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2022
Hawaii/SOCAL Training & Testing (HSTT) Study Area Annual Training Report

21 December 2021 to 20 December 2022
Year 4

21 MARCH 2023

TABLE OF CONTENTS

ANNUAL HSTT STUDY AREA TRAINING REPORT

INTRODUCTION 3

(1) HSTT – Major Training Exercises (MTEs)
(i) Exercise information (for each MTE) 4
(ii) Individual marine mammal sighting information for each sighting when mitigation occurred during each MTE 4
(iii) Evaluation (based on data gathered during all MTEs) of effectiveness 6

(2) HSTT – Sinking Exercises (SINKEXs) 8

(3) HSTT – Summary of Sources Used
(i) Total annual hours or quantity of each bin of sonar or other acoustic sources 10
(ii) Total annual expended/detonated ordnance for each explosive bin 10

(4) HSTT – Humpback Whale Special Reporting Area (December 15 – April 15) 11

(5) HSTT – HSTT Study Area Mitigation Areas 11

(6) HSTT – Geographic Information Presentation 12

(7) HSTT – Sonar Exercise Notification 13

HAWAII-SOUTHERN CALIFORNIA TRAINING AND TESTING STUDY AREA ANNUAL TRAINING REPORT

INTRODUCTION

The U.S. Navy prepared this Annual Training Report covering the period from 21 December 2021 to 20 December 2022 in compliance with the National Marine Fisheries Service (NMFS) Final Rule, Letters of Authorization (LOA), and Incidental Take Statements under the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) authorizations for the U.S. Navy's Hawaii-Southern California Training and Testing (HSTT) Study Area.

In the HSTT Final Rule and Letters of Authorization,[1] the following report subsections were specified and are present within this report:

(1) Major Training Exercises (MTEs)
- (i) Exercise information (for each MTE)
- (ii) Individual marine mammal sighting information for each sighting in each exercise when mitigation occurred
- (iii) Evaluation (based on data gathered during all MTEs) of the effectiveness of mitigation measures designed to minimize the received level to which marine mammals may be exposed

(2) Sinking Exercises (SINKEXs)
- (i) Exercise information (gathered for each SINKEX)
- (ii) Individual marine mammal observation (by Navy Lookouts) information (gathered for each marine mammal sighting) for each sighting where mitigation was implemented

(3) Summary of Sources Used
- (i) Total annual hours or quantity (per the LOA) of each bin of sonar or other acoustic sources (pile driving and air gun activities)
- (ii) Total annual expended/detonated ordnance (missiles, bombs, sonobuoys, etc.) for each explosive bin

(4) Humpback Whale Special Reporting Area (December 15 – April 15)

(5) HSTT Study Area Mitigation Areas

(6) Geographic Information Presentation

(7) Sonar Exercise Notification

The information in this report represents the best practical data collection for this period.

[1]HSTT Requirements for Monitoring and Reporting, 50 CFR 218.75(e)(1) through (e)(7). The reporting requirements are also delineated in section 7(e) of the Training Letter of Authorization.

(1) HSTT – Major Training Exercises

This section summarizes authorized sonar use and marine mammal observations from MTEs conducted within the HSTT Study Area during the reporting period. The HSTT MTEs include Large Integrated Anti-Submarine Warfare, which consists of ***Composite Training Unit Exercises*** (C2X) and ***Rim of the Pacific Exercise*** (RIMPAC), and Medium Integrated Anti-Submarine Warfare, which consists of ***Fleet Exercises*** (FLEETEX), ***Sustainment Exercises*** (SUSTEX), and ***Undersea Warfare Exercises*** (USWEX).

(i) Exercise information

Table 1-1. MTEs conducted in the HSTT Study Area

(A) Exercise designator	(B) Date began and ended	(C) Location	(D) Number and types of active sonar sources used	(E) Number and types of passive acoustic sources used	(F) Number and types of vessels, aircraft, and other platforms participating	(G) Total hours of all active sonar source operation	(H) Total hours of each active sonar source bin	(I) Wave height (high, low, average)
RIMPAC	11 Jul – 3 Aug 2022	SOCAL/HRC	*	*	*	*	*	5,1,3
C2X	23 Sep – 22 Oct 2022	SOCAL	*	*	*	*	*	5,2,3

*Information is presented in the classified annex to this report.

(ii) Individual marine mammal sighting information for each sighting in each exercise when mitigation occurred

Table 1-2. HSTT MTE – Individual Marine Mammal and Sea Turtle Mitigation Sighting Information: RIMPAC 11 Jul – 3 Aug 2022

(A) Date/time/location of sighting	(B) Species	(C) Number of individuals	(D) Initial detection sensor	(E) Indication of specific type of platform observation was made from	(F) Length of time observers maintained visual contact with marine mammal (min)	(G) Sea state (Beaufort scale)	(H) Visibility (nm)	(I) Sound source in use at time of sighting (Y/N)	(J) Indication of whether animal was <200 yd, 200-500 yd, 500-1000 yd, 1000-2000 yd, or >2000 yd from sonar source	(K) Whether operation of sonar sensor was delayed, or sonar was powered or shut down, and how long the delay	(L) If source in use was hull-mounted, true bearing of animal from the vessel, true direction of vessel's travel, and estimation of animal's motion relative to vessel	(M) Lookouts must report, in plain language and without trying to categorize in any way, the observed behavior of the animal(s) and if any calves were present
No marine mammal mitigations reported during this exercise.												

Table 1-3. HSTT MTE – Individual Marine Mammal and Sea Turtle Mitigation Sighting Information: C2X 23 Sep – 22 Oct 2022

(A) Date/time/location of sighting			(B) Species	(C) Number of individuals	(D) Initial detection sensor	(E) Indication of specific type of platform observation was made from	(F) Length of time observers maintained visual contact with marine mammal (min)	(G) Sea state (Beaufort scale)	(H) Visibility (nm)	(I) Sound source in use at time of sighting (Y/N)	(J) Indication of whether animal was <200 yd, 200-500 yd, 500-1000 yd, 1000-2000 yd, or >2000 yd from sonar source	(K) Whether operation of sonar sensor was delayed, or sonar was powered or shut down, and how long the delay	(L) If source in use was hull-mounted, true bearing of animal from the vessel, true direction of vessel's travel, and estimation of animal's motion relative to vessel	(M) Lookouts must report, in plain language and without trying to categorize in any way, the observed behavior of the animal(s) and if any calves were present
5-Oct	1905Z	SOCAL	Whale	1	Vis	DDG	15	2	10	N	<200	Sonar delayed 93 minutes	Whale bearing 110T, ship course 180T, whale paralleling ship	Blowing
6-Oct	1918Z	SOCAL	Dolphin	1	Vis	DDG	NR	NR	NR	Y	<200	Sonar shut down	Dolphin bearing 090T, ship course 120T, relative motion NR	None

NR=not reported

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

There were two major training exercises conducted in the HSTT Study Area this reporting period (see **Table 1-4**). In support of these MTEs, the Navy conducted over 1,930 hours of Marine Species Awareness Training for at least 1,242 personnel prior to the beginning of these training exercises.

Table 1-4. HSTT Study Area Major Training Exercises.

MTE Type	Dates	# of Exercise Days	# of US Ships Involved (MFAS and non-MFAS)	# of Marine Mammal Mitigation Sightings	# of Marine Mammals
RIMPAC	11 Jul - 3 Aug 2022	24	18	0	0
C2X	23 Sep – 22 Oct 2022	30	10	2	2
	Total	**54**	**28**	**2**	**2**

HSTT Study Area Major Training Exercise Marine Mammal Observations When Mitigation Occurred

There were two marine mammal sightings over the course of the two MTEs in the HSTT Study Area (see **Table 1-4**) that required active sonar mitigation. The breakdown of sightings by species type is shown in **Table 1-5**.

Table 1-5. Total number of marine mammal sightings observed from Navy platforms when mitigation occurred during Major Training Exercises.

Species Type	# of Sightings	% of Total Sightings	# of Marine Mammals	% of Total Number of Marine Mammals
Dolphins	1	50%	1	50%
Whales	1	50%	1	50%
Pinnipeds	0	0%	0	0%
Turtles	0	0%	0	0%
Not recorded	0	0%	0	0%
Total	**2**		**2**	

SUMMARY: Mitigation Effectiveness and Navy Safety Zone Adherence

During this year's MTEs in the HSTT Study Area, prescribed NMFS mitigation zones were effectively applied in cases of observation of marine mammals within the applicable zone. **Table 1-6** depicts the maximum estimated received levels by the marine mammal at the time the mitigation measure was applied. In each case, the Permanent Threshold Shift (PTS) threshold is higher than the estimated maximum exposure level prior to mitigation which means that the marine mammal was unlikely to experience injury. During this reporting period the proper implementation of mitigation measures for sighted marine mammals is estimated to be highly effective at preventing exposures that may result in injury (e.g. PTS).

The two categories of mitigation measures (procedural mitigation and mitigation areas) outlined in the HSTT Final Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) of October 2018 and approved by NMFS in the HSTT Training LOA were effective in appropriately mitigating exposure of marine mammals to sonar. Fleet commanders, aircrews 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 (including online training required for watch standing qualifications), adherence to required active sonar mitigation zones, and application of lessons learned in marine mammal sighting and reporting.

Table 1-6. Sightings where sonar was on during detection of marine mammals, and the mitigation conducted.

1) Location	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 (Sonar power-down, Sonar shutdown)	10) Estimate MAX exposure PRIOR to mitigation (dB re 1uPa)[1]	11) Number of minutes sonar mitigation applied	12) Estimate exposure AFTER mitigation (dB re 1uPa)[1]	13) DISTANCE ship would have moved given length of mitigation and nominal 10-knot ship speed (yds)	14) If source in use was hull-mounted, true bearing of animal from the vessel, true direction of vessel's travel, and estimation of animal's motion relative to vessel	15) Observed behavior
SOCAL	C2X	Oct	Dolphin	1	DDG	NR	<200	Shut down sonar	<189	30	None	10,000	Dolphin bearing 090T, ship course 120T, relative motion NR	None

[1]Estimated exposure based on 20Log[R] spherical spreading propagation loss for ranges less than 1,000 yards and where nominal active sonar Source Level (SL) assumed to be 235 dB for CGs and DDGs. Actual operating parameters and oceanographic condition likely result in lower exposure. This calculation assumes exposure prior to mitigation. Once the animal was spotted at the range indicated, applied mitigation would have resulted in much lower to no exposures.
NR=not reported

Exposure Assessment

Estimated exposures within 2,000 yards can be determined based on standard formulas of how sound propagates in water. Spherical spreading is generally valid within 1,000 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). Spherical spreading loss in the first 1,000 yards equates to 60 dB of loss. At ranges between 1,000 and 2,000 yards, the sound waves become trapped by the sea surface and bottom and cannot 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 (10logR2/R1), with "R2" being the longer range, and "R1" being 1,000 yards. Cylindrical spreading loss between 1,000 and 2,000 yards equates to an additional 3 dB of loss. By the time the wave has propagated to 2,000 yards, the sonar signal strength has decreased by a total of 63 dB. Using the AN/SQS-53 sonar as an example, transmitting at 235 dB and subtracting the 63 dB of spreading loss equates to an estimated sonar Receive Level (RL) of 172 dB at 2,000 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 the relative motion of ships and animals at sea, the time spent with any given exposure from surface ships is likely to be limited.

(2) HSTT – Sinking Exercises (SINKEXs)

Two SINKEX events were conducted in the HSTT Study Area during the reporting period, one on 12 July 2022 and one on 22 July 2022.

Table 2-1. SINKEX information for event on 12 July 2022.

(A) Location
Hawaii Range Complex
(B) Date and time exercise began and ended
0438 local, 12 July 2022 through 2145 local, 12 July 2022
(C) Total hours of observation by Lookouts before, during, and after exercise
192 hours
(D) Total number and types of explosive bins detonated
E6: 10 detonations E9: 9 detonations E10: 11 detonations E12: 1 detonation
(E) Number and types of passive acoustic sources used in exercise
1x SQS-53 surface hull-mounted sonar 1x BQQ-10 submarine hull-mounted sonar 20x SSQ-53 passive sonobuoys
(F) Total hours of passive acoustic search time
38 hours
(G) Number and types of vessels, aircraft, and other platforms participating in exercise
USNS GRASP (Non-ASW ship) USS TOPEKA (SSN) USS MOBILE BAY (CG) HMCS WINNIPEG (Canada) KD LEKIR (Malaysia) RAAF 11 Squadron, VP-4, VP-10, VP-47, VP-40 (P-8 aircraft) USAF 163 Attack Wing (UAV aircraft) CVW-9, VFA-41, VFA-14, VFA-151 (F/A-18 aircraft)

VMFA-314 (F-35 aircraft) HSC-14, HSM-71 (H-60 helicopter aircraft)
(H) Wave height in feet (high, low, average) during exercise
6,5,5
(I) Narrative description of sensors and platforms utilized for marine mammal detection and timeline illustrating how marine mammal detection was conducted
In addition to surface ship Lookouts, aircraft surveys were conducted throughout the day. Aircraft included MQ-9 UAV and P-8 maritime patrol aircraft. 20 passive sonobuoys were deployed to monitor during the torpedo shot. Timeline (all times local): 0438 Hulk released, set adrift 0601 Sunrise 0645-0800 Mammal survey 0835-0854 P-8 mammal survey 1645-1810 P-8 mammal survey; buoy field deployed 1924 Sunset 2145 Hulk sunk

Table 2-2. SINKEX information for event on 22 July 2022.

(A) Location
Hawaii Range Complex
(B) Date and time exercise began and ended
0336 local, 22 July 2022 through 2137 local, 22 July 2022
(C) Total hours of observation by Lookouts before, during, and after exercise
122 hours
(D) Total number and types of explosive bins detonated
E1: 600 detonations E3: 24 detonations E5: 18 detonations E6: 10 detonations E8: 1 detonation E9: 2 detonations E10: 3 detonations E11: 2 detonations E12: 1 detonation
(E) Number and types of passive acoustic sources used in exercise
1x SQS-53 surface hull-mounted sonar 1x BQQ-10 submarine hull-mounted sonar
(F) Total hours of passive acoustic search time
20 hours
(G) Number and types of vessels, aircraft, and other platforms participating in exercise
USNS GRASP (Non-ASW ship) USS TULSA (SSN) USS CHAFEE (DDG) VP-10, VP-45 (P-8 aircraft) USAF 163 Attack Wing (UAV aircraft) CVW-9, VFA-41, VMFA-232 (F/A-18 aircraft) 25th Combat Aviation Brigade (AH-64 helicopter aircraft) JGSDF 5th SSM Regiment (Japan)
(H) Wave height in feet (high, low, average) during exercise
5,4,4

(I) Narrative description of sensors and platforms utilized for marine mammal detection and timeline illustrating how marine mammal detection was conducted
In addition to surface ship Lookouts, aircraft surveys were conducted prior to exercise. Survey platforms included S-61 range support helicopter aircraft. Timeline (all times local): 0336 Hulk released, set adrift 0600-0800 Mammal survey 0607 Sunrise 1923 Sunset 2030-2100 Surface ship mammal survey 2137 Hulk sunk

(3) HSTT – Summary of Sources Used

This section summarizes total annual usage of each type of sound source used for training within HSTT from 21 December 2021 to 20 December 2022, which constitutes Year 4 of the 7-year authorization.

(i) Total annual hours or quantity of each bin of sonar or other acoustic sources

Table 3-1. Annual Training Acoustic Source Usage within the HSTT Study Area by Source Bin

Authorized sound sources from HSTT Final Rule		Authorized Amount (21Dec21-20Dec22)	Actual Usage (21Dec21-20Dec22)	% Used of Authorized Amount
(i) Acoustic Sources Used During Annual Training				
Pile driving	Pile driving (impact)	238 count	0	0%
Pile removal	Vibratory pile removal	238 count	0	0%
See classified annex for all other acoustic sources				

(ii) Total annual expended/detonated ordnance for each explosive bin

Table 3-2. Annual Training Explosive Source Usage within the HSTT Study Area by Source Bin

Authorized sound sources from HSTT Final Rule		Authorized Amount (21Dec21-20Dec22)	Actual Usage (21Dec21-20Dec22)	% Used of Authorized Amount
(ii) Explosive Sources Used During Annual Training				
E1	Medium-caliber projectile	2,940 detonations	876	30%
E2	Medium-caliber projectile	1,746 detonations	52	3%
E3	Large-caliber projectile	2,797 detonations	2,603	93%
E4	Mine neutralization charge	38 detonations	38	100%
E5	5-inch projectile	4,830 detonations	1,721	36%
E6	Hellfire missile	592 detonations	181	31%
E7	Demo block / shaped charge	13 detonations	13	100%
E8	Maverick missile	38 detonations	32	84%
E9	500 lb. bomb	450 detonations	42	9%
E10	Harpoon missile / 1000 lb. bomb	224 detonations	78	35%
E11	650 lb. mine	17 detonations	2	12%
E12	2,000 lb. bomb	21 detonations	3	14%
E13	Multiple Mat Weave charges	9 detonations	6	67%

Table 3-3. 7-year Cumulative Training Sound Source Usage within the HSTT Study Area by Source Bin

Sound Source Bin	Year 1 Actual Usage (21Dec18-20Dec19)	Year 2 Actual Usage (21Dec19-20Dec20)	Year 3 Actual Usage (21Dec20-20Dec21)	Year 4 Actual Usage (21Dec21-20Dec22)	7-yr Authorized Amount (21Dec18-20Dec25)	7-yr Cumulative Actual Usage (21Dec18-20Dec25)	% Used of 7-yr Authorized Amount
(i) Acoustic Sources Used During Annual Training							
Pile driving	0	0	0	0	1,666	0	0%
Pile removal	0	0	0	0	1,666	0	0%
See classified annex for all other acoustic sources							
(ii) Explosive Sources Used During Annual Training							
E1	2,629	0	0	876	20,580	3,505	17%
E2	492	494	0	52	12,222	1,038	8%
E3	405	2,068	2,736	2,603	19,579	7,812	40%
E4	4	96	38	38	266	176	66%
E5	773	914	900	1,721	33,310	4,308	13%
E6	35	57	116	181	4,056	389	10%
E7	1	8	9	13	91	31	34%
E8	17	16	3	32	241	68	28%
E9	38	18	26	42	2,950	124	4%
E10	16	26	9	78	1,543	129	8%
E11	1	0	0	2	69	3	4%
E12	0	0	2	3	114	5	4%
E13	0	8	0	6	63	14	22%

(4) HSTT – Humpback Whale Special Reporting Area (December 15 – April 15)

The amount of surface ship hull-mounted mid-frequency active sonar used for training in the six Humpback Whale Special Reporting Areas from December 15 to April 15 is presented in the classified annex to this report.

(5) HSTT – HSTT Study Area Mitigation Areas

Table 5-1. Training Active Sonar & In-Water Explosive Usage within the Hawaii Island Mitigation Area (year-round)

Authorized sound sources from HSTT Final Rule		Actual Usage[1]
Active Sonar	All Source Bins	*
In-Water Explosives	All Explosive Bins	0

[1]MF1 usage did not exceed 300 hours and MF4 usage did not exceed 20 hours.
*Information is presented in the classified annex of this report.

Table 5-2. Training Active Sonar & In-Water Explosive Usage within the 4-Islands Region Mitigation Area (November 15 through April 15 for active sonar; year-round for explosives)

Authorized sound sources from HSTT Final Rule		Actual Usage
Active Sonar	All Source Bins	*
In-Water Explosives	All Explosive Bins	0

*Information is presented in the classified annex to this report.

Table 5-3. Training Active Sonar & In-Water Explosive Usage within the San Diego Arc Mitigation Area (June 1 through October 31)

Authorized sound sources from HSTT Final Rule		Actual Usage[1]
Active Sonar	All Source Bins	*
In-Water Explosives	All Explosive Bins	0

[1]Combined MF1 usage did not exceed 200 hours.
*Information is presented in the classified annex to this report.

Table 5-4. Training Active Sonar & In-Water Explosive Usage within the San Nicholas Island Mitigation Area (June 1 through October 31)

Authorized sound sources from HSTT Final Rule		Actual Usage[1]
Active Sonar	All Source Bins	*
In-Water Explosives	All Explosive Bins	0

[1]Combined MF1 usage did not exceed 200 hours.
*Information is presented in the classified annex to this report.

Table 5-5. Training Active Sonar & In-Water Explosive Usage within the Santa Monica/Long Beach Mitigation Area (June 1 through October 31)

Authorized sound sources from HSTT Final Rule		Actual Usage[1]
Active Sonar	All Source Bins	*
In-Water Explosives	All Explosive Bins	0

[1]Combined MF1 usage did not exceed 200 hours.
*Information is presented in the classified annex to this report.

Table 5-6. Training Active Sonar & In-Water Explosive Usage within the Santa Barbara Island Mitigation Area (year-round)

Authorized sound sources from HSTT Final Rule		Actual Usage[1]
Active Sonar	All Source Bins	*
In-Water Explosives	All Explosive Bins	0

*Information is presented in the classified annex of this report.

(6) HSTT – Geographic Information Presentation

The precise locations and frequency of ASW training are 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 available method for this information to be disseminated is in the classified annex of this report.

(7) HSTT – Sonar Exercise Notification

The Navy submitted all required information to NMFS for all MTEs during the reporting period, including location of the exercise, beginning and end dates of the exercise, and type of exercise.