Prepared for and submitted to:

National Marine Fisheries Service
Office of Protected Resources

Prepared by:

Department of the Navy

In accordance with the Letter of Authorization
Under the MMPA and ITS authorization under
the ESA
21 January 2010

Annual Range Complex Exercise Report

2 August 2009 to 1 August 2010

For The U.S. Navy's Atlantic Fleet Active Sonar Training (AFAST) Range Complex

1 October 2010

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ATLANTIC FLEET ACTIVE SONAR TRAINING RANGE COMPLEX

(U) ATLANTIC FLEET ACTIVE SONAR TRAINING RANGE COMPLEX

(U) INTRODUCTION

(U) The U.S. Navy prepared this Annual Range Complex Exercise Report covering the period from 2 August 2009 to 1 August 2010 in compliance with the National Marine Fisheries Service (NMFS) Final Rule under the Marine Mammal Protection Act (MMPA) for the Atlantic Fleet Active Sonar Training (AFAST) Study Area (NMFS 2009).

(U) In the AFAST Range Complex Final Rule and Letters of Authorization[1] "Requirements for monitoring and reporting" the following report subsections were specified and are present within this report:

(1) Mid-Frequency Active Sonar (MFAS)/High-Frequency Active Sonar (HFAS) Major Training Exercise for reporting (MTER).

- (i) Exercise Information (for each MTER)
- (ii) Individual Marine Mammal Sighting Information (for each MTER).
- (iii) Evaluation (based on data gathered during all MTERs) of effectiveness of mitigation measures designed to avoid exposing marine mammals to MFAS. This evaluation shall identify the specific observations that support any conclusion the Navy reaches about the effectiveness of the mitigation.

(2) Anti-submarine Warfare (ASW) Summary

- (i) Total annual hours of each type of sonar source
- (ii) Cumulative Impact Report

(3) Improved Extended Echo Ranging (IEER) / Advanced Extended Echo Ranging (AEER) Summary

(U) This Annual Report covers the period from 2 August 2009 to 1 August 2010, and the information represents the best practical data collection for this period. Due to the data collection and reporting timeline differing from the actual LOA dates, exercise data from 2 August 2009 to 20 January 2010 falls under the 2009 AFAST Letter of Authorization, while exercise data from 21 January 2010 to 1 August 2010 falls under the 2010 AFAST Letter of Authorization. In an effort to provide a better representation of annual exercise data for the AFAST Range Complex, the Navy has combined all exercise data from 2 August 2009 to 1 August 2010 and compared it to the annual allocations provided in the 2010 AFAST Letter of Authorization. This representation of annual exercise data shall be repeated in future Annual Reports. To provide accounting for the entire five year period of the authorization, Navy will also submit a final report at the end of the five years to provide comprehensive totals of authorized usage.

All information marked CLASSIFIED in this report can be found in the classified version of the AFAST Annual Range Complex Exercise Report.

[1]AFAST:§216.245(f) (1) through (f) (3) of the Final Rule and 7(f) of the Letter of Authorization

(U) (1) AFAST – MFAS/HFAS Major Training Exercise Summary

(U) This section summarizes authorized sonar use and marine mammal observations from MTERs conducted within the AFAST Study Area during the reporting period. The AFAST MTERs include ***Southeastern ASW Integrated Training Initiative*** exercises (SEASWITI), ***Integrated ASW Course*** (IAC), ***Composite Training Unit Exercises*** (COMPTUEX) and ***Joint Task Force Exercises*** (JTFEX).

(U) (i) Exercise information

(U) Table 1-i-1. MTERs conducted in the AFAST Study Area.

(A) Exercise designator	(B) Date that exercise began and ended	(C) Location	(D) # and types of active sources used							(E) # and types of passive sources used							(F) # and types of vessels and aircraft participating								(G) Total hours of observation by watchstanders (hrs)	(H) Total hours of all active sonar	(I) Total hours ea. active source							(J) Wave height (high, low, and average) (ft)
			SQS-53	SQS-56	BQQ-5/10	AQS-13F	AQS-22	DICASS	SLQ-25 Nixie	SQS-53	SQS-56	SQR-19	BQQ-5/10	AQS-22	AQS-13F	DIFAR Sonobuoys	CG	DDG	FFG	SH-60F \SH-60R dipping helo	SH-60B non-dipping helo	Submarines	P-3C MPA	Non-ASW surface ships			SQS-53	SQS-56	BQQ-5/10	AQS-13F	AQS-22	DICASS	SLQ-25 Nixie	
JTFEX	14-20 SEP 2009	JAX	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1	3,666	*	*	*	*	*	*	*	*	8, 2, 3
IAC II	9-11 OCT 2009	JAX	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1	6,262	*	*	*	*	*	*	*	*	8, 2, 3
C2X	23 OCT - 23 NOV 2009	CPOA	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1	1,253	*	*	*	*	*	*	*	*	8, 2, 3
C2X	3-25 NOV 2009	CPOA / JAX	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1	1,482	*	*	*	*	*	*	*	*	10, 2, 4
SEASWITI	7-12 DEC 2009	JAX	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1	834	*	*	*	*	*	*	*	*	7, 2, 3
SEASWITI	15-19 MAR 2010	JAX	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1	5,760	*	*	*	*	*	*	*	*	10, 5, 7
SEASWITI	4-9 JUN 2010	JAX	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1	3,622	*	*	*	*	*	*	*	*	4, 1, 2
C2X	7-28 JUL 2010	VCOA / CPOA / JAX	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	5	8,636	*	*	*	*	*	*	*	*	6, 1, 3

JAX=Jacksonville Operating Area; CPOA=Cherry Point Operating Area; VCOA=Virginia Capes Operating Area.
* CLASSIFIED

(U) (ii) Individual marine mammal sighting information by exercise

(U) Table 1-ii-1. AFAST MTER – Individual Marine Mammal Sighting Information: JTFEX 14-20 Sep 2009.

(A) Location of sighting	(B) Species	(C) # of individuals	(D) Calves observed (y/n)	(E) Initial detection sensor	(F) Platform detection from	(G) Length of time observed (min)	(H) Wave height (ft)	(I) Visibility (nm)	(J) Sonar source in use (y/n)	(K) Range (yds)	(L) Mitigation implemented	(M) If hullmounted source in use, true bearing and animal travel	(N) Observed behavior
JAX	dolphin	20	Y	nr	FFG	4	nr	nr	n	<200	nr	na	nr

nr=not reported; VIS=visual; ACO=acoustic; y=yes; n=no; na=not applicable; crs=course

JAX=Jacksonville Operating Area

(U) Table 1-ii-2. AFAST MTER – Individual Marine Mammal Sighting Information: IAC II 9-11 Oct 2009.

(A) Location of sighting	(B) Species	(C) # of individuals	(D) Calves observed (y/n)	(E) Initial detection sensor	(F) Platform detection from	(G) Length of time observed (min)	(H) Wave height (ft)	(I) Visibility (nm)	(J) Sonar source in use (y/n)	(K) Range (yds)	(L) Mitigation implemented	(M) If hullmounted source in use, true bearing and animal travel	(N) Observed behavior
No sightings reported													

(U) Table 1-ii-3. AFAST MTER – Individual Marine Mammal Sighting Information: C2X 23 Oct – 23 Nov 2010.

(A) Location of sighting	(B) Species	(C) # of individuals	(D) Calves observed (y/n)	(E) Initial detection sensor	(F) Platform detection from	(G) Length of time observed (min)	(H) Wave height (ft)	(I) Visibility (nm)	(J) Sonar source in use (y/n)	(K) Range (yds)	(L) Mitigation implemented	(M) If hullmounted source in use, true bearing and animal travel	(N) Observed behavior
CPOA	dolphin	nr	nr	nr	DDG	nr	nr	nr	n	nr	nr	na	nr
CPOA	dolphin	nr	nr	nr	DDG	nr	nr	nr	n	nr	nr	na	nr

nr=not reported; VIS=visual; ACO=acoustic; y=yes; n=no; na=not applicable; crs=course

CPOA=Cherry Point Operating Area

(U) Table 1-ii-4. AFAST MTER – Individual Marine Mammal Sighting Information: C2X 3-25 Nov 2009.

(A) Location of sighting	(B) Species	(C) # of individuals	(D) Calves observed (y/n)	(E) Initial detection sensor	(F) Platform detection from	(G) Length of time observed (min)	(H) Wave height (ft)	(I) Visibility (nm)	(J) Sonar source in use (y/n)	(K) Range (yds)	(L) Mitigation implemented	(M) If hullmounted source in use, true bearing and animal travel	(N) Observed behavior
JAX	whale	1	n	VIS	non-ASW ship	1	9	10	na	>2000	nr	na	nr
JAX	whale	4	n	VIS	non-ASW ship	1	4	10	na	>2000	nr	na	nr
JAX	dolphin	2	n	VIS	CG	1	5	10	n	200-500	nr	na	nr
JAX	dolphin	8	n	VIS	CG	5	3	10	n	<200	nr	na	bow riding
JAX	dolphin	5	n	VIS	CG	1	2	10	n	<200	nr	na	bow riding
JAX	dolphin	8	n	VIS	CG	5	1	10	n	<200	nr	na	bow riding
JAX	dolphin	10	n	VIS	CG	15	4	10	n	500-1000	nr	na	bow riding
JAX	dolphin	6	n	VIS	CG	10	3	10	n	200-500	nr	na	bow riding
JAX	dolphin	4	n	VIS	CG	5	3	10	n	1000-2000	nr	na	bow riding
JAX	dolphin	10	n	VIS	CG	10	3	10	n	200-500	nr	na	bow riding
JAX	dolphin	3	n	VIS	CG	20	5	10	n	1000-2000	nr	na	bow riding
JAX	dolphin	7	n	VIS	CG	10	5	10	n	500-1000	nr	na	bow riding
CPOA	dolphin	5	n	VIS	DDG	15	5	10	n	200-500	nr	na	nr
CPOA	dolphin	2	n	VIS	DDG	15	5	10	n	200-500	nr	na	bow riding
JAX	whale	1	n	VIS	DDG	40	1	10	n	500-1000	nr	na	nr

nr=not reported; VIS=visual; ACO=acoustic; y=yes; n=no; na=not applicable; crs=course

JAX=Jacksonville Operating Area; CPOA=Cherry Point Operating Area

(U) Table 1-ii-5. AFAST MTER – Individual Marine Mammal Sighting Information: SEASWITI 7-12 Dec 2009

(A) Location of sighting	(B) Species	(C) # of individuals	(D) Calves observed (y/n)	(E) Initial detection sensor	(F) Platform detection from	(G) Length of time observed (min)	(H) Wave height (ft)	(I) Visibility (nm)	(J) Sonar source in use (y/n)	(K) Range (yds)	(L) Mitigation implemented	(M) If hullmounted source in use, true bearing and animal travel	(N) Observed behavior
JAX	dolphin	5	nr	VIS	DDG	5	2	10	n	<200	nr	na	bowriding
JAX	dolphin	8	nr	VIS	DDG	1	6	13	n	<200	nr	na	bowriding
JAX	dolphin	2	nr	VIS	FFG	0	0	0	n	nr	nr	na	nr
JAX	dolphin	1	nr	ACO	DDG	20	4	13	n	nr	nr	na	nr
JAX	dolphin	6	nr	VIS	DDG	4	4	13	n	<200	nr	na	nr
JAX	dolphin	1	nr	ACO	DDG	20	6	13	Y	nr	powered down sonar 10dB	dolphin bearing nr, ship crs 250, dolphin direction nr	nr
JAX	dolphin	1	nr	ACO	DDG	5	6	13	Y	nr	powered down sonar 10dB	dolphin bearing nr, ship crs 340, dolphin direction nr	nr

nr=not reported; VIS=visual; ACO=acoustic; y=yes; n=no; na=not applicable; crs=course

JAX=Jacksonville Operating Area

(U) Table 1-ii-6. AFAST MTER – Individual Marine Mammal Sighting Information: SEASWITI 15-19 Mar 2010.

(A) Location of sighting	(B) Species	(C) # of individuals	(D) Calves observed (y/n)	(E) Initial detection sensor	(F) Platform detection from	(G) Length of time observed (min)	(H) Wave height (ft)	(I) Visibility (nm)	(J) Sonar source in use (y/n)	(K) Range (yds)	(L) Mitigation implemented	(M) If hullmounted source in use, true bearing and animal travel	(N) Observed behavior
JAX	dolphin	2	n	VIS	DDG	12	2	10	n	<200	nr	na	nr
JAX	dolphin	nr	n	VIS	DDG	5	2	10	n	<200	nr	na	nr
JAX	whale	1	n	VIS	DDG	1	2	6	Y	>2000	nr	whale 050 from ship, ship crs 081, whale direction nr	nr
JAX	dolphin	nr	n	ACO	DDG	nr	nr	nr	n	nr	nr	na	nr
JAX	dolphin	nr	n	ACO	DDG	nr	nr	nr	n	nr	nr	na	nr
JAX	dolphin	4	n	VIS	DDG	nr	4	9	n	nr	nr	na	nr
JAX	dolphin	nr	n	ACO	DDG	nr	3	10	Y	nr	nr	dolphin 095 from ship, ship crs 185, dolphin direction nr	nr

nr=not reported; VIS=visual; ACO=acoustic; y=yes; n=no; na=not applicable; crs=course

JAX=Jacksonville Operating Area

(U) Table 1-ii-7. AFAST MTER – Individual Marine Mammal Sighting Information: SEASWITI 4-9 Jun 2010.

(A) Location of sighting	(B) Species	(C) # of individuals	(D) Calves observed (y/n)	(E) Initial detection sensor	(F) Platform detection from	(G) Length of time observed (min)	(H) Wave height (ft)	(I) Visibility (nm)	(J) Sonar source in use (y/n)	(K) Range (yds)	(L) Mitigation implemented	(M) If hullmounted source in use, true bearing and animal travel	(N) Observed behavior
JAX	dolphin	8	n	VIS	DDG	5	4	10	n	<200	nr	na	bowriding
JAX	dolphin	2	n	VIS	DDG	3	2	10	n	<200	nr	na	surfaced off port beam
JAX	dolphin	5	n	VIS	DDG	4	2	10	n	<200	nr	na	surfaced off port beam
JAX	whale	5	n	VIS	DDG	5	2	10	Y	200-500	powered down sonar 10dB	whale 350 from ship, ship crs 051, whale paralleling ship	riding port beam
JAX	dolphin	6	n	VIS	DDG	6	2	10	Y	<200	secured sonar	dolphin 030 from ship, ship crs 061, dolphin paralleling ship	traveled down port beam
JAX	dolphin	3	n	VIS	DDG	3	1	10	Y	200-500	powered down sonar 10dB	dolphin 030 from ship, ship crs 132, dolphin crossing bow	randomly surfacing
JAX	whale	4	n	VIS	FFG	5	3	7	n	<200	nr	na	bowriding

nr=not reported; VIS=visual; ACO=acoustic; y=yes; n=no; na=not applicable; crs=course

JAX=Jacksonville Operating Area

(U) Table 1-ii-8. AFAST MTER – Individual Marine Mammal Sighting Information: C2X 7-28 Jul 2010.

(A) Location of sighting	(B) Species	(C) # of individuals	(D) Calves observed (y/n)	(E) Initial detection sensor	(F) Platform detection from	(G) Length of time observed (min)	(H) Wave height (ft)	(I) Visibility (nm)	(J) Sonar source in use (y/n)	(K) Range (yds)	(L) Mitigation implemented	(M) If hullmounted source in use, true bearing and animal travel	(N) Observed behavior
VCOA	Whale	3	n	VIS	DDG	14	1	7	n	200-500	nr	na	riding down starboard beam
VCOA	Whale	2	n	VIS	DDG	8	1	7	n	>2000	nr	na	crossed ship's bow port to starboard
VCOA	Whale	7	n	VIS	DDG	22	2	7	n	500-1000	nr	na	traveled down port beam
VCOA	Dolphin	25	n	VIS	DDG	22	2	7	n	500-1000	nr	na	traveled down port beam
CPOA	Dolphin	6	n	VIS	DDG	5	1	10	Y	1000-2000	secured sonar	dolphin 094 from ship, ship crs 100, dolphin passed down stbd side	passed down stbd side
CPOA	Dolphin	8	Y	VIS	non-ASW ship	1	1	10	na	<200	nr	na	dove under ship
CPOA	Dolphin	7	n	VIS	non-ASW ship	2	1	10	na	500-1000	nr	na	headed away from ship
CPOA	Dolphin	2	n	VIS	non-ASW ship	1	1	10	na	1000-2000	nr	na	headed away from ship
CPOA	Dolphin	4	n	VIS	non-ASW ship	2	1	10	na	1000-2000	nr	na	crossed bow port to stbd
CPOA	Whale	4	n	VIS	DDG	8	1	10	Y	<200	secured sonar	whale 340 from ship, ship crs 040, whale passed down port side	passed down port side

AFAST MTER – Individual Marine Mammal Sighting Information: C2X 7-28 Jul 2010 (continued)													
CPOA	Dolphin	2	Y	VIS	DDG	2	1	10	Y	<200	nr	dolphin 130 from ship, ship crs 008, dolphin closing ship	bowriding
CPOA	Dolphin	4	n	VIS	non-ASW ship	5	2	8	na	>2000	nr	na	headed away from ship
CPOA	Dolphin	4	n	VIS	non-ASW ship	10	3	8	na	>2000	nr	na	bowriding
CPOA	Dolphin	2	Y	VIS	DDG	5	2	10	n	<200	nr	na	bowriding
JAX	Dolphin	4	n	VIS	non-ASW ship	5	2	10	na	500-1000	nr	na	briefly surfaced
JAX	Turtle	5	n	VIS	non-ASW ship	12	2	10	na	<200	nr	na	passed down port side
JAX	Dolphin	8	n	VIS	non-ASW ship	20	2	10	na	<200	nr	na	moved away from ship
JAX	Dolphin	4	n	VIS	DDG	3	2	10	n	<200	nr	na	nr
JAX	Dolphin	30	Y	VIS	DDG	10	1	10	n	200-500	nr	na	crossed bow port to stbd
JAX	Dolphin	10	n	VIS	non-ASW ship	40	2	10	na	<200	nr	na	moved away from ship
CPOA	Dolphin	10	n	VIS	DDG	10	1	10	n	<200	nr	na	crossed bow port to stbd
CPOA	Dolphin	10	Y	VIS	DDG	5	1	10	n	<200	nr	na	crossed bow then down stbd beam
VCOA	Dolphin	2	n	VIS	DDG	1	3	10	n	<200	nr	na	jumped then submerged
VCOA	Dolphin	3	n	VIS	non-ASW ship	20	1	10	na	<200	nr	na	bowriding
VCOA	Dolphin	3	n	VIS	non-ASW ship	5	1	9	na	1000-2000	nr	na	passed down stbd side

nr=not reported; VIS=visual; ACO=acoustic; y=yes; n=no; na=not applicable; crs=course

JAX=Jacksonville Operating Area; CPOA=Cherry Point Operating Area; VCOA=Virginia Capes Operating Area

(U) (iii) Evaluation (based on data gathered during all MTERs) of effectiveness

(U) Between 2 August 2009 and 1 August 2010, there were a total of eight Major Training Exercises, including one IAC II, three COMPTUEX, one JTFEX, and three SEASWITI.

(U) Table 1-iii-1. AFAST MTERs and associated marine mammal sightings.

MTER Type	Month	# of Exercise Days	# of Ships Involved (MFAS and non-MFAS)	# of Marine Mammal Sightings	# of Marine Mammals
JTFEX	SEP 2009	7	5	1	20
IAC II	OCT 2009	3	9	0	0
C2X	OCT-NOV 2009	31	5	2	nr
C2X	NOV 2009	23	11	15	76
SEASWITI	NOV 2009	6	7	7	24
SEASWITI	MAR 2010	5	5	7	7
SEASWITI	JUN 2010	6	5	7	33
C2X	JUL 2010	22	8	25	169
	Total	**103**	**55**	**64**	**329**

(U) Mitigation Effectiveness Discussion

(U) The three categories of mitigation measures (Personnel Training, Lookout and Watchstander Responsibility, and Operating Procedures) outlined in the AFAST EIS/OEIS and approved by NMFS (DoN 2008, NMFS 2009a, 2009b) were effective in detecting and appropriately mitigating exposure of marine mammal to mid-frequency active sonar. Fleet commanders and ship watch teams continue to improve individual awareness and enhance reporting practices. This improvement can be attributed to the various pre-exercise conferences, mandatory marine species awareness training, and making adjustments based upon the lessons learned. The safety zones were adhered to, and vessels and aircraft applied mitigation measures when marine mammals were visually observed within the requisite zones.

(U) There were a total of 5 sightings of 20 marine mammals for all AFAST MTER sightings at ranges less than 1,000 yards during which MFAS was in use. Of these 5 total MTER MFAS sightings, there were 3 sightings of 11 dolphins, 2 sightings of 9 whales, and 0 sightings of pinnipeds. (**Table 1-iii-2**).

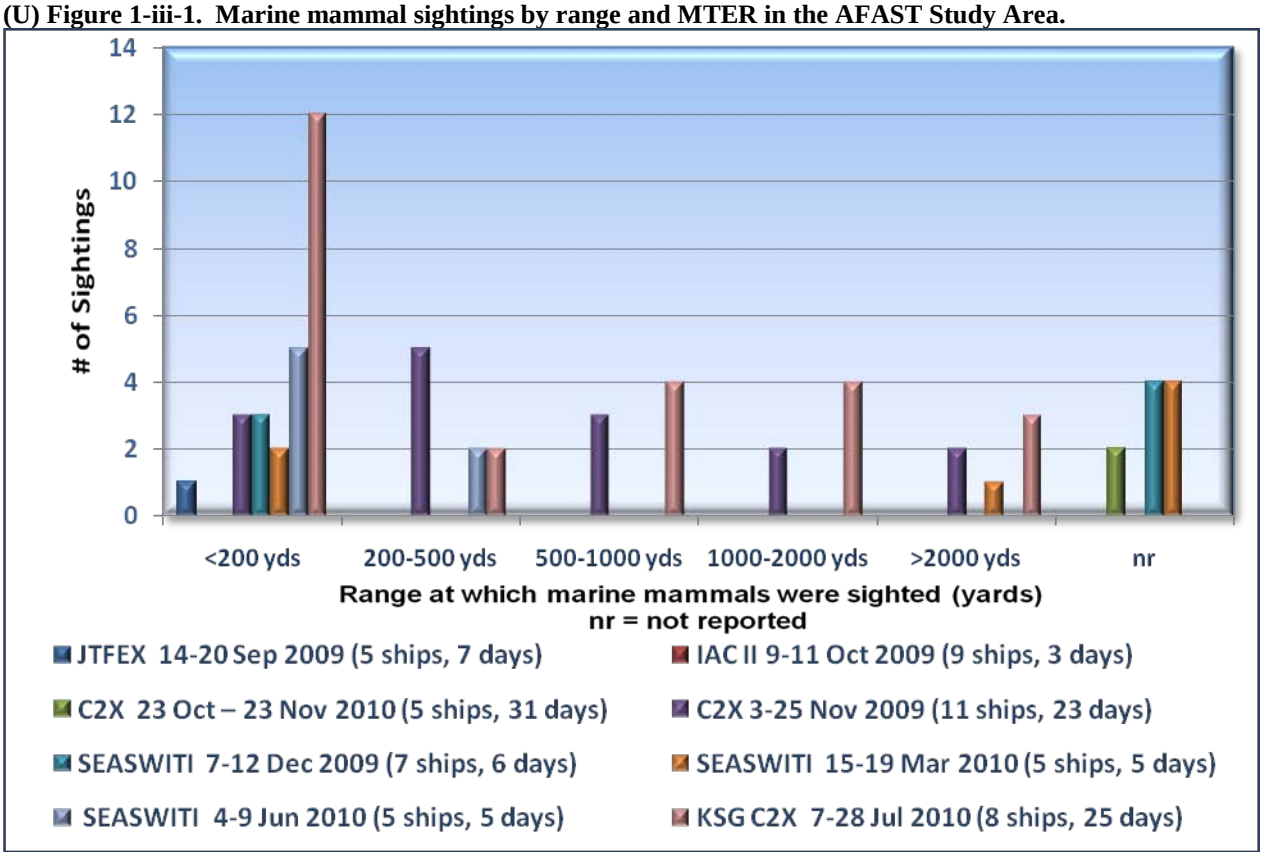
(U) Table 1-iii-2. Breakdown of marine mammals sighted in the AFAST study area during MTERs at ranges less than 1000 yards concurrent with MFAS use.

Range	< 200 yards	200 – 500 yards	500 – 1000 yards
Dolphins	8	3	0
Whales	4	5	0
Pinnipeds	0	0	0
Total marine mammals	12	8	0

(U) For AFAST MTERs, there were a total of 7 mitigation events when sonar was powered down or shut off during ASW training. During one of these mitigations sonar was unnecessarily shut down with the observed range of a whale in excess of 1000 yards. During 2 mitigation events when sonar power was lowered (power down by -10 dB), the ship did not report a range to the mammal sighting.

(U) **Figure 1-iii-1** depicts the reported ranges of all marine mammal sightings (with and without MFAS) from each of eight MTERs within the AFAST Study Area. The number of sightings is variable by strike group, exercise type, and sea state at the time of the MTER.

(U) Figure 1-iii-1. Marine mammal sightings by range and MTER in the AFAST Study Area.



(U) Deep diving animals were not observed during any of the MTERs. If exposure did occur, Navy assesses that these animals would not be exposed to significant levels for long periods based on the moving nature of ship MFAS use, and even less so from less frequent and lower power aviation deployed MFAS systems (dipping sonar, sonobuoys). For instance, during a one hour dive by a beaked whale or sperm whale, a MFAS ship moving at a nominal 10 knot speed could cover about 10 nm from its original location, well beyond ranges predicted to have significant exposures (**Table 1-iii-3**).

(U) **Table 1-iii-3** contains a list of all mitigation events where sonar was on and observed range was less than 1000 yards. It should be noted that with or without mitigation, given relative motion of ships maneuvering at-sea and independent marine mammal movement, the time any given animal would be exposed to MFAS from surface ships is likely to be limited as shown by the distances calculated in **Table 1-iii-3 Column 13**.

(U) Table 1-iii-3. Sightings where sonar was on during detection of marine mammals at ranges less than 1,000 yards, and the mitigation conducted.

1) OpArea (JAX (J); CPOA (C); VCOA (V))	2) MTER	3) Month	4) Species sighted	5) # of marine mammals sighted	6) Platform	7) Length of time observed (min)	8) Range at which marine mammal sighted	9) Mitigation [secure (SD); power down (PD); maneuver ship (MAN)[1]]	10) Estimate MAX exposure PRIOR to mitigation (dB re 1uPa)[2]	11) Number of minutes sonar mitigation applied	12) Estimate exposure AFTER mitigation (dB re 1uPa)[2]	13) DISTANCE ship would have moved given length of mitigation and nominal 10-knot ship speed (yds)	14) If hullmounted source in use, true bearing, animal travel	15) Observed behavior
C	C2X	July 2010	Whale	4	DDG	3	<200	SD	<189	8	none for 8 min	2,667	whale 340 from ship, ship crs 040, whale passed down port side	passed down port side
C	C2X	July 2010	Dolphin	2	DDG	2	<200	none	<189	na	<189	na	dolphin 130 from ship, ship crs 008, dolphin closing ship	bowriding
J	SEASWITI	June 2010	Whale	5	DDG	5	200-500	PD	<189-181	20	<179-171 for 20 min	6,667	whale 350 from ship, ship crs 051, whale paralleling ship	riding port beam
J	SEASWITI	June 2010	Dolphin	6	DDG	6	<200	SD	<189	15	none for 15 min	5,000	dolphin 030 from ship, ship crs 061, dolphin paralleling ship	traveled down port beam
J	SEASWITI	June 2010	Dolphin	3	DDG	3	200-500	PD	<189-181	15	<179-171 for 15 min	5,000	dolphin 030 from ship, ship crs 132, dolphin crossing bow	randomly surfacing

Notes:
[1] na = not applicable; mitigation not applicable if dolphins are determined to be bowriding.
[2] Estimated exposure based on 20Log[R] spherical spreading propagation loss for ranges less than 1000 yards and where nominal MFAS source level (SL) assumed to be 235 dB for DDG's and 225 for FFG's (Urick 1982). Actual operating parameters and oceanographic condition likely result is lower exposure. This calculation assumes exposure prior to mitigation. Once animal was spotted at the range indicated, applied mitigation would have resulted in much lower to no exposures.

Exposure assessment
Estimated exposures within 2000 yards can be determined based on standard formulas of how sound propagates in water. Spherical spreading is generally valid within 1000 yards from the sound source, and can be expressed as spreading loss (in dB from a source) equals 20logR [with "R" being range from the source in yards (Urick 1982)]. Spherical spreading loss in the first 1000 yards equates to 60 dB of loss. At ranges between 1000 and 2000 yards the sound waves can become trapped by the sea surface and bottom (depending on water depth and other sound propagation factors) and not expand vertically. The spreading wave then forms an expanding cylinder. Cylindrical spreading loss in dB between two points can be calculated by using the formula $(10\log R_2/R_1)$. Cylindrical spreading loss between 1000 and 2000 yards equates to an additional 3 dB of loss. By the time the sound wave has propagated to 2000 yards, the sonar signal strength has decreased by a total of at least 63 dB. Using the AN/SQS-53 sonar as an example transmitting at 235 dB subtracting the 63 dB of spreading loss equates to an estimated sonar Receive Level (RL) of 172 dB at 2000 yards. The spreading loss formulas are used to make very conservative assumptions about potential exposure. The formula is an estimation of spreading losses only and does not take into account other factors that could increase the total propagation losses such as oceanographic conditions, attenuation losses, scattering losses, and Navy-unique MFAS operating parameters which would result in slightly lower sonar transmit levels. Use of this approach to estimate potential RL at any given animal assumes the horizontal range from a visual sighting accounts for an animal across all depths at which an animal travels to predict the maximum, worst case potential exposure. In other words, this estimated worst case exposure is presented independent of the animal's actual depth level, since a) time and depth of current and previous dives cannot be deduced from a limited surface sighting, and b) oceanographic and tactical conditions influence actual sound propagation at different depths. Given relative motion of ships and animals at sea, the time spent with any given exposure from surface ships is likely to be limited.

(U) Passive sonar is an acoustic device used for listening to underwater sound and does not involve transmitting active sound into the water column. Passive sonar use is driven by the tactical nature of an ASW or training event, and is employed whenever possible. Given the nature of passive sonar technology and underwater sound propagation, determining range and absolute position of a marine mammal is exceedingly difficult and generally not possible with any single ship-based passive sonar. Skilled operators or unique circumstances may sometimes allow real-time or near-real time determinations of marine mammal range at the expense of interrupting the ship's ASW training at the time. Active sonar, on the other hand, is critical in providing range and bearing to potential underwater submarines and mines. In addition, passive sonar can only detect marine mammals that are vocalizing (i.e., making underwater sound as part of communication and echolocation). Marine mammal vocalization is based on individual needs at a particular moment, species-level foraging, and mating strategies, and other oceanographic or biological factors. For instance, for some species, only males typically vocalize (ex. humpback whales, blue whales, fin whales, and minke whales). Depending on oceanographic conditions and animal source levels, when marine mammals do vocalize, sounds can easily travel one to several tens of kilometers (km) (0.5 nautical mile (nm) to tens of nm) for some mid-to-low frequency animals, and tens to hundreds of km for very low frequency baleen whales (i.e., blue and fin whales). These ranges demonstrate that even if the marine mammal vocalization can be detected, it does not mean the mammal is necessarily close to the passive sonar sensor. Determining when or if a marine mammal is within a mitigation zone by passive acoustic detection is not always technically feasible.

(U) There is no information from which to assess how many, if any, animals not observed by Navy lookouts may or may not have been exposed to MFAS received levels equal to or greater than the exposure criteria set forth by NMFS (DoN 2008, NMFS 2009). However, many of the ESA-listed species in AFAST with the exception of perhaps the sperm whale are easier to spot on the surface due to shorter dive times and larger animal size (blue whale, fin whale, sei whale). Dolphins, the most common cetacean seen in AFAST often occur in large, visible pods. Beaked whales are acknowledged to be difficult to observe at-sea due to deep diving profiles and short surface intervals. For all marine mammal sightings made by Navy platforms during AFAST MTERs (**Tables 1-iii-1, 1-iii-2, 1-iii-3** and **Figure 1-iii-1**), there was no obvious indication or report that any animal behaved in a manner not associated with normal movement, or foraging (**Table 1-iii-3**).

(U) (2) AFAST – Annual ASW Summary

(U) (i) Total annual hours of each type of sonar source

(U) This section summarizes total annual hours of each type of sonar source used within AFAST between 2 August 2009 to 1 August 2010 from MTERs and non-major training exercises such as unit-level training.

(U) Table 2-i-1. Sonar usage within the AFAST Study Area by source.

Authorized MFAS sources §216.170 (c)(1) of NMFS AFAST Final Rule and LOA	Aug'09-Jan'10 (MTER + ULT)	Jan'10-Aug'10 (MTER + ULT)	Aug'09-Aug'10 (MTER + ULT)	Annually Authorized	% Total Used of Total Authorized
(i) AN/SQS-53 surface ship hull-mounted active sonar (hours)	*	*	*	3,214	*
(ii) AN/SQS-56 surface ship hull-mounted active sonar (hours)	*	*	*	1,684	*
(iii) AN/SQS-56/53 hull-mounted sonar in object detection mode (hours)	*	*	*	216	*
(iv) AN/BQQ-5/10 submarine active sonar (# of pings)**	*	*	*	9,976	*
(v) AN/AQS-22 or 13 helicopter active dipping sonar (# of dips)***	*	*	*	2,952	*
(vi) AN/SSQ-62 DICASS acoustic sonobuoy (# of buoys)****	*	*	*	5,853	*
(vii) Mk-48 heavyweight torpedoes (# of torpedoes)	*	*	*	32	*
(viii) Mk-46 or 54 lightweight torpedoes (# of torpedoes)	*	*	*	24	*
(ix) AN/SSQ-110A IEER explosive sonobuoy (# of buoys)	*	*	*	1,725	*
(x) AN/SSQ-125 AEER sonobuoy (# of buoys)	*	*	*	1,550	*
(xi) AN/SLQ-25 NIXIE towed countermeasure (hours)	*	*	*	2,500	*
(xii) AN/BQS-15 submarine navigation (hours)	*	*	*	450	*
(xiii) MK-1/2/3/4 Acoustic Device Countermeasures (# of ADCs)	*	*	*	225	*
(xiv) Noise Acoustic Emitters (# of NAEs)	*	*	*	127	*

*CLASSIFIED

**ULT data does not report actual number of pings a submarine conducted, only the sonar hours. The number of pings shown in this table is based on the modeled estimate of one ping per 2 hours for training, or 120 minutes of active sonar per ping, and 60 pings per hour for maintenance, or 1 minute of active sonar per ping. Therefore, the actual number of pings conducted during ULT events may differ.

***ULT data does not report actual number of dips an aircraft conducted, only the sonar hours. The number of dips shown in this table is based on a conservative empirical estimate of 5 minutes of active sonar per dip, therefore the actual number of dips conducted during ULT events may differ.

****ULT data does not report actual number of buoys deployed, only the sonar hours. The DICASS buoy numbers in this table are based on a conservative estimate of 10 minutes of active sonar per buoy, therefore the actual number of buoys used during ULT events may differ.

(U) (ii) Cumulative Impact Report

(U) From NMFS Final Rule: "*To the extent practical, the Navy, in coordination with NMFS, shall develop and implement a method of annually reporting non-major training exercises utilizing hull-mounted sonar. The report shall present an annual (and seasonal, where practicable) depiction of non-major training exercises geographically across the AFAST Study Area. To the extent practicable, this report will also include the total number of sonar hours (from helicopter dipping sonar and object detection exercises) conducted within the NARW calving habitat plus 5nm buffer area.*"

(U) The annual quantity in hours and breakdown by system of hullmounted sonar use in AFAST during non-major training events between 2 August 2009 and 1 August 2010 is presented below.

(U) Table 2-ii-1. ULT MFAS use within the AFAST Study Area.

Authorized MFAS sources §216.170 (c)(1)	Aug 2009 – Jan 2010 ULT Use	Jan 2010 – Aug 2010 ULT Use	Total Annual Use 2 Aug 2009 to 1 Aug 2010
(i) AN/SQS-53 hours	*	*	*
(ii) AN/SQS-56 hours	*	*	*
(iii) AN/BQQ-5/10 hours	*	*	*
Total hullmounted ULT hours	*	*	*

*CLASSIFIED

(U) The geographic depiction of non-major training exercise MFAS use within the AFAST Study Area is contained in the classified version of this report.

(U) The total number of sonar hours (from helicopter dipping sonar or object detection exercises) that were conducted within the southern North Atlantic Right Whale (NARW) Critical Habitat plus a 5nm buffer area during this reporting period is shown in Table 2-ii-2 below. Both events occurred outside of the NARW calving season (15 November – 15 April).

(U) Table 2-ii-2. Sonar use within the southern NARW Critical Habitat plus a 5nm buffer.

Date	Source	Duration
15 August 2009	AN/SQS-56	*
5 November 2009	AN/SQS-53	*
	Total	*

*CLASSIFIED

(U) The geographic depiction of MFAS use within the southern NARW Critical Habitat plus a 5nm buffer is contained in the classified version of this report.

(U) (3) AFAST – IEER/AEER Summary

(U) The annual summary of use within the AFAST Study Area for Improved Extended Echo-Ranging System (IEER) and Advanced Extended Echo-Ranging System (AEER) sonobuoys is deemed classified. Data requested from the Navy is contained in the classified version of this report. Reporting elements include (i) Total number of IEER and AEER events; (ii) Total expended/detonated rounds (buoys); and (iii) Total number of self-scuttled IEER rounds. Authorized IEER/AEER usage conducted within the AFAST Study Area during the reporting period in shown in Table 3-1 below.

(U) Table 3-1. IEER/AEER events conducted and buoys expended, detonated, and self-scuttled.

Period	# Events	# Expended	# Detonated	# Self-scuttled
2 Aug '09 to 19 Jan '10	*	*	*	*
20 Jan '10 to 1 Aug '10	*	*	*	*
Total Annual	*	*	*	*

*CLASSIFIED

(U) Report Summary

(U) The Navy's mitigation measures within the AFAST Study Area are assessed to have been effective during this reporting period. No animals were adversely affected by the use of mid-frequency active sonar.

(U) Visual detection by Navy lookouts remains the most realistically achievable at-sea mitigation currently available.

(U) Real-time passive sonar systems used by the Navy, and to some degree by most of the marine mammal science community, lack the ability to automatically classify detected species in real time. Most current passive data sets rely on extensive post-collection analysis by skilled subject matter experts to conclusively establish species identification. In addition to species classification, range detection using moving passive acoustic systems on Navy ships is limited in real time. Also, non-vocalizing marine mammals cannot currently be detected using passive systems.

(U) The Navy continues conducting robust and realistic exercises, and development of long-term range complex marine mammal monitoring plans. The goal of these plans is to integrate multiple tools in an effort to generate better assessments of marine mammal occurrence and possible MFAS effects (or lack thereof). Data collection efforts continue to focus on addressing unresolved questions regarding likely area-specific species' composition and the potential for alternative detection technologies.

(U) REFERENCES

(U) DoN. 2008. Letter of Authorization Application (request for incidental Harassment for AFAST activities) submitted to NMFS Office of Protected Resources.

(U) DoN. 2008a. Final Atlantic Fleet Active Sonar Training Environmental Impact Statement\Overseas Environmental Impact Statement-December 2008. Department of the Navy.

(U) DoN. 2009. Letter of Authorization Application (request for incidental Harassment for AFAST activities) submitted to NMFS Office of Protected Resources.

(U) NMFS. 2008. Taking and Importing Marine Mammals; U.S. Navy's Atlantic Fleet Active Sonar Training (AFAST); Proposed Rule. October 14 2008. 73 FR 60754

(U) NMFS. 2009. Taking and Importing Marine Mammals; U.S. Navy's Atlantic Fleet Active Sonar Training (AFAST); Final Rule. January 27, 2009. 74 FR 4843.

(U) NMFS. 2009a. Letter of Authorization take marine mammals incidental to U.S. Navy's Atlantic Fleet Active Sonar Training (AFAST) issued. January 22 2009

(U) NMFS. 2010. Letter of Authorization take marine mammals incidental to U.S. Navy's Atlantic Fleet Active Sonar Training (AFAST) issued. January 21 2010

(U) Urick, R.J. 1982. Sound Propagation in the Sea. Peninsula Publishing, Los Altos CA.