



Hawaii Range Complex



Final Environmental Impact Statement/ Overseas Environmental Impact Statement (EIS/OEIS)

Volume 4 of 5: Chapter 14

May 2008

Coordinator
Hawaii Range Complex
Pacific Missile Range Facility
P.O. Box 128
Kekaha, Kauai, Hawaii 96752-0128



HAWAII RANGE COMPLEX
FINAL ENVIRONMENTAL IMPACT STATEMENT/
OVERSEAS ENVIRONMENTAL IMPACT STATEMENT

Volume 4 of 5

MAY 2008

Coordinator
Hawaii Range Complex
Pacific Missile Range Facility
P.O. Box 128
Kekaha, Kauai, Hawaii 96752-0128

THIS PAGE INTENTIONALLY LEFT BLANK

COVER SHEET
**FINAL ENVIRONMENTAL IMPACT STATEMENT/
OVERSEAS ENVIRONMENTAL IMPACT STATEMENT**
HAWAII RANGE COMPLEX (HRC)

Lead Agency for the EIS: U.S. Department of the Navy
Title of the Proposed Action: Hawaii Range Complex
Affected Jurisdiction: Kauai, Honolulu, Maui, and Hawaii Counties
Designation: Final Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS)

Abstract

This Final EIS/OEIS has been prepared by the U.S. Department of the Navy (Navy) in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code § 4321 et seq.); the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [CFR] §§ 1500-1508); Navy Procedures for Implementing NEPA (32 CFR § 775); and Executive Order 12114 (EO 12114), *Environmental Effects Abroad of Major Federal Actions*. The Navy has identified the need to support and conduct current, emerging, and future training and research, development, test, and evaluation (RDT&E) activities in the Hawaii Range Complex (HRC). The alternatives—the No-action Alternative, Alternative 1, Alternative 2, and Alternative 3—are analyzed in this Final EIS/OEIS. All alternatives include an analysis of potential environmental impacts associated with the use of mid-frequency active (MFA) and high-frequency active (HFA) sonar. The No-action Alternative stands as no change from current levels of HRC usage and includes HRC training, support, and RDT&E activities, Major Exercises, and maintenance of the technical and logistical facilities that support these activities and exercises. Alternative 1 includes all ongoing training associated with the No-action Alternative, an increased tempo and frequency of such training (including increases in MFA and HFA sonar use), a new training event (Field Carrier Landing Practice), enhanced and future RDT&E activities, enhancements to optimize HRC capabilities, and an increased number of Major Exercises. Alternative 2 includes all of the training associated with Alternative 1 plus additional increases in the tempo and frequency of training (including additional increases in MFA and HFA sonar use), enhanced RDT&E activities, future RDT&E activities, and additional Major Exercises, such as supporting three Strike Groups training at the same time. Alternative 3 would include all of the training and RDT&E activities associated with Alternative 2. The difference between Alternative 2 and Alternative 3 is the amount of MFA/HFA sonar usage. As described under Alternative 2, Alternative 3 would provide increased flexibility in training activities by increasing the tempo and frequency of training events, future and enhanced RDT&E activities, and the addition of Major Exercises. Alternative 3 would consist of the MFA/HFA sonar usage as analyzed under the No-action Alternative. Alternative 3 is the Navy's preferred alternative.

This Final EIS/OEIS addresses potential environmental impacts that result from activities that occur under the No-action Alternative and proposed activities that would occur under Alternatives 1, 2, and 3. This EIS/OEIS also addresses changes and associated environmental analyses that were presented in the Supplement to the Draft EIS/OEIS. Environmental resource topics evaluated include air quality, airspace, biological resources (open ocean, offshore, and onshore), cultural resources, geology and soils, hazardous materials and waste, health and safety, land use, noise, socioeconomics, transportation, utilities, and water resources.

Prepared by: U.S. Department of Defense, Department of the Navy
Point of Contact: Pacific Missile Range Facility Public Affairs Officer
P.O. Box 128, Kekaha, Hawaii, 96752, (866) 767-3347

May 2008

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

TABLE OF CONTENTS

Volume 1

	<u>Page</u>
EXECUTIVE SUMMARY	ES-1
1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION	1-1
1.1 Introduction.....	1-1
1.2 Overview of the Hawaii Range Complex.....	1-2
1.3 Background	1-6
1.3.1 Navy’s At Sea Policy	1-8
1.3.2 Why the Navy Trains	1-9
1.3.3 Tactical Training Theater Assessment and Planning Program	1-11
1.3.4 Mission of the Hawaii Range Complex.....	1-12
1.3.5 Strategic Importance of the Existing Hawaii Range Complex	1-13
1.4 Purpose and Need for the Proposed Action.....	1-14
1.5 The Environmental Review Process	1-15
1.5.1 Scope and Content of the EIS/OEIS	1-15
1.5.2 Cooperating Agencies	1-16
1.5.3 National Environmental Policy Act.....	1-16
1.5.3.1 Public Scoping Process	1-17
1.5.3.2 Public Review Process	1-17
1.5.4 Executive Order 12114.....	1-21
1.5.5 Marine Mammal Protection Act Compliance	1-21
1.5.6 Endangered Species Act Compliance	1-23
1.5.7 Other Environmental Requirements Considered	1-24
1.6 Related Environmental Documents.....	1-24
2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES.....	2-1
2.1 Description of the Hawaii Range Complex.....	2-2
2.2 Proposed Action and Alternatives	2-8
2.2.1 Alternatives Eliminated From Further Consideration	2-9
2.2.1.1 Reduction or Elimination of Training in the Hawaii Range Complex.....	2-9
2.2.1.2 Alternative Locations for Training Conducted in the Hawaii Range Complex	2-10
2.2.1.3 Computer Simulation Training	2-11
2.2.2 No-action Alternative	2-12
2.2.2.1 Hawaii Range Complex Training for the No-action Alternative....	2-13
2.2.2.2 Hawaii Range Complex Support Events for the No-action Alternative	2-16
2.2.2.3 Current Training Events Within the Hawaii Range Complex for the No-action Alternative.....	2-17
2.2.2.4 Mid-Frequency Active/High-Frequency Active Sonar Usage for the No-action Alternative.....	2-21
2.2.2.5 Hawaii Range Complex RDT&E Activities for the No-action Alternative	2-23
2.2.2.5.1 Pacific Missile Range Facility.....	2-25

2.2.2.5.2	Naval Undersea Warfare Center Ranges	2-32
2.2.2.6	Major Exercises for the No-action Alternative	2-36
2.2.2.6.1	Rim of the Pacific	2-36
2.2.2.6.2	Undersea Warfare Exercise	2-39
2.2.2.7	Mitigation Measures for the No-action Alternative	2-40
2.2.3	Alternative 1	2-40
2.2.3.1	Training Events for Alternative 1	2-40
2.2.3.2	MFA/HFA Sonar Usage for Alternative 1	2-40
2.2.3.3	Increased Tempo and Frequency of Training and New Training for Alternative 1	2-41
2.2.3.4	Enhanced RDT&E Activities for Alternative 1	2-42
2.2.3.5	Future RDT&E Activities for Alternative 1	2-42
2.2.3.6	Hawaii Range Complex Enhancements for Alternative 1	2-46
2.2.3.6.1	EOD Range Enhancements	2-47
2.2.3.6.2	Pearl Harbor Enhancements	2-47
2.2.3.6.3	Offshore Enhancements	2-51
2.2.3.6.4	PMRF Enhancements	2-51
2.2.3.7	Major Exercises for Alternative 1	2-60
2.2.3.8	Mitigation Measures for Alternative 1	2-60
2.2.4	Alternative 2	2-60
2.2.4.1	Training Events for Alternative 2	2-60
2.2.4.2	MFA/HFA Sonar Usage for Alternative 2	2-61
2.2.4.3	Increased Tempo and Frequency of Training for Alternative 2	2-62
2.2.4.4	Enhanced RDT&E Activities for Alternative 2	2-62
2.2.4.5	Future RDT&E Activities for Alternative 2	2-62
2.2.4.6	Hawaii Range Complex Enhancements for Alternative 2	2-64
2.2.4.7	Additional Major Exercises—Multiple Strike Group Training for Alternative 2	2-64
2.2.4.8	Mitigation Measures For Alternative 2	2-65
2.2.5	Alternative 3 (Preferred)	2-65
2.2.5.1	Mitigation Measures For Alternative 3	2-66
3.0	AFFECTED ENVIRONMENT	3-1
3.1	Open Ocean Area	3-1
3.1.1	Airspace—Open Ocean Area	3-3
3.1.2	Biological Resources—Open Ocean Area	3-8
3.1.2.1	Coral	3-8
3.1.2.2	Fish	3-11
3.1.2.2.1	Essential Fish Habitat	3-12
3.1.2.2.2	Offshore Ocean or Pelagic Species	3-13
3.1.2.2.3	Fish Acoustics	3-14
3.1.2.2.3.1	Sound in Water	3-16
3.1.2.2.3.1.1	What Do Fish Hear?	3-17
3.1.2.2.3.1.2	Sound Detection Mechanisms	3-18
3.1.2.2.3.1.3	Hearing Generalists and Specialists	3-19
3.1.2.2.3.1.4	Ancillary Structures for Hearing Specializations	3-19
3.1.2.2.3.1.5	Lateral Line	3-20
3.1.2.2.3.2	Overview of Fish Hearing Capabilities	3-21
3.1.2.2.3.2.1	Variability in Hearing Among Groups of Fish	3-21
3.1.2.2.3.2.2	Marine Hearing Specialists	3-25

3.1.2.2.3.2.3	Marine Hearing Generalists	3-26
3.1.2.2.3.2.4	Hearing Capabilities of Elasmobranchs and Other “Fish”	3-28
3.1.2.2.3.2.5	Data on Fish Hearing	3-28
3.1.2.3	Sea Turtles	3-29
3.1.2.3.1	Green Turtle (<i>Chelonia mydas</i>).....	3-33
3.1.2.3.2	Hawksbill Turtle (<i>Eretmochelys imbricata</i>).....	3-35
3.1.2.3.3	Leatherback Turtle (<i>Dermochelys coriacea</i>)	3-35
3.1.2.3.4	Loggerhead Turtle (<i>Caretta caretta</i>)	3-36
3.1.2.3.5	Olive Ridley Turtle (<i>Lepidochelys olivacea</i>).....	3-38
3.1.2.4	Marine Mammals	3-39
3.1.2.4.1	Marine Mammal Occurrence.....	3-41
3.1.2.4.1.1	Mysticetes.....	3-41
3.1.2.4.1.2	Odontocetes	3-52
3.1.2.4.1.3	Pinnipeds	3-69
3.1.3	Cultural Resources—Open Ocean Area	3-73
3.1.4	Hazardous Materials and Waste—Open Ocean Area	3-77
3.1.5	Health and Safety—Open Ocean Area	3-86
3.1.6	Noise—Open Ocean Area.....	3-86
3.1.7	Water Resources—Open Ocean Area	3-89
3.2	Northwestern Hawaiian Islands.....	3-93
3.2.1	Northwestern Hawaiian Islands Offshore	3-99
3.2.1.1	Biological Resources—Northwestern Hawaiian Islands Offshore	3-99
3.2.1.1.1	Nihoa—Biological Resources—Northwestern Hawaiian Islands Offshore.....	3-99
3.2.1.1.2	Necker—Biological Resources—Northwestern Hawaiian Islands Offshore	3-100
3.2.2	Northwestern Hawaiian Islands Onshore	3-102
3.2.2.1	Biological Resources—Northwestern Hawaiian Islands Onshore	3-102
3.2.2.1.1	Nihoa—Biological Resources—Northwestern Hawaiian Islands Onshore.....	3-102
3.2.2.1.2	Necker—Biological Resources—Northwestern Hawaiian Islands Onshore	3-103
3.2.2.2	Cultural Resources—Northwestern Hawaiian Islands Onshore	3-104
3.3	Kauai	3-107
3.3.1	Kauai Offshore.....	3-107
3.3.1.1	PMRF Offshore (BARSTUR, BSURE, SWTR, Kingfisher)	3-107
3.3.1.1.1	Biological Resources—PMRF—Offshore (BARSTUR, BSURE, SWTR, Kingfisher).....	3-108
3.3.1.1.2	Cultural Resources—PMRF—Offshore (BARSTUR, BSURE, SWTR, Kingfisher).....	3-115
3.3.1.1.3	Socioeconomics—PMRF—Offshore (BARSTUR, BSURE, SWTR, Kingfisher).....	3-117
3.3.1.1.4	Transportation—PMRF—Offshore (BARSTUR, BSURE, SWTR, Kingfisher).....	3-121
3.3.1.2	Niihau Offshore	3-122
3.3.1.2.1	Biological Resources—Niihau—Offshore	3-122
3.3.1.3	Kaula Offshore	3-124
3.3.1.3.1	Biological Resources—Kaula—Offshore	3-124

3.3.1.3.2	Cultural Resources—Kaula—Offshore	3-125
3.3.2	Kauai Onshore.....	3-126
3.3.2.1	PMRF/Main Base.....	3-126
3.3.2.1.1	Air Quality—PMRF/Main Base.....	3-126
3.3.2.1.2	Airspace—PMRF/Main Base	3-128
3.3.2.1.3	Biological Resources—PMRF/Main Base.....	3-132
3.3.2.1.4	Cultural Resources—PMRF/Main Base.....	3-139
3.3.2.1.5	Geology and Soils—PMRF/Main Base	3-141
3.3.2.1.6	Hazardous Materials and Waste—PMRF/Main Base	3-143
3.3.2.1.7	Health and Safety—PMRF/Main Base.....	3-146
3.3.2.1.8	Land Use—PMRF/Main Base	3-152
3.3.2.1.9	Noise—PMRF/Main Base	3-158
3.3.2.1.10	Socioeconomics—PMRF/Main Base	3-161
3.3.2.1.11	Transportation—PMRF/Main Base	3-165
3.3.2.1.12	Utilities—PMRF/Main Base.....	3-166
3.3.2.1.13	Water Resources—PMRF/Main Base	3-168
3.3.2.2	Makaha Ridge.....	3-171
3.3.2.2.1	Air Quality—Makaha Ridge.....	3-171
3.3.2.2.2	Biological Resources—Makaha Ridge.....	3-172
3.3.2.2.3	Cultural Resources—Makaha Ridge.....	3-174
3.3.2.2.4	Hazardous Materials and Waste—Makaha Ridge	3-176
3.3.2.2.5	Health and Safety—Makaha Ridge.....	3-176
3.3.2.3	Kokee.....	3-178
3.3.2.3.1	Air Quality—Kokee.....	3-178
3.3.2.3.2	Biological Resources—Kokee.....	3-178
3.3.2.3.3	Hazardous Materials and Waste—Kokee	3-180
3.3.2.3.4	Health and Safety—Kokee.....	3-181
3.3.2.4	Hawaii Air National Guard Kokee	3-183
3.3.2.4.1	Biological Resources—Hawaii Air National Guard Kokee	3-183
3.3.2.5	Kamokala Magazines	3-185
3.3.2.5.1	Hazardous Materials and Waste—Kamokala Magazines.....	3-185
3.3.2.5.2	Health and Safety—Kamokala Magazines	3-185
3.3.2.6	Port Allen	3-187
3.3.2.7	Kikiaola Small Boat Harbor.....	3-188
3.3.2.8	Mt. Kahili	3-189
3.3.2.9	Niihau.....	3-190
3.3.2.9.1	Biological Resources—Niihau.....	3-190
3.3.2.9.2	Hazardous Materials and Waste—Niihau	3-192
3.3.2.9.3	Health and Safety—Niihau.....	3-192
3.3.2.10	Kaula.....	3-195
3.3.2.10.1	Airspace—Kaula	3-195
3.3.2.10.2	Biological Resources—Kaula.....	3-195
3.3.2.10.3	Cultural Resources—Kaula.....	3-197
3.3.2.10.4	Geology and Soils—Kaula	3-197
3.3.2.10.5	Health and Safety—Kaula.....	3-198
3.3.2.10.6	Land Use—Kaula.....	3-199
3.4	Oahu.....	3-201
3.4.1	Oahu Offshore	3-201
3.4.1.1	Puuloa Underwater Range—Offshore	3-201

3.4.1.1.1	Biological Resources—Puuloa Underwater Range— Offshore	3-202
3.4.1.1.2	Cultural Resources—Puuloa Underwater Range— Offshore	3-205
3.4.1.1.3	Hazardous Materials and Waste—Puuloa Underwater Range—Offshore	3-205
3.4.1.1.4	Health and Safety—Puuloa Underwater Range— Offshore	3-206
3.4.1.2	Naval Defensive Sea Area—Offshore	3-207
3.4.1.2.1	Biological Resources—Naval Defensive Sea Area— Offshore	3-207
3.4.1.2.2	Cultural Resources—Naval Defensive Sea Area— Offshore	3-208
3.4.1.2.3	Health and Safety—Naval Defensive Sea Area— Offshore	3-209
3.4.1.3	Marine Corps Base Hawaii (MCBH)—Offshore	3-210
3.4.1.3.1	Biological Resources—MCBH—Offshore	3-210
3.4.1.3.2	Cultural Resources—MCBH—Offshore	3-213
3.4.1.4	Marine Corps Training Area/Bellows (MCTAB)—Offshore	3-215
3.4.1.4.1	Biological Resources—MCTAB—Offshore	3-215
3.4.1.4.2	Cultural Resources—MCTAB—Offshore	3-216
3.4.1.5	Makua Military Reservation—Offshore	3-217
3.4.1.5.1	Biological Resources—Makua Military Reservation— Offshore	3-217
3.4.1.5.2	Cultural Resources—Makua Military Reservation— Offshore	3-218
3.4.1.6	Dillingham Military Reservation—Offshore	3-219
3.4.1.6.1	Biological Resources—Dillingham Military Reservation—Offshore	3-219
3.4.1.6.2	Cultural Resources—Dillingham Military Reservation— Offshore	3-221
3.4.1.7	Ewa Training Minefield—Offshore	3-222
3.4.1.7.1	Biological Resources—Ewa Training Minefield— Offshore	3-222
3.4.1.7.2	Hazardous Materials and Waste—Ewa Training Minefield—Offshore	3-223
3.4.1.7.3	Health and Safety—Ewa Training Minefield—Offshore	3-223
3.4.1.8	Barbers Point Underwater Range—Offshore.....	3-224
3.4.1.8.1	Biological Resources—Barbers Point Underwater Range—Offshore	3-224
3.4.1.8.2	Hazardous Materials and Waste—Barbers Point Underwater Range—Offshore	3-225
3.4.1.8.3	Health and Safety—Barbers Point Underwater Range—Offshore	3-226
3.4.1.9	Naval Undersea Warfare Center (NUWC) Shipboard Electronic Systems Evaluation Facility (SESEF)—Offshore.....	3-227
3.4.1.9.1	Biological Resources—SESEF—Offshore.....	3-227
3.4.1.9.2	Health and Safety—SESEF—Offshore.....	3-228
3.4.1.10	Naval Undersea Warfare Center (NUWC) Fleet Operational Readiness Accuracy Check Site (FORACS)—Offshore	3-229
3.4.1.10.1	Biological Resources—FORACS—Offshore.....	3-229

3.4.1.10.2	Health and Safety—FORACS—Offshore	3-231
3.4.2	Oahu Onshore	3-232
3.4.2.1	Naval Station Pearl Harbor	3-232
3.4.2.1.1	Biological Resources—Naval Station Pearl Harbor	3-232
3.4.2.1.2	Cultural Resources—Naval Station Pearl Harbor	3-235
3.4.2.1.3	Socioeconomics—Naval Station Pearl Harbor.....	3-237
3.4.2.2	Ford Island	3-242
3.4.2.2.1	Biological Resources—Ford Island	3-242
3.4.2.2.2	Cultural Resources—Ford Island	3-243
3.4.2.2.3	Water Resources—Ford Island.....	3-244
3.4.2.3	Naval Inactive Ship Maintenance Facility, Pearl Harbor	3-246
3.4.2.3.1	Biological Resources—Naval Inactive Ship Maintenance Facility, Pearl Harbor	3-246
3.4.2.3.2	Hazardous Materials and Waste—Naval Inactive Ship Maintenance Facility, Pearl Harbor	3-246
3.4.2.3.3	Water Resources—Naval Inactive Ship Maintenance Facility, Pearl Harbor	3-247
3.4.2.4	Explosive Ordnance Disposal (EOD) Land Range— Naval Magazine (NAVMAG) Pearl Harbor West Loch	3-249
3.4.2.4.1	Biological Resources—EOD Land Range—NAVMAG Pearl Harbor West Loch.....	3-249
3.4.2.4.2	Cultural Resources—EOD Land Range—NAVMAG Pearl Harbor West Loch.....	3-250
3.4.2.4.3	Geology and Soils—EOD Land Range—NAVMAG Pearl Harbor West Loch.....	3-251
3.4.2.4.4	Health and Safety—EOD Land Range—NAVMAG Pearl Harbor West Loch.....	3-251
3.4.2.4.5	Water Resources—EOD Land Range—NAVMAG Pearl Harbor West Loch.....	3-252
3.4.2.5	Lima Landing	3-253
3.4.2.5.1	Biological Resources—Lima Landing	3-253
3.4.2.5.2	Cultural Resources—Lima Landing	3-254
3.4.2.5.3	Hazardous Materials and Waste—Lima Landing.....	3-254
3.4.2.5.4	Health and Safety—Lima Landing	3-255
3.4.2.6	U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport....	3-256
3.4.2.6.1	Airspace—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport	3-256
3.4.2.6.2	Biological Resources—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport.....	3-258
3.4.2.7	Marine Corps Base Hawaii (MCBH)	3-260
3.4.2.7.1	Airspace—MCBH.....	3-260
3.4.2.7.2	Biological Resources—MCBH	3-261
3.4.2.7.3	Cultural Resources—MCBH	3-264
3.4.2.7.4	Noise—MCBH.....	3-265
3.4.2.7.5	Socioeconomics—MCBH.....	3-267
3.4.2.8	Marine Corps Training Area/Bellows (MCTAB)	3-268
3.4.2.8.1	Biological Resources—MCTAB	3-268
3.4.2.8.2	Cultural Resources—MCTAB	3-269
3.4.2.9	Hickam Air Force Base (AFB).....	3-272
3.4.2.9.1	Airspace—Hickam AFB	3-272
3.4.2.9.2	Biological Resources—Hickam AFB	3-273

3.4.2.10	Wheeler Army Airfield	3-275
3.4.2.10.1	Airspace—Wheeler Army Airfield.....	3-275
3.4.2.10.2	Biological Resources—Wheeler Army Airfield	3-276
3.4.2.11	Makua Military Reservation.....	3-279
3.4.2.11.1	Biological Resources—Makua Military Reservation.....	3-279
3.4.2.11.2	Cultural Resources—Makua Military Reservation.....	3-282
3.4.2.11.3	Health and Safety—Makua Military Reservation.....	3-285
3.4.2.11.4	Noise—Makua Military Reservation	3-286
3.4.2.12	Kahuku Training Area	3-287
3.4.2.12.1	Biological Resources—Kahuku Training Area	3-287
3.4.2.12.2	Cultural Resources—Kahuku Training Area	3-289
3.4.2.13	Dillingham Military Reservation.....	3-292
3.4.2.13.1	Biological Resources—Dillingham Military Reservation....	3-292
3.4.2.13.2	Cultural Resources—Dillingham Military Reservation.....	3-294
3.4.2.14	Keehi Lagoon.....	3-295
3.4.2.15	Kaena Point	3-296
3.4.2.16	Mt. Kaala.....	3-297
3.4.2.17	Wheeler Network Segment Control/PMRF Communication Sites	3-298
3.4.2.18	Mauna Kapu Communication Site	3-299
3.4.2.19	Makua Radio/Repeater/Cable Head	3-300
3.5	Maui.....	3-301
3.5.1	Maui Offshore	3-301
3.5.1.1	Maui Offshore	3-301
3.5.1.1.1	Biological Resources—Maui Offshore	3-301
3.5.1.2	Shallow-water Minefield Sonar Training Area-Offshore.....	3-304
3.5.2	Maui Onshore	3-305
3.5.2.1	Maui Space Surveillance System	3-305
3.5.2.2	Maui High Performance Computing Center	3-306
3.5.2.3	Sandia Maui Haleakala Facility.....	3-307
3.5.2.4	Molokai Mobile Transmitter Site.....	3-308
3.6	Hawaii.....	3-309
3.6.1	Hawaii Offshore	3-309
3.6.1.1	Kawaihae Pier—Offshore	3-309
3.6.1.1.1	Biological Resources—Kawaihae Pier—Offshore	3-309
3.6.2	Hawaii Onshore	3-312
3.6.2.1	Pohakuloa Training Area (PTA).....	3-312
3.6.2.1.1	Airspace—PTA	3-312
3.6.2.1.2	Biological Resources—PTA.....	3-315
3.6.2.1.3	Cultural Resources—PTA.....	3-319
3.6.2.1.4	Health and Safety—PTA.....	3-320
3.6.2.1.5	Noise—PTA	3-322
3.6.2.2	Bradshaw Army Airfield.....	3-324
3.6.2.2.1	Airspace—Bradshaw Army Airfield	3-324
3.6.2.2.2	Biological Resources—Bradshaw Army Airfield.....	3-324
3.6.2.2.3	Cultural Resources—Bradshaw Army Airfield.....	3-325
3.6.2.3	Kawaihae Pier.....	3-326
3.6.2.3.1	Biological Resources—Kawaihae Pier.....	3-326

3.7	Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS)	3-327
3.7.1	Biological Resources—HIHWNMS	3-329
3.7.1.1	Kauai—Biological Resources—HIHWNMS	3-329
3.7.1.2	Oahu—Biological Resources—HIHWNMS	3-329
3.7.1.3	Maui—Biological Resources—HIHWNMS	3-329
3.7.1.4	Hawaii—Biological Resources—HIHWNMS	3-330

4.1.2.4.3	Analytical Framework for Assessing Marine Mammal Response to Active Sonar	4-50
4.1.2.4.4	Regulatory Framework.....	4-54
4.1.2.4.5	Integration of Regulatory and Biological Frameworks.....	4-55
4.1.2.4.6	Criteria and Thresholds for Physiological Effects.....	4-61
4.1.2.4.7	Other Physiological Effects Considered.....	4-70
4.1.2.4.8	Previous Criteria and Thresholds for Behavioral Effects.....	4-73
4.1.2.4.9	Summary of Existing Credible Scientific Evidence Relevant to Assessing Behavioral Effects.....	4-76
4.1.2.4.9.1	Background.....	4-76
4.1.2.4.9.2	Development of the Risk Function.....	4-77
4.1.2.4.9.3	Methodology for Applying Risk Function	4-78
4.1.2.4.9.4	Data Sources Used for Risk Function.....	4-82
4.1.2.4.9.5	Limitations of the Risk Function Data Sources	4-84
4.1.2.4.9.6	Input Parameters for the Feller-Adapted Risk Function	4-85
4.1.2.4.9.7	Basic Application of the Risk Function and Relation to the Current Regulatory Scheme	4-88
4.1.2.4.9.8	Navy Post Acoustic Modeling Analysis.....	4-91
4.1.2.4.10	Cetacean Stranding Events	4-92
4.1.2.4.10.1	Causes of Strandings	4-96
4.1.2.4.10.2	Stranding Events Associated with Navy Sonar.....	4-116
4.1.2.4.10.3	Other Global Stranding Discussions.....	4-123
4.1.2.4.11	Marine Mammal Mitigation Measures Related to Acoustic and Explosive Exposures	4-134
4.1.2.4.11.1	Acoustic Exposure Mitigation Measures.....	4-134
4.1.2.4.11.2	Explosive Source Mitigation Measures.....	4-135
4.1.2.4.12	Sonar Marine Mammal Modeling	4-137
4.1.2.4.12.1	Active Acoustic Devices.....	4-137
4.1.2.4.12.2	Sonar Modeling Methodology	4-139
4.1.2.4.13	Explosive Source Marine Mammal Modeling.....	4-141
4.1.2.4.13.1	Explosive Source Exercises	4-141
4.1.2.4.13.2	Explosive Source Modeling Criteria.....	4-144
4.1.2.5	Marine Mammals No-action Alternative (Biological Resources—Open Ocean).....	4-151
4.1.2.5.1	No-action Alternative Summary of Exposures	4-151
4.1.2.5.2	Estimated Effects on ESA Listed Species—No-action Alternative	4-154
4.1.2.5.3	Estimated Exposures for Non-ESA Species—No-action Alternative	4-161
4.1.2.5.4	Summary of Compliance with MMPA and ESA—No-action Alternative	4-175
4.1.2.5.5	HRC Training—No-action Alternative	4-176
4.1.2.5.6	HRC RDT&E Activities—No-action Alternative	4-178
4.1.2.5.7	Major Exercises—No-action Alternative	4-178
4.1.2.6	Marine Mammals Alternative 1 (Biological Resources—Open Ocean)	4-181
4.1.2.6.1	Alternative 1 Summary of Exposures.....	4-181
4.1.2.6.2	Estimated Effects on ESA Listed Species—Alternative 1	4-184

4.1.2.6.3	Estimated Exposures for Non-ESA Species— Alternative 1	4-189
4.1.2.6.4	Summary of Compliance with MMPA and ESA— Alternative 1	4-203
4.1.2.6.5	Increased Tempo and Frequency of Training— Alternative 1	4-205
4.1.2.6.6	Enhanced and Future RDT&E Activities—Alternative 1....	4-205
4.1.2.6.7	HRC Enhancements—Alternative 1	4-205
4.1.2.6.8	Major Exercises—Alternative 1	4-207
4.1.2.7	Marine Mammals Alternative 2 (Biological Resources—Open Ocean)	4-210
4.1.2.7.1	Alternative 2 Summary of Exposures.....	4-210
4.1.2.7.2	Estimated Effects on ESA Listed Species—Alternative 2	4-213
4.1.2.7.3	Estimated Exposures for Non-ESA Species— Alternative 2	4-219
4.1.2.7.4	Summary of Compliance with MMPA and ESA— Alternative 2	4-233
4.1.2.7.5	Increased Tempo and Frequency of Training— Alternative 2	4-236
4.1.2.7.6	Enhanced and Future RDT&E Activities—Alternative 2....	4-236
4.1.2.7.7	HRC Enhancements—Alternative 2.....	4-236
4.1.2.7.8	Major Exercises—RIMPAC, USWEX, and Multiple Strike Group Training—Alternative 2	4-236
4.1.2.8	Marine Mammals Alternative 3 (Biological Resources—Open Ocean)	4-237
4.1.2.8.1	Summary of Compliance with ESA and MMPA— Alternative 3	4-237
4.1.2.9	Marine Mammal Mortality Request	4-239
4.1.3	Cultural Resources—Open Ocean	4-241
4.1.3.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Cultural Resources Open Ocean).....	4-241
4.1.4	Hazardous Materials & Wastes—Open Ocean	4-242
4.1.4.1	No-action Alternative (Hazardous materials and Wastes— Open Ocean)	4-242
4.1.4.1.1	HRC Training—No-action Alternative	4-242
4.1.4.1.2	HRC RDT&E Activities—No-action Alternative	4-246
4.1.4.1.3	Major Exercises—No-action Alternative	4-246
4.1.4.2	Alternative 1 (Hazardous Materials and Wastes—Open Ocean)	4-246
4.1.4.2.1	Increased Tempo and Frequency of Training— Alternative 1	4-246
4.1.4.2.2	Enhanced RDT&E Activities—Alternative 1	4-247
4.1.4.2.3	HRC Enhancements—Alternative 1	4-247
4.1.4.2.4	Major Exercises—Alternative 1	4-247
4.1.4.3	Alternative 2 (Hazardous Materials and Wastes—Open Ocean)	4-249
4.1.4.3.1	Increased Tempo and Frequency of Training— Alternative 2	4-249
4.1.4.3.2	Enhanced RDT&E Activities—Alternative 2	4-249

4.1.4.3.3	Additional Major Exercises—Multiple Strike Group Training—Alternative 2	4-251
4.1.4.4	Alternative 3 (Hazardous Materials and Wastes—Open Ocean)	4-251
4.1.5	Health and Safety—Open Ocean	4-252
4.1.5.1	No-action Alternative (Health and Safety—Open Ocean).....	4-252
4.1.5.1.1	HRC Training—No-action Alternative	4-252
4.1.5.1.2	HRC RDT&E Activities—No-action Alternative	4-254
4.1.5.1.3	Major Exercises—No-action Alternative	4-255
4.1.5.2	Alternative 1 (Health and Safety—Open Ocean).....	4-255
4.1.5.2.1	Increased Tempo and Frequency of Training—Alternative 1	4-255
4.1.5.2.2	Enhanced RDT&E Activities—Alternative 1	4-256
4.1.5.2.3	HRC Enhancements and Major Exercises—Alternative 1	4-256
4.1.5.3	Alternative 2 (Health and Safety—Open Ocean).....	4-256
4.1.5.3.1	Increased Tempo and Frequency of Training—Alternative 2	4-256
4.1.5.3.2	Enhanced RDT&E Activities—Alternative 2	4-257
4.1.5.3.3	Future RDT&E Activities—Alternative 2.....	4-257
4.1.5.3.4	Additional Major Exercises—Multiple Strike Group Training—Alternative 2	4-258
4.1.5.4	Alternative 3 (Health and Safety—Open Ocean).....	4-258
4.1.6	Noise—Open Ocean	4-259
4.1.6.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Noise—Open Ocean)	4-259
4.1.7	Water Resources—Open Ocean.....	4-259
4.1.7.1	No-action Alternative (Water Resources—Open Ocean)	4-259
4.1.7.1.1	HRC Training—No-action Alternative	4-259
4.1.7.1.2	HRC RDT&E Activities—No-action Alternative	4-275
4.1.7.1.3	Major Exercises—No-action Alternative	4-277
4.1.7.2	Alternative 1 (Water Resources—Open Ocean).....	4-277
4.1.7.2.1	Increased Tempo and Frequency of Training—Alternative 1	4-277
4.1.7.2.2	Enhanced and Future RDT&E Activities—Alternative 1....	4-277
4.1.7.2.3	HRC Enhancement—Alternative 1.....	4-277
4.1.7.2.4	Major Exercises—Alternative 1	4-277
4.1.7.3	Alternative 2 (Water Resources—Open Ocean).....	4-277
4.1.7.3.1	Increased Tempo and Frequency of Training—Alternative 2	4-277
4.1.7.3.2	Enhanced and Future RDT&E Activities—Alternative 2....	4-278
4.1.7.3.3	Additional Major Exercises—Multiple Strike Group Training—Alternative 2	4-278
4.1.7.4	Alternative 3 (Water Resources—Open Ocean).....	4-278
4.2	Northwestern Hawaiian Islands.....	4-279
4.2.1	Northwestern Hawaiian Islands Offshore	4-279
4.2.1.1	Biological Resources—Northwestern Hawaiian Islands—Offshore	4-280
4.2.1.1.1	Nihoa—Biological Resources—Offshore	4-280
4.2.1.1.1.1	No-action Alternative (Biological Resources—Nihoa—Offshore).....	4-280

4.2.1.1.1.2	Alternative 1 (Biological Resources—Nihoa—Offshore).....	4-282
4.2.1.1.1.3	Alternative 2 (Biological Resources—Nihoa—Offshore).....	4-283
4.2.1.1.1.4	Alternative 3 (Biological Resources—Nihoa—Offshore).....	4-283
4.2.1.1.2	Necker—Biological Resources—Offshore	4-283
4.2.1.1.2.1	No-action Alternative (Biological Resources—Necker—Offshore).....	4-283
4.2.1.1.2.2	Alternative 1 (Biological Resources—Necker—Offshore).....	4-284
4.2.1.1.2.3	Alternative 2 (Biological Resources—Necker—Offshore).....	4-284
4.2.1.1.2.4	Alternative 3 (Biological Resources—Necker—Offshore).....	4-284
4.2.2	Northwestern Hawaiian Islands Onshore	4-286
4.2.2.1	Biological Resources—Northwestern Hawaiian Islands	4-286
4.2.2.1.1	Nihoa—Biological Resources	4-286
4.2.2.1.1.1	No-action Alternative (Biological Resources—Nihoa)	4-286
4.2.2.1.1.2	Alternative 1 (Biological Resources—Nihoa).....	4-287
4.2.2.1.1.3	Alternative 2 (Biological Resources—Nihoa).....	4-288
4.2.2.1.1.4	Alternative 3 (Biological Resources—Nihoa).....	4-288
4.2.2.1.2	Necker—Biological Resources	4-289
4.2.2.1.2.1	No-action Alternative (Biological Resources—Necker)	4-289
4.2.2.1.2.2	Alternative 1 (Biological Resources—Necker).....	4-289
4.2.2.1.2.3	Alternative 2 (Biological Resources—Necker).....	4-289
4.2.2.1.2.4	Alternative 3 (Biological Resources—Necker).....	4-290
4.2.2.2	Cultural Resources—Northwestern Hawaiian Islands	4-290
4.2.2.2.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Cultural Resources—Northwestern Hawaiian Islands).....	4-290
4.3	Kauai	4-291
4.3.1	Kauai Offshore.....	4-291
4.3.1.1	PMRF Offshore (BARSTUR, BSURE, SWTR, Kingfisher)	4-291
4.3.1.1.1	Biological Resources—PMRF Offshore (BARSTUR, BSURE, SWTR, Kingfisher).....	4-292
4.3.1.1.1.1	No-action Alternative (Biological Resources—PMRF Offshore ([BARSTUR, BSURE, SWTR, Kingfisher])).....	4-292
4.3.1.1.1.2	Alternative 1 (Biological Resources—PMRF Offshore [BARSTUR, BSURE, SWTR, Kingfisher]).....	4-299
4.3.1.1.1.3	Alternative 2 (Biological Resources—PMRF Offshore [BARSTUR, BSURE, SWTR, Kingfisher]).....	4-300
4.3.1.1.1.4	Alternative 3 (Biological Resources—PMRF Offshore [BARSTUR, BSURE, SWTR, Kingfisher]).....	4-301

4.3.1.1.2	Cultural Resources—PMRF Offshore (BARSTUR, BSURE, SWTR, Kingfisher).....	4-302
4.3.1.1.2.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Cultural Resources—PMRF Offshore [BARSTUR, BSURE, SWTR, Kingfisher]).....	4-302
4.3.1.1.3	Socioeconomics—PMRF Offshore (BARSTUR, BSURE, SWTR, Kingfisher).....	4-302
4.3.1.1.3.1	No-action Alternative (Socioeconomics—PMRF Offshore [BARSTUR, BSURE, SWTR, Kingfisher]).....	4-302
4.3.1.1.3.2	Alternative 1 (Socioeconomics—PMRF Offshore [BARSTUR, BSURE, SWTR, Kingfisher])	4-303
4.3.1.1.3.3	Alternative 2 (Socioeconomics—PMRF Offshore [BARSTUR, BSURE, SWTR, Kingfisher])	4-303
4.3.1.1.3.4	Alternative 3 (Socioeconomics—PMRF Offshore [BARSTUR, BSURE, SWTR, Kingfisher])	4-304
4.3.1.1.4	Transportation—PMRF Offshore (BARSTUR, BSURE, SWTR, Kingfisher)	4-305
4.3.1.1.4.1	No-action Alternative (Transportation—PMRF Offshore [BARSTUR, BSURE, SWTR, Kingfisher]).....	4-305
4.3.1.1.4.2	Alternative 1 (Transportation—PMRF Offshore [BARSTUR, BSURE, SWTR, Kingfisher])	4-305
4.3.1.1.4.3	Alternative 2 (Transportation —PMRF Offshore [BARSTUR, BSURE, SWTR, Kingfisher])	4-306
4.3.1.1.4.4	Alternative 3 (Transportation —PMRF Offshore [BARSTUR, BSURE, SWTR, Kingfisher])	4-306
4.3.1.2	Niihau Offshore	4-307
4.3.1.2.1	Biological Resources—Niihau Offshore	4-307
4.3.1.2.1.1	No-action Alternative (Biological Resources—Niihau Offshore).....	4-307
4.3.1.2.1.2	Alternative 1 (Biological Resources—Niihau Offshore).....	4-308
4.3.1.2.1.3	Alternative 2 (Biological Resources—Niihau Offshore).....	4-309
4.3.1.2.1.4	Alternative 3 (Biological Resources—Niihau Offshore).....	4-310
4.3.1.3	Kaula Offshore	4-311
4.3.1.3.1	Biological Resources—Kaula Offshore	4-311
4.3.1.3.1.1	No-action Alternative (Biological Resources—Kaula Offshore).....	4-311
4.3.1.3.1.2	Alternative 1 (Biological Resources—Kaula Offshore).....	4-312
4.3.1.3.1.3	Alternative 2 (Biological Resources—Kaula Offshore).....	4-313
4.3.1.3.1.4	Alternative 3 (Biological Resources—Kaula Offshore).....	4-313
4.3.1.3.2	Cultural Resources—Kaula Offshore	4-313
4.3.1.3.2.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Cultural Resources—Kaula Offshore).....	4-313
4.3.2	Kauai Onshore.....	4-314
4.3.2.1	Pacific Missile Range Facility/Main Base.....	4-314

4.3.2.1.1	Air Quality—PMRF/Main Base	4-315
4.3.2.1.1.1	No-action Alternative (Air Quality—PMRF/Main Base)	4-315
4.3.2.1.1.2	Alternative 1 (Air Quality—PMRF/Main Base)	4-319
4.3.2.1.1.3	Alternative 2 (Air Quality—PMRF/Main Base)	4-321
4.3.2.1.1.4	Alternative 3 (Air Quality—PMRF/Main Base)	4-323
4.3.2.1.2	Airspace—PMRF/Main Base	4-323
4.3.2.1.2.1	No-action Alternative (Airspace—PMRF/Main Base)	4-323
4.3.2.1.2.2	Alternative 1 (Airspace—PMRF/Main Base)	4-326
4.3.2.1.2.3	Alternative 2 (Airspace—PMRF/Main Base)	4-328
4.3.2.1.2.4	Alternative 3 (Airspace—PMRF/Main Base)	4-329
4.3.2.1.3	Biological Resources—PMRF/Main Base	4-330
4.3.2.1.3.1	No-action Alternative (Biological Resources—PMRF/Main Base)	4-330
4.3.2.1.3.2	Alternative 1 (Biological Resources—PMRF/Main Base)	4-334
4.3.2.1.3.3	Alternative 2 (Biological Resources—PMRF/Main Base)	4-338
4.3.2.1.3.4	Alternative 3 (Biological Resources—PMRF/Main Base)	4-339
4.3.2.1.4	Cultural Resources—PMRF/Main Base	4-339
4.3.2.1.4.1	No-action Alternative (Cultural Resources—PMRF/Main Base)	4-339
4.3.2.1.4.2	Alternative 1 (Cultural Resources—PMRF/Main Base)	4-341
4.3.2.1.4.3	Alternative 2 (Cultural Resources—PMRF/Main Base)	4-342
4.3.2.1.4.4	Alternative 3 (Cultural Resources—PMRF/Main Base)	4-343
4.3.2.1.5	Geology and Soils—PMRF/Main Base	4-343
4.3.2.1.5.1	No-action Alternative (Geology and Soils—PMRF/Main Base)	4-343
4.3.2.1.5.2	Alternatives 1, 2, and 3 (Geology and Soils—PMRF/Main Base)	4-343
4.3.2.1.6	Hazardous Materials and Waste—PMRF/Main Base	4-343
4.3.2.1.6.1	No-action Alternative (Hazardous Materials and Waste—PMRF/Main Base)	4-343
4.3.2.1.6.2	Alternative 1 (Hazardous Materials and Waste—PMRF/Main Base)	4-346
4.3.2.1.6.3	Alternative 2 (Hazardous Materials and Waste—PMRF/Main Base)	4-348
4.3.2.1.6.4	Alternative 3 (Hazardous Materials and Waste—PMRF/Main Base)	4-349
4.3.2.1.7	Health and Safety—PMRF/Main Base	4-349
4.3.2.1.7.1	No-action Alternative (Health and Safety—PMRF/Main Base)	4-349
4.3.2.1.7.2	Alternative 1 (Health and Safety—PMRF/Main Base)	4-354
4.3.2.1.7.3	Alternative 2 (Health and Safety—PMRF/Main Base)	4-355

4.3.2.1.7.4	Alternative 3 (Health and Safety—PMRF/Main Base)	4-357
4.3.2.1.8	Land Use—PMRF/Main Base	4-357
4.3.2.1.8.1	No-action Alternative (Land Use—PMRF/Main Base)	4-357
4.3.2.1.8.2	Alternative 1 (Land Use—PMRF/Main Base)	4-359
4.3.2.1.8.3	Alternative 2 (Land Use—PMRF/Main Base)	4-361
4.3.2.1.8.4	Alternative 3 (Land Use—PMRF/Main Base)	4-362
4.3.2.1.9	Noise—PMRF/Main Base	4-363
4.3.2.1.9.1	No-action Alternative (Noise—PMRF/Main Base) ..	4-363
4.3.2.1.9.2	Alternative 1 (Noise—PMRF/Main Base)	4-369
4.3.2.1.9.3	Alternative 2 (Noise—PMRF/Main Base)	4-372
4.3.2.1.9.4	Alternative 3 (Noise—PMRF/Main Base)	4-373
4.3.2.1.10	Socioeconomics—PMRF/Main Base	4-373
4.3.2.1.10.1	No-action Alternative (Socioeconomics—PMRF/Main Base)	4-373
4.3.2.1.10.2	Alternative 1 (Socioeconomics—PMRF/Main Base)	4-373
4.3.2.1.10.3	Alternative 2 (Socioeconomics—PMRF/Main Base)	4-375
4.3.2.1.10.4	Alternative 3 (Socioeconomics—PMRF/Main Base)	4-376
4.3.2.1.11	Transportation—PMRF/Main Base	4-376
4.3.2.1.11.1	No-action Alternative (Transportation—PMRF/Main Base)	4-377
4.3.2.1.11.2	Alternative 1 (Transportation—PMRF/Main Base) ..	4-377
4.3.2.1.11.3	Alternative 2 (Transportation—PMRF/Main Base) ..	4-378
4.3.2.1.11.4	Alternative 3 (Transportation—PMRF/Main Base) ..	4-380
4.3.2.1.12	Utilities—PMRF/Main Base	4-380
4.3.2.1.12.1	No-action Alternative (Utilities—PMRF/Main Base) ..	4-380
4.3.2.1.12.2	Alternative 1 (Utilities—PMRF/Main Base)	4-380
4.3.2.1.12.3	Alternative 2 (Utilities—PMRF/Main Base)	4-383
4.3.2.1.12.4	Alternative 3 (Utilities—PMRF/Main Base)	4-384
4.3.2.1.13	Water Resources—PMRF/Main Base	4-384
4.3.2.1.13.1	No-action Alternative (Water Resources—PMRF/Main Base)	4-384
4.3.2.1.13.2	Alternative 1 (Water Resources—PMRF/Main Base)	4-386
4.3.2.1.13.3	Alternative 2 (Water Resources—PMRF/Main Base)	4-386
4.3.2.1.13.4	Alternative 3 (Water Resources—PMRF/Main Base)	4-387
4.3.2.2	Makaha Ridge	4-388
4.3.2.2.1	Air Quality—Makaha Ridge	4-388
4.3.2.2.1.1	No-action Alternative (Air Quality—Makaha Ridge) ..	4-388
4.3.2.2.1.2	Alternative 1 (Air Quality—Makaha Ridge)	4-389
4.3.2.2.1.3	Alternative 2 (Air Quality—Makaha Ridge)	4-389
4.3.2.2.1.4	Alternative 3 (Air Quality—Makaha Ridge)	4-389
4.3.2.2.2	Biological Resources—Makaha Ridge	4-389
4.3.2.2.2.1	No-action Alternative (Biological Resources—Makaha Ridge)	4-389

4.3.2.2.2 Alternative 1 (Biological Resources—Makaha Ridge) 4-390

4.3.2.2.3 Alternative 2 (Biological Resources—Makaha Ridge) 4-391

4.3.2.2.4 Alternative 3 (Biological Resources—Makaha Ridge) 4-391

4.3.2.2.3 Cultural Resources—Makaha Ridge 4-392

4.3.2.2.3.1 No-action Alternative (Cultural Resources—Makaha Ridge) 4-392

4.3.2.2.3.2 Alternative 1 (Cultural Resources—Makaha Ridge) 4-392

4.3.2.2.3.3 Alternative 2 (Cultural Resources—Makaha Ridge) 4-392

4.3.2.2.3.4 Alternative 3 (Cultural Resources—Makaha Ridge) 4-393

4.3.2.2.4 Hazardous Materials and Waste—Makaha Ridge 4-393

4.3.2.2.4.1 No-action Alternative (Hazardous Materials and Waste—Makaha Ridge)..... 4-393

4.3.2.2.4.2 Alternative 1 (Hazardous Materials and Waste—Makaha Ridge) 4-393

4.3.2.2.4.3 Alternative 2 (Hazardous Materials and Waste—Makaha Ridge) 4-394

4.3.2.2.4.4 Alternative 3 (Hazardous Materials and Waste—Makaha Ridge) 4-394

4.3.2.2.5 Health and Safety—Makaha Ridge 4-394

4.3.2.2.5.1 No-action Alternative (Health and Safety—Makaha Ridge) 4-394

4.3.2.2.5.2 Alternative 1 (Health and Safety—Makaha Ridge) . 4-394

4.3.2.2.5.3 Alternative 2 (Health and Safety—Makaha Ridge) . 4-395

4.3.2.2.5.4 Alternative 3 (Health and Safety—Makaha Ridge) . 4-395

4.3.2.3 Kokee 4-396

4.3.2.3.1 Air Quality—Kokee 4-396

4.3.2.3.1.1 No-action Alternative (Air Quality—Kokee)..... 4-396

4.3.2.3.1.2 Alternative 1 (Air Quality—Kokee) 4-397

4.3.2.3.1.3 Alternative 2 (Air Quality—Kokee) 4-397

4.3.2.3.1.4 Alternative 3 (Air Quality—Kokee) 4-397

4.3.2.3.2 Biological Resources—Kokee 4-398

4.3.2.3.2.1 No-action Alternative (Biological Resources—Kokee) 4-398

4.3.2.3.2.2 Alternative 1 (Biological Resources—Kokee) 4-398

4.3.2.3.2.3 Alternative 2 (Biological Resources—Kokee) 4-399

4.3.2.3.2.4 Alternative 3 (Biological Resources—Kokee) 4-399

4.3.2.3.3 Hazardous Materials and Waste—Kokee 4-400

4.3.2.3.3.1 No-action Alternative (Hazardous Materials and Waste—Kokee)..... 4-400

4.3.2.3.3.2 Alternative 1 (Hazardous Materials and Waste—Kokee) 4-400

4.3.2.3.3.3 Alternative 2 (Hazardous Materials and Waste—Kokee) 4-400

4.3.2.3.3.4 Alternative 3 (Hazardous Materials and Waste—Kokee) 4-401

4.3.2.3.4 Health and Safety—Kokee 4-401

4.3.2.3.4.1 No-action Alternative (Health and Safety—Kokee) . 4-401

4.3.2.3.4.2 Alternative 1 (Health and Safety—Kokee) 4-401

4.3.2.3.4.3 Alternative 2 (Health and Safety—Kokee)..... 4-402

4.3.2.3.4.4 Alternative 3 (Health and Safety—Kokee)..... 4-402

4.3.2.4 Hawaii Air National Guard Kokee 4-403

4.3.2.4.1 Biological Resources—Hawaii Air National Guard Kokee..... 4-403

4.3.2.4.1.1 No-action Alternative (Biological Resources—Hawaii Air National Guard Kokee)..... 4-403

4.3.2.4.1.2 Alternative 1 (Biological Resources—Hawaii Air National Guard Kokee) 4-404

4.3.2.4.1.3 Alternative 2 (Biological Resources—Hawaii Air National Guard Kokee) 4-404

4.3.2.4.1.4 Alternative 3 (Biological Resources—Hawaii Air National Guard Kokee) 4-404

4.3.2.5 Kamokala Magazines 4-405

4.3.2.5.1 Hazardous Materials and Waste—Kamokala Magazines..... 4-405

4.3.2.5.1.1 No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Hazardous Materials and Waste—Kamokala Magazines) 4-405

4.3.2.5.2 Health and Safety—Kamokala Magazines 4-405

4.3.2.5.2.1 No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Health and Safety—Kamokala Magazines) 4-405

4.3.2.6 Port Allen 4-406

4.3.2.7 Kikiaola Small Boat Harbor..... 4-408

4.3.2.8 Mt. Kahili 4-409

4.3.2.9 Niihau..... 4-410

4.3.2.9.1 Biological Resources—Niihau..... 4-410

4.3.2.9.1.1 No-action Alternative (Biological Resources—Niihau) 4-410

4.3.2.9.1.2 Alternative 1 (Biological Resources—Niihau) 4-411

4.3.2.9.1.3 Alternative 2 (Biological Resources—Niihau) 4-412

4.3.2.9.1.4 Alternative 3 (Biological Resources—Niihau) 4-412

4.3.2.9.2 Hazardous Materials and Waste—Niihau 4-412

4.3.2.9.2.1 No-action Alternative (Hazardous Materials and Waste—Niihau)..... 4-412

4.3.2.9.2.2 Alternative 1, Alternative 2, and Alternative 3 (Hazardous Materials and Waste—Niihau) 4-413

4.3.2.9.3 Health and Safety—Niihau..... 4-414

4.3.2.9.3.1 No-action Alternative (Health and Safety—Niihau). 4-414

4.3.2.9.3.2 Alternative 1, Alternative 2, and Alternative 3 (Health and Safety—Niihau) 4-414

4.3.2.10 Kaula..... 4-416

4.3.2.10.1 Airspace—Kaula 4-416

4.3.2.10.1.1 No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Airspace—Kaula)..... 4-416

4.3.2.10.2 Biological Resources—Kaula..... 4-417

4.3.2.10.2.1 No-action Alternative (Biological Resources—Kaula) 4-417

4.3.2.10.2.2 Alternative 1 (Biological Resources—Kaula)..... 4-418

4.3.2.10.2.3 Alternative 2 (Biological Resources—Kaula)..... 4-418

4.3.2.10.2.4 Alternative 3 (Biological Resources—Kaula) 4-418

4.3.2.10.3 Cultural Resources—Kaula 4-419

4.3.2.10.3.1 No-action Alternative (Cultural Resources—Kaula) 4-419

4.3.2.10.3.2 Alternative 1 (Cultural Resources—Kaula) 4-419

4.3.2.10.3.3 Alternative 2 (Cultural Resources—Kaula) 4-419

4.3.2.10.3.4 Alternative 3 (Cultural Resources—Kaula) 4-419

4.3.2.10.4 Geology and Soils—Kaula 4-420

4.3.2.10.4.1 No-action Alternative (Geology and Soils—Kaula) . 4-420

4.3.2.10.4.2 Alternative 1 (Geology and Soils—Kaula) 4-420

4.3.2.10.4.3 Alternative 2 (Geology and Soils—Kaula) 4-420

4.3.2.10.4.4 Alternative 3 (Geology and Soils—Kaula) 4-420

4.3.2.10.5 Health and Safety—Kaula 4-421

4.3.2.10.5.1 No-action Alternative, Alternative 1, Alternative 2,
and Alternative 3 (Health and Safety—Kaula) 4-421

4.3.2.10.6 Land Use—Kaula 4-421

4.3.2.10.6.1 No-action Alternative (Land Use—Kaula) 4-421

4.3.2.10.6.2 Alternative 1 (Land Use—Kaula) 4-421

4.3.2.10.6.3 Alternative 2 (Land Use—Kaula) 4-422

4.3.2.10.6.4 Alternative 3 (Land Use—Kaula) 4-422

4.4 Oahu 4-423

4.4.1 Oahu Offshore 4-423

4.4.1.1 Puuloa Underwater Range—Offshore 4-423

4.4.1.1.1 Biological Resources—Puuloa Underwater Range—
Offshore 4-423

4.4.1.1.1.1 No-action Alternative (Biological Resources—
Puuloa Underwater Range—Offshore) 4-423

4.4.1.1.1.2 Alternative 1 (Biological Resources—Puuloa
Underwater Range—Offshore) 4-425

4.4.1.1.1.3 Alternative 2 (Biological Resources—Puuloa
Underwater Range—Offshore) 4-426

4.4.1.1.1.4 Alternative 3 (Biological Resources—Puuloa
Underwater Range—Offshore) 4-426

4.4.1.1.2 Cultural Resources—Puuloa Underwater Training
Range—Offshore 4-426

4.4.1.1.2.1 No-action Alternative, Alternative 1, Alternative 2,
and Alternative 3 (Cultural Resources—Puuloa
Underwater Training Range—Offshore) 4-426

4.4.1.1.3 Hazardous Materials and Waste—Puuloa Underwater
Range—Offshore 4-427

4.4.1.1.3.1 No-action Alternative, Alternative 1, Alternative 2,
and Alternative 3 (Hazardous Materials and
Waste—Puuloa Underwater Range—Offshore) 4-427

4.4.1.1.4 Health and Safety—Puuloa Underwater Range—
Offshore 4-428

4.4.1.1.4.1 No-action Alternative, Alternative 1, Alternative 2,
and Alternative 3 (Health and Safety—Puuloa
Underwater Range—Offshore) 4-428

4.4.1.2 Naval Defensive Sea Area—Offshore 4-429

4.4.1.2.1 Biological Resources—Naval Defensive Sea Area—
Offshore 4-429

- 4.4.1.2.1.1 No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Biological Resources—Naval Defensive Sea Area—Offshore)4-429
- 4.4.1.2.2 Cultural Resources—Naval Defensive Sea Area—Offshore4-430
 - 4.4.1.2.2.1 No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Cultural Resources—Naval Defensive Sea Area—Offshore)4-430
- 4.4.1.2.3 Health and Safety—Naval Defensive Sea Area—Offshore4-430
 - 4.4.1.2.3.1 No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Health and Safety—Naval Defensive Sea Area—Offshore)4-430
- 4.4.1.3 Marine Corps Base Hawaii (MCBH)—Offshore4-432
 - 4.4.1.3.1 Biological Resources—MCBH—Offshore4-432
 - 4.4.1.3.1.1 No-action Alternative (Biological Resources—MCBH—Offshore).....4-432
 - 4.4.1.3.1.2 Alternative 1 (Biological Resources—MCBH—Offshore).....4-434
 - 4.4.1.3.1.3 Alternative 2 (Biological Resources—MCBH—Offshore).....4-434
 - 4.4.1.3.1.4 Alternative 3 (Biological Resources—MCBH—Offshore).....4-435
 - 4.4.1.3.2 Cultural Resources—MCBH—Offshore4-435
 - 4.4.1.3.2.1 No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Cultural Resources—MCBH—Offshore).....4-435
- 4.4.1.4 Marine Corps Training Area/Bellows (MCTAB)—Offshore4-436
 - 4.4.1.4.1 Biological Resources—MCTAB—Offshore4-436
 - 4.4.1.4.1.1 No-action Alternative (Biological Resources—MCTAB—Offshore).....4-436
 - 4.4.1.4.1.2 Alternative 1 (Biological Resources—MCTAB—Offshore).....4-438
 - 4.4.1.4.1.3 Alternative 2 (Biological Resources—MCTAB—Offshore).....4-439
 - 4.4.1.4.1.4 Alternative 3 (Biological Resources—MCTAB—Offshore).....4-439
 - 4.4.1.4.2 Cultural Resources—MCTAB—Offshore4-439
 - 4.4.1.4.2.1 No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Cultural Resources—MCTAB—Offshore).....4-439
- 4.4.1.5 Makua Military Reservation—Offshore4-440
 - 4.4.1.5.1 Biological Resources—Makua Military Reserve—Offshore4-440
 - 4.4.1.5.1.1 No-action Alternative (Biological Resources—Makua Military Reservation—Offshore).....4-440
 - 4.4.1.5.1.2 Alternative 1 (Biological Resources—Makua Military Reservation—Offshore).....4-441
 - 4.4.1.5.1.3 Alternative 2 (Biological Resources—Makua Military Reservation—Offshore).....4-441

4.4.1.5.1.4	Alternative 3 (Biological Resources—Makua Military Reservation—Offshore).....	4-442
4.4.1.5.2	Cultural Resources—Makua Military Reservation—Offshore	4-442
4.4.1.5.2.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Cultural Resources—Makua Military Reservation—Offshore).....	4-442
4.4.1.6	Dillingham Military Reservation—Offshore	4-443
4.4.1.6.1	Biological Resources—Dillingham Military Reservation—Offshore	4-443
4.4.1.6.1.1	No-action Alternative (Biological Resources—Dillingham Military Reservation—Offshore).....	4-443
4.4.1.6.1.2	Alternative 1 (Biological Resources—Dillingham Military Reservation—Offshore).....	4-444
4.4.1.6.1.3	Alternative 2 (Biological Resources—Dillingham Military Reservation—Offshore).....	4-444
4.4.1.6.1.4	Alternative 3 (Biological Resources—Dillingham Military Reservation—Offshore).....	4-445
4.4.1.6.2	Cultural Resources—Dillingham Military Reservation—Offshore	4-445
4.4.1.6.2.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Cultural Resources—Dillingham Military Reservation—Offshore).....	4-445
4.4.1.7	Ewa Training Minefield—Offshore	4-446
4.4.1.7.1	Biological Resources—Ewa Training Minefield—Offshore	4-446
4.4.1.7.1.1	No-action Alternative (Biological Resources—Ewa Training Minefield—Offshore).....	4-446
4.4.1.7.1.2	Alternative 1 (Biological Resources—Ewa Training Minefield—Offshore).....	4-447
4.4.1.7.1.3	Alternative 2 (Biological Resources—Ewa Training Minefield—Offshore).....	4-447
4.4.1.7.1.4	Alternative 3 (Biological Resources—Ewa Training Minefield—Offshore).....	4-447
4.4.1.7.2	Hazardous Materials and Waste—Ewa Training Minefield—Offshore	4-447
4.4.1.7.2.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Hazardous Materials and Waste—Ewa Training Minefield—Offshore).....	4-447
4.4.1.7.3	Health and Safety—Ewa Training Minefield—Offshore	4-448
4.4.1.7.3.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Health and Safety—Ewa Training Minefield—Offshore).....	4-448
4.4.1.8	Barbers Point Underwater Range—Offshore.....	4-449
4.4.1.8.1	Biological Resources—Barbers Point Underwater Range—Offshore	4-449
4.4.1.8.1.1	No-action Alternative (Biological Resources—Barbers Point Underwater Range—Offshore)	4-449
4.4.1.8.1.2	Alternative 1 (Biological Resources—Barbers Point Underwater Range—Offshore).....	4-450

4.4.1.8.1.3	Alternative 2 (Biological Resources—Barbers Point Underwater Range—Offshore).....	4-450
4.4.1.8.1.4	Alternative 3 (Biological Resources—Barbers Point Underwater Range—Offshore).....	4-450
4.4.1.8.2	Hazardous Materials and Waste—Barbers Point Underwater Range—Offshore	4-451
4.4.1.8.2.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Hazardous Materials and Waste—Barbers Point Underwater Range—Offshore).....	4-451
4.4.1.8.3	Health and Safety—Barbers Point Underwater Range—Offshore	4-451
4.4.1.8.3.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Health and Safety—Barbers Point Underwater Range—Offshore).....	4-451
4.4.1.9	Naval Undersea Warfare Center (NUWC) Shipboard Electronic Systems Evaluation Facility (SESEF)—Offshore.....	4-453
4.4.1.9.1	Biological Resources—SESEF—Offshore.....	4-453
4.4.1.9.1.1	No-action Alternative (Biological Resources—SESEF—Offshore)	4-453
4.4.1.9.1.2	Alternative 1 (Biological Resources—SESEF—Offshore).....	4-454
4.4.1.9.1.3	Alternative 2 (Biological Resources—SESEF—Offshore).....	4-454
4.4.1.9.1.4	Alternative 3 (Biological Resources—SESEF—Offshore).....	4-454
4.4.1.9.2	Health and Safety—SESEF—Offshore.....	4-455
4.4.1.9.2.1	No-action Alternative (Health and Safety—SESEF—Offshore)	4-455
4.4.1.9.2.2	Alternative 1, Alternative 2, and Alternative 3 (Health and Safety—SESEF—Offshore).....	4-455
4.4.1.10	Naval Undersea Warfare Center (NUWC) Fleet Operational Readiness Accuracy Check Site (FORACS)—Offshore	4-456
4.4.1.10.1	Biological Resources—FORACS—Offshore.....	4-456
4.4.1.10.1.1	No-action Alternative (Biological Resources—FORACS—Offshore)	4-456
4.4.1.10.1.2	Alternative 1 (Biological Resources—FORACS—Offshore).....	4-457
4.4.1.10.1.3	Alternative 2 (Biological Resources—FORACS—Offshore).....	4-457
4.4.1.10.1.4	Alternative 3 (Biological Resources—FORACS—Offshore).....	4-457
4.4.1.10.2	Health and Safety—FORACS—Offshore	4-457
4.4.1.10.2.1	No-action Alternative (Health and Safety—FORACS—Offshore)	4-457
4.4.1.10.2.2	Alternative 1 (Health and Safety—FORACS—Offshore).....	4-458
4.4.1.10.2.3	Alternative 2 (Health and Safety—FORACS—Offshore).....	4-458
4.4.1.10.2.4	Alternative 3 (Health and Safety—FORACS—Offshore).....	4-458

4.4.2	Oahu Onshore	4-459
4.4.2.1	Naval Station Pearl Harbor	4-459
4.4.2.1.1	Biological Resources—Naval Station Pearl Harbor	4-459
4.4.2.1.1.1	No-action Alternative (Biological Resources— Naval Station Pearl Harbor)	4-460
4.4.2.1.1.2	Alternative 1 (Biological Resources—Naval Station Pearl Harbor)	4-462
4.4.2.1.1.3	Alternative 2 (Biological Resources—Naval Station Pearl Harbor)	4-463
4.4.2.1.1.4	Alternative 3 (Biological Resources—Naval Station Pearl Harbor)	4-463
4.4.2.1.2	Cultural Resources—Naval Station Pearl Harbor	4-463
4.4.2.1.2.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Cultural Resources—Naval Station Pearl Harbor)	4-463
4.4.2.1.3	Socioeconomics—Naval Station Pearl Harbor.....	4-464
4.4.2.1.3.1	No-action Alternative (Socioeconomics—Naval Station Pearl Harbor)	4-464
4.4.2.1.3.2	Alternative 1 (Socioeconomics—Naval Station Pearl Harbor)	4-465
4.4.2.1.3.3	Alternative 2 (Socioeconomics—Naval Station Pearl Harbor)	4-465
4.4.2.1.3.4	Alternative 3 (Socioeconomics—Naval Station Pearl Harbor)	4-465
4.4.2.2	Ford Island	4-467
4.4.2.2.1	Biological Resources—Ford Island	4-467
4.4.2.2.1.1	No-action Alternative (Biological Resources—Ford Island)	4-467
4.4.2.2.1.2	Alternative 1 (Biological Resources—Ford Island)	4-467
4.4.2.2.1.3	Alternative 2 (Biological Resources—Ford Island)	4-468
4.4.2.2.1.4	Alternative 3 (Biological Resources—Ford Island)	4-468
4.4.2.2.2	Cultural Resources—Ford Island	4-468
4.4.2.2.2.1	No-action Alternative (Cultural Resources—Ford Island)	4-468
4.4.2.2.2.2	Alternative 1 (Cultural Resources—Ford Island)	4-468
4.4.2.2.2.3	Alternative 2 (Cultural Resources—Ford Island)	4-469
4.4.2.2.2.4	Alternative 3 (Cultural Resources—Ford Island)	4-469
4.4.2.2.3	Water Resources—Ford Island	4-469
4.4.2.2.3.1	No-action Alternative (Water Resources—Ford Island)	4-469
4.4.2.2.3.2	Alternative 1 (Water Resources—Ford Island)	4-469
4.4.2.2.3.3	Alternative 2 (Water Resources—Ford Island)	4-469
4.4.2.2.3.4	Alternative 3 (Water Resources—Ford Island)	4-470
4.4.2.3	Naval Inactive Ship Maintenance Facility, Pearl Harbor	4-471
4.4.2.3.1	Biological Resources—Naval Inactive Ship Maintenance Facility, Pearl Harbor	4-471
4.4.2.3.1.1	No-action Alternative (Biological Resources— Naval Inactive Ship Maintenance Facility, Pearl Harbor)	4-471
4.4.2.3.1.2	Alternative 1 (Biological Resources—Naval Inactive Ship Maintenance Facility, Pearl Harbor)	4-472

4.4.2.3.1.3	Alternative 2 (Biological Resources—Naval Inactive Ship Maintenance Facility, Pearl Harbor) ..	4-473
4.4.2.3.1.4	Alternative 3 (Biological Resources—Naval Inactive Ship Maintenance Facility, Pearl Harbor) ..	4-473
4.4.2.3.2	Hazardous Materials and Waste—Naval Inactive Ship Maintenance Facility, Pearl Harbor	4-473
4.4.2.3.2.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Hazardous Materials and Waste—Naval Inactive Ship Maintenance Facility, Pearl Harbor)	4-473
4.4.2.3.3	Water Resources—Naval Inactive Ship Maintenance Facility, Pearl Harbor	4-474
4.4.2.3.3.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Water Resources—Naval Inactive Ship Maintenance Facility, Pearl Harbor) ..	4-474
4.4.2.4	Explosive Ordnance Disposal (EOD) Land Range—Naval Magazine (NAVMAG) Pearl Harbor West Loch	4-475
4.4.2.4.1	Biological Resources—EOD Land Range—NAVMAG Pearl Harbor West Loch	4-475
4.4.2.4.1.1	No-action Alternative (Biological Resources—EOD Land Range—NAVMAG Pearl Harbor West Loch) ..	4-475
4.4.2.4.1.2	Alternative 1 (Biological Resources—EOD Land Range—NAVMAG Pearl Harbor West Loch)	4-476
4.4.2.4.1.3	Alternative 2 (Biological Resources—EOD Land Range—NAVMAG Pearl Harbor West Loch)	4-476
4.4.2.4.1.4	Alternative 3 (Biological Resources—EOD Land Range—NAVMAG Pearl Harbor West Loch)	4-476
4.4.2.4.2	Cultural Resources—EOD Land Range—NAVMAG Pearl Harbor West Loch)	4-476
4.4.2.4.2.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Cultural Resources—EOD Land Range—NAVMAG Pearl Harbor West Loch)	4-476
4.4.2.4.3	Geology and Soils—EOD Land Range—NAVMAG Pearl Harbor West Loch)	4-477
4.4.2.4.3.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Geology and Soils—EOD Land Range—NAVMAG Pearl Harbor West Loch)	4-477
4.4.2.4.4	Health and Safety—EOD Land Range—NAVMAG Pearl Harbor West Loch	4-478
4.4.2.4.4.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Health and Safety—EOD Land Range—NAVMAG Pearl Harbor West Loch)	4-478
4.4.2.4.5	Water Resources—EOD Land Range—NAVMAG Pearl Harbor West Loch	4-479
4.4.2.4.5.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Water Resources—EOD Land Range—NAVMAG Pearl Harbor West Loch)	4-479
4.4.2.5	Lima Landing	4-481
4.4.2.5.1	Biological Resources—Lima Landing	4-481
4.4.2.5.1.1	No-action Alternative (Biological Resources—Lima Landing)	4-481

4.4.2.5.1.2	Alternative 1 (Biological Resources—Lima Landing).....	4-482
4.4.2.5.1.3	Alternative 2 (Biological Resources—Lima Landing).....	4-483
4.4.2.5.1.4	Alternative 3 (Biological Resources—Lima Landing).....	4-483
4.4.2.5.2	Cultural Resources—Lima Landing	4-483
4.4.2.5.2.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Cultural Resources—Lima Landing).....	4-483
4.4.2.5.3	Hazardous Materials and Waste—Lima Landing.....	4-484
4.4.2.5.3.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Hazardous Materials and Waste—Lima Landing)	4-484
4.4.2.5.4	Health and Safety—Lima Landing	4-484
4.4.2.5.4.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Health and Safety—Lima Landing).....	4-484
4.4.2.6	U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport....	4-486
4.4.2.6.1	Airspace—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport	4-486
4.4.2.6.1.1	No-action Alternative (Airspace—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport)..	4-486
4.4.2.6.1.2	Alternative 1 (Airspace—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport).....	4-487
4.4.2.6.1.3	Alternative 2 (Airspace—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport).....	4-487
4.4.2.6.1.4	Alternative 3 (Airspace—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport).....	4-488
4.4.2.6.2	Biological Resources—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport.....	4-488
4.4.2.6.2.1	No-action Alternative (Biological Resources—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport).....	4-488
4.4.2.6.2.2	Alternative 1 (Biological Resources—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport)..	4-489
4.4.2.6.2.3	Alternative 2 (Biological Resources—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport)..	4-490
4.4.2.6.2.4	Alternative 3 (Biological Resources—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport)..	4-490
4.4.2.6.3	Noise—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport	4-490
4.4.2.6.3.1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 (Noise—U.S. Coast Guard Air Station Barbers Point/Kalaeloa Airport).....	4-490
4.4.2.7	Marine Corps Base Hawaii (MCBH)	4-491
4.4.2.7.1	Airspace—MCBH.....	4-491
4.4.2.7.1.1	No-action Alternative (Airspace—MCBH).....	4-491
4.4.2.7.1.2	Alternative 1 (Airspace—MCBH)	4-492
4.4.2.7.1.3	Alternative 2 (Airspace—MCBH)	4-492
4.4.2.7.1.4	Alternative 3 (Airspace—MCBH)	4-493

4.4.2.7.2	Biological Resources—MCBH	4-493
4.4.2.7.2.1	No-action Alternative (Biological Resources— MCBH)	4-493
4.4.2.7.2.2	Alternative 1 (Biological Resources—MCBH).....	4-494
4.4.2.7.2.3	Alternative 2 (Biological Resources—MCBH).....	4-495
4.4.2.7.2.4	Alternative 3 (Biological Resources—MCBH).....	4-495
4.4.2.7.3	Cultural Resources—MCBH	4-496
4.4.2.7.3.1	No-action Alternative (Cultural Resources— MCBH)	4-496
4.4.2.7.3.2	Alternative 1 (Cultural Resources—MCBH).....	4-496
4.4.2.7.3.3	Alternative 2 (Cultural Resources—MCBH).....	4-496
4.4.2.7.3.4	Alternative 3 (Cultural Resources—MCBH).....	4-497
4.4.2.7.4	Noise—MCBH.....	4-497
4.4.2.7.4.1	No-action Alternative (Noise—MCBH).....	4-497
4.4.2.7.4.2	Alternative 1 (Noise—MCBH)	4-498
4.4.2.7.4.3	Alternative 2 (Noise—MCBH)	4-499
4.4.2.7.4.4	Alternative 3 (Noise—MCBH)	4-499
4.4.2.7.5	Socioeconomics—MCBH.....	4-499
4.4.2.7.5.1	No-action Alternative (Socioeconomics—MCBH)...	4-499
4.4.2.7.5.2	Alternative 1 (Socioeconomics—MCBH)	4-500
4.4.2.7.5.3	Alternative 2 (Socioeconomics—MCBH)	4-501
4.4.2.7.5.4	Alternative 3 (Socioeconomics—MCBH)	4-501
4.4.2.8	Marine Corps Training Area/Bellows (MCTAB)	4-503
4.4.2.8.1	Biological Resources—MCTAB	4-503
4.4.2.8.1.1	No-action Alternative (Biological Resources— MCTAB)	4-503
4.4.2.8.1.2	Alternative 1 (Biological Resources—MCTAB).....	4-505
4.4.2.8.1.3	Alternative 2 (Biological Resources—MCTAB).....	4-505
4.4.2.8.1.4	Alternative 3 (Biological Resources—MCTAB).....	4-506
4.4.2.8.2	Cultural Resources—MCTAB	4-506
4.4.2.8.2.1	No-action Alternative (Cultural Resources— MCTAB)	4-506
4.4.2.8.2.2	Alternative 1 (Cultural Resources—MCTAB).....	4-507
4.4.2.8.2.3	Alternative 2 (Cultural Resources—MCTAB).....	4-507
4.4.2.8.2.4	Alternative 3 (Cultural Resources—MCTAB).....	4-507
4.4.2.9	Hickam Air Force Base (AFB).....	4-508
4.4.2.9.1	Airspace—Hickam AFB	4-508
4.4.2.9.1.1	No-action Alternative (Airspace—Hickam AFB)	4-508
4.4.2.9.1.2	Alternative 1 (Airspace—Hickam AFB).....	4-509
4.4.2.9.1.3	Alternative 2 (Airspace—Hickam AFB).....	4-509
4.4.2.9.1.4	Alternative 3 (Airspace—Hickam AFB).....	4-510
4.4.2.9.2	Biological Resources —Hickam AFB	4-510
4.4.2.9.2.1	No-action Alternative (Biological Resources— Hickam AFB).....	4-510
4.4.2.9.2.2	Alternative 1 (Biological Resources—Hickam AFB)4-511	
4.4.2.9.2.3	Alternative 2 (Biological Resources—Hickam AFB)4-511	
4.4.2.9.2.4	Alternative 3 (Biological Resources—Hickam AFB)4-512	
4.4.2.10	Wheeler Army Airfield	4-513
4.4.2.10.1	Airspace—Wheeler Army Airfield.....	4-513
4.4.2.10.1.1	No-action Alternative (Airspace—Wheeler Army Airfield).....	4-513

4.4.2.10.1.2 Alternative 1 (Airspace—Wheeler Army Airfield) 4-514

4.4.2.10.1.3 Alternative 2 (Airspace—Wheeler Army Airfield) 4-514

4.4.2.10.1.4 Alternative 3 (Airspace—Wheeler Army Airfield) 4-514

4.4.2.10.2 Biological Resources—Wheeler Army Airfield 4-515

4.4.2.10.2.1 No-action Alternative (Biological Resources—Wheeler Army Airfield)..... 4-515

4.4.2.10.2.2 Alternative 1 (Biological Resources—Wheeler Army Airfield) 4-515

4.4.2.10.2.3 Alternative 2 (Biological Resources—Wheeler Army Airfield) 4-516

4.4.2.10.2.4 Alternative 3 (Biological Resources—Wheeler Army Airfield) 4-516

4.4.2.11 Makua Military Reservation..... 4-517

4.4.2.11.1 Biological Resources—Makua Military Reservation..... 4-517

4.4.2.11.1.1 No-action Alternative (Biological Resources—Makua Military Reservation) 4-517

4.4.2.11.1.2 Alternative 1 (Biological Resources—Makua Military Reservation) 4-519

4.4.2.11.1.3 Alternative 2 (Biological Resources—Makua Military Reservation) 4-519

4.4.2.11.1.4 Alternative 3 (Biological Resources—Makua Military Reservation) 4-520

4.4.2.11.2 Cultural Resources—Makua Military Reservation..... 4-520

4.4.2.11.2.1 No-action Alternative (Cultural Resources—Makua Military Reservation) 4-520

4.4.2.11.2.2 Alternative 1 (Cultural Resources—Makua Military Reservation) 4-521

4.4.2.11.2.3 Alternative 2 (Cultural Resources—Makua Military Reservation) 4-521

4.4.2.11.2.4 Alternative 3 (Cultural Resources—Makua Military Reservation) 4-521

4.4.2.11.3 Health and Safety—Makua Military Reservation..... 4-521

4.4.2.11.3.1 No-action Alternative (Health and Safety—Makua Military Reservation) 4-521

4.4.2.11.3.2 Alternative 1 (Health and Safety—Makua Military Reservation)..... 4-522

4.4.2.11.3.3 Alternative 2 (Health and Safety—Makua Military Reservation) 4-522

4.4.2.11.3.4 Alternative 3 (Health and Safety—Makua Military Reservation) 4-522

4.4.2.11.4 Noise—Makua Military Reservation 4-523

4.4.2.11.4.1 No-action Alternative (Noise—Makua Military Reservation) 4-523

4.4.2.11.4.2 Alternative 1 (Noise—Makua Military Reservation) 4-523

4.4.2.11.4.3 Alternative 2 (Noise—Makua Military Reservation) 4-523

4.4.2.11.4.4 Alternative 3 (Noise—Makua Military Reservation) 4-524

4.4.2.12 Kahuku Training Area 4-525

4.4.2.12.1 Biological Resources—Kahuku Training Area 4-525

4.4.2.12.1.1 No-action Alternative (Biological Resources—Kahuku Training Area)..... 4-525

4.4.2.12.1.2	Alternative 1 (Biological Resources—Kahuku Training Area).....	4-526
4.4.2.12.1.3	Alternative 2 (Biological Resources—Kahuku Training Area).....	4-527
4.4.2.12.1.4	Alternative 3 (Biological Resources—Kahuku Training Area).....	4-527
4.4.2.12.2	Cultural Resources—Kahuku Training Area	4-527
4.4.2.12.2.1	No-action Alternative (Cultural Resources—Kahuku Training Area).....	4-527
4.4.2.12.2.2	Alternative 1 (Cultural Resources—Kahuku Training Area).....	4-528
4.4.2.12.2.3	Alternative 2 (Cultural Resources—Kahuku Training Area).....	4-528
4.4.2.12.2.4	Alternative 3 (Cultural Resources—Kahuku Training Area).....	4-529
4.4.2.13	Dillingham Military Reservation.....	4-530
4.4.2.13.1	Biological Resources—Dillingham Military Reservation....	4-530
4.4.2.13.1.1	No-action Alternative (Biological Resources—Dillingham Military Reservation)	4-530
4.4.2.13.1.2	Alternative 1 (Biological Resources—Dillingham Military Reservation)	4-531
4.4.2.13.1.3	Alternative 2 (Biological Resources—Dillingham Military Reservation)	4-532
4.4.2.13.1.4	Alternative 3 (Biological Resources—Dillingham Military Reservation)	4-532
4.4.2.13.2	Cultural Resources—Dillingham Military Reservation.....	4-532
4.4.2.13.2.1	No-action Alternative (Cultural Resources—Dillingham Military Reservation)	4-532
4.4.2.13.2.2	Alternative 1 (Cultural Resources—Dillingham Military Reservation)	4-533
4.4.2.13.2.3	Alternative 2 (Cultural Resources—Dillingham Military Reservation)	4-533
4.4.2.13.2.4	Alternative 3 (Cultural Resources—Dillingham Military Reservation)	4-533
4.4.2.14	Keehi Lagoon.....	4-534
4.4.2.15	Kaena Point	4-535
4.4.2.16	Mt. Kaala.....	4-536
4.4.2.17	Wheeler Network Segment Control/PMRF Communication Sites	4-537
4.4.2.18	Mauna Kapu Communication Site	4-538
4.4.2.19	Makua Radio/Repeater/Cable Head	4-539
4.5	Maui.....	4-541
4.5.1	Maui Offshore	4-541
4.5.1.1	Maui Offshore	4-542
4.5.1.1.1	Biological Resources—Maui Offshore	4-542
4.5.1.1.1.1	No-action Alternative (Biological Resources—Maui Offshore).....	4-542
4.5.1.1.1.2	Alternative 1 (Biological Resources—Maui Offshore).....	4-543
4.5.1.1.1.3	Alternative 2 (Biological Resources—Maui Offshore).....	4-544

4.5.1.1.1.4	Alternative 3 (Biological Resources—Maui Offshore).....	4-544
4.5.1.2	Shallow-water Minefield Sonar Training Area Offshore	4-545
4.5.2	Maui Onshore	4-546
4.5.2.1	Maui Space Surveillance System	4-546
4.5.2.2	Maui High Performance Computing Center	4-547
4.5.2.3	Sandia Maui Haleakala Facility.....	4-548
4.5.2.4	Molokai Mobile Transmitter Site.....	4-549
4.6	Hawaii.....	4-551
4.6.1	Hawaii Offshore	4-551
4.6.1.1	Kawaihae Pier Offshore.....	4-551
4.6.1.1.1	Biological Resources—Kawaihae Pier—Offshore	4-551
4.6.1.1.1.1	No-action Alternative (Biological Resources—Kawaihae Pier—Offshore).....	4-551
4.6.1.1.1.2	Alternative 1 (Biological Resources—Kawaihae Pier—Offshore).....	4-553
4.6.1.1.1.3	Alternative 2 (Biological Resources—Kawaihae Pier—Offshore).....	4-553
4.6.1.1.1.4	Alternative 3 (Biological Resources—Kawaihae Pier—Offshore).....	4-553
4.6.2	Hawaii Onshore	4-554
4.6.2.1	Pohakuloa Training Area	4-554
4.6.2.1.1	Airspace—PTA	4-555
4.6.2.1.1.1	No-action Alternative (Airspace—PTA)	4-555
4.6.2.1.1.2	Alternative 1 (Airspace—PTA).....	4-555
4.6.2.1.1.3	Alternative 2 (Airspace—PTA).....	4-556
4.6.2.1.1.4	Alternative 3 (Airspace—PTA).....	4-557
4.6.2.1.2	Biological Resources—PTA.....	4-557
4.6.2.1.2.1	No-action Alternative (Biological Resources—PTA).....	4-557
4.6.2.1.2.2	Alternative 1 (Biological Resources—PTA)	4-559
4.6.2.1.2.3	Alternative 2 (Biological Resources—PTA)	4-560
4.6.2.1.2.4	Alternative 3 (Biological Resources—PTA)	4-560
4.6.2.1.3	Cultural Resources—PTA.....	4-561
4.6.2.1.3.1	No-action Alternative (Cultural Resources—PTA).....	4-561
4.6.2.1.3.2	Alternative 1 (Cultural Resources—PTA)	4-561
4.6.2.1.3.3	Alternative 2 (Cultural Resources—PTA)	4-562
4.6.2.1.3.4	Alternative 3 (Cultural Resources—PTA)	4-562
4.6.2.1.4	Health and Safety—PTA.....	4-562
4.6.2.1.4.1	No-action Alternative (Health and Safety—PTA)....	4-562
4.6.2.1.4.2	Alternative 1 (Health and Safety—PTA)	4-563
4.6.2.1.4.3	Alternative 2 (Health and Safety—PTA)	4-564
4.6.2.1.4.4	Alternative 3 (Health and Safety—PTA)	4-564
4.6.2.1.5	Noise—PTA	4-564
4.6.2.1.5.1	No-action Alternative (Noise—PTA)	4-564
4.6.2.1.5.2	Alternative 1 (Noise—PTA).....	4-565
4.6.2.1.5.3	Alternative 2 (Noise—PTA).....	4-565
4.6.2.1.5.4	Alternative 3 (Noise—PTA).....	4-565
4.6.2.2	Bradshaw Army Airfield.....	4-567
4.6.2.2.1	Airspace—Bradshaw Army Airfield	4-567

4.6.2.2.1.1	No-action Alternative (Airspace—Bradshaw Army Airfield).....	4-567
4.6.2.2.1.2	Alternative 1 (Airspace—Bradshaw Army Airfield) .	4-568
4.6.2.2.1.3	Alternative 2 (Airspace—Bradshaw Army Airfield) .	4-568
4.6.2.2.1.4	Alternative 3 (Airspace—Bradshaw Army Airfield) .	4-569
4.6.2.2.2	Biological Resources—Bradshaw Army Airfield.....	4-569
4.6.2.2.2.1	No-action Alternative (Biological Resources—Bradshaw Army Airfield)	4-569
4.6.2.2.2.2	Alternative 1 (Biological Resources—Bradshaw Army Airfield)	4-570
4.6.2.2.2.3	Alternative 2 (Biological Resources—Bradshaw Army Airfield)	4-570
4.6.2.2.2.4	Alternative 3 (Biological Resources—Bradshaw Army Airfield)	4-571
4.6.2.2.3	Cultural Resources—Bradshaw Army Airfield.....	4-571
4.6.2.2.3.1	No-action Alternative (Cultural Resources—Bradshaw Army Airfield)	4-571
4.6.2.2.3.2	Alternative 1 (Cultural Resources—Bradshaw Army Airfield)	4-571
4.6.2.2.3.3	Alternative 2 (Cultural Resources—Bradshaw Army Airfield)	4-571
4.6.2.2.3.4	Alternative 3 (Cultural Resources—Bradshaw Army Airfield)	4-572
4.6.2.3	Kawaihae Pier.....	4-573
4.6.2.3.1	Biological Resources—Kawaihae Pier.....	4-573
4.6.2.3.1.1	No-action Alternative (Biological Resources—Kawaihae Pier)	4-573
4.6.2.3.1.2	Alternative 1 (Biological Resources—Kawaihae Pier)	4-574
4.6.2.3.1.3	Alternative 2 (Biological Resources—Kawaihae Pier)	4-574
4.6.2.3.1.4	Alternative 3 (Biological Resources—Kawaihae Pier)	4-575
4.7	Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS)	4-576
4.7.1	Biological Resources—HIHWNMS.....	4-577
4.7.1.1	Kauai—Biological Resources—HIHWNMS	4-577
4.7.1.2	Oahu—Biological Resources—HIHWNMS	4-578
4.7.1.3	Maui—Biological Resources—HIHWNMS.....	4-578
4.7.1.4	Hawaii—Biological Resources—HIHWNMS.....	4-578
4.8	Conflicts With Federal, State, and Local Land Use Plans, Policies, and Controls for the Area Concerned.....	4-579
4.9	Energy Requirements and Conservation Potential	4-581
4.10	Irreversible or Irretrievable Commitment of Resources.....	4-581
4.11	Relationship Between Short-Term Use of The Human Environment and the Maintenance and Enhancement of Long-Term Productivity	4-582
4.12	Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations (Executive Order 12898).....	4-582
4.12.1	Air Quality	4-584
4.12.2	Airspace.....	4-584
4.12.3	Biological Resources	4-584
4.12.4	Cultural Resources	4-585

4.12.5	Geology and Soils	4-585
4.12.6	Hazardous Materials and Waste	4-585
4.12.7	Health and Safety	4-585
4.12.8	Land Use	4-586
4.12.9	Noise	4-587
4.12.10	Socioeconomics	4-587
4.12.11	Transportation	4-587
4.12.12	Utilities	4-587
4.12.13	Water Resources	4-588
4.13	Federal Actions To Address Protection of Children from Environmental Health Risks and Safety Risks (Executive Order 13045, as Amended by Executive Order 13229).....	4-588
4.14	Hawaii's Coastal Zone Management Program.....	4-589
5.0	CUMULATIVE IMPACTS	5-1
5.1	Requirement for Cumulative Impact Analysis	5-1
5.2	Approach	5-2
5.3	Geographic Boundaries for Cumulative Analysis	5-2
5.4	Other Projects and Activities Analyzed for Cumulative Impacts.....	5-3
5.4.1	Other Projects.....	5-3
5.4.2	Other Activities	5-18
5.4.2.1	Commercial Fishing	5-18
5.4.2.2	Ship Strikes.....	5-20
5.4.2.3	Anthropogenic Contributors to Ocean Noise Levels	5-21
5.4.2.3.1	Commercial Shipping	5-22
5.4.2.3.2	Vessel Mechanical Noise Sources	5-22
5.4.2.3.3	Whale Watching.....	5-23
5.4.2.3.4	Commercial and Military Sonar	5-23
5.4.2.4	Environmental Contamination and Biotoxins	5-28
5.4.2.5	Coastal Development Activities	5-28
5.4.2.6	Scientific Research Permits	5-29
5.4.2.7	Other considerations.....	5-29
5.5	Cumulative Impact Analysis	5-30
5.5.1	Air Quality	5-30
5.5.2	Airspace.....	5-31
5.5.3	Biological Resources	5-31
5.5.3.1	Open Ocean and Offshore Biological Resources	5-31
5.5.3.2	Onshore Biological Resources.....	5-45
5.5.4	Cultural Resources	5-46
5.5.5	Geology and Soils	5-46
5.5.6	Hazardous Materials and Waste	5-47
5.5.7	Health and Safety	5-47
5.5.8	Land Use	5-48
5.5.9	Noise	5-48
5.5.10	Socioeconomics	5-49
5.5.11	Transportation	5-49
5.5.12	Utilities	5-49
5.5.13	Water Resources	5-50
6.0	MITIGATION MEASURES	6-1
6.1	Current Mitigation Measures	6-1

6.1.1	Personnel Training	6-3
6.1.2	Lookout and Watchstander Responsibilities.....	6-3
6.1.3	Operating Procedures	6-4
6.1.4	Current Mitigation Measures Associated with Events Using EER/IEER Sonobuoys.....	6-7
6.1.5	MFA/HFA Sonar Use Associated with Training Events in the Humpback Whale Cautionary Area	6-8
	6.1.5.1 Humpback Whale Cautionary Area.....	6-9
	6.1.5.2 Cautionary Area Use, Authorization, and Reporting.....	6-9
6.1.6	Evaluation of Current Mitigation Measures.....	6-10
6.2	Alternative and/or Additional Mitigation Measures	6-11
6.2.1	Evaluation of Alternative and/or Additional Mitigation Measures.....	6-12
	6.2.1.1 After Action Reports and Assessment	6-19
	6.2.1.2 Coordination and Reporting.....	6-19
6.3	Conservation Measures	6-20
6.4	Underwater Detonations.....	6-20
6.4.1	Demolition and Ship Mine Countermeasures Operations (up to 20 Pounds)	6-20
	6.4.1.1 Exclusion Zones	6-20
	6.4.1.2 Pre-Exercise Surveillance.....	6-20
	6.4.1.3 Post-Exercise Surveillance	6-21
	6.4.1.4 Reporting	6-21
6.4.2	Sinking Exercise, Gunnery Exercise, Missile Exercise and Bombing Exercise.....	6-21
6.4.3	Underwater Detonations Mitigation Procedures	6-21
6.5	Aircraft Operations Involving Non-Explosive Devices	6-23
6.6	Conditions Associated with the Biological Opinion.....	6-23
6.7	Review of Endangered Species Recovery Plans	6-24
6.7.1	Recovery Plan for the Blue Whale (<i>Balaenoptera musculus</i>)—(1998).....	6-25
6.7.2	Draft Recovery Plan for the Fin Whale (<i>Balaenoptera physalus</i>)— (2006).....	6-25
6.7.3	Final Recovery Plan for the Humpback Whale (<i>Megaptera novaeangliae</i>)—(1991)	6-26
6.7.4	Draft Recovery Plan for the Sperm Whale (<i>Physeter macrocephalus</i>)—(2006).....	6-27
	6.7.4.1 G.8 Military Operations (p.I-32).....	6-27
6.7.5	Recovery Plan for the Hawaiian Monk Seal (<i>Monachus schauinslandi</i>)—(Draft revision 2005)	6-28
6.7.6	Recovery Plan for the U.S. Pacific Populations of the Green Turtle (<i>Chelonia mydas</i>)—(1998)	6-29
6.7.7	Recovery Plan for U.S. Pacific Populations of the Hawksbill Turtle (<i>Eretmochelys imbricata</i>)—(1998).....	6-30
6.7.8	Recovery Plan for U.S. Pacific Populations of the Loggerhead Turtle (<i>Caretta caretta</i>)—(1998)	6-30
6.7.9	Recovery Plan for U.S. Pacific Populations of the Olive Ridley Turtle (<i>Lepidochelys olivacea</i>)—(1998)	6-31
6.7.10	Recovery Plan for U.S. Populations of the Leatherback Turtle (<i>Dermochelys coriacea</i>)—(1998).....	6-32
6.7.11	Additional Marine Mammal Research Sources	6-32
6.8	Hawaii Range Complex Monitoring Plan.....	6-33
6.8.1	Integrated Comprehensive Monitoring Program.....	6-33

6.9	Navy-Funded Research	6-34
6.10	Kauai	6-35
6.10.1	Airspace.....	6-35
6.10.2	Biological Resources	6-36
6.10.3	Cultural Resources	6-38
6.10.4	Geology and Soils	6-39
6.10.5	Hazardous Materials and Waste	6-39
6.10.6	Health and Safety	6-39
6.10.7	Noise	6-40
6.10.8	Kaula	6-41
6.10.9	Niihau	6-41
6.10.9.1	Biological Resources	6-41
6.10.9.2	Hazardous Materials and Waste.....	6-41
6.10.9.3	Health and Safety	6-41
6.11	Oahu.....	6-42
6.11.1	Puuloa Underwater Range	6-42
6.11.1.1	Airspace	6-42
6.11.1.2	Biological Resources	6-42
6.11.1.3	Health and Safety	6-42
6.11.2	Naval Defensive Sea Area	6-44
6.11.2.1	Biological Resources	6-44
6.11.2.2	Health and Safety	6-44
6.11.3	Pearl Harbor	6-44
6.11.4	Ford Island.....	6-44
6.11.5	Explosive Ordnance Disposal Land Range	6-44
6.11.6	Lima Landing	6-44
6.11.6.1	Biological Resources	6-44
6.11.6.2	Health and Safety	6-45
6.11.7	Marine Corps Base Hawaii	6-45
6.11.7.1	Airspace	6-45
6.11.7.2	Biological Resources	6-45
6.11.7.3	Cultural Resources	6-45
6.11.8	Marine Corps Training Area/Bellows	6-46
6.11.8.1	Biological Resources	6-46
6.11.8.2	Cultural Resources	6-46
6.11.9	Hickam Air Force Base	6-46
6.11.9.1	Airspace	6-46
6.11.9.2	Biological Resources	6-46
6.11.10	Wheeler Army Airfield	6-47
6.11.10.1	Airspace	6-47
6.11.10.2	Biological: Resources.....	6-47
6.11.11	Makua Military Reservation.....	6-47
6.11.11.1	Biological Resources.....	6-47
6.11.11.2	Cultural Resources.....	6-47
6.11.11.3	Health and Safety.....	6-47
6.11.12	Kahuku Training Area	6-48
6.11.12.1	Biological Resources.....	6-48
6.11.12.2	Cultural Resources.....	6-48
6.11.13	Dillingham Military Reservation.....	6-49
6.11.13.1	Biological Resources.....	6-49
6.11.13.2	Cultural Resources.....	6-49

Table of Contents

6.12 Maui.....	6-49
6.13 Hawaii.....	6-50
6.13.1 Kawaihae Pier	6-50
6.13.2 Pohakuloa Training Area	6-50
6.13.2.1 Airspace	6-50
6.13.2.2 Biological Resources	6-51
6.13.2.3 Cultural Resources	6-52
6.13.2.4 Health and Safety	6-52
6.13.3 Bradshaw Army Airfield	6-52
6.13.3.1 Airspace	6-52
6.13.3.2 Biological Resources	6-52
6.14 General Offshore Areas	6-52
7.0 LIST OF PREPARERS	7-1
8.0 GLOSSARY OF TERMS.....	8-1
9.0 REFERENCES.....	9-1
10.0 DISTRIBUTION LIST	10-1
11.0 AGENCIES AND INDIVIDUALS CONTACTED	11-1

Volume 3

	<u>Page</u>
12.0 CONSULTATION COMMENTS AND RESPONSES	12-1
13.0 COMMENTS AND RESPONSES—DRAFT EIS/OEIS	13-1
13.1 Public Involvement Process	13-1
13.1.1 Public Scoping Process	13-1
13.1.2 Public Review Process	13-1
13.2 Summary of Comments	13-5
13.3 Summary of Responses	13-10
13.4 Summary Tables	13-18
13.4.1 Written Public Comments	13-21
13.4.2 Email Public Comments	13-199
13.4.3 Public Hearing Comments	13-565
13.4.4 Webmail Public Comments	13-705

Volume 4

	<u>Page</u>
14.0 COMMENTS AND RESPONSES—SUPPLEMENT TO THE DRAFT EIS/OEIS.....	14-1
14.1 Public Involvement Process	14-1
14.2 Summary of Comments.....	14-3
14.3 Summary of Responses	14-7
14.4 Summary Tables	14-16
14.4.1 Written Public Comments	14-19
14.4.2 Email Public Comments	14-65
14.4.3 Public Hearing Comments.....	14-183
14.4.4 Webmail Public Comments	14-239

Volume 5

APPENDICES

	<u>Page</u>
A COOPERATING AGENCIES REQUEST AND ACCEPTANCE LETTERS	A-1
B FEDERAL REGISTER NOTICES	B-1
C RESOURCE DESCRIPTIONS INCLUDING LAWS AND REGULATIONS CONSIDERED	C-1
D HAWAII RANGE COMPLEX TRAINING	D-1
E WEAPON SYSTEMS	E-1
F MAJOR EXERCISE MONITORING REPORTS.....	F-1
G OVERVIEW OF AIRBORNE AND UNDERWATER ACOUSTICS.....	G-1
H CULTURAL RESOURCES	H-1
I LAND USE	I-1
J ACOUSTIC IMPACT MODELING	J-1
K MISSILE LAUNCH SAFETY AND EMERGENCY RESPONSE.....	K-1
ACRONYMS AND ABBREVIATIONS.....	AC-1

FIGURES

		<u>Page</u>
1.2-1	Hawaii Range Complex Overview, Pacific Ocean	1-3
1.2-2	EIS/OEIS Study Area: Hawaii Range Complex Open Ocean, Offshore, and Land Areas, Hawaiian Islands	1-4
1.2-3	EIS/OEIS Study Area: Hawaii Range Complex Including the Hawaii Operating Area and Temporary Operating Area, Hawaiian Islands	1-5
1.2-4	Distance Relationship Between Major Hawaiian Islands.....	1-7
2.1-1	EIS/OEIS Study Area: Hawaii Range Complex Including the Temporary Operating Area, Hawaiian Islands	2-3
2.1-2	Hawaii Range Complex Study Area and Support Locations, Kauai, Niihau, and Kaula, Hawaii	2-4
2.1-3	Hawaii Range Complex Study Area and Support Locations, Oahu, Hawaii.....	2-5
2.1-4	Hawaii Range Complex Study Area and Support Locations, Maui, Molokai, and Lanai, Hawaii.....	2-6
2.1-5	Hawaii Range Complex Study Area and Support Locations, Island of Hawaii.....	2-7
2.2.2.5.1-1	Relative Missile Heights	2-26
2.2.2.5.1-2	Existing Pacific Missile Range Facility and Kauai Test Facility Launch Facilities, Kauai, Hawaii.....	2-29
2.2.2.5.1-3	Existing Missile Flight Corridors at Pacific Missile Range Facility, Open Ocean	2-30
2.2.2.5.1-4	Pacific Missile Range Facility Open Ocean Conceptual Intercept Scenarios—Sea, Hawaiian Islands	2-31
2.2.2.5.1-5	Pacific Missile Range Facility Open Ocean Conceptual Intercept Scenarios—Land, Hawaiian Islands.....	2-33
2.2.2.5.2-1	Naval Undersea Warfare Center Ranges, Oahu, Hawaii	2-34
2.2.2.6-1	Existing Exercise Area for Rim of the Pacific and Undersea Warfare Exercise, Hawaiian Islands.....	2-38
2.2.3.5-1	Proposed Target Flight Corridors into the Temporary Operating Area, Open Ocean	2-43
2.2.3.6.1-1	Explosive Ordnance Disposal Land Range at Pearl Harbor, Oahu, Hawaii.....	2-48
2.2.3.6.2-1	Ford Island, Oahu, Hawaii	2-49
2.2.3.6.2-2	Mobile Diving and Salvage Unit Training Areas Proposed Sites, Oahu, Hawaii.....	2-50
2.2.3.6.3-1	Portable Undersea Tracking Range Potential Area, Hawaiian Islands	2-52
2.2.3.6.4-1	Large Area Tracking Range Upgrade, Hawaiian Islands	2-53
2.2.3.6.4-2	Kingfisher Range, Hawaiian Islands.....	2-55
2.2.3.6.4-3	Proposed RDT&E Enhancements at Makaha Ridge, Kauai, Hawaii.....	2-56
2.2.3.6.4-4	Proposed RDT&E Enhancements at Kokee Park Radar Facility, Kauai, Hawaii.....	2-57
2.2.3.6.4-5	Proposed Consolidated Range Operations Complex, Kauai, Hawaii.....	2-59
2.2.4.5-1	Proposed Directed Energy Facilities at Pacific Missile Range Facility, Kauai, Hawaii.....	2-63
3.1.1-1	Airways and Special Use Airspace, Hawaiian Islands.....	3-4

3.1.1-2	Airspace Managed by Oakland and Honolulu Air Route Traffic Control Centers, Pacific Ocean.....	3-7
3.1.2.1-1	Distribution of Deep-Sea Corals and Hydrothermal Vents, Hawaiian Islands.....	3-10
3.1.2.2.3.1-1	Hearing Curves (Audiograms) for Select Teleost Fishes.....	3-18
3.1.3-1	Shipwreck Locations Near Kauai and Niihau, Kauai and Niihau, Hawaii.....	3-74
3.1.3-2	Shipwreck Locations Near Oahu, Oahu, Hawaii.....	3-75
3.1.3-3	Shipwreck Locations Near Maui, Molokai, Lanai, and Kahoolawe, Maui, Molokai, Lanai, and Kahoolawe, Hawaii.....	3-76
3.2-1	Papahānaumokuākea (Northwestern Hawaiian Islands) Marine National Monument, Hawaiian Islands.....	3-94
3.3.1.1.1-1	Offshore Hardbottom Habitats of Pacific Missile Range Facility, Kauai, Hawaii.....	3-109
3.3.1.1.1-2	Hawaiian Islands Humpback Whale National Marine Sanctuary, Hawaiian Islands.....	3-114
3.3.1.1.2-1	Hawaiian Fishpond Locations in the Vicinity of Kauai and Niihau, Kauai and Niihau, Hawaii.....	3-116
3.3.2.1.2-1	Airspace Use Surrounding Pacific Missile Range Facility, Kauai, Niihau, and Kaula, Hawaii.....	3-129
3.3.2.1.3-1	Critical Habitat—Western Kauai, Hawaii, Kauai, Hawaii.....	3-138
3.3.2.1.7-1	Pacific Missile Range Facility Health and Safety Areas, Kauai, Hawaii.....	3-149
3.3.2.1.8-1	State Land Use—Western Kauai, Hawaii, Kauai, Hawaii.....	3-154
3.3.2.1.8-2	Agricultural Lands of Importance to the Hawaii/Department of Hawaiian Homelands, Kauai, Hawaii.....	3-157
3.3.2.2.2-1	Critical Habitat—Northwestern Kauai, Hawaii, Kauai, Hawaii.....	3-175
3.3.2.9.1-1	Critical Habitat—Niihau, Hawaii, Niihau, Hawaii.....	3-193
3.4.1.1.1-1	Offshore Hardbottom Habitats of the Pearl Harbor Area, Oahu, Hawaii.....	3-203
3.4.1.3.1-1	Offshore Hardbottom Habitats of Marine Corps Base, Hawaii and Marine Corps Training Area-Bellows, Oahu, Hawaii.....	3-211
3.4.1.3.2-1	Hawaiian Fishpond Locations in the Vicinity of Oahu, Oahu, Hawaii.....	3-214
3.4.1.6.1-1	Offshore Hardbottom Habitats of Dillingham Military Reservation, Makua Military Reservation, and Kaena Point, Oahu, Hawaii.....	3-220
3.4.1.10.1-1	Offshore Hardbottom Habitats Near Fleet Operational Readiness Accuracy Check Site, Oahu, Hawaii.....	3-230
3.4.2.1.1-1	Critical Habitat, Southern Oahu, Hawaii, Oahu, Hawaii.....	3-236
3.4.2.6.1-1	Airspace Use Surrounding Oahu, Hawaii, Oahu, Hawaii.....	3-257
3.4.2.7.2-1	Critical Habitat—Eastern Oahu, Hawaii, Oahu, Hawaii.....	3-263
3.4.2.7.4-1	Marine Corps Base Hawaii Noise Contours for 1999 Aircraft Operations, Oahu, Hawaii.....	3-266
3.4.2.10.2-1	Critical Habitat—Central Oahu, Hawaii, Oahu, Hawaii.....	3-278
3.4.2.11.1-1	Critical Habitat—Northwest Oahu, Hawaii, Oahu, Hawaii.....	3-283
3.4.2.12.1-1	Critical Habitat—Northern Oahu, Hawaii, Oahu, Hawaii.....	3-290
3.6.1.1.1-1	Offshore Hardbottom Habitats Near Kawaihae Pier, Island of Hawaii.....	3-311
3.6.2.1.1-1	Airspace Use Surrounding Pohakuloa Training Area, Island of Hawaii.....	3-313
3.6.2.1.2-1	Critical Habitat—Pohakuloa Training Area, Island of Hawaii.....	3-318
3.6.2.1.5-1	Existing Noise Levels at Pohakuloa Training Area.....	3-323
4.1.2.4.3-1	Conceptual Marine Mammal Protection Act Analytical Framework.....	4-51
4.1.2.4.5-1	Harassment Zones Extending from a Hypothetical, Directional Sound Source.....	4-58
4.1.2.4.5-2	Hypothetical Temporary and Permanent Threshold Shifts.....	4-60
4.1.2.4.6-1	Existing TTS Data for Cetaceans.....	4-63

Table of Contents

4.1.2.4.6-2	Growth of TTS Versus the Exposure EL (from Ward et al., 1958, 1959)	4-65
4.1.2.4.9.3-1	Step Function Versus Risk Continuum Function	4-79
4.1.2.4.9.6.3-1	Risk Function Curve for Odontocetes (Toothed Whales) and Pinnipeds	4-86
4.1.2.4.9.6.3-2	Risk Function Curve for Mysticetes (Baleen Whales)	4-87
4.1.2.4.9.7-1	The Percentage of Behavioral Harassments Resulting from the Risk Function for Every 5 dB of Received Level	4-90
4.1.2.4.13.2-1	Proposed Marine Mammal Response Severity Scale Spectrum to Anthropogenic Sounds in Free Ranging Marine Mammals	4-148
4.3.2.1.7.1-1	Pacific Missile Range Facility Flight Corridor Azimuth Limits, Kauai, Hawaii.....	4-352
4.3.2.1.9.1-1	Typical Launch Noise Levels (dBA) for Kauai Test Facility Launch Area, Kauai, Hawaii.....	4-365
4.3.2.1.9.1-2	Typical Launch Noise Levels (dBA) for Pacific Missile Range Facility Launch Area, Kauai, Hawaii	4-366
4.3.2.1.9.1-3	Typical Launch Noise Levels (dBA) for Kokole Point Launch Area, Kauai, Hawaii.....	4-367
4.3.2.1.9.2-1	Pacific Missile Range Facility Noise Contours for 2009 Prospective Flight Operations, Kauai, Hawaii	4-370
5.4.2.1-1	Impacts from Fishing and Whaling Compared to Potential Impacts from Sonar Use.....	5-20
5.5.3.1-1	Human Threats to World-wide Small Cetacean Populations.....	5-36

TABLES

	<u>Page</u>	
1.5.3.1-1	Meeting Locations, Dates, and Attendees—Scoping	1-17
1.5.3.1-2	Number of Comments by Resource Area—Scoping.....	1-18
1.5.3.2-1	Public Hearing Locations, Dates, and Attendees— HRC Draft EIS/OEIS	1-18
1.5.3.2-2	Number of Comments by Resource Area— HRC Draft EIS/OEIS.....	1-19
1.5.3.2-3	Public Informational Sessions Locations, Dates, and Attendees— HRC Supplement to the Draft EIS/OEIS	1-20
1.5.3.2-4	Number of Comments by Resource Area HRC—Supplement to the Draft EIS/OEIS	1-20
2.1-1	Onshore Locations Where Navy Training is Conducted.....	2-8
2.2.2.1-1	Current Navy Training Events in the HRC.....	2-13
2.2.2.3-1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 Proposed Navy Training	2-18
2.2.2.4-1	Sonar Usage for the No-action Alternative	2-22
2.2.2.5-1	No-action Alternative, Alternative 1, Alternative 2, and Alternative 3 Proposed RDT&E Activities	2-23
2.2.2.6-1	Current Training Events Included in Major Exercises.....	2-37
2.2.3.2-1	Sonar Usage for Alternative 1	2-40
2.2.4.2-1	Sonar Usage for Alternative 2	2-61
2.3-1	Sonar Usage for Alternative 3	2-65
3-1	Chapter 3.0 Locations and Resources	3-2
3.1.1-1	Special Use Airspace in the Open Ocean Area Airspace Use Region of Influence	3-5

3.1.2.2.2-1	Summary of Pelagic or Open Water Species and Depth Distribution	3-15
3.1.2.2.3.2-1	Marine Fish Hearing Sensitivities	3-22
3.1.2.4-1	Summary of Hawaiian Islands Stock or Population of Marine Mammals	3-40
3.1.4-1	Hazardous Constituents of Training Materials.....	3-78
3.1.4-2	Water Solubility and Degradation Products of Common Explosives	3-80
3.1.4-3	Explosive Components of Munitions	3-80
3.1.4-4	Chemical Byproducts of Underwater Detonations.....	3-81
3.1.4-7	Sonobuoy Hazardous Constituents	3-84
3.1.6-1	Sound Levels of Typical Airborne Noise Sources and Environments	3-88
3.1.7-1	Threshold Marine Pollutant Concentrations	3-91
3.2.1.1.1-1	Listed Species Known or Expected to Occur Offshore of Nihoa and Necker	3-100
3.2.2.1.1-1	Listed Species Known or Expected to Occur on Nihoa and Necker.....	3-102
3.3.1.1.1-1	Listed Species Known or Expected to Occur Offshore of PMRF/Main Base	3-112
3.3.2.1.2-1	Special Use Airspace in the PMRF/Main Base Airspace Use Region of Influence	3-131
3.3.2.1.3-1	Listed Species Known or Expected to Occur in the Vicinity of PMRF/Main Base	3-134
3.3.2.1.9-1	Typical Range Operations Noise Levels	3-160
3.3.2.1.9-2	Noise Levels Monitored for ZEST and Strategic Target System Launches.....	3-160
3.3.2.1.10-1	Demographics of the Population of Kauai in 2000	3-162
3.3.2.1.10-2	Age Profile of Kauai County Residents in 2000.....	3-162
3.3.2.1.10-3	2006 Economic Impact of the Military in Hawaii	3-163
3.3.2.1.10-4	Employment in Kauai and Hawaii.....	3-164
3.3.2.1.10-5	Visitors to Kauai (2000-2006)	3-165
3.3.2.1.13-1	Water Tank Perchlorate Sampling.....	3-170
3.3.2.2.2-1	Listed Species Known or Expected to Occur in the Vicinity of Makaha Ridge	3-173
3.3.2.3.2-1	Listed Species Known or Expected to Occur in the Vicinity of Kokee	3-180
3.3.2.4.1-1	Listed Species Known or Expected to Occur in the Vicinity of Kokee Air Force Station	3-184
3.3.2.9.1-1	Listed Species Known or Expected to Occur on Niihau	3-191
3.3.2.10.2-1	Listed Species Known or Expected to Occur on Kaula	3-196
3.4.1.1.1-1	Listed Species Known or Expected to Occur in the Vicinity of Puuloa Underwater Range	3-205
3.4.1.3.1-1	Listed Species Known or Expected to Occur Offshore of Marine Corps Base Hawaii.....	3-212
3.4.2.1.1-1	Listed Species Known or Expected to Occur at Naval Station Pearl Harbor.....	3-234
3.4.2.1.3-1	Demographics of the Population of Oahu in 2006.....	3-238
3.4.2.1.3-2	Age Profile of Honolulu County Residents in 2006.....	3-238
3.4.2.1.3-3	Renter Occupied Housing Units	3-239
3.4.2.1.3-4	Employment on Oahu and in Hawaii	3-240
3.4.2.1.3-5	Visitors to Oahu (2000-2006).....	3-241
3.4.2.6.2-1	Listed Species Known or Expected to Occur in the Vicinity of	3-259
3.4.2.7.2-1	Listed Species Known or Expected to Occur in the MCBH Region.....	3-262

3.4.2.8.1-1	Listed Species Known or Expected to Occur at Marine Corps Training Area/Bellows.....	3-269
3.4.2.9.2-1	Listed Species Known or Expected to Occur in the Hickam AFB Region ...	3-274
3.4.2.11.1-1	Listed Species Known or Expected to Occur at Makua Military Reservation	3-280
3.4.2.12.1-1	Listed Species Known or Expected to Occur at Kahuku Training Area.....	3-288
3.4.2.13.1-1	Listed Species Known or Expected to Occur at Dillingham Military Reservation	3-293
3.6.2.1.1-1	Special Use Airspace in the Island of Hawaii Region of Influence	3-314
3.6.2.1.2-1	Listed Species Known or Expected to Occur in the Vicinity of the Proposed Action	3-318
4-1	Chapter 4.0 Locations and Resources	4-2
4.1-1	Training and RDT&E Activities in the Open Ocean Area	4-3
4.1.2.2-1	Maximum Fish-Effects Ranges.....	4-31
4.1.2.3-1	Summary of Criteria and Acoustic Thresholds for Underwater Detonation Impacts on Sea Turtles and Marine Mammals.....	4-39
4.1.2.4.9.7-1	Harassments at Each Received Level Band	4-90
4.1.2.4.9.8-1	Navy Protocols Providing for Accurate Modeling Quantification of Marine Mammal Exposures.....	4-91
4.1.2.4.10-1	Summary of the Number of Cetacean and Pinniped Strandings by Region from 2001-2005.....	4-96
4.1.2.4.10.1-1	Marine Mammal Unusual Mortality Events Attributed to or Suspected from Natural Causes 1978-2005	4-98
4.1.2.4.10.1-2	Summary of Marine Mammal Strandings by Cause for Each Region from 1999-2000	4-104
4.1.2.5.1-1	No-action Alternative Sonar Modeling Summary—Yearly Marine Mammal Exposures From all ASW (RIMPAC, USWEX, and Other ASW Training)	4-152
4.1.2.5.1-2	No-action Alternative Explosives Modeling Summary—Yearly Marine Mammal Exposures From all Explosive Sources	4-153
4.1.2.5.5-1	No-action Alternative Sonar Modeling Summary—Yearly Marine Mammal Exposures from Other HRC ASW Training.....	4-177
4.1.2.5.7-1	No-action Alternative Sonar Modeling Summary—Yearly Marine Mammal Exposures for RIMPAC (Conducted Every Other Year)	4-179
4.1.2.5.7-2	No-action Alternative Sonar Modeling Summary - Yearly Marine Mammal Exposures from USWEX (5 per year).....	4-180
4.1.2.6.1-1	Alternative 1 Sonar Modeling Summary—Yearly Marine Mammal Exposures from All ASW (RIMPAC, USWEX, and Other ASW Training) ...	4-182
4.1.2.6.1-2	Alternative 1 Explosives Modeling Summary—Yearly Marine Mammal Exposures from All Explosive Sources.....	4-183
4.1.2.6.5-1	Alternative 1 Sonar Modeling Summary—Yearly Marine Mammal Exposures from Other HRC ASW Training	4-206
4.1.2.6.8-1	Alternative 1 Sonar Modeling Summary—Yearly Marine Mammal Exposures for RIMPAC with 2 Strike Groups (Conducted Every Other Year).....	4-208
4.1.2.6.8-2	Alternative 1 Sonar Modeling Summary—Yearly Marine Mammal Exposures from USWEX (6 per year).....	4-209
4.1.2.7.1-1	Alternative 2 Sonar Modeling Summary—Yearly Marine Mammal Exposures from all ASW (RIMPAC, USWEX, Multiple Strike Group, and Other ASW Training)	4-211

4.1.2.7.1-2	Alternative 2 Explosives Modeling Summary - Yearly Marine Mammal Exposures from all Explosive Sources	4-212
4.1.2.7.5-1	Alternative 2 Sonar Modeling Summary—Yearly Marine Mammal Exposures from Other HRC ASW Training	4-235
4.1.4.1.1-1	HRC Training with Hazardous Materials No-action Alternative—Open Ocean Areas.....	4-243
4.1.4.1.1-2	Sonobuoy Hazardous Materials, No-action Alternative (Based on Average Amounts of Constituents).....	4-245
4.1.4.2.1-1	HRC Training with Hazardous Training Materials Alternative 1—Open Ocean Areas.....	4-248
4.1.4.3.1-1	HRC Training with Hazardous Training Materials Alternative 2—Open Ocean Areas.....	4-250
4.1.4.3.1-2	Sonobuoy Hazardous Materials, Alternative 2 (Based on Average Amounts of Constituents)	4-251
4.1.7.1.1-1	Ordnance Constituents of Concern	4-261
4.1.7.1.1-2	Missiles Typically Fired in Training Exercises	4-264
4.1.7.1.1-3	Hazardous Materials in Aerial Targets Typically Used in Navy Training	4-265
4.1.7.1.1-4	Concentration of Sonobuoy Battery Constituents and Criteria	4-268
4.1.7.1.1-5	Torpedoes Typically Used in Navy Training Activities	4-270
4.1.7.1.1-6	MK-46 Torpedo Constituents.....	4-270
4.2-1	RDT&E Activities Near the Northwestern Hawaiian Islands.....	4-279
4.3.1.1-1	Training and RDT&E Activities at PMRF Offshore (BARSTUR, BSURE, SWTR, Kingfisher).....	4-291
4.3.1.2-1	Training and RDT&E Activities at Niihau Offshore	4-307
4.3.1.3-1	Training at Kaula Offshore.....	4-311
4.3.2.1-1	Training and RDT&E Activities at PMRF/Main Base	4-314
4.3.2.1.1.1-1	Air Emissions from Emergency Generators, PMRF/Main Base	4-315
4.3.2.1.1.2-1	Proposed Construction Air Emissions Summary (Tons per Year).....	4-321
4.3.2.2-1	Training and RDT&E Activities at Makaha Ridge	4-388
4.3.2.3-1	RDT&E Activities at Kokee	4-396
4.3.2.9-1	Training and RDT&E Activities at Niihau	4-410
4.3.2.10-1	Training at Kaula	4-416
4.4.1.1-1	Training and RDT&E Activities at Puuloa Underwater Range—Offshore ...	4-423
4.4.1.2-1	Training and RDT&E Activities at Naval Defensive Sea Area—Offshore...	4-429
4.4.1.3-1	Training at MCBH—Offshore.....	4-432
4.4.1.4-1	Training Offshore of MCTAB—Offshore.....	4-436
4.4.1.5-1	Training at Makua Military Reservation—Offshore	4-440
4.4.1.6-1	Training at Dillingham Military Reservation—Offshore	4-443
4.4.1.7-1	Training at Ewa Training Minefield—Offshore	4-446
4.4.1.8-1	Training at Barbers Point Underwater Range—Offshore	4-449
4.4.1.9-1	RDT&E Activities at SESEF—Offshore	4-453
4.4.1.10-1	RDT&E Activities at FORACS—Offshore.....	4-456
4.4.2.1-1	Training at Naval Station Pearl Harbor.....	4-459
4.4.2.1.1.1-1	Training Guidelines for Resource Protection— All Oahu Training Areas ...	4-460
4.4.2.2-1	RDT&E Activities at Ford Island	4-467
4.4.2.3-1	Training at Naval Inactive Ship Maintenance Facility, Pearl Harbor.....	4-471
4.4.2.4-1	Training at EOD Land Range- NAVMAG Pearl Harbor West Loch	4-475
4.4.2.5-1	Training at Lima Landing	4-481
4.4.2.6-1	Training at Coast Guard Air Station Barbers Point/Kalaeloa Airport	4-486
4.4.2.7-1	Training at Marine Corps Base Hawaii	4-491
4.4.2.8-1	Training at MCTAB	4-503

Table of Contents

4.4.2.9-1	Training and RDT&E Activities at Hickam AFB	4-508
4.4.2.10-1	Training at Wheeler Army Airfield.....	4-513
4.4.2.11-1	Training at Makua Military Reservation	4-517
4.4.2.12-1	Training at Kahuku Training Area.....	4-525
4.4.2.13-1	Training at Dillingham Military Reservation	4-530
4.5.1-1	Training and RDT&E Activities in the Maui Offshore.....	4-541
4.6.1.1-1	Training at Kawaihae Pier Offshore.....	4-551
4.6.2.1-1	Training and RDT&E Activities at PTA	4-554
4.6.2.2-1	Training at Bradshaw Army Airfield	4-567
4.6.2.3-1	Training at Kawaihae Pier	4-573
4.8-1	Summary of Environmental Compliance Requirements.....	4-579
4.12-1	Population and Ethnicity for the State of Hawaii.....	4-583
5.3-1	Geographic Areas for Cumulative Impacts Analysis	5-3
5.4.1-1	Cumulative Projects List.....	5-4
5.5.3.1-1	Sea Turtles Captured Incidentally in the Hawaii-Based Long Line Fishery 2003 - 2007.....	5-32
6.11-1	Training Guidelines for Resource Protection—All Oahu Training Areas	6-43
13.1.2-1	Information Repositories with Copies of the Draft EIS/OEIS.....	13-2
13.1.2-2	Advertisements Published for the HRC EIS/OEIS Public Hearings and Comment Period.....	13-3
13.1.2-3	Public Hearing Locations, HRC EIS/OEIS.....	13-3
13.2-1	Number of Public Commenters—HRC Draft EIS/OEIS.....	13-5
13.2-2	Number of Comments Organized by Resource Area HRC Draft EIS/OEIS	13-6
13.4.1-1	Commenters on the HRC Draft EIS/OEIS (Written)	13-21
13.4.1-2	Responses to Written Comments – Draft EIS/OEIS.....	13-157
13.4.2-1	Commenters on the HRC Draft EIS/OEIS (Email).....	13-199
13.4.2-2	Responses to Email Comments – Draft EIS/OEIS	13-411
13.4.3-1	Commenters on the HRC Draft EIS/OEIS (Public Hearings)	13-565
13.4.3-2	Responses to Public Hearing Comments – Draft EIS/OEIS.....	13-679
13.4.4-1	Commenters on the HRC Draft EIS/OEIS (Webmail).....	13-705
13.4.4-2	Responses to Webmail Comments – Draft EIS/OEIS	13-767
14.1-1	Advertisements Published for the Supplement to the Draft EIS/OEIS Public Hearings and Comment Period	14-2
14.1-2	Public Hearing Locations, Supplement to the Draft EIS/OEIS	14-2
14.2-1	Number of Public Commenters—Supplement to the Draft EIS/OEIS	14-3
14.2-2	Number of Comments by Resource Area Supplement to the Draft EIS/OEIS	14-4
14.4.1-1	Commenters on the Supplement to the Draft EIS/OEIS (Written).....	14-19
14.4.1-2	Responses to Written Comments – Supplement to the Draft EIS/OEIS	14-49
14.4.2-1	Commenters on the Supplement to the Draft EIS/OEIS (E-Mail).....	14-65
14.4.2-2	Responses to Email Comments – Supplement to the Draft EIS/OEIS.....	14-113
14.4.3-1	Commenters on the Supplement to the Draft EIS/OEIS (Public Hearings).....	14-183
14.4.3-2	Responses to Public Hearing Comments – Supplement to the Draft EIS/OEIS	14-229
14.4.4-1	Commenters on the HRC Supplement to the Draft EIS/OEIS (Webmail)	14-239
14.4.4-2	Responses to Webmail Comments – Supplement to the Draft EIS/OEIS	14-255

EXHIBITS

		<u>Page</u>
12-1	Consultation Comments and Responses	12-2
13.4.1-1	Copy of Written Documents – Draft EIS/OEIS	13-25
13.4.2-1	Copy of Email Documents – Draft EIS/OEIS	13-207
13.4.3-1	Copy of Public Hearing Documents – Draft EIS/OEIS	13-567
13.4.4-1	Copy of Webmail Documents – Draft EIS/OEIS	13-707
14.4.1-1	Copy of Written Documents – Supplement to the Draft EIS/OEIS	14-21
14.4.2-1	Copy of Email Documents – Supplement to the Draft EIS/OEIS.....	14-69
14.4.3-1	Copy of Public Hearing Documents – Supplement to the Draft EIS/OEIS	14-185
14.4.4-1	Copy of Webmail Documents – Supplement to the Draft EIS/OEIS.....	14-241

THIS PAGE INTENTIONALLY LEFT BLANK

14.0 Comments and Responses—Supplement to the Draft EIS/OEIS

14.0 COMMENTS AND RESPONSES— SUPPLEMENT TO THE DRAFT EIS/OEIS

This chapter presents responses to comments received on the Draft Hawaii Range Complex (HRC) Supplement to the Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) (February 2008). The comments were expressed during the public comment period for the document. Section 14.1 provides an overview of the Public Involvement process, Section 14.2 is a summary of comments received; and Section 14.3 is a summary of responses. Section 14.4 includes data summary tables organized by the source of the comment: Written Public Comments, Email Public Comments, Public Hearing Comments, and Webmail Comments (Sections 14.4.1, 14.4.2, 14.4.3, and 14.4.4). See Chapter 13.0 for responses to comments received on the Draft HRC EIS/OEIS.

14.1 PUBLIC INVOLVEMENT PROCESS

Following publication of the Draft EIS/OEIS in July 2007, the Navy, in coordination with the National Marine Fisheries Service (NMFS), conducted a re-evaluation of the analysis in that document. This re-evaluation and subsequent identification of new information led the Navy to prepare a Supplement to the Draft document in February 2008. The purpose of the Supplement to the Draft EIS/OEIS was to address the following:

- Modifications to the analytical methodology used to evaluate the effects of mid-frequency active (MFA) sonar on marine mammals;
- Changes to the amount and types of sonar allocated to each of the alternatives; and,
- Development of a new alternative.

Notice of the Navy's intent to publish a Supplement to the Draft EIS/OEIS was published in the *Federal Register* on January 17, 2008. The Supplement was filed with U.S. Environmental Protection Agency for release to the public on February 22, 2008, and a Notice of Public Meeting was published in the *Federal Register* on February 26, 2008. The Supplement to the Draft EIS/OEIS was distributed to Federal, State, and local agencies; organizations; information repositories and libraries (see Table 13.2.1-1); and private citizens, with a request that all written comments be postmarked or received by April 7, 2008 (45 calendar days from release). The Navy also placed notices in the newspapers announcing the availability of the Supplement to the Draft EIS/OEIS and providing detailed information concerning locations and times for each of the public hearings (Table 14.1-1).

Four public hearings were held on March 13, 14, 17, and 18, 2008, on the islands of Kauai, Maui, Oahu, and Hawaii. The hearings were held in an open house format, presenting informational posters and written information and with Navy staff and project experts available to answer participants' questions. A court reporter recorded participants' oral comments and a tape recorder was provided for those participants wishing to provide additional comments. The interaction during the information sessions was productive and helpful to the Navy.

Table 14.1-1. Advertisements Published for the Supplement to the Draft EIS/OEIS Public Hearings and Comment Period

Hawaii Newspapers	<i>The Garden Island</i>	<i>Hawaii-Tribune Herald</i>	<i>The Honolulu Advertiser</i>	<i>Honolulu-Star Bulletin</i>	<i>The Maui News</i>
	2/25/08	2/25/08	2/25/08	2/25/08	2/25/08
Dates Published	3/4/08	3/9/08	3/9/08	3/11/08	3/5/08
	3/9/08	3/12/08			3/9/08

The purpose of the public hearings was to solicit public comments on the Supplement to the Draft EIS/OEIS. This chapter includes transcripts from the hearings and copies of written public comments received during the comment period.

Table 14.1-2 lists the locations where public hearings were held. During these public hearings, attendees were invited to ask questions and provide comments to the program representatives at each meeting. In addition, written comments were received from the public and regulatory agencies by letter, email, and through the HRC public website during the comment period. Comments have been considered and the analysis revised as appropriate into the Final EIS/OEIS. Comments received from the public concerning DoD policy and program issues outside the scope of analysis in the Supplement to the EIS/OEIS were not addressed in the Final EIS/OEIS.

Table 14.1-2. Public Hearing Locations, Supplement to the Draft EIS/OEIS

City (Island)	Date	Location
Lihue (Kauai)	Thursday, March 13, 2008	Kauai Community College
Kahului (Maui)	Friday, March 14, 2008	Maui Waena Intermediate School
Honolulu (Oahu)	Monday, March 17, 2008	Disabled American Veterans Memorial Hall
Hilo (Hawaii)	Tuesday, March 18, 2008	Hilo Hawaiian Hotel

At the public hearings, a Navy representative provided a clear and concise overview of the Supplement to the Draft EIS/OEIS. This was followed by individual testimony. A summary of attendance at the four public hearings is as follows:

- Kauai: 40 individuals signed in
 9 individuals provided verbal comments
 7 individual provided written comments
- Maui: 19 individuals signed in
 6 individuals provided verbal comments
 1 individual provided a tape recorded comment
 2 individuals provided written comments

Oahu: 16 individuals signed in
 1 individual provided verbal comments
 1 individual provided written comments

Island of
 Hawaii: 24 individuals signed in
 8 individuals provided verbal comments
 3 individuals provided a tape recorded comment
 3 individuals provided written comments (two written comments were provided by
 the same individual)

The Navy solicited additional comments from agencies and the public during the comment period that followed the public hearings for the Supplement to the Draft EIS/OEIS. The comment period ended on April 7, 2008.

14.2 SUMMARY OF COMMENTS

The Navy received 1,595 public comments on the Supplement to the Draft EIS/OEIS from 265 separate sources—251 were citizens, 8 represented organizations, and 6 represented government agencies. The majority of commenters were from Hawaii (199 of 265); however, the Navy also received comments from individuals residing in 20 other states and the District of Columbia. Table 14.2-1 shows the forums that the public used to submit their comments and the number of commenters for each forum.

Table 14.2-1. Number of Public Commenters—Supplement to the Draft EIS/OEIS

Source	Number of Commenters
Written	30
Email	198
Transcript of Public Hearings	28
Website	9
Total	265

The Navy received a total of 1,595 comments on the Supplement to the Draft EIS/OEIS. Table 14.2-2 presents a summary of the number of comments identified for each resource area and indicates the percentage of total comments that each resource area or issue received (rounded to the nearest tenth percent). Comments are organized by resource area. The text that follows gives an overview of comments received during the comment period. The first set of comments is organized alphabetically by resource area, concluding with Water Resources. The second set of comments covers non-resource specific issues or questions that were raised. Most resource areas are self-explanatory—“Biological Resources–Marine” includes all ocean and near shore comments, “Alternatives” includes all sonar comments. “Hazardous Materials and Waste” includes munitions debris issues. “Program” refers to concerns with the Proposed Action in general. “Policy/National Environmental Policy Act (NEPA) Process” refers to concerns with policies that lead to the Proposed Action.

**Table 14.2-2. Number of Comments by Resource Area
Supplement to the Draft EIS/OEIS**

Resource Area	Number of Comments	Percent of Total
Air Quality	1	0.1%
Airspace	0	0%
Biological Resources - Marine	34	2.1%
Biological Resources - Terrestrial	0	0%
Cultural Resources	0	0%
Geology and Soils	0	0%
Hazardous Materials and Waste	15	0.9%
Health and Safety	0	0%
Land Use	1,135	71.2%
Noise	0	0%
Socioeconomics	1	0.1%
Transportation	0	0%
Utilities	0	0%
Water Resources	8	0.5%
Environmental Justice	1	0.1%
Alternatives	163	10.2%
Program	181	11.3%
Policy/NEPA Process	17	1.1%
Mitigation Measures	25	1.6%
Cumulative Impacts	4	0.3%
Miscellaneous	10	0.6%
Total	1,595	

Air Quality

There was one comment in this category, requesting that the Navy account for the cumulative effects of its actions on coral with rising sea levels caused by global warming.

Biological Resources—Marine

This category includes comments on all marine resources, including fish, mammals, and marine sanctuaries. Many of the comments were focused on the perceived harmful effects of detonations and MFA sonar on whales, sea turtles, fish, and marine life. Some of the comments were concerned with international stranding events. Specifically, the public requested additional information or clarification regarding:

- The affects of detonations on fish
- The seasonal effects of training on various species
- The accuracy of marine mammal research undertaken by the Navy
- The presence of current toothed-whale research undertaken by Robin Baird

- The inclusion of information regarding the 2004 stranding of melon-headed whales in Hanalei Bay
- The need to discuss minke whales
- The number of times an individual within a species group might be exposed to MFA
- The inclusion of humpback whale research
- Utilization of the National Defense Exemption from the Marine Mammal Protection Act (MMPA)
- The use and protection of the Northwestern Hawaiian Islands during Navy activities

Additional comments on marine biological resources included a request to address the indirect effects on the continued survival of endangered and threatened marine species and the health and safety of the general public through the potential bioaccumulation of hazardous materials in benthic species and coral, which form the basis of the food chain; a request to account for the risk or consequences of direct strikes on corals around the Main Hawaiian Islands and within Papahānaumokuākea Marine National Monument.

Hazardous Materials/Hazardous Waste

Comments regarding hazardous materials and waste focused on the clean-up of former and currently contaminated sites unassociated with this EIS/OEIS; the effects of increased training debris, including chaff, chemical stimulants, fuel and oil, toxic substances potentially being released into the coastal zone and materials used during the construction of various HRC enhancements; and the cumulative effects of simultaneous major exercises. There were also comments regarding potential impacts on corals; the potential for training debris or live ordnance to strike a marine mammal; toxic chemicals released by sonobuoys and the use of San Clemente Island, California, data for that analysis; and the potential for detonations to disperse PCBs and heavy metals in Pearl Harbor.

Land Use

The Navy received 1,135 identical form letter comments from 162 individuals about potential violations of the Coastal Zone Management Act (CZMA) and protection of Hawaii's coastal regions.

Socioeconomics

One commenter asked about the potential socioeconomic effects from Navy activities on fisheries.

Water Resources

Comments on water resources focused on effects on the State of Hawaii's waters, the need for a Department of the Army permit for activities over or under navigable waters of the United States, and any potential need for a National Pollutant Discharge Elimination System (NPDES) permit for wastewater/stormwater discharges.

Environmental Justice

One commenter noted that the Native Hawaiian community would be disproportionately affected if fish stocks were reduced as a result of Navy activities.

Alternatives

The largest number of comments in this category related to the use of sonar for Navy training. Most commenters expressed opposition to the use of sonar, particularly during certain seasons of the year or above certain decibel levels. Many commenters requested additional research into the effects of sonar on marine life, and several commenters asked about alternative technologies for detecting submarines, and the use of simulators in lieu of active training. There were also several comments related to the possibility that marine mammals experience “bends.” Some commenters requested the incorporation of specific research into the EIS/OEIS and suggested that the data sets, application of, and conclusions used during the risk function analysis were too narrow.

Additional comments regarding Alternatives were focused on the adequacy of the analysis, particularly in light of recent court decisions. There were also several comments regarding the use of data from the Sonar Positional Reporting System (SPORTS); a suggestion to add a new alternative in which no sonar would be used; the perception that the Navy does not prepare/release After Action Reports; and the perception that the addition of Alternative 3 in the Supplement to the Draft EIS/OEIS contains uncertainties and may result in underestimations of impacts.

Policy/National Environmental Policy Act Process

Comments on Navy Policy and the NEPA process included a suggestion to pursue a policy that would make whales a cultural treasure and a suggestion to include more involvement/collaboration from various research scientists and organizations. In addition, two commenters questioned the expertise of the individuals preparing the Supplement to the Draft EIS/OEIS.

One commenter asked if conclusions in the EIS/OEIS were based in part on classified information, and if so, how the conclusions would change if the classified information was not considered.

There was also a comment concerning the Navy’s compliance with various Federal statutes, including the MMPA, the National Marine Sanctuaries Act, and the Coastal Zone Management Act.

Program

The Navy received 162 form letters about the perceived establishment of a live fire training range encompassing the entire Hawaiian Archipelago. Commenters on the overall Program were concerned that analysis was based on information not readily available to the public and potential violations of several Federal laws (e.g., the MMPA and Coastal Zone Management Act). There were also comments about basic or potentially misleading information provided in the EIS/OEIS, including the quantification of training exercises, the amount of hazardous materials introduced into the marine environment, and the issue of live fire at Makua. There were also requests for additional research before using sonar for military training.

Mitigation Measures

Most of the comments in this category were focused on the mitigation measures associated with marine mammals. One commenter was in agreement with the mitigation measures presented in the Supplement to the Draft EIS/OEIS. Specific comments included:

- Navy training should be conducted in places and at times where marine mammals would not be affected
- The level of mitigation measures is insufficient
- Navy training should be conducted in seasons when marine mammals are in lesser numbers (e.g., when whales are not migrating)
- Adherence to the restrictions issued by various courts between 2006 and 2008
- Additional information about pre- and post-monitoring efforts
- Requests to use non-harmful sounds to scare animals away from the sonar areas
- Requests to follow protective measures used by other nations
- Discussion of the mitigation measures offered by the Marine Mammal Commission on the Draft EIS/OEIS

Cumulative Impacts

Comments in this category were focused on the cumulative effect of sonar use with other stressors (pollution, warming water, fishing, etc.).

Miscellaneous

Miscellaneous comments included a request to add a commenter's name and the University of Hawaii, Hamilton Library to the distribution list; a request to note in the reference list, which references are, or are not publicly available; and a comment that secondary references were used, when primary references should have been cited.

14.3 SUMMARY OF RESPONSES

Some of the comments received on the Supplement to the Draft EIS/OEIS were declarative statements not requiring a direct response, but which are noted in the context of overall public review. Examples of comments on non-related topics include a request for a copy of the NAS Barbers Point closure EIS, an inquiry from a local Hawaiian firm regarding the hiring of employees, and a request to identify atomic materials, which the commenter believes are affecting marine life.

Some comments were related to the perception that the Navy intends to establish a live fire range encompassing the entire Hawaiian Archipelago. This general program-related comment is considered to be outside the scope of this EIS/OEIS and therefore required no revision to the text.

Some comments questioned the methodologies, analyses, and conclusions for various environmental resource impacts and mitigations presented in the Supplement to the Draft EIS/OEIS. For each of these comments, a specific response was prepared. New information and analysis supporting or changing the conclusions of the Supplement to the Draft EIS/OEIS have been incorporated into the text of the Final EIS/OEIS.

The Navy received many substantive comments during the rigorous Supplement to the Draft EIS/OEIS process. The Navy considered all public input as part of the decision-making process prior to issuing the Final EIS/OEIS.

The primary intent of the Supplement to the Draft EIS/OEIS was to provide additional information regarding the analytical methodology used to evaluate the effects of MFA sonar on marine mammals; therefore some of the comments were outside the scope of the Supplement to the Draft EIS/OEIS. However, to the extent possible, the Navy addressed the public comments discussed in Section 14.2 in the following manner:

Air Quality

The comment regarding cumulative effects of Navy activities on coral with rising sea levels caused by global warming is noted, but is beyond the scope of the Supplement to the Draft EIS/OEIS. Assuming that global warming is occurring and that human activities are the cause, global warming involves the activity of billions of human beings on every continent on Earth. It also involves the consumption of fossil fuels to such a degree and intensity that the intermittent and infrequent training activities presented in this EIS/OEIS are insignificant when compared to the scale.

Biological Resources—Marine

The analysis of effects in the Supplement to the Draft EIS/OEIS indicates that there should be no mortality from Navy training activities. Range clearance procedures and mitigations are intended to reduce the possibility of serious injury and mortality. The Letter of Authorization (LOA) issued by NMFS will place limits on the number and types of allowable takes (e.g., harassments) for all activities conducted within the HRC. Navy training has been going on for the past 60 years, and there has been no significant change in the sonar equipment in the last 30 years. Given this history and the scientific evidence, the Navy believes that risk to marine mammals from sonar training is low. Though the Navy works to minimize impacts to marine mammals to the greatest extent practicable, they are not mandated by any statute to alleviate all risk to marine mammals. Over the past 30 years, the numbers of humpback whales around Hawaii appear to be increasing, and the Navy believes that sonar has not significantly affected marine mammals in general.

The affects of detonations on fish—The Navy recognizes that individual fish may be injured or killed as the result of several of the training events; however, these incidents are localized, and would not have a population impact on any individual species. The effect on fish from a given amount of explosive depends on location (including proximity to the detonation), season, and many other factors. The Navy has completed an Essential Fish Habitat and Coral Reef Assessment for the EIS/OEIS and concludes that Proposed Actions would not affect managed species (i.e., Essential Fish Habitat).

Seasonal avoidance for training—Avoidance of the seasonal presence of migrating marine mammals fails to take into account the fact that the Navy’s current mitigation measures apply to all detected marine mammals no matter the season. Advance planning to avoid the seasonal presence of migrating marine mammals is not possible given the start of any “season” is variable (dependent on largely unknown environmental factors). To the degree possible, however, the Navy already has taken a proactive step in this regard by specifically informing all naval vessels to increase vigilance when the first humpback whales have been sighted around the Hawaiian Islands. Otherwise, limiting training operations to the remaining 6 months of the year would not only concentrate all annual training and testing activities into a shorter 6-month time period, but would also not meet the readiness requirements of the Navy to deploy trained forces.

Accuracy of marine mammal research undertaken by the Navy—The Navy’s assessment of potential impacts on marine mammals reflects the use of the best available and applicable science determined in consultation with NMFS. Information concerning the scientific data used is provided in EIS/OEIS Sections 4.1.2 and 6.0.

Research conducted by Robin Baird—Mr. Baird is cited in several sections of the EIS/OEIS, including, but not limited to Sections 4.1.2.4.7, 4.1.2.4.9.8, and 4.1.2.4.10.1. Numerous documents and reports prepared by Mr. Baird are cited in Section 9.0 (references).

2004 stranding of melon-headed whales in Hanalei Bay—Section 4.1.2.4.10.3 of the EIS/OEIS provides a comprehensive discussion of the stranding of melon-headed whales in Hanalei Bay in 2004. The text describes the relationship of the stranding to both Navy Anti-Submarine Warfare (ASW) activities occurring approximately 25 nautical miles (nm) away from the incident and the activities of people and boats that were in the water with the whales at the time of the stranding. The stranding is not known to be directly related to Navy activities.

Need for minke whale discussion—The presence of minke whales has been noted in Section 4.1.2.5.3; however, there is no density information available for minke whales in Hawaiian waters given that they have rarely been seen during surveys. The lack of available data and comparative species makes it unreliable to extrapolate estimates of exposure to Navy sonar.

The number of times an individual within a species group might be exposed to MFA—as noted by the commenter, it would be virtually impossible to determine how many individuals within a given population would experience one or more exposures.

Humpback Whale Research—Information regarding the humpback whale and the Hawaiian Islands Humpback Whale National Marine Sanctuary was provided in Chapters 3.3 and 4.1 and is expanded in the EIS/OEIS.

Utilization of the National Defense Exemption from the MMPA—Sections 4.1.2.4.3 and 4.1.2.4.4 provide the regulatory framework and history behind the development of the Navy’s compliance efforts with various statutes, including the MMPA.

Use of the Northwestern Hawaiian Islands—Sections 3.2 and 4.2 of the EIS/OEIS reviewed the Papahānaumokuākea Marine National Monument. The Navy complies with the Presidential

Proclamation 8031 (71 FR 36443, June 26, 2006) which states that all “activities and exercises of the Armed Forces shall be carried out in a manner that avoids, to the extent practicable and consistent with operational requirements, adverse impacts on monument resources and qualities.” The Navy in Hawaii takes its commitment to environmental stewardship seriously, providing funds, efforts, and professional staff dedicated to this important matter. The Navy complies with all applicable environmental laws and has established procedures to ensure that programs are protective of Hawaii's environment.

Hazardous Materials/Hazardous Waste

There were multiple comments related to Hazardous Materials/Hazardous Waste sections of the Draft EIS/OEIS. These were beyond the scope of the Supplement to the Draft EIS/OEIS; however, the Navy responded as follows:

The Navy recognizes that past practices conducted decades ago resulted in contamination of certain sites, such as Kahoolawe. Since that time, Congress has created and funded programs to identify those sites in need of remediation and proceed with the available funds. The island of Kahoolawe is one site that received priority funding in excess of \$400 million and its own special legislation which resulted in a 10-year cleanup conducted in consultation with the State of Hawaii.

As discussed in Sections 3.1.4, 3.1.7, 4.1.4, and 4.1.7 of the EIS/OEIS, the type of sonobuoy used for the analysis in this EIS/OEIS is now in general use by the Navy. San Clemente Island information is used because that is where the Navy's Sonobuoy Quality Assurance testing is done, and detailed information from that program is available. All sonobuoys of a given type are manufactured with the same quantities of constituents.

One commenter listed enhancements that are assumed to generate hazardous substances. As discussed in the EIS/OEIS, the Portable Undersea Tracking Range could be located anywhere within the area shown on Figure 2.2.3.6.3-1 and not necessarily consistently deployed in the same area. According to Section 2.2.3.6.3, the Navy proposes using the system for only 2 days per month. Development of the Acoustic Test Facility involves the addition of pinger equipment at Pier S291 on Ford Island, Beckoning Point piers, or on a mobile test site that could operate within the test area. As a result, there would be no disturbance of any contaminated sediments or soils containing PCBs. An environmental review of the proposed Range Operations Control Building construction was conducted that determined that the effects of the proposed construction on the environment are minimal and a categorical exclusion (CATEX) for the proposed project was approved on May 14, 2004. Hazardous waste discovered during construction will be handled in compliance with applicable rules and regulations.

One commenter asked if there are any potential effects of 56,422 additional pieces of training debris. Navy training, RDT&E, and munitions debris are discussed in Sections 4.1.4 and 4.1.7. The majority of debris would be widely dispersed and accumulate in deep water far away from the coral reef. Therefore, there will be no quantifiable impact on habitat, any natural resource, including coral. The analysis presented in Section 4.1.7 assumed that hazardous constituents for each category of expended training material would be expended over only 20 percent of the training areas. But the probability that the materials would be expended in exactly the same location, given slight differences in the positions of Navy assets and lines of fire, and dispersal of expended materials by currents, is about zero. A total of about 654 tons of training material

are expended per year under the No-action Alternative (see Table 4.1.4.1.1-1). Assuming an ocean floor area of about 235,000 nm², and making a further conservative assumption that the training materials are concentrated within 20 percent of this area, this is about 5.6 pounds per nm² per year of training material.

Bioaccumulation of hazardous materials in benthic species and coral is not known to accrue as a result of the Proposed Action because: (a) leach rates are very low, (b) leached materials are widely dispersed, so they affect different populations, and (c) the estimated ambient concentrations are generally within the “natural” range of these materials so uptake of these constituents would be similar to natural rates.

Direct strikes on coral reefs, which could be either strikes of missile debris or ordnance on coral reefs is unlikely, as described in Section 4.2.1.1.1.1. The majority of debris would be widely dispersed and in open ocean, far away from the coral reef. Therefore, there will be no quantifiable impact on habitat, any natural resource, including coral.

Land Use

The Navy received 162 form letters stating that the Navy is not meeting its obligations under the Hawaii Coastal Zone Management Program (CZMP). Specifically, Navy is in compliance with Section 205A-2 (6) of the CZMP, which addresses the spread of coastal pollution. As discussed in Section 4.1.7 and 4.3.2.1.8 of the EIS/OEIS, no direct or indirect effects associated with coastal hazards, specifically pollution, would occur as a result of the Proposed Action.

The form letter requested that Hawaii CZMP require the Navy to acquire a State incidental permit for harm to State-listed species. While the EIS/OEIS does consider impact to State-listed species, the Navy is not subject to the State’s permitting process. The letter also calls for consistency with the objectives of marine protection requirements or Hawaii’s CZMP, specifically, strict limits on activities in the Papahānaumokuākea Marine National Monument. Navy is conducting their active sonar training in only a fraction of the Monument; however, with mitigation none of the resources of the Monument will be affected. Lastly, the form letter called for more public participation in coastal management. The Navy has provided full disclosure of its activities in this EIS/OEIS, and is a participant in many organizations whose mission is the protection of coastal Hawaii.

Socioeconomics

Reduced fish catch rates as a result of underwater detonations are not anticipated (see Section 5.5.3.1 of the EIS/OEIS).

Water Resources

Depending on the action or construction being undertaken, a variety of Federal and State approvals, comments, and permits may be required. In addition, all construction activities would follow Spill Prevention, Control, and Countermeasures Plans and transportation safety measures; therefore, potential effects on surface and groundwater resulting from accidental spills of hazardous materials would be minimized.

The EIS/OEIS provides an analysis in Section 4.1.7 of how current levels and future levels of hazardous training materials, chemical simulants, and debris entering the ocean does and will

comply with the State of Hawaii water quality standards and criteria and will not require an NPDES permit. The EIS/OEIS also evaluated the potential impacts of launch emissions, spills of toxic materials, and early flight termination on surface and groundwater. The analysis concluded that hydrogen chloride emissions would not significantly affect the chemical composition of surface or groundwater; that there would be no significant increase in aluminum oxide in surface waters due to launches; that sampling of surface waters in the vicinity of the launch site showed that hydrogen chloride, potentially deposited during past launches, has not affected surface water quality on the Pacific Missile Range Facility (PMRF) or adjacent areas; and that contamination from spills of toxic materials would be highly unlikely. An NPDES permit is not required for launch activity due to the lack of significant storm water runoff.

Environmental Justice

Reduced fish catch rates and any associated effects on the Native Hawaiian community are not anticipated.

Alternatives

The majority of the comments in this category were opposed to the use of sonar for Navy training. However, sonar is currently the best available technology for ASW. Although the Navy does do some simulated training, it does not fully develop the skills and capabilities necessary to attain appropriate military readiness. In addition, under NEPA, the choice of alternatives is bounded by some notion of feasibility. Agencies are not required to consider alternatives that are infeasible, ineffective, or inconsistent with its basic objectives.

Section 4.1.2.4.7 of the EIS/OEIS contains a discussion of the “bends-like” issue raised in several comments. It has not been demonstrated that sonar causes this effect.

The Navy’s assessment of potential impacts on marine mammals reflects the use of the best available and applicable science determined in consultation with NMFS and the requirements of the Navy to train. Information concerning the scientific data used is provided in EIS/OEIS Sections 4.1.2 and 6.0.

The discussion of the development of the risk function has been expanded from that in the Supplement to the Draft EIS/OEIS and is presented in Section 4.1.2. The methodology used in this EIS/OEIS was developed in close coordination with NMFS. This represents the best available and most applicable science with regard to analysis of effects to marine mammals from MFA/HFA sound sources. While recognizing there is incomplete and unavailable information with regard to behavioral impacts on marine mammals (see Section 4.1.2), the risk function curve extends to 120 decibels (dB) sound pressure level (SPL) specifically to encompass uncertainty and the potential for behavioral reactions in marine mammal species that may be affected by sounds perceived at levels just above ambient in some areas during some parts of the year in Hawaiian waters.

Analysis of ongoing litigation is not part of the Proposed Action and alternatives nor is it necessary for compliance with the applicable laws and regulations. Some mitigations discussed in Chapter 6.0 overlap with mitigations raised during litigation.

The original analysis of effects of mid-frequency sonar on marine mammals was based on data prepared as part of the program described in Section 1.3 of the EIS/OEIS, which predates the Sonar Positional Reporting System (SPORTS) database. In early 2008, the Navy concluded that SPORTS provided enough information after only 18 months that it could be used as a partial basis for calculating sonar hours when combined with additional extrapolation for the sonar effects analysis. More information on SPORTS has been provided in Sections 2.2.2.4 and 4.1.2 of the EIS/OEIS. The SPORTS database will continue being refined and populated with data and used as the basis for future analysis on sonar use on range complexes.

The Navy does prepare and release After Action Reports. An After Action Report prepared for the 2006 Rim of the Pacific (RIMPAC) exercises, providing an analysis detailing the reasons for adoption, modification, or rejection of mitigation measures, is provided in Appendix F of the EIS/OEIS.

Policy/National Environmental Policy Act Process

One commenter asked about establishing a policy to protect whales as cultural treasures. The Navy realizes that many marine mammals are significant to the cultural heritage of the Hawaiian people; however, establishing such a policy is outside the scope of this EIS/OEIS.

Two comments requested increased involvement by scientists and research institutions. NEPA requires an interdisciplinary approach to analysis. This EIS/OEIS used the experience of a wide range of subject matter experts. Although they may be currently residing in other areas of the United States, the professionals preparing this EIS/OEIS have either lived and worked as environmental scientists in Hawaii or have been conducting environmental projects in Hawaii for many years. The Navy solicited comments and encouraged input from all Agencies, organizations, and individuals in Hawaii throughout the environmental impact analysis process, as reported in this chapter (see also Section 1.7.1 and Chapter 13.0 of the EIS/OEIS).

Program

The Navy received 162 form letters stating that the Navy intends to establish a live fire training range encompassing the entire Hawaiian Archipelago. The Navy is not proposing to establish a live fire training range encompassing the entire Hawaiian Archipelago. Only a fraction of the Papahānaumokuākea Marine National Monument is within the Navy's Hawaiian Islands Operating Area (OPAREA) on its western boundary near the northern border. Current and proposed live fire training takes place in OPAREA; however, these activities will not affect resources in the Hawaiian Islands Marine Refuge, Papahānaumokuākea Marine National Monument, or the Hawaiian Islands Humpback Whale National Marine Sanctuary. The Navy understands and respects the value and importance of Hawaii's marine sanctuaries to many people. They also recognize that the primary philosophy of these sanctuaries is protection and preservation and we share that philosophy. The Navy takes precautions to minimize harm to these areas.

Classified information was used for some of the analysis in the EIS/OEIS. Accurate conclusions could not be made if this information was not considered.

The Navy is in compliance with all applicable environmental laws and is consulting with the Hawaii Coastal Zone Management Program in accordance with the Coastal Zone Management

Act. Also, see response to comment S-T-0001-1 (see EIS/OEIS Sections 4.1.2.4 and 4.1.2.5.4).

Mitigation Measures

Navy training should be conducted in places and at times where marine mammals would not be affected—It is critical for the Navy to be able to conduct training in a variety of environmental and bathymetric conditions, which may overlap with marine mammal areas. Mitigation measures proposed in Chapter 6.0 should ensure that marine mammals would not be injured by Navy training activities. As discussed in Section 4.1.2, the analytical methodology used was developed in close coordination with NMFS. This represents the best available and most applicable science with regard to analysis of effects to marine mammals from MFA/HFA sound sources. While recognizing there is incomplete and unavailable information with regard to behavioral impacts on marine mammals, the risk function curve extends to 120 dB SPL specifically to encompass uncertainty and the potential for behavioral reactions in marine mammal species that may be affected by sounds perceived at levels just above ambient in some areas during some parts of the year in Hawaiian waters. Section 1.3.2 describes why the Navy must train and why Hawaii is the most appropriate place to undertake the proposed actions.

Perceived insufficiency of mitigation measures—The full analysis of effects in the EIS/OEIS indicates that there should be no mortality from Navy training activities. Range clearance procedures and mitigations are intended reduce the possibility of serious injury and mortality to zero. The LOA issued by NMFS will place limits on the number and types of allowable takes (e.g., harassments) for all activities conducted within the HRC.

Mitigate marine mammal impacts using seasonal avoidance during Navy training—As discussed in Chapter 6.0, avoidance of the seasonal presence of migrating marine mammals fails to take into account the fact that the Navy's current mitigation measures apply to all detected marine mammals no matter the season. Advance planning to avoid the seasonal presence of migrating marine mammals is not possible given the start of any "season" is variable (dependent on largely unknown environmental factors). To the degree possible, however, the Navy already has taken a proactive step in this regard by specifically informing all naval vessels to increase vigilance when the first humpback whales have been sighted around the Hawaiian Islands. Otherwise, limiting training operations to the remaining 6 months of the year would not only concentrate all annual training and testing activities into a shorter 6-month time period, but would also not meet the readiness requirements of the Navy to deploy trained forces.

Restrictions issued by various courts—As discussed in Section 6.0, avoiding active sonar use within 12 nm from shore or 15.5 miles from the 200-m isobaths was made part of the RIMPAC 2006 authorization by NMFS and was based on the assumption that avoidance of the North American continental shelf was a prudent mitigation measure given the presence of beaked whales in the Gulf of Mexico. NMFS modified the measure for Hawaii because they had received a public comment during rulemaking for a proposed action taking place elsewhere. This measure lacks any scientific basis when applied to conditions in Hawaii. There is no scientific basis for requiring this mitigation measure in the Pacific and no known basis for the specific metrics. During RIMPAC 2006, this mitigation measure precluded active ASW training in the littoral region, which significantly affected realism and training effectiveness. This procedure had no observable effect on the protection of marine mammals during RIMPAC 2006, and its value is unclear (there is a lengthy history of sonar use in the Hawaiian Islands without

any strandings or apparent effect on marine mammals). However, its effect on realistic training is significant.

Pre- and post-monitoring—As described in Chapter 6.0, the Navy is developing an Integrated Comprehensive Monitoring Plan (ICMP) to determine behavioral and population level changes to marine mammals within Navy ranges. This Plan will also continue or initiate studies of abundance, distribution, habitat utilization, etc. for sensitive species of concern using visual surveys, passive and acoustic monitoring, radar and data logging tags (satellite or radio linked to record data on acoustics, diving and foraging behavior, and movements). The Plan will include the evaluation of Navy lookouts that observe for all objects in or on the water including debris, periscopes, other vessels, and marine animals. As of this EIS/OEIS, the Navy and NMFS are developing an HRC-specific monitoring plan which may include third party monitoring efforts by qualified entities as a component of the ICMP for unit level exercises.

Use of non-harmful sound to scare animals from sonar event areas—Section 6.0 presents the range of Navy protective measures that would be implemented to protect marine mammals and federally listed species during training events. Among these is the use of passive detection capabilities to alert exercise participants to the presence of marine mammals in an event location.

Other Navies mitigation—Each nation has its own training needs based on that nation's forces, capabilities, missions, and environmental requirements. The Navy is a global environmental leader. As part of the Navy's commitment to sustainable use of resources and environmental stewardship, the Navy incorporates mitigation measures that are protective of the environment into all of its activities. The Navy's current mitigation measures reflect a balance between training requirements and Navy's important role in ensuring environmental protection. These measures have been the subject of extensive discussions between NMFS and the Navy, and evaluated for mission impacts, probable effectiveness, and the ability to implement. Mitigation measures are described in detail in Chapter 6.0.

Mitigation measures proposed by the Marine Mammal Commission—EIS/OEIS Chapter 6.0, Mitigation Measures, presents the Navy's protective measures, outlining steps that would be implemented to protect marine mammals and Federally listed species during training events. It should be noted that these protective measures have been standard operating procedures for unit-level ASW training since 2004. In addition, The Navy's current mitigation measures reflect the use of the best available and applicable science balanced with the NMFS precautionary approach and the requirements of the Navy to train.

Cumulative Impacts

The discussion of cumulative effect of sonar use with other stressors (pollution, warming water, fishing, etc.) has been expanded in Section 5.0 of the EIS/OEIS.

Miscellaneous

The request to add a commenter's name and the University of Hawaii, Hamilton Library to the distribution list was completed, and references were crosschecked. The reference list was not annotated with which are, or are not publicly available; however, those references that are

available, or a referral to a repository where the item is housed, will become part of the EIS/OEIS Administrative Record.

14.4 SUMMARY TABLES

Sections 14.4.1 through 14.4.4 of the EIS/OEIS provide reproductions of all the original letters, emails, and transcripts that were received during the public comment period for the Supplement to the Draft EIS/OEIS. Responses to issues included in those documents are also provided. As shown below, the organization of Sections 14.4.1 through 14.4.4 provides a separate comment/response section for each of the forums (email, written, etc.) that the public used to submit their comments:

- 14.4.1 Written Public Comments
 - Table 14.4.1-1 Written Commenters on the Supplement to the Draft HRC EIS/OEIS
 - Exhibit 14.4.1-1 Copy of Written Documents
 - Table 14.4.1-2 Responses to Written Comments

- 14.4.2 Email Public Comments
 - Table 14.4.2-1 Email Commenters on the Supplement to the Draft HRC EIS/OEIS
 - Exhibit 14.4.2-1 Copy of Email Documents
 - Table 14.2.4.2-2 Responses to Email Comments

- 14.4.3 Public Hearing Comments
 - Table 14.4.3-1 Public Hearing Commenters on the Supplement to the Draft HRC EIS/OEIS
 - Exhibit 14.4.3-1 Copy of Public Hearing Documents
 - Table 14.4.3-2 Responses to Public Hearing Comments

- 14.4.4 Webmail Comments
 - Table 14.4.4-1 Webmail Commenters on the Supplement to the Draft HRC EIS/OEIS
 - Exhibit 14.4.4-1 Copy of Webmail Documents
 - Table 14.4.4-2 Responses to Webmail Comments

The first table in each section provides an index of the names of the individuals who submitted comments on the Supplement to the Draft EIS/OEIS. Each individual has been assigned an identification number. The code in the middle of the identification number indicates the source of the comment as follows:

- W = Written comments
- E = Email comments
- T = Transcript comments from public hearing
- N = Comments received via the public HRC website

Comments that were received during the public review period for the Supplement to the Draft EIS/OEIS were treated equally regardless of the form or commenter. A commenter can be listed multiple times. Each comment was carefully documented, thoroughly read and evaluated, and categorized according to the environmental resource area (see Table 14.2-2). Each of the identified issues was numbered as shown in the exhibit in each section. For example, if the 10th speaker presented in a transcript from a public hearing document (S-T-0010) provided comments on seven separate topics, those comments were numbered S-T-0010-1 through S-T-0010-7. Finally, the Navy responded to each comment, as provided in the second table in each section.

To follow comments and responses for a specific individual, find their commenter number (e.g., S-W-0042, S-E-0003, S-T-0021, S-N-0030) in the appropriate Commenters table; locate their document within the Copy of Documents exhibit; and use the issue numbers to identify corresponding responses in the Response Table.

THIS PAGE INTENTIONALLY LEFT BLANK