

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

17 May 2011

Annual Unclassified Exercise Report

**For Exercise Northern Edge 2015 Conducted in
the Gulf of Alaska TMAA
(15-26 June 2015)**

**For The U.S. Navy
Gulf of Alaska Temporary Maritime Activities Area**

15 December 2015

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GULF OF ALASKA TEMPORARY MARITIME ACTIVITIES AREA

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INTRODUCTION

The U.S. Navy prepared this Annual Exercise Report covering the period of Northern Edge 2015 in compliance with the National Marine Fisheries Service (NMFS) Final Rule under the Marine Mammal Protection Act (MMPA) for the Gulf of Alaska Temporary Maritime Activities Area.

In the Gulf of Alaska Temporary Maritime Activities Area Letter of Authorization “Annual GoA TMAA Exercise Report”, the following report subsections were specified and are present within this report for the GoA TMAA:

- (1) Mid-Frequency Active Sonar (MFAS)/High-Frequency Active Sonar (HFAS) Training Exercises.
 - (i) Exercise information.
 - (ii) Individual Marine Mammal Sighting Information (for each sighting in each exercise).
 - (iii) Evaluation (based on data gathered during all of the exercises) 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) Sinking Exercises (SINKEX)
 - (i) Exercise information.
 - (ii) Individual marine mammal observation information.
- (4) Improved Extended Echo Ranging (IEER) Summary
 - (i) Total number of IEER events.
 - (ii) Total expended/detonated rounds (buoys).
 - (iii) Total number of self-scuttled IEER rounds.
- (5) Explosives Summary
 - (i) Total annual number of each type of explosive exercise.
 - (ii) Total annual expended/detonated rounds for each explosive type.

This Annual Exercise Report covers the period from May 2015 to October 2015, and the information represents the best practical data collection for this period. Total ordnance and sonar use during Northern Edge 2015 was less than the amount analyzed for a single year in the Gulf of Alaska Final Environmental Impact Statement, and less than the amount authorized in a single year by the National Marine Fisheries Service (NMFS) Letter of Authorization under the Marine Mammal Protection Act (MMPA) and the Incidental Take Statement under the Endangered Species Act (ESA). Actual amount of sonar and explosive use is classified, however this information is provided to NMFS in the classified version of the GoA TMAA annual exercise report.

(1) GOA TMAA – MFAS/HFAS Training Exercises

(i) Exercise information

Table A1-i. Exercise information for the GoA TMAA.

(A) Exercise Designator	(B) Date	(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	(I) Total hours each active source	(J) Wave height (high, low, and average)
NE 15	15-26 JUNE 2015	A	(D)a SQS-53 # (D)b SQS-56 # (D)c BQ-10 # (D)d AQS-22 # (D)e MK-48 # (D)f SQS-62 #	(E)a SQS-53 # (E)b SQS-56 # (E)c SQ-19 # (E)d BQ-10 # (E)e AQS-22 # (E)f TB-16 # (E)g TB-29 #	(F)CG # (F)DDG # (F)FPG # (F)SH-60R # (F)SH-60F # (F)Submarines # (F)P-3C/P-8 MRPA # (F)Non-ASW Ships # (F)USNS #	2,592	#	(I)a SQS-53 # (I)b SQS-56 # (I)c BQ-10 # (I)d AQS-22 # (I)e MK-48 Sonar # (I)f SSQ-62 #	1,0, 0,5

NE 15-Northern Edge 2015

A-Gulf of Alaska TMAA

Classified information submitted to the National Marine Fisheries Service in the classified version of the GoA TMAA annual exercise report.

(ii) Individual marine mammal sighting information by exercise
Table A1-ii. GoA TMAA Exercise – Individual Marine Mammal Sighting Information: Northern Edge 2015.

(A) Location	(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 hull mounted and in use, true bearing and animal travel	(N) Observed behavior
GoA TMAA	Whale	3	N	Visual	DDG	8	1	10	N	1000	none	N/A	Slowly moving
GoA TMAA	Whale	3	N	Visual	DDG	2	0.5	10	N	1000	none	N/A	
GoA TMAA	Sea Otter	1	N	Visual	DDG	2	0	10	N	200	none	N/A	
GoA TMAA	Whale	8	Y	Visual	DDG	20	0.5	10	N	1000	Maneuvered to port	N/A	Swimming off STBD bow
GoA TMAA	Whale	1	N	Visual	DDG	3	0	10	N	500	none	N/A	
GoA TMAA	Pinniped	1	N	Visual	DDG	3	0	10	N	100	none	N/A	Sea Lion
GoA TMAA	Whale	3	N	Visual	DDG	2	0.5	10	N	2000	none	N/A	
GoA TMAA	Whale	1	N	Visual	DDG	2	1	10	N	200	none	N/A	Swimming off port qtr
GoA TMAA	Pinniped	1	N	Visual	DDG	1	0.5	10	N	1000	none	N/A	Seal swimming off our port beam
GoA TMAA	Whale	1	N	Visual	DDG	1	0.5	10	N	NR	none	N/A	

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(A) Location	(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 (m)	(J) Sonar source in use (y/n)	(K) Range (yds)	(L) Mitigation implemented	(M) If hull mounted and in use, true bearing and animal travel	(N) Observed behavior
GoA TMAA	Whale	1	N	Visual	DDG	1	0.5	10	N	N/R	none	N/A	
GoA TMAA	Whale	3	Y	Visual	DDG	3	0.5	10	N	300	none	N/A	Blow off STBD bow
GoA TMAA	Whale	2	N	Visual	DDG	12	0	10	N	1000	none	N/A	fluke
GoA TMAA	Whale	1	N	Visual	DDG	1	0.5	10	Y	100	SD	MM bearing 212 degrees	Breached surface, blowing
GoA TMAA	Whale	1	N	Visual	DDG	4	0.5	10	N	4000	none	N/A	
GoA TMAA	Whale	1	N	Visual	DDG	5	0.5	10	N	6000	none	N/A	Paralleling ship
GoA TMAA	Whale	1	N	Visual	DDG	3	1	10	N	600	none	N/A	broaching
GoA TMAA	Whale	1	N	Visual	DDG	5	1	10	N	2000	none	N/A	Swimming off STBD off beam
GoA TMAA	Whale	1	N	Visual	DDG	5	1	10	N	1000	none	N/A	Fluke
GoA TMAA	Whale	1	N	Visual	DDG	1	0.5	9	N	1000	none	N/A	Crossing to stern
GoA TMAA	Generic	3	N	Visual	DDG	23	0.5	10	N	100	none	N/A	opening
GoA TMAA	Whale	8	N	Visual	DDG	10	0.5	10	N	1000	none	N/A	Opening surfacing

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(A) Location	(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 hull mounted and in use, true bearing and animal travel	(N) Observed behavior
GoA TMAA	Whale	5	N	Visual	DDG	15	0.5	10	N	2000	none	N/A	Opening, blowing
GoA TMAA	Whale	1	N	Visual	DDG	20	0.5	10	N	4000	Maneuvered	N/A	Dead whale floating on surface
GoA TMAA	Whale	1	N	Visual	DDG	4	1	10	N	800	none	N/A	Opening, fluke
GoA TMAA	Whale	1	N	Visual	DDG	3	1	10	N	1000	none	N/A	Opening, fluke
GoA TMAA	Whale	1	N	Visual	DDG	2	1	10	N	700	none	N/A	
GoA TMAA	Whale	1	N	Visual	DDG	1	1	10	N	1000	none	N/A	
GoA TMAA	Dolphin	8	N	Visual	DDG	4	0.5	1	N	250	none	N/A	Playing, jumping out of the water
GoA TMAA	Whale	1	N	Visual	DDG	3	1	10	Y	1000	SD	Bearing 065	Paralleling
GoA TMAA	Whale	1	N	Visual	DDG	5	1	10	N	500	none	N/A	20 foot whale carcass
GoA TMAA	Whale	1	N	Visual	DDG	1	1	8	N	1000	none	N/A	Paralleling
GoA TMAA	Whale	2	N	Acoustic	DDG	1	1	10	N	8000	none	N/A	Paralleling

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

There was one Northern Edge Exercise conducted in the GoA TMAA during the period covered by this report. This exercise was conducted from 15-26 June 2015.

Table A1-iii-1. GOA TMAA MTE from 15-26 June 2015.

Exercise Type	Month	# of Exercise Days	# of Ships Involved (MFAS and non-MFAS)	# of Marine Mammal Sightings	# of Marine Mammals
Northern Edge	JUN 2015	11	6	31	68
	Totals:	11	6	31	68

Mitigation Effectiveness Discussion

The three categories of mitigation measures (Personnel Training, Lookout and Watch stander Responsibility, and Operating Procedures) outlined in the GoA TMAA EIS/OEIS and approved by NMFS were used, and were effectively implemented by the watch standers and lookouts during the Northern Edge 2015 exercise. Only two marine mammal sightings out of thirty one (6.5%) occurred concurrently with active sonar use. In one of these sightings the initial visual detection was 100 yards and the correct mitigation was employed (sonar was shut down). In the second of these sightings a whale was sighted at 1000 yards and the sonar was also shut down (this is an over mitigation, correct action would have been a 6 dB power down).

Table A1-iii-2. Breakdown of marine mammals sighted in the GoA TMAA during exercises at less than 1000 yards concurrent with MFAS use.

Range of Marine Mammal Sighting		
< 200 yards	200 – 500 yards	500 – 1000 yards
1	No applicable sightings	1

Table A1-iii-3. GoA TMAA MTE where sonar was on during detection of marine mammals at ranges < 1,000 yards and mitigation conducted.

1) Range [GOA TMAA]	2) MTE	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)]	10) Estimate MAX exposure PRIOR to mitigation (dB re 1µPa) ²	11) Number of minutes sonar mitigation applied	12) Estimate exposure AFTER mitigation (dB re 1µPa) ²	13) DISTANCE ship would have moved given length of mitigation and nominal 10-knot ship speed (yds)	14) If hull mounted source in use, true bearing, animal travel	15) Observed behavior
A	NE15	June	Whale	1	DDG	1	100 yds	SD	195 dB	24	Zero	8000	Brg-212	Breached surface, blowing
A	NE15	June	Whale	1	DDG	3	1000 yds	SD	175 dB	13	Zero	4333	Brg-065, paralleling	none

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 $20\log R$ [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.

(2) GoA TMAA – ASW Summary

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

The Total annual hours of each type of sonar source used within the GoA TMAA during Northern Edge 2015 is classified. Actual amount of sonar use is submitted to the National Marine Fisheries Service (NMFS) in a separate classified annual exercise report. **Table A2-i. Sonar use within the GoA TMAA.**

Authorized MFAS sources §218.120 (c)(1) of NMFS GoA TMAA Final Rule	May – Oct 2015 (~ 5 months)	Annually Authorized	% Total Used of Total Authorized Annually
(i) AN/SQS-53 surface ship hull-mounted active sonar (hours)	#	578 hours	#
(ii) AN/SQS-56 surface ship hull-mounted active sonar (hours)	#	52 hours	#
(iii) AN/SSQ-62 DICASS acoustic sonobuoy (# of buoys)	#	266 buoys	#
(iv) AN/AQS-22 or 13 helicopter active dipping sonar (# of dips)	#	192 dips	#
(v) AN/BQQ-10 submarine active sonar (hours)	#	48 hours	#
(vi) Mk-48 torpedoes (# of torpedoes)	#	2 runs	#
(vii) AN/SSQ-110A (IEER) sonobuoy (# of buoys)	#	80 Buoys	#
(viii) AN/SSQ-125 (AEER) sonobuoy (# of buoys)	#		
(ix) Range Pinger	#	80 hours	#
(x) MK-84 SUS	#	24 devices	#
(xi) PUTR Transponder	#	80 hours	#
(xiii) EMATT	#	12 devices	#

Classified information, the actual amount of sonar use is submitted to the National Marine Fisheries Service (NMFS) in a separate classified annual exercise report.

(ii) Cumulative Impact Report

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 (i.e., other than MTE’s) 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 GoA TMAA. The Navy shall include (in the GoA TMAA annual report) a brief annual progress update on the status of the development of an effective and unclassified method to report this information until an agreed-upon (with NMFS) method has been developed and implemented.”*

The precise locations and frequency of ASW training is classified. There is currently no method to declassify the sensitivity of this data in order to publish this type of information in an unclassified report. For this reason the only method available for this information to be disseminated for the foreseeable future is in the classified version of the GoA TMAA annual exercise report.

(3) GoA TMAA – Sinking Exercises (SINKEX)

(i) Exercise information

Table A3-i. Summary of SINKEX conducted in the GoA TMAA.

(a) Location	(b) Date/time exercise began/ended	(c) Total hours of observation before, during, and after exercise	(d) Total number and types of rounds expended/explosives detonated	(e) Number and types of passive acoustic sources used in exercise	(f) Total hours of passive acoustic search time	(g) Number and types of vessels and aircraft participating	(h) Wave height in ft (High, Low, Avg)	(i) Narrative description of sensors and platforms used for marine mammal detection and timeline illustrating how marine mammal detection was conducted
A SINKEX event was not conducted during Northern Edge 2015.								

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(ii) Individual marine mammal observation information

Table A3-ii-1. Mammal sighting information for SINKEX.

(a) Location	(b) Species	(c) Number of individuals	(d) Calves observed (y/n)	(e) Initial detection sensor	(f) Length of observation (min)	(g) Wave height	(h) Visibility	(i) Sighted before/during/after exercise, and time (min)	(j) Distance of mammal from detonation	(k) Observed behavior	(l) Mitigation implementation	(m) If observation occurs during detonation, indicate munitions type
A SINKEX event was not conducted in Northern Edge 2015.												

(4) GoA TMAA – IEER/AEER Summary

The annual summary of Advanced Extended Echo-Ranging System (AEER) sonobuoys use within the GoA TMAA Study Area is classified. The actual amount of sonar use is submitted to the National Marine Fisheries Service (NMFS) in a separate classified annual exercise report.

Table A4-1. AEER events conducted and buoys expended, detonated, and self-scuttled.

Period	(i) # Events	(ii) # Expended	(ii) # Detonated	(iii) # Self-scuttled
Northern Edge 2015	#	#	#	#
Total Annual	#	#	#	#

Classified information.

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(5) GoA TMAA – Explosives Summary

Table A5-1. Explosives usage in the GoA TMAA.

(ii) Total annual number of each type of explosive exercise			
Authorized Exercise	Total Exercise Amount May-Oct 2015 (~5 months)	Amt. Annual Authorized	% Total Used To Total Authorized
(A) Surface to Surface Gunnery Exercises	#	12	#
(B) Bombing Exercises (BOMBEX)	#	36	#
(C) Sinking Exercises (SINKEX)	#	2	#
(D) Extended Echo Ranging and Improved Echo Ranging (IEER/AEER*) Systems	#	80	#
(E) Missile Exercises	#	4	#
(i) Total annual expended/detonated rounds for each explosive type			
Category	Authorized quantity/year	Total Amount Used May-Oct 2015 (~5 months)	
(A) 5” Naval rounds	84 HE	#	
(B) 76mm Naval rounds	28 HE	#	
(C) Maverick Missile	3 HE	#	
(D) MK-82 bomb	7 HE	#	
(E) MK-83 bomb	4 HE	#	
(F) MK-83 bomb**	4 HE	#	
(G) MK-84 bomb	1 HE	#	
(H) MK-48 torpedo	2 HE	#	
(D) IEER/AEER Systems	80	#	

*AEER buoys are not explosive sources but are grouped here with IEER buoys..

**As listed in the LOA, MK-83 is listed twice

Classified information, the actual amount of at-sea explosive use is submitted to the National Marine Fisheries Service (NMFS) in a separate classified annual exercise report.

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