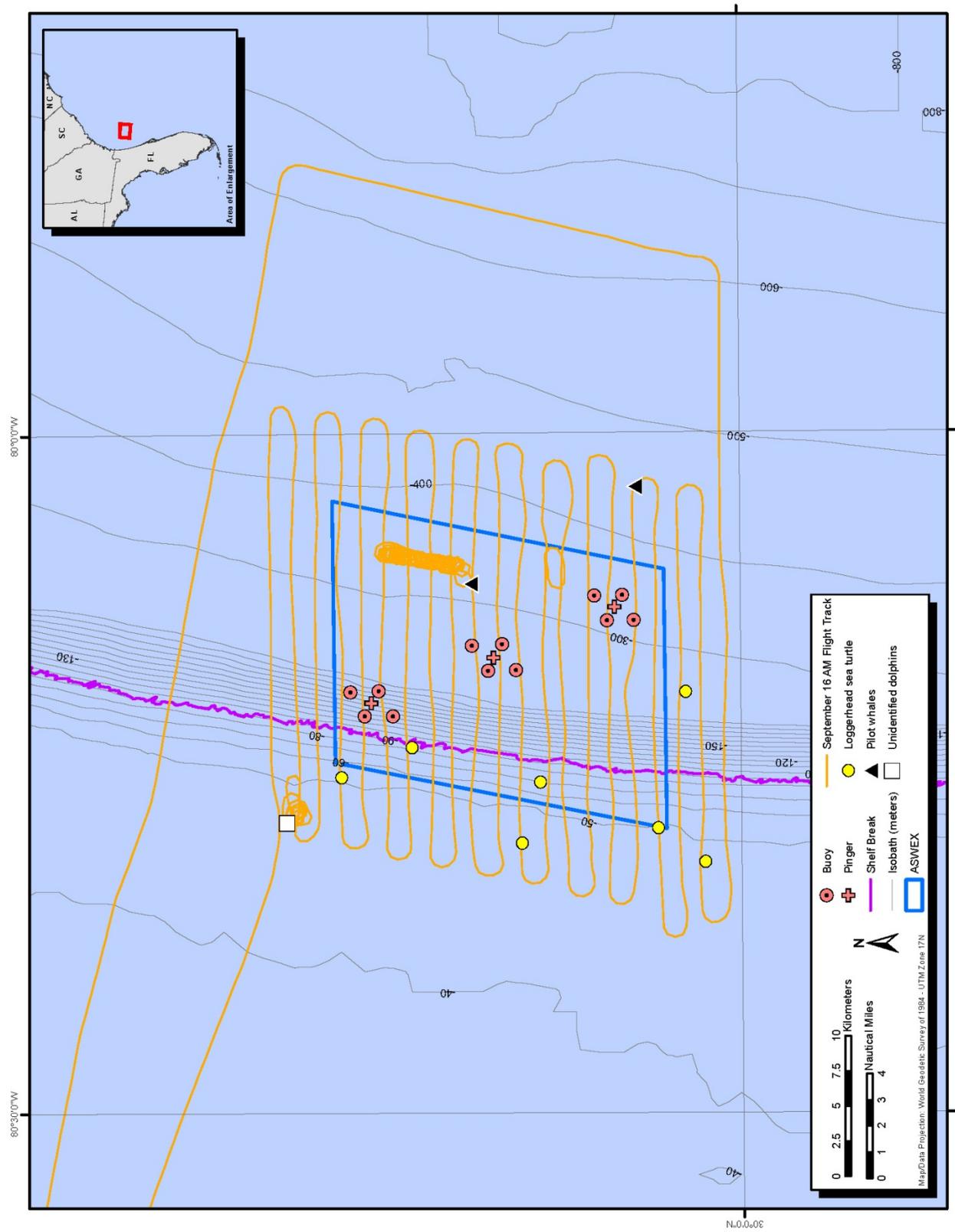


Figure 10. Focal Follow of Unidentified Pilot Whales Conducted During ASWEX Monitoring in Relation to Deployed AMARs.

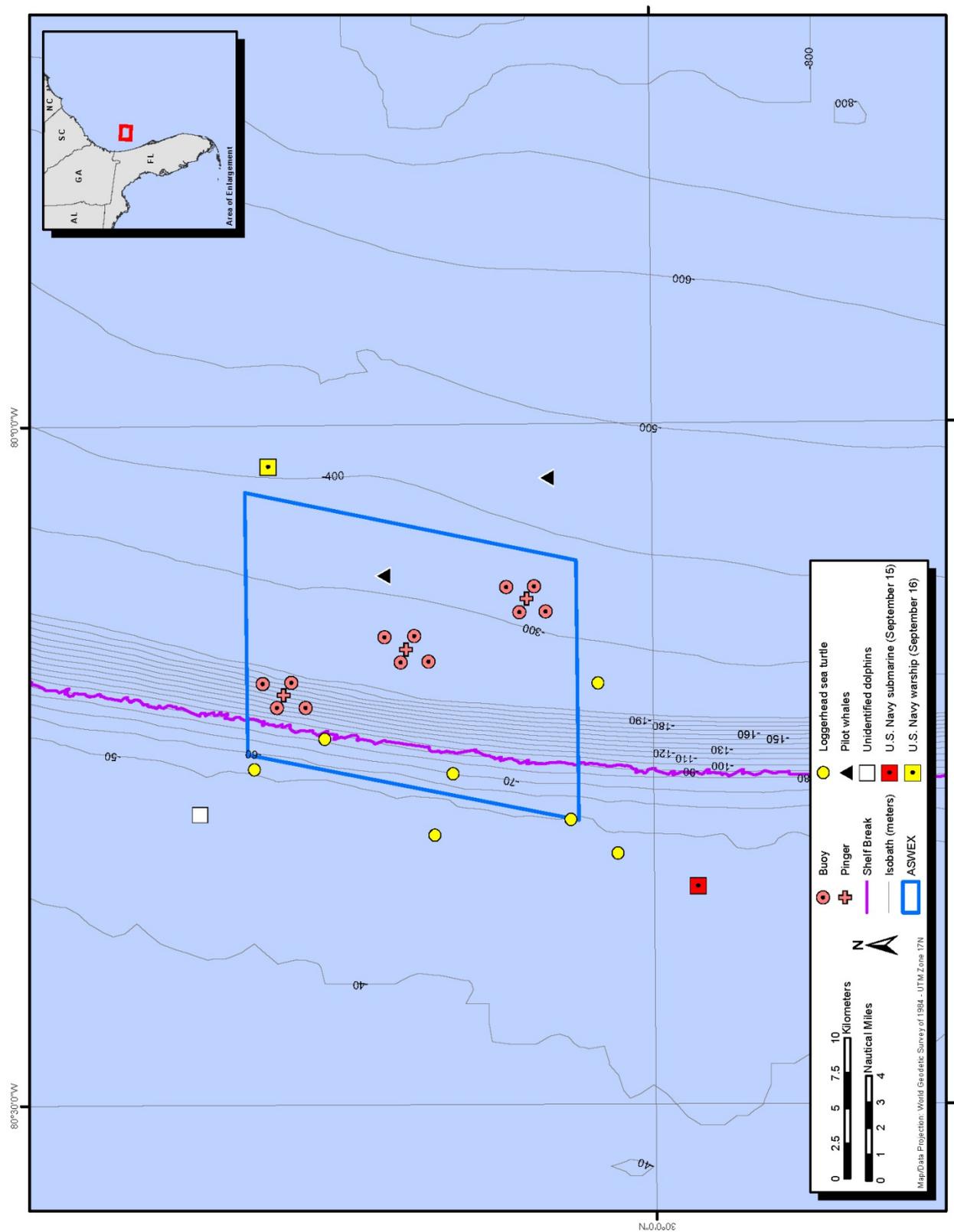


Figure 11. U.S. Navy Vessels and Submarines, Cetaceans, and Sea Turtles Sighted During ASWEX Training.

## APPENDIX A

### Environmental, Oceanographic, and Sighting Conditions

**Table A-1** shows the environmental, oceanographic, and sighting conditions encountered throughout the during-ASWEX and post-ASWEX 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 (%)
<b>ASWEX Survey Effort on 15 September 2011</b>							
12:06	3	20	2	3	60	2	50
12:16	2	60	2	2	10	2	50
12:21	3	60	2	3	10	2	50
12:25	3	10	2	3	95	2	50
12:34	3	75	2	3	10	2	50
12:44	3	10	2	3	95	2	50
12:53	3	75	2	3	10	2	50
13:04	2	20	2	2	90	2	50
13:12	3	75	2	3	10	2	50
13:22	3	20	2	3	90	2	50
13:31	3	75	2	3	10	2	50
13:41	3	10	2	3	90	2	50
13:49	3	75	2	3	10	2	50
14:00	2	10	2	2	85	2	50
14:08	2	75	2	2	10	2	50
14:18	2	10	2	2	75	2	50
14:27	2	65	2	2	10	2	50
14:36	2	10	2	2	85	2	50
14:45	2	75	2	2	10	2	50
14:55	2	10	2	2	70	2	50
15:03	2	70	2	2	5	2	50
15:13	2	10	2	2	80	2	50
15:21	2	10	2	2	80	2	50
15:23	2	60	2	3	5	2	50
15:28	2	60	2	3	5	2	50

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 (%)
<b>ASWEX Survey Effort on 16 September 2011 (Morning)</b>							
8:30	3	20	1	3	80	1	20
8:39	3	50	1	3	20	1	20
8:57	3	50	1	3	20	1	20
8:59	3	20	1	3	60	1	20
9:08	3	50	1	3	20	1	20
9:18	3	20	1	3	85	1	20
9:27	3	50	1	3	20	1	20
9:37	3	20	1	3	70	1	20
9:45	3	50	1	3	15	1	20
9:56	3	20	1	3	60	1	20
10:04	3	40	1	3	20	1	20
10:45	3	40	1	3	30	1	20
10:52	3	20	1	3	95	1	20
11:01	3	50	1	3	10	1	20
11:11	3	50	1	3	10	1	20
11:20	3	50	1	3	10	1	20
11:23	3	50	1	3	5	1	20
11:33	3	20	1	3	80	1	20
11:42	3	60	1	3	15	1	20
11:52	3	20	1	3	80	1	20
12:01	3	20	1	3	5	1	20
12:12	3	20	1	3	90	1	20
12:21	3	70	1	3	10	1	20
12:30	3	20	1	3	90	1	20
12:38	2	20	1	2	90	1	20
12:44	2	30	1	2	30	1	20
<b>ASWEX Survey Effort on 16 September 2011 (Afternoon)</b>							
15:15	2	5	1	2	40	1	30
15:19	3	5	1	3	40	1	30
15:25	3	70	1	3	30	1	30
15:35	2	5	1	2	50	1	30
15:38	3	5	1	3	50	1	30

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 (%)
<b>ASWEX Survey Effort on 16 September 2011 (Afternoon) (continued)</b>							
15:45	3	30	1	3	40	1	30
15:55	2	30	1	2	40	1	30
15:59	3	30	1	3	40	1	30
16:04	3	60	1	3	40	1	30
16:11	2	60	1	2	40	1	30
16:14	2	30	1	2	40	1	30
16:24	2	35	1	2	40	1	30
16:34	2	35	1	2	50	1	30
17:03	3	50	1	3	50	1	30
17:07	2	50	1	2	50	1	30
17:13	2	40	1	2	40	1	30
17:21	2	40	1	2	40	1	30
17:24	2	95	0.25	2	10	1	30
<b>ASWEX Survey Effort on 18 September 2011</b>							
12:35	5	30	0.5	5	70	1	100
12:41	5	30	0.5	5	10	1	100
12:44	5	60	0.5	5	0	1	100
12:47	6	60	0.5	6	0	1	100
12:53	5	40	0.5	5	20	1	100
12:58	6	40	0.5	6	20	1	100
13:02	6	40	0.5	6	40	1	100
13:07	5	40	0.5	5	40	1	100
13:10	5	50	0.5	5	20	1	100
13:16	6	50	0.5	6	20	1	100
13:20	6	65	0.5	6	20	1	100
13:28	5	45	0.5	5	10	1	100
13:32	6	45	0.5	6	10	1	100
13:38	6	20	0.5	6	0	1	100
13:40	5	20	0.5	5	0	1	100
13:46	6	40	0.5	6	0	1	100
13:56	5	40	0.5	5	40	1	100
14:03	6	45	0.5	6	30	1	100
14:13	5	45	0.5	5	0	1	100

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 (%)
<b>ASWEX Survey Effort on 20 September 2011</b>							
12:55	3	25	1	3	75	0.5	100
13:05	3	90	0.5	3	40	0.5	100
13:07	2	90	0.5	2	40	0.5	100
13:14	3	25	1	3	85	1	100
13:24	3	75	1	3	15	1	100
13:32	3	20	1	3	80	1	100
13:42	3	60	1	3	30	1	100
13:45	3	90	1	3	30	1	100
13:51	3	25	1	3	80	1	100
14:00	3	80	1	3	20	1	100
14:08	3	20	1	3	80	1	100
14:18	3	85	1	3	15	1	100
14:25	3	20	1	3	85	1	100
14:35	3	45	1	3	15	1	100
14:44	3	15	1	3	80	1	100
14:54	3	75	1	3	30	1	100
15:03	3	20	1	3	70	1	100
15:13	3	50	1	3	50	1	100
15:21	3	45	1	3	50	1	100
15:32	3	10	1	3	25	1	100
15:40	3	0	1	3	90	1	100
15:50	3	5	1	3	40	1	100
15:59	3	0	1	3	85	1	100

## APPENDIX B

### Focal Follow Data

**Table B-1** shows the focal-follow behavioral data from the JAX ASWEX training 2011 monitoring efforts within the survey area. One focal-follow event was conducted on 16 September 2011 from unidentified pilot whales.

Record Number	Time	Date	Latitude	Longitude	Recorded Behavior
<b>Sighting Number 2 (16 September 2011, Morning)</b>					
<b>Species: <i>Globicephala</i> spp. Group size: 24.</b>					
1	10:17	9/16/11	30.191	-80.101	Rapid travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Lots of time underwater.
2	10:18	9/16/11	30.196	-80.098	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Group is traveling more width wise than front to back.
3	10:19	9/16/11	30.198	-80.093	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Surfacing sporadically - not in a synchronized fashion.
4	10:20	9/16/11	30.197	-80.089	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Separating into 2 groups with 6 body lengths separating them. 18-20 in one group with 2-3 body lengths. Travelling more side by side than front to back. Unsure of other subgroup numbers - could be stragglers.
5	10:22	9/16/11	30.196	-80.089	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Definitely a calf in the larger group. 4 or 5 in front group and separated by 10 body lengths from front and back groups.
6	10:23	9/16/11	30.195	-80.091	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. 10 body lengths from front group to back group.
7	10:24	9/16/11	30.196	-80.091	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Unidentified pilot whale ID confirmed.
8	10:25	9/16/11	30.197	-80.093	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Group is moving fast to north across the survey area that we've already covered. Smaller group is 3-4 body lengths apart, 6 body lengths from larger group. Mom and calf are right next to each other. Larger group is 1 to 4 body lengths.
9	10:26	9/16/11	30.200	-80.095	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Same as above.
10	10:27	9/16/11	30.202	-80.096	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Mom and calf are on outside of group with the calf being the far outside member of the group.

Record Number	Time	Date	Latitude	Longitude	Recorded Behavior
<b>Sighting Number 2 (continued)</b>					
11	10:28	9/16/11	30.202	-80.093	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. group shape is changing - more of a circular formation instead of a line.
12	10:29	9/16/11	30.204	-80.092	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Group seems to be doing the same thing. Still traveling quickly to the north. Not porpoising travel, but coming up for quick breath then back down.
13	10:30	9/16/11	30.205	-80.094	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Glare at first. Group seems to be moving quicker. Haven't seen mom and calf on this pass, but probably underwater during circle. Mom/calf would be most eastern animals. Calf has moved on the other side of the mom.
14	10:31	9/16/11	30.208	-80.095	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Glare at first. Still travelling and mostly underwater. Still 2 separate groups with smaller group up front. More of a circular formation that side to side. Didn't see the calf on this circle.
15	10:32	9/16/11	30.209	-80.092	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Glare at first. Same as above. Smaller group is absorbing some of the larger group. Smaller group is now 5 body lengths ahead of larger group. Front group is approximately 45 degrees ahead of larger.
16	10:34	9/16/11	30.212	-80.093	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Groups are beginning to merge and look like one larger group. Body lengths are for larger group.
17	10:35	9/16/11	30.215	-80.094	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Same as above.
18	10:36	9/16/11	30.217	-80.093	Travel heading 000. Min Dispersal = 1, Max Dispersal = 4. Same as above. Body lengths for all members are 1 to 4. Group is beginning to shift from circular formation to more of a partial line.
19	10:37	9/16/11	30.218	-80.093	Travel heading 000. Min Dispersal = 1, Max Dispersal = 3. Slightly tighter group side-to-side formation.
20	10:38	9/16/11	30.219	-80.092	Travel heading 000. Min Dispersal = 1, Max Dispersal = 3. All at surface, lined up. Same as above. Leaving focal follow to take a few more pictures to reconfirm ID.