Environmental Impact Statement/

Overseas Environmental Impact Statement

Point Mugu Sea Range

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Appendix C Predicted Marine Mammal Effects Resulting from Navy Activities Involving Use of Explosives at or Near the Ocean's Surface

Ongoing and proposed Navy activities are estimated to result in the incidental takes of marine mammals within the Point Mugu Sea Range (PMSR) Study Area. This appendix provides the predicted number and type of effects to marine mammals that could potentially be exposed to sound in the water from surface explosives based on an acoustic model pursuant to the requirements of the Marine Mammal Protection Act (MMPA). For explosives, these predicted estimates were based on MMPA criteria (U.S. Department of the Navy, 2017) and using the Navy's Acoustic Effects Modeling as discussed in Section 3.7 (Marine Mammals) and cited references (U.S. Department of the Navy, 2017, 2020). Specifically, estimated effects are derived from the quantitative analysis for the current baseline of activities, Alternative 1 (Alt 1), and Alternative 2 (Alt 2) that involve the use of explosives as acoustic stressors.

These estimates do not account for potential reduction or avoidance of impacts by Navy Standard Operating Procedures or implemented procedural mitigation measures as provided in Chapter 5 (Standard Operating procedures and Mitigation). Because the modeling involving underwater acoustic stressors uses static animats to calculate potential impacts, these estimates also do not account for any marine mammals moving away from a location of noise or preliminary set-up activity. In addition, the estimates presented do not account for other conservative assumptions made to err on the side of overestimation such as modeling surface or near-surface in-air detonations as occurring 0.1 m below the surface with no energy loss from collapse of a cavitation bubble at the surface (Urick, 1983) or from surface blow-off (U.S. Department of the Navy, 2018).

A detailed explanation of the quantitative analysis is provided in the technical report *Quantifying Acoustic Impacts on Marine Mammals and Sea Turtles: Methods and Analytical Approach for Phase III Training and Testing* (U.S. Department of the Navy, 2020). Basically, the quantitative analysis for use of explosives detonating at or near the water surface takes into account the type of Navy activity, the marine species density in locations where activities occur, acoustic modeling of underwater sound, and other environmental factors such as seasonal changes in the density and distribution of marine mammals. It is important to note that underwater acoustic effects numbers, as presented in this appendix, are the summations of estimated fractional probability of marine mammal exposures to underwater sound, not necessarily the number of individuals impacted. For example, some individual marine mammals could be impacted several times, while others in the population may not experience any impacts as a result of Navy activity.

The take tables below represent the estimated impacts under the current baseline, Alternative 1 (Alt 1), and Alternative 2 (Alt 2) for any given year and across a consecutive seven-year period over the duration of the anticipated MMPA Regulations and Letter of Authorization, which would be valid for a seven-year period.

C.1 Predicted Annual Effects to Marine Mammal from Explosives

Table C-1 provides a summary of the estimated number of potential marine mammal effects from exposure to explosives detonating at or near the surface when used during Navy testing and training activities under the current baseline conditions, Alternative 1 (Alt 1), and Alternative 2 (Alt 2) over the course of a year. The analysis indicates exposures above the non-auditory injury thresholds, should not occur as a result of Navy testing and training activities in the PMSR Study Area.

Table C-1: Predicted Marine Mammal Effects per Year from Explosives

Common Name	Stock/DPS	Baseline			Alt 1			Alt 2		
		Behavioral Response	TTS	PTS	Behavioral Response	TTS	PTS	Behavioral Response	TTS	PTS
Blue whale*	Eastern North Pacific	1	1	0	7	4	0	2	2	0
Bryde's whale	Eastern Tropical Pacific	0	0	0	0	0	0	0	0	0
Fin whale*	California, Oregon, and Washington	2	2	0	14	7	1	3	3	1
Gray whale	Eastern North Pacific	1	1	0	9	5	0	4	3	0
	Western North Pacific†	0	0	0	0	0	0	0	0	0
Humpback whale*	California, Oregon, and Washington/Mexico DPS	1	1	0	7	4	0	2	2	0
	California, Oregon, and Washington/Central America DPS	0	0	0	1	0	0	0	0	0
Minke whale	California, Oregon, and Washington	0	0	0	2	1	0	0	0	0
Sei whale*	Eastern North Pacific	0	0	0	0	0	0	0	0	0
Baird's beaked whale	California, Oregon, and Washington	0	0	0	0	0	0	0	0	0
Bottlenose dolphin	California Coastal	0	0	0	0	0	0	0	0	0
	California, Oregon, and Washington Offshore	1	1	0	5	5	1	1	2	0
Cuvier's beaked whale	California, Oregon, and Washington	0	0	0	0	0	0	0	0	0
Dall's porpoise	California, Oregon, and Washington	41	93	11	261	406	49	65	160	18
Dwarf sperm whale	California, Oregon, and Washington	3	7	1	20	31	6	5	12	2

Table C-1: Predicted Marine Mammal Effects per Year from Explosives (continued)

Common Name	Stock/DPS	Baseline			Alt 1			Alt 2		
		Behavioral Response	TTS	PTS	Behavioral Response	TTS	PTS	Behavioral Response	TTS	PTS
Harbor Porpoise	Morro Bay	0	0	0	0	0	0	0	0	0
Killer whale	Eastern North Pacific Offshore	0	0	0	0	0	0	0	0	0
	Eastern North Pacific Transient or West Coast Transient	0	0	0	0	0	0	0	0	0
Long-beaked common dolphin	California	7	7	2	66	44	9	13	14	3
Mesoplodont spp.	California, Oregon, and Washington	0	0	0	0	0	0	0	0	0
Northern right whale dolphin	California, Oregon, and Washington	0	0	0	3	2	1	1	1	0
Pacific white-sided dolphin	California, Oregon, and Washington	1	2	0	11	8	2	2	3	1
Pygmy killer whale	-	0	0	0	0	0	0	0	0	0
Pygmy sperm whale	California, Oregon, and Washington	3	7	1	20	31	6	5	12	2
Risso's dolphins	California, Oregon, and Washington	1	1	0	6	3	1	1	1	0
Short-beaked common dolphin	California, Oregon, and Washington	11	13	3	90	65	15	21	23	5
Short-finned pilot whale	California, Oregon, and Washington	0	0	0	0	0	0	0	0	0

Table C-1: Predicted Marine Mammal Effects per Year from Explosives (continued)

Common Name	Stock/DPS	Baseline			Alt 1			Alt 2		
		Behavioral Response	TTS	PTS	Behavioral Response	TTS	PTS	Behavioral Response	TTS	PTS
Sperm whale*	California, Oregon, and Washington	0	0	0	1	1	0	0	1	0
Striped dolphin	California, Oregon, and Washington	0	0	0	1	1	0	0	0	0
Harbor seal	California	24	20	4	202	120	14	44	36	7
Northern elephant seal	California	5	14	7	37	20	9	9	25	11
California sea lion	U.S. Stock	1	2	1	8	12	2	2	3	1
Guadalupe fur seal*	Mexico to California	0	0	0	1	1	0	0	0	0
Northern fur seal	California	0	0	0	0	0	0	0	0	0
Southern sea otter	Southern Sea Otter	0	0	0	0	0	0	0	0	0

* ESA-listed species within the PMSR Study Area. †Only the designated stock is ESA-listed.
Notes: PTS = permanent threshold shift; TTS = temporary threshold shift.

C.2 Predicted Marine Mammal Effects per Seven-Year Period from Explosives

Table C-2 provides a summary of the estimated number of potential marine mammal effects from exposure to explosives used during Navy testing and training activities under the baseline, Alternative 1 (Alt 1), and Alternative 2 (Alt 2) over the course of seven years.

Table C-2: Predicted Marine Mammals Effects per Seven-Year Period from Explosives

Common Name	Stock/DPS	7-Year Baseline			7-Year Alt 1			7-Year Alt 2		
		Behavioral Response	TTS	PTS	Behavioral Response	TTS	PTS	Behavioral Response	TTS	PTS
Blue whale*	Eastern North Pacific	8	7	0	52	27	0	12	12	0
Bryde's whale	Eastern Tropical Pacific	0	0	0	0	0	0	0	0	0
Fin whale*	California, Oregon, and Washington	16	13	0	101	46	7	23	20	4
Gray whale	Eastern North Pacific	10	9	0	65	37	0	15	13	0
	Western North Pacific†	0	0	0	0	0	0	0	0	0
Humpback whale*	California, Oregon, and Washington, Mexico DPS	8	7	0	52	29	0	12	11	0
	California, Oregon, and Washington, Central America DPS	0	0	0	6	0	0	0	0	0
Minke whale	California, Oregon, and Washington	0	0	0	15	6	0	0	0	0
Sei whale*	Eastern North Pacific	0	0	0	0	0	0	0	0	0
Baird's beaked whale	California, Oregon, and Washington	0	0	0	0	0	0	0	0	0
Bottlenose dolphin	California Coastal	0	0	0	0	0	0	0	0	0
	California, Oregon, and Washington Offshore	4	6	0	37	36	4	8	11	0
Cuvier's beaked whale	California, Oregon, and Washington	0	0	0	0	0	0	0	0	0
Dall's porpoise	California, Oregon, and Washington	290	650	74	1,824	2,845	341	453	1,119	127
Dwarf sperm whale	California, Oregon, and Washington	21	48	10	142	217	43	34	85	17

Table C-2: Predicted Marine Mammals Effects per Seven-Year Period from Explosives (continued)

Common Name	Stock/DPS	7-Year Baseline			7-Year Alt 1			7-Year Alt 2		
		Behavioral Response	TTS	PTS	Behavioral Response	TTS	PTS	Behavioral Response	TTS	PTS
Harbor Porpoise	Morro Bay	0	0	0	0	0	0	0	0	0
Killer whale	Eastern North Pacific Offshore	0	0	0	0	0	0	0	0	0
	Eastern North Pacific Transient or West Coast Transient[6]	0	0	0	0	0	0	0	0	0
Long-beaked common dolphin	California	49	50	11	464	310	65	93	95	23
Mesoplodont spp.	California, Oregon, and Washington	0	0	0	0	0	0	0	0	0
Northern right whale dolphin	California, Oregon, and Washington	0	0	0	22	16	4	5	5	0
Pacific white-sided dolphin	California, Oregon, and Washington	9	11	0	76	58	14	17	20	5
Pygmy killer whale	-	0	0	0	0	0	0	0	0	0
Pygmy sperm whale	California, Oregon, and Washington	20	49	10	141	219	44	34	85	17
Risso's dolphins	California, Oregon, and Washington	4	5	0	39	24	6	10	9	0

Table C-2: Predicted Marine Mammals Effects per Seven-Year Period from Explosives (continued)

Common Name	Stock/DPS	7-Year Baseline			7-Year Alt 1			7-Year Alt 2		
		Behavioral Response	TTS	PTS	Behavioral Response	TTS	PTS	Behavioral Response	TTS	PTS
Short-beaked common dolphin	California, Oregon, and Washington	77	91	18	630	456	103	145	160	33
Short-finned pilot whale	California, Oregon, and Washington	0	0	0	0	0	0	0	0	0
Sperm whale*	California, Oregon, and Washington	0	0	0	7	8	0	0	0	0
Striped dolphin	California, Oregon, and Washington	0	0	0	5	4	0	0	0	0
Harbor seal	California	166	141	30	1,141	842	99	309	252	47
Northern elephant seal	California	37	98	48	258	444	152	61	174	79
California sea lion	U.S. Stock	6	12	5	58	81	16	11	24	9
Guadalupe fur seal*	Mexico to California	0	0	0	5	7	0	0	0	0
Northern fur seal	California	0	0	0	0	0	0	0	0	0
Southern sea otter	Southern Sea Otter	0	0	0	0	0	0	0	0	0

* ESA-listed species within the PMSR Study Area. †Only the designated stock is ESA-listed.
Notes: PTS = permanent threshold shift; TTS = temporary threshold shift.

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