

APPENDIX E

SUMMARY OF ACOUSTIC MODELING RESULTS

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E SUMMARY OF ACOUSTIC MODELING RESULTS

When analyzing the results of the acoustic effect modeling to provide an estimate of harassment, it is important to understand that there are limitations to the ecological data used in the model, and to interpret the model results within the context of a given species' ecology. In particular, density estimates used in the model were calculated for an area much larger than the range itself, encompassing a diverse swath of habitats beginning with inshore coastal environments and moving to the shelf edge and pelagic systems well offshore in the Gulf Stream (refer to Subchapter 3.3.2 for a summary).

Although the model differentiates between off-shelf and on-shelf depth strata, actual distributions of animals are patchy and more isolated than they appear in the density estimates used. It is also important to understand that the estimates of marine mammal sound exposures are presented **without** consideration of mitigation. The Navy will work through the ESA consultation process to evaluate the mitigation measures to reduce the potential for incidental harassment to ESA-listed species (see Chapter 6). Based on the ongoing consultation and the consideration of mitigation with NMFS, the Navy would request authorization under MMPA and ESA for any listed species where NMFS concludes that incidental harassment may occur.

E.1 Summary of Modeling Results Published in 2008 for Site A off the Coast of Northeastern Florida

Table E-1 provides the Site A annual raw acoustic exposure estimates by source, Table E-2 provides the Site A effect estimate by training scenario, and Table E-3 provides the Site A effect estimate by mammal species.

E.2 Summary of Modeling Results Published in 2008 for Site B off the Coast of South Carolina

Table E-4 provides the Site B annual raw acoustic exposure estimates by source, Table E-5 provides the Site B effect estimate by training scenario, and Table E-6 provides the Site B effect estimate by mammal species.

E.3 Summary of Modeling Results Published in 2008 for Site C off the Coast of Southeastern North Carolina

Table E-7 provides the Site C annual raw acoustic exposure estimates by source, Table E-8 provides the Site C effect estimate by training scenario, and Table E-9 provides the Site C effect estimate by mammal species.

E.4 Summary of Modeling Results Published in 2008 for Site D off the Coast of Northeastern Virginia

Table E-10 provides the Site D annual raw acoustic exposure estimates by source, Table E-11 provides the Site D effect estimate by training scenario, and Table E-12 provides the Site D effect estimate by mammal species.

Table E-1

Site A - MMPA Harassment Estimate Summary by Source
 Total annual number of estimated exposures of all species.
 Exposure thresholds are dB re $1\mu\text{Pa}^2$ -s received EL

Source	Total Estimated Level A MMPA Harassments Using 215 dB EL	Total Estimated MMPA Harassments Using 195 dB EL	Total MMPA Harassments per Estimate
56X Search Mode	0.000	6.107	12032.813
56X Target Mode	0.000	2.003	5978.515
53C Search Mode	4.789	1471.824	58976.699
53C Target Mode	0.000	7.166	13004.079
SUB	0.362	12.236	12168.391
MK-48	0.000	4.216	391.682
ALFS	2.534	193.421	2490.031
DICASS	0.000	2.584	60.674
Fathometer surface ship	0.000	0.000	0.008
Fathometer submarine	0.000	0.000	0.012
MK 54	0.000	0.000	0.000
Mk 46	0.000	0.703	0.436
Pinger	0.000	0.000	1091.624
ADC Mk43	0.137	1.231	142.293
NIXIE	0.000	0.000	69.315
	7.8	1701.49	106406.6

Table E-2

Site A - MMPA Harassment Summary by Scenario
 Total annual number of estimated exposures of all species.
 Exposure thresholds are dB re $1\mu\text{Pa}^2$ -s received EL

	Scenario 1 Estimated MMPA Harassments	Scenario 2 Estimated MMPA Harassments	Scenario 3 Estimated MMPA Harassments	Scenario 4 Estimated MMPA Harassments
Estimated Level A MMPA Harassments	2.091	2.808	0.394	2.529
Estimated Level B MMPA Harassments	158.921	808.692	14.826	719.053
Estimated Behavioral Effects	2761.113	48217.060	12660.934	42767.466

Table E-3

Site A - MMPA Harassment Estimate Summary by Marine Mammal
 Total annual number of estimated exposures of all species.
 Exposure thresholds are dB re $1\mu\text{Pa}^2$ -s received EL

Species	Estimated Level A MMPA Harassments	Estimated Level B MMPA Harassments	Estimated Behavioral Effects
Bottlenose Dolphin	4.339	747.384	49756.949
Pilot Whales	0.062	23.611	1809.482
Common Dolphin	0.000	0.000	0.000
Risso's Dolphin	0.230	28.789	2554.386
All Beaked Whales	0.000	0.037	28.246
Humpback Whales	0.000	1.818	105.639
Sperm Whales	0.000	0.000	0.000
Spotted Dolphins	2.806	808.232	46558.455
Clymene Dolphin	0.119	28.139	1713.101
Northern Right Whales	0.000	0.532	47.005
Pgymy Dwarf Sperm Whales	0.011	2.674	162.778
Rough Toothed Dolphin	0.005	1.270	77.356
Striped Dolphin	0.000	0.000	0.000
Minke Whale	0.000	0.106	7.407
Pantropical Dolphin	0.249	58.898	3585.769
Fin Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000

Table E-4

Site B (EFD) MMPA Harassment Estimate Summary by Source
 Total annual number of estimated exposures of all species.
 Exposure thresholds are dB re $1\mu\text{Pa}^2$ -s received EL

Source	Total Estimated Level A MMPA Harassments Using 215 dB EL	Total Estimated MMPA Harassments Using 195 dB EL	Total MMPA Harassments per Estimate
56X Search Mode	0.000	0.696	2116.222
56X Target Mode	0.000	0.000	0.000
53C Search Mode	0.000	170.914	3300.592
53C Target Mode	0.000	0.800	550.163
SUB	0.000	13.707	856.101
MK-48	0.000	0.685	240.072
ALFS	0.000	11.247	539.752
DICASS	0.000	0.296	56.327
Fathometer surface ship	0.000	0.000	1.556
Fathometer submarine	0.000	0.000	2.334
MK 54	0.000	0.000	0.000
Mk 46	0.000	0.000	0.132
Pinger	0.000	0.000	513.572
ADC Mk43	0.053	0.445	0.236
NIXIE	0.000	0.000	18.650
	0.053	198.792	8195.707

Table E-5

Site B - MMPA Harassment Summary by Scenario
 Total annual number of estimated exposures of all species.
 Exposure thresholds are dB re $1\mu\text{Pa}^2$ -s received EL

	Scenario 1 Estimated MMPA Harassments	Scenario 2 Estimated MMPA Harassments	Scenario 3 Estimated MMPA Harassments	Scenario 4 Estimated MMPA Harassments
Estimated Level A MMPA Harassments	0.016	0.006	0.012	0.019
Estimated Level B MMPA Harassments	9.455	92.691	14.186	82.459
Estimated Behavioral Effects	790.720	3371.665	1097.773	2935.549

Table E-6

Site B - MMPA Harassment Estimate Summary by Marine Mammal
 Total annual number of estimated exposures of all species.
 Exposure thresholds are dB re $1\mu\text{Pa}^2$ -s received EL

Species	Estimated Level A MMPA Harassments	Estimated Level B MMPA Harassments	Estimated Behavioral Effects
Bottlenose Dolphin	0.021	75.822	3298.093
Pilot Whales	0.004	15.396	748.925
Common Dolphin	0.000	0.000	0.000
Risso's Dolphin	0.003	18.564	755.999
All Beaked Whales	0.000	0.000	0.003
Humpback Whales	0.000	0.000	23.050
Sperm Whales	0.000	0.000	0.003
Spotted Dolphins	0.000	0.000	2405.157
Clymene Dolphin	0.000	0.000	296.893
Northern Right Whales	0.000	0.000	4.282
Pgymy Dwarf Sperm Whales	0.000	0.675	28.473
Rough Toothed Dolphin	0.000	0.000	12.477
Striped Dolphin	0.000	0.000	0.000
Minke Whale	0.000	0.000	1.131
Pantropical Dolphin	0.000	0.000	621.222
Fin Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000

Table E-7

Site C - Acoustic Effect Analysis Output by Source
 Total annual number of estimated exposures of all species.
 Exposure thresholds are dB re $1\mu\text{Pa}^2$ -s received EL

Source	Total Estimated Level A MMPA Harassments Using 215 dB EL	Total Estimated MMPA Harassments Using 195 dB EL	Total MMPA Harassments per Estimate
56X Search Mode	0.000	2.208	2273.641
56X Target Mode	0.000	0.741	1209.317
53C Search Mode	1.761	608.735	13600.091
53C Target Mode	0.000	2.621	2680.430
SUB	0.187	10.488	18025.576
MK-48	0.000	2.326	186.230
ALFS	0.000	17.264	3535.262
DICASS	0.000	0.925	105.569
Fathometer surface ship	0.000	0.000	0.008
Fathometer submarine	0.000	0.000	0.012
MK 54	0.000	0.000	0.000
Mk 46	0.000	0.254	0.172
Pinger	0.000	0.000	602.548
ADC Mk43	0.048	0.596	80.811
NIXIE	0.000	0.000	24.629
	1.996	646.157	42324.3

Table E-8

Site C - MMPA Harassment Summary by Scenario
 Total annual number of estimated exposures of all species.
 Exposure thresholds are dB re $1\mu\text{Pa}^2$ -s received EL

	Scenario 1 Estimated MMPA Harassments	Scenario 2 Estimated MMPA Harassments	Scenario 3 Estimated MMPA Harassments	Scenario 4 Estimated MMPA Harassments
Estimated Level A MMPA Harassments	0.014	0.938	0.198	0.846
Estimated Level B MMPA Harassments	14.888	327.868	11.897	291.504
Estimated Behavioral Effects	3327.572	10994.396	18276.524	9725.804

Table E-9

Site C - MMPA Harassment Estimate Summary by Marine Mammal
 Total annual number of estimated exposures of all species.
 Exposure thresholds are dB re 1 μ Pa²-s received EL

Species	Estimated Level A MMPA Harassments	Estimated Level B MMPA Harassments	Estimated Behavioral Effects
Bottlenose Dolphin	0.906	239.840	21861.150
Pilot Whales	0.000	2.915	539.067
Common Dolphin	0.000	0.000	1.165
Risso's Dolphin	0.000	5.600	348.670
All Beaked Whales	0.000	0.000	3.114
Humpback Whales	0.000	0.000	0.000
Sperm Whales	0.000	0.000	0.041
Spotted Dolphins	0.813	304.308	14050.020
Clymene Dolphin	0.086	28.882	1704.117
Northern Right Whales	0.000	0.000	3.487
Pgymy Dwarf Sperm Whales	0.008	2.745	161.917
Rough Toothed Dolphin	0.003	1.305	76.949
Striped Dolphin	0.000	0.000	0.000
Minke Whale	0.000	0.109	7.636
Pantropical Dolphin	0.180	60.454	3566.964
Fin Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000

Table E-10

Site D - Acoustic Effect Analysis Output by Source
 Total annual number of estimated exposures of all species.
 Exposure thresholds are dB re $1\mu\text{Pa}^2$ -s received EL

Source	Total Estimated Level A MMPA Harassments Using 215 dB EL	Total Estimated MMPA Harassments Using 195 dB EL	Total MMPA Harassments per Estimate
56X Search Mode	0.000	11.005	11430.218
56X Target Mode	0.000	0.000	5702.172
53C Search Mode	9.403	3570.075	64215.740
53C Target Mode	0.000	14.064	9113.088
SUB	0.979	79.714	45124.306
MK-48	0.000	15.285	1317.655
ALFS	0.000	62.709	10512.661
DICASS	0.000	4.880	363.437
Fathometer surface ship	0.000	0.000	0.008
Fathometer submarine	0.000	0.000	0.012
MK 54	0.000	0.000	0.000
Mk 46	0.000	1.206	1.003
Pinger	0.000	0.000	2933.533
ADC Mk43	0.247	2.014	230.909
NIXIE	0.000	0.000	108.305
	10.629	3760.951	151053.047

Table E-11

Site D - MMPA Harassment Summary by Scenario
 Total annual number of estimated exposures of all species.
 Exposure thresholds are dB re $1\mu\text{Pa}^2$ -s received EL

	Scenario 1 Estimated MMPA Harassments	Scenario 2 Estimated MMPA Harassments	Scenario 3 Estimated MMPA Harassments	Scenario 4 Estimated MMPA Harassments
Estimated Level A MMPA Harassments	0.073	5.007	1.037	4.512
Estimated Level B MMPA Harassments	55.237	1915.064	88.525	1702.125
Estimated Behavioral Effects	10618.930	49870.331	46527.630	44036.156

Table E-12

Site D - MMPA Harassment Estimate Summary by Marine Mammal
 Total annual number of estimated exposures of all species.
 Exposure thresholds are dB re $1\mu\text{Pa}^2\text{-s}$ received EL

Species	Estimated Level A MMPA Harassments	Estimated Level B MMPA Harassments	Estimated Behavioral Effects
Bottlenose Dolphin	0.212	80.087	6640.133
Pilot Whales	0.133	31.267	3632.056
Common Dolphin	9.240	3329.034	119211.559
Risso's Dolphin	0.169	46.137	2243.339
All Beaked Whales	0.000	0.496	127.614
Humpback Whales	0.000	0.000	0.000
Sperm Whales	0.000	1.108	268.196
Spotted Dolphins	0.000	0.724	80.299
Clymene Dolphin	0.086	31.646	1421.163
Northern Right Whales	0.000	0.359	15.533
Pgymy Dwarf Sperm Whales	0.008	3.007	135.029
Rough Toothed Dolphin	0.003	1.430	64.171
Striped Dolphin	0.597	167.531	14148.420
Minke Whale	0.000	0.120	6.185
Pantropical Dolphin	0.180	66.238	2974.706
Fin Whale	0.000	1.766	84.644
Sei Whale	0.000	0.000	0.000