

Table of Contents

Executive Summary	i
List of Tables	xxi
List of Figures	xxiv
List of Acronyms and Abbreviations	xxv
Chapter 1 Introduction	1
1.1 Statement of Purpose and Need for the Action	1
1.2 Pelagic Fisheries Management in the Region	3
1.2.1 NOAA Fisheries	3
1.2.2 The Magnuson-Stevens Act and the Fishery Management Council	4
1.2.3 The Pelagics FMP	5
1.2.4 NEPA and ESA Compliance for the Pelagics FMP	11
1.2.4.1 NEPA and CEQ Regulations	11
1.2.4.2 NOAA’s NEPA Guidelines	11
1.2.4.3 ESA Section 7 Requirements	12
1.2.4.4 Pelagics FMP NEPA Documents and BiOps	13
1.3 Fisheries Managed under the Pelagics FMP	18
1.3.1 Longline Fisheries	22
1.3.1.1 Hawaii-based Longline Fishery	22
1.3.1.2 American Samoa Longline Fishery	23
1.3.2 Handline Fisheries	25
1.3.3 Hawaii Pole-and-Line (Baitboat) Fishery	25
1.3.4 Troll Fisheries	26
1.4 West Coast-based Highly Migratory Species FMP Fisheries	27
1.5 Foreign and Non-FMP U.S. Fisheries	28
1.5.1 International Cooperation in Fisheries Conservation and Management in the Pacific Ocean	28
1.5.1.1 The International Legal Context	28
1.5.1.1.1 FAO Compliance Agreement and the U.S. High Seas Fishing Compliance Act	29
1.5.1.1.2 UN Fish Stocks Agreement	30
1.5.1.1.3 FAO Code of Conduct	30
1.5.1.2 Regional Fisheries Conventions, Organizations and Treaties	31
1.5.1.2.1 Inter-American Tropical Tuna Commission	31
1.5.1.2.2 South Pacific Forum Fisheries Agency	31
1.5.1.2.3 South Pacific Tuna Treaty	32
1.5.1.2.4 Secretariat of the Pacific Community, Oceanic Fisheries Programme	32
1.5.1.2.5 Western and Central Pacific Tuna Convention	33

1.5.2 Landings of Foreign and Non-FMP U.S. Pelagic Fisheries in the Pacific	34
1.6 The Scoping Process	35
1.7 Permits, Licenses and Approvals Required for the Proposed Action	40
Chapter 2 Alternatives	43
2.1 Seabird Interaction Reduction Alternatives	43
2.2.1 Potential Methods to Reduce Longline-Seabird Interactions and Their Consequences	43
2.1.1.1 Blue-dyed and Thawed Bait	44
2.1.1.2 Strategic Offal Discard	44
2.1.1.3 Line-shooter with Weighted Branch Lines	45
2.1.1.4 Seabird Handling Techniques	46
2.1.1.5 Protected Species Workshops	47
2.1.1.6 Towed Deterrent	47
2.1.1.7 Night Setting	48
2.1.1.8 Setting Chute	49
2.1.1.9 Side Setting	49
2.1.1.10 Comparison of Individual Seabird Deterrent Methods	50
2.1.2 Combinations of Methods for Reduction of Longline-Seabird Interactions	53
2.1.3 Alternatives for Reduction of Seabird Interactions in the Hawaii-based Longline Fishery Including a Preliminary Preferred Alternative	59
2.1.4 Alternatives Considered but Rejected for Reduction of Seabird Interactions in the Hawaii-based Longline Fishery	69
2.1.5 Seabird Interaction Mitigation Measure Effectiveness Comparison	70
2.2 Alternatives for Management of the U.S. Pacific Squid Jigging Fishery	71
2.2.1 Alternatives for Management of the Squid Jigging Fishery under the MSA	71
2.2.2 Alternatives for Management of the Squid Jigging Fishery under the HSFCA	72
2.3.2 Alternatives Considered but Rejected for Management of the U.S. Pacific Squid Fishery	73
Chapter 3 Affected Environment	75
3.1 Introduction	75
3.2 The Western Pacific Pelagic Environment	75
3.2.1 Oceanography	75
3.2.2 Essential Fish Habitat and Habitat Areas of Particular Concern	75
3.2.3 Contaminants in the Environment	76
3.3 Pelagic Management Unit Species	76
3.3.1 Status of Billfish Stocks	77
3.3.1.1 Swordfish (<i>Xiphias gladius</i>)	77
3.3.1.2 Black Marlin (<i>Makaira indica</i>)	78
3.3.1.3 Blue Marlin (<i>Makaira mazara</i>)	78
3.3.1.4 Striped Marlin (<i>Tetrapturus audax</i>)	78

3.3.1.5	Shortbill spearfish (<i>Tetrapturus angustirostris</i>)	78
3.3.1.6	Sailfish (<i>Istiophorus platypterus</i>)	78
3.3.2	Status of Tuna Stocks	78
3.3.2.1	Bigeye Tuna (<i>Thunnus obesus</i>)	78
3.3.2.2	Albacore (<i>Thunnus alalunga</i>)	80
3.3.2.3	Yellowfin Tuna (<i>Thunnus albacares</i>)	80
3.3.2.4	Bluefin Tuna (<i>Thunnus thynnus</i>)	81
3.4.2.5	Skipjack Tuna (<i>Katsuwonus pelamis</i>)	81
3.3.2.6	Kawakawa (<i>Euthynnus affinis</i>)	81
3.3.3	Status of Shark Stocks	81
3.3.3.1	General Life History Characteristics of Sharks	81
3.3.3.2	Blue shark (<i>Prionace glauca</i>)	82
3.3.3.3	Miscellaneous Sharks (Families Carcharhinidae, Alopiidae, Sphyrnidae, and Laminidae)	82
3.3.3.3.1	Family Alopiidae	84
3.3.3.3.2	Family Lamnidae	84
3.3.3.3.3	Family Carcharhinidae	85
3.3.4	Stock Status of Miscellaneous PMUS	85
3.3.4.1	Mahimahi (<i>Coryphaena hippurus</i>) and Wahoo (Ono) (<i>Acanthocybium solandri</i>)	85
3.3.4.2	Moonfish (<i>Lampris guttatus</i>): Opah or Moonfish	85
3.3.4.3	Pomfret (<i>Eumegistus illustris</i>)	85
3.3.4.4	Snake Mackerels (Family Gempylidae)	85
3.4	Potential Squid PMUS	85
3.4.1	Neon Flying Squid (<i>Ommastrephes bartramii</i> Lesueur, 1821)	86
3.4.1.1	General Description	86
3.4.1.2	Status of the Stock	87
3.4.2	Diamondback Squid (<i>Thysanoteuthis rhombus</i>)	87
3.4.2.1	General Description	87
3.4.2.2	Status of the Stock	88
3.4.3	Purpleback Flying Squid (<i>Sthenoteuthis oualaniensis</i>)	89
3.4.3.1	General Description	89
3.4.3.2	Status of the Stock	89
3.4.4	Other Pelagic Cephalopods of the Western Pacific Region	90
3.4.5	Bycatch in the Squid Jigging Fishery	91
3.5	Other Species, Including Non-Target, Associated, or Dependent Pelagic Species (NADS)	91
3.6	Protected Species	91
3.6.1	Seabirds	91
3.6.1.1	Albatrosses (Order Procellariiformes, Family Diomedidae)	92
3.6.1.1.1	Short-tailed Albatross (<i>Phoebastria albatrus</i>)	94
3.6.1.1.2	Black-footed Albatross (<i>Phoebastria nigripes</i>)	99
3.6.1.1.3	Laysan Albatross (<i>Phoebastria immutabilis</i>)	103
3.6.1.2	Shearwaters (Order Procellariiformes, Family Procellariidae)	106
3.6.1.2.1	Newell's Shearwater (<i>Puffinus auricularis newelli</i>)	107

3.6.1.2.2	Wedge-tailed Shearwater (<i>Puffinus pacificus</i>)	108
3.6.1.2.3	Christmas Shearwater (<i>Puffinus nativitatis</i>)	109
3.6.1.3	Boobies (Order Pelecaniformes, Family Sulidae)	109
3.6.1.4	Fishery Seabird Interactions	110
3.6.1.4.1	Worldwide Longline Seabird Interactions	110
3.6.1.4.2	Hawaii Longline Seabird Interactions	111
3.6.1.4.3	Previous Actions to Reduce Seabird Interactions in the Hawaii-based Longline Fishery	112
3.6.1.4.4	Monitoring Seabird Interactions	117
3.6.1.4.5	Estimating the Incidental Catch of Seabirds by the Hawaii-based Longline Fishery	123
3.6.2	Sea Turtles	132
3.6.2.1	Leatherback Turtle (<i>Dermochelys coriacea</i>)	132
3.6.2.2	Loggerhead Turtle (<i>Caretta caretta</i>)	133
3.6.2.3	Green Turtle (<i>Chelonia mydas</i>)	133
3.6.2.4	Olive Ridley Turtle (<i>Lepidochelys olivacea</i>)	135
3.6.2.5	Hawksbill (<i>Eretmochelys imbricata</i>)	136
3.6.2.6	Interactions of the Hawaii-based Longline Fleet with Sea Turtles	136
3.6.3	Marine Mammals	137
3.6.3.1	Endangered Marine Mammals	139
3.6.3.1.1	Humpback Whale (<i>Megaptera novaeangliae</i>)	139
3.6.3.1.2	Sperm Whale (<i>Physeter macrocephalus</i>)	140
3.6.3.1.3	Hawaiian Monk Seal (<i>Monachus schauinslandi</i>)	141
3.6.3.2	Non-Endangered Marine Mammals	142
3.6.3.2.1	Delphinids	143
3.6.3.2.2	Phocoenids	146
3.6.3.2.3	Balaenopterids	147
3.6.3.2.4	Beaked whales	147
3.6.3.2.5	Physeterids	148
3.6.3.2.6	Pinnipeds	148
3.6.3.3	Interactions of the Hawaii-based Longline Fleet with Marine Mammals	148
3.7	Features of the Economic Environment	149
3.7.1	Overview of Hawaii's Pelagic Fisheries	150
3.7.2	Hawaii Longline Fishery	155
3.7.2.1	Overview	155
3.7.2.2	Description of Impacts of Recent Regulatory Changes	157
3.7.2.2.1	Sea Turtle Interaction Measures	157
3.7.2.2.2	Seabird Interaction Mitigation Methods	161
3.7.2.2.3	Shark Finning Measures	163
3.7.2.3	Changes in Net Revenue and Regional Impacts	164
3.7.2.3.1	Changes in Net Revenue	164
3.7.2.3.2	Regional Impacts	165
3.7.3	Squid Fisheries	166
3.7.3.1	Overview of Global Squid Fishery	167

3.7.3.1.1	Harvesting Sector	167
3.7.3.1.2	Processing Sector	178
3.7.3.1.3	Market Trends for Squid Products	180
3.7.3.2	Domestic Distant-Water Squid Fishery in the Pacific	182
3.7.3.2.1	Number of Vessels Involved	182
3.7.3.2.2	Type and Quantity of Fishing Gear Used	183
3.7.3.2.3	Species of Fish Involved and Their Location	183
3.7.3.2.4	Actual and Potential Revenue from the Fishery	184
3.7.3.2.5	Recreational Interest in the Fishery	184
3.7.3.2.6	Nature and Extent of Foreign Fishing and Indian Treaty Fishing Rights, If Any	184
3.7.3.3	Ika Shibi Component of the Hawaii Pelagic Handline Fishery	184
3.7.3.3.1	Number of Vessels Involved	184
3.7.3.3.2	Type and Quantity of Fishing Gear Used	185
3.7.3.3.3	Species of Fish Involved and Their Location	186
3.7.3.3.4	Actual and Potential Revenue from the Fishery	187
3.7.3.3.5	Recreational Interest in the Fishery	188
3.7.3.3.6	Nature and Extent of Foreign Fishing and Indian Treaty Fishing Rights, If Any	188
3.7.3.4	Kauai-based Directed Squid Fishery	189
3.7.3.4.1	Number of Vessels Involved	189
3.7.3.4.2	Type and Quantity of Fishing Gear Used	189
3.7.3.4.3	Species of Fish Involved and Their Location	189
3.7.3.4.4	Actual and Potential Revenue from the Fishery	190
3.7.3.4.5	Recreational Interest in the Fishery	191
3.7.3.4.6	Nature and Extent of Foreign Fishing and Indian Treaty Fishing Rights, If Any	191
3.8	Sociocultural Setting and Fishing Communities	191
3.8.1	Hawaii Sociocultural Setting	192
3.8.1.1	Longline Fishery	192
3.8.1.2	Squid Fisheries	197
3.8.2	Hawaii Fishing Communities	199
3.9	Administration and Enforcement	200
3.9.1	Permitting, Data Collection and Enforcement under the Pelagics FMP	200
3.9.1.1	Permitting	200
3.9.1.2	Observer Program	201
3.9.1.3	Enforcement	202
3.9.1.4	Data Collection	202
3.9.1.4.1	Hawaii	203
3.9.1.4.2	American Samoa	203
3.9.1.4.3	Guam	204
3.9.1.4.4	Northern Mariana Islands	204
3.9.2	Permitting, Data Collection and Enforcement under the High Seas Fishing Compliance Act	204

3.9.3 Permitting, Data Collection and Enforcement under the South Pacific Tuna Treaty	205
Chapter 4 Environmental Consequences	207
4.1 Introduction	207
4.2 Impacts to the Pelagic Environment	207
4.2.1 Seabird Interaction Mitigation Methods	207
4.2.2 Squid Management Alternatives	207
4.3 Impacts to Squid	208
4.3.1 Seabird Interaction Mitigation Methods	208
4.3.2 Squid Management Alternatives	208
4.4 Impacts to PMUS and Non-PMUS	208
4.4.1 Seabird Interaction Mitigation Methods	208
4.4.2 Squid Management Alternatives	209
4.5 Impacts to seabirds	209
4.5.1 Alternative SB1: No action	209
4.5.2 Alternative SB2A: Use either current methods or side-setting north of 23°N	213
4.5.3 Alternative SB2B: Use either current methods or side-setting in all areas	214
4.5.4 Alternative SB3A: Use either current methods or underwater setting chute north of 23°N	215
4.5.5 Alternative SB3B: Use either current methods or underwater setting chute in all areas	215
4.5.6 Alternative SB4A: Use either current methods or tori line (i.e., paired streamer lines) north of 23°N	215
4.5.7 Alternative SB4B: Use either current methods or tori line (i.e., paired streamer lines) in all areas	215
4.5.8 Alternative SB5A: Use either current methods or side-setting or underwater setting chute north of 23°N	216
4.5.9 Alternative SB5B: Use either current methods or side-setting or underwater chute in all areas	216
4.5.10 Alternative SB6A: Use either current methods or side-setting or underwater chute or tori line north of 23°N	216
4.5.11 SB 6B: Use either current methods or side-setting or underwater chute or tori line in all areas	216
4.5.12 Alternative SB7A: Use either current measures or side-setting or tori line (i.e., paired streamer lines) north of 23°N	217
4.5.13 SB 7B: Use either current measures or side setting or tori line in all areas	217
4.5.14 Alternative SB7C: For shallow-sets: use either current measures (without blue-dyed bait) or underwater chute or side-setting or tori line (i.e., paired streamer lines) in all areas. For deep-sets: use either current measures (without blue-dyed bait) or underwater chute or side-setting or tori line (i.e., paired streamer lines) north of 23°N	217

4.5.15	Alternative SB8A: Use current mitigation measures plus side-setting north of 23°N	217
4.5.16	Alternative SB8B: Use current mitigation measures plus side-setting in all areas	217
4.5.17	Alternative SB9A: Use side-setting north of 23°N	218
4.5.18	Alternative SB9B: Use side-setting in all areas	218
4.5.19	Alternative SB10A: Use-side setting unless technically infeasible in which case use current measures north of 23°N	218
4.5.20	Alternative SB10B: Use side-setting unless technically infeasible in which case use current measures in all areas	218
4.5.21	Alternative SB11A: Use side setting unless technically infeasible, in which case use an underwater setting chute or a tori line or current measures without blue bait or strategic offal discards (shallow-setting vessels set at night, deep-setting vessels use line shooters with weighted branch lines), when fishing north of 23°N	218
4.5.22	Alternative SB11B: Use side setting unless technically infeasible, in which case use an underwater setting chute or a tori line or current measures without blue bait or strategic offal discards (shallow-setting vessels set at night, deep-setting vessels use line shooters with weighted branch lines), in all areas	218
4.5.23	Alternative SB12: Voluntarily use night-setting or underwater chute or tori line or line-shooter with weighted branch lines south of 23°N	219
4.6	Impacts to Sea Turtles	219
4.6.1	Seabird Interaction Mitigation Methods	219
4.6.2	Squid Management Alternatives	219
4.7	Impacts to Marine Mammals	220
4.7.1	Seabird Interaction Mitigation Methods	220
4.7.2	Squid Management Alternatives	220
4.8	Economic Impacts	220
4.8.1	Seabird Mitigation Measures	220
4.8.1.1	Alternative SB1: No action	220
4.8.1.2	Alternative SB2A: Use either current methods or side setting north of 23°N	228
4.8.1.3	Alternative SB2B: Use either current methods or side setting in all areas	230
4.8.1.4	Alternative SB3A: Use either current methods or underwater chute north of 23°N	230
4.8.1.5	Alternative SB3B: Use either current methods or underwater chute in all areas	231
4.8.1.6	Alternative SB4A: Use either current methods or tori line (e.g., paired streamer lines) north of 23°N	231
4.8.1.7	Alternative SB4B: Use either current methods or tori line (e.g., paired streamer lines) in all areas	232
4.8.1.8	Alternative SB5A: Use either current methods or side setting or underwater chute north of 23°N	232

4.8.1.9	Alternative SB5B: Use either current methods or side setting or underwater chute in all areas	232
4.8.1.10	Alternative SB6A: Use either current methods or side setting or underwater chute or tori line (e.g., paired streamer lines) north of 23°N	232
4.8.1.11	Alternative SB6B: Use either current methods or side setting or underwater chute or tori line (e.g., paired streamer lines) in all areas	232
4.8.1.12	Alternative SB7A: Use either current methods or side setting or tori line (e.g., paired streamer lines) north of 23°N	232
4.8.1.13	Alternative SB7B: Use either current methods or side setting or tori line (e.g., paired streamer lines) in all areas	232
4.8.1.14	Alternative SB7C: For shallow-sets: use either current methods (without blue-dyed bait) or underwater chute or side setting or tori line (e.g., paired streamer lines) in all areas. For deep- sets: use either current methods (without blue-dyed bait) or underwater chute or side setting or tori line (e.g., paired streamer lines) north of 23°N	233
4.8.1.15	Alternative SB8A: Use current mitigation methods plus side setting north of 23°N	233
4.8.1.16	Alternative SB8B: Use current mitigation methods plus side setting in all areas	233
4.8.1.17	Alternative SB9A: Use side setting north of 23°N	234
4.8.1.18	Alternative SB9B: Use side setting in all areas	234
4.8.1.19	Alternative SB10A: Use side setting unless technically infeasible in which case use current methods north of 23°N	234
4.8.1.20	Alternative SB10B: Use side setting unless technically infeasible in which case use current methods in all areas	234
4.8.1.21	Alternative SB11A: Use side setting unless technically infeasible, in which case use an underwater setting chute or a tori line or current measures without blue bait or strategic offal discards (shallow-setting vessels set at night, deep-setting vessels use line shooters with weighted branch lines), when fishing north of 23°N	234
4.8.1.22	Alternative SB11B: Use side setting unless technically infeasible, in which case use an underwater setting chute or a tori line or current measures without blue bait or strategic offal discards (shallow-setting vessels set at night, deep-setting vessels use line shooters with weighted branch lines), in all areas	234
4.8.1.23	Alternative SB12: Voluntarily use night setting or underwater chute or tori line (e.g., paired streamer lines) or line shooter with weighted branch line south of 23°N	234
4.8.2	Squid Management Measures	235
4.8.2.1	Alternative SQA.1: No action	235
4.8.2.2	Alternative SQA.2: Improve voluntary monitoring by the optional use of logbooks designed specifically for use by domestic pelagic	

squid vessels, and by the voluntary placement of federal observers on these vessels	235
4.8.2.3 Alternative SQA.3: Improve mandatory monitoring and establish mechanisms for management by including pelagic squid in the Council's existing Pelagics Fishery Management Plan. Replace HSFCA logbooks currently used with logbooks specifically designed for squid harvesting, and require operators of squid vessels licensed under the HSFCA to also include any EEZ harvests in this logbook. Require vessels that harvest pelagic squid solely in EEZ waters to either use this logbook or to participate in local reporting systems	235
4.8.2.4 Alternative SQA.4: Improve mandatory monitoring and establish mechanisms for management by developing a new Squid Fishery Management Plan for pelagic squid. Replace HSFCA logbooks currently used with logbooks specifically designed for squid harvesting, and require operators of squid vessels licensed under the HSFCA to also include any EEZ harvests in this logbook. Require vessels that harvest pelagic squid solely in EEZ waters to either use this logbook or to participate in local reporting systems	237
4.8.2.5 Alternative SQA.5: Improve mandatory international monitoring and establish mechanisms for both domestic and international management by pursuing and participating in international management agreements for Pacific pelagic squid	237
4.8.2.6 Alternative SQB.1: No action	237
4.8.2.7 Alternative SQB.2: Stop issuing HSFCA permits for the high seas domestic squid fishery	237
4.8.2.8 Alternative SQB.3: Improve voluntary monitoring by the optional use of logbooks designed specifically for use by domestic pelagic squid vessels, and by the voluntary placement of federal observers on these vessels.	238
4.8.2.9 Alternative SQB.4: Improve mandatory monitoring by replacing the HSFCA logbooks currently used with required logbooks specifically designed for squid harvesting. Centralize this data into a database easily available to resource managers. In addition, revise HSFCA permit applications to indicate the specific fisheries (including both gears and target species) in which permittees anticipate fishing on the high seas (e.g., jigging for pelagic squid)	238
4.8.2.10 Alternative SQB.5: Establish domestic management mechanisms by categorizing all domestic vessels harvesting squid on the high seas as under the jurisdiction of one or more fishery management Councils and asking the relevant Council(s) to include pelagic squid in their fishery management plans	239
4.8.2.11 Alternative SQB.6: Improve mandatory international monitoring and establish mechanisms for both domestic and international	

	management by pursuing and participating in international management agreements for Pacific pelagic squid	239
4.9 Social Impacts		239
4.9.1 Seabird Mitigation Measures		239
4.9.1.1 Alternative SB1: No action		239
4.9.1.1.1 Sustained Participation of Fishing Communities		239
4.9.1.1.2 Group and Cultural Issues		240
4.9.1.1.3 Environmental Justice		240
4.9.1.2 Alternative SB2A: Use either current methods or side setting north of 23°N		241
4.9.1.2.1 Sustained Participation of Fishing Communities		241
4.9.1.2.2 Group and Cultural Issues		241
4.9.1.2.3 Environmental Justice		242
4.9.1.3 Alternative SB2B: Use either current methods or side setting in all areas		242
4.9.1.4 Alternative SB3A: Use either current methods or underwater chute north of 23°N		242
4.9.1.5 Alternative SB3B: Use either current methods or underwater chute in all areas		242
4.9.1.6 Alternative SB4A: Use either current methods or tori line (e.g., paired streamer lines) north of 23°N		242
4.9.1.7 Alternative SB4B: Use either current methods or tori line (e.g., paired streamer lines) in all areas		242
4.9.1.8 Alternative SB5A: Use either current methods or side setting or underwater chute north of 23°N		242
4.9.1.9 Alternative SB5B: Use either current methods or side setting or underwater chute in all areas		242
4.9.1.10 Alternative SB6A: Use either current methods or side setting or underwater chute or tori line (e.g., paired streamer lines) north of 23°N		242
4.9.1.11 Alternative SB6B: Use either current methods or side setting or underwater chute or tori line (e.g., paired streamer lines) in all areas		242
4.9.1.12 Alternative SB7A: Use either current measures or side setting or tori line (e.g., paired streamer lines) north of 23°N		243
4.9.1.13 Alternative SB7B: Use either current measures or side setting or tori line (e.g., paired streamer lines) in all areas		243
4.9.1.14 Alternative SB7C: For shallow-sets: use either current measures (without blue-dyed bait) or underwater chute or side setting or tori line (e.g., paired streamer lines) in all areas. For deep-sets: use either current measures (without blue-dyed bait) or underwater chute or side setting or tori line (e.g., paired streamer lines) north of 23°N		243
4.9.1.15 Alternative SB8A: Use current mitigation measures plus side setting north of 23°N		243

4.9.1.16	Alternative SB8B: Use current mitigation measures plus side setting in all areas	243
4.9.1.17	Alternative SB9A: Use side setting north of 23°N	244
4.9.1.18	Alternative SB9B: Use side setting in all areas	244
4.9.1.19	Alternative SB10A: Use side setting unless technically infeasible in which case use current measures north of 23°N	244
4.9.1.20	Alternative SB10B: Use side setting unless technically infeasible in which case use current measures in all areas	244
4.9.1.21	Alternative SB11A: Use side setting unless technically infeasible, in which case use an underwater setting chute or a tori line or current measures without blue bait or strategic offal discards (shallow-setting vessels set at night, deep-setting vessels use line shooters with weighted branch lines), when fishing north of 23°N	244
4.9.1.22	Alternative SB11B: Use side setting unless technically infeasible, in which case use an underwater setting chute or a tori line or current measures without blue bait or strategic offal discards (shallow-setting vessels set at night, deep-setting vessels use line shooters with weighted branch lines), in all areas	244
4.9.1.23	Alternative SB12: Voluntarily use night setting or underwater chute or tori line (e.g., paired streamer lines) or line shooter with weighted branch line south of 23°N	244
4.9.2	Squid Management Measures	245
4.9.2.1	Alternative SQA.1: No action	245
4.9.2.2	Alternative SQA.2: Improve voluntary monitoring by the optional use of logbooks designed specifically for use by domestic pelagic squid vessels, and by the voluntary placement of federal observers on these vessels	245
4.9.2.3	Alternative SQA.3: Improve mandatory monitoring and establish mechanisms for management by including pelagic squid in the Council's existing Pelagics Fishery Management Plan. Replace HSFCA logbooks currently used with logbooks specifically designed for squid harvesting, and require operators of squid vessels licensed under the HSFCA to also include any EEZ harvests in this logbook. Require vessels that harvest pelagic squid solely in EEZ waters to either use this logbook or to participate in local reporting systems	245
4.9.2.4	Alternative SQA.4: Improve mandatory monitoring and establish mechanisms for management by developing a new Squid Fishery Management Plan for pelagic squid. Replace HSFCA logbooks currently used with logbooks specifically designed for squid harvesting, and require operators of squid vessels licensed under the HSFCA to also include any EEZ harvests in this logbook. Require vessels that harvest pelagic squid solely in EEZ waters to either use this logbook or to participate in local reporting systems	245

4.9.2.5	Alternative SQA.5: Improve mandatory international monitoring and establish mechanisms for both domestic and international management by pursuing and participating in international management agreements for Pacific pelagic squid	245
4.9.2.6	Alternative SQB.1: No action	246
4.9.2.7	Alternative SQB.2: Stop issuing HSFCA permits for the high seas domestic squid fishery	246
4.9.2.8	Alternative SQB.3: Improve voluntary monitoring by the optional use of logbooks designed specifically for use by domestic pelagic squid vessels, and by the voluntary placement of federal observers on these vessels	246
4.9.2.9	Alternative SQB.4: Improve mandatory monitoring by replacing the HSFCA logbooks currently used with required logbooks specifically designed for squid harvesting. Centralize this data into a database easily available to resource managers. In addition, revise HSFCA permit applications to indicate the specific fisheries (including both gears and target species) in which permittees anticipate fishing on the high seas (e.g. jigging for pelagic squid)	246
4.9.2.10	Alternative SQB.5: Establish domestic management mechanisms by categorizing all domestic vessels harvesting squid on the high seas as under the jurisdiction of one or more fishery management Councils and asking the relevant Council(s) to include pelagic squid in their fishery management plans	246
4.9.2.11	Alternative SQB.6: Improve mandatory international monitoring and establish mechanisms for both domestic and international management by pursuing and participating in international management agreements for Pacific pelagic squid	246
4.10	Impacts to Administration and Enforcement	247
4.10.1	Seabird Interaction Mitigation Methods	247
4.10.2	Squid Management Alternatives	247
4.10.2.1	Alternative SQA.1: No Action	247
4.10.2.2	Alternative SQA.2: Improve voluntary monitoring by the optional use of logbooks designed specifically for use by domestic pelagic squid vessels, and by the voluntary placement of federal observers on these vessels. Centralize this data into a database easily available to resource managers	247
4.10.2.3	Alternative SQA.3: Improve mandatory monitoring and establish mechanisms for management by including pelagic squid in the Council’s existing Pelagics Fishery Management Plan. Replace HSFCA logbooks currently used with logbooks specifically designed for squid harvesting, and require operators of squid vessels permitted under the HSFCA to also include any EEZ fishing activities in this logbook(Council Preferred)	248
4.10.2.4	Alternative SQA.4: Improve mandatory monitoring and establish mechanisms for management by developing a new Squid Fishery	

Management Plan for pelagic squid. Replace HSFCA logbooks currently used with logbooks specifically designed for squid harvesting, and require operators of squid vessels permitted under the HSFCA to also include any EEZ fishing activities in this logbook	248
4.10.2.5 Alternative SQA.5: Improve mandatory international monitoring and establish mechanisms for both domestic and international management by pursuing and participating in international management agreements for Pacific pelagic squid. Consider the use of mandatory observers on vessels harvesting squid	248
4.10.2.6 Alternative SQB.1: No Action	249
4.10.2.7 Alternative SQB.2: Cease issuing HSFCA permits for the high seas domestic squid fishery	249
4.10.2.8 Alternative SQB.3: Improve voluntary monitoring by the optional use of logbooks designed specifically for use by domestic pelagic squid vessels, and by the voluntary placement of federal observers on these vessels	249
4.10.2.9 Alternative SQB.4: Improve mandatory monitoring by replacing the HSFCA logbooks currently used with required logbooks specifically designed for squid harvesting. Centralize this data into a database easily available to resource managers (Council Preferred)	249
4.10.2.10 Alternative SQB.5: Establish domestic management mechanisms by categorizing all domestic vessels harvesting squid on the high seas as under the jurisdiction of one or more fishery management Councils and asking the relevant Council(s) to include pelagic squid in their fishery management plans	249
4.10.2.11 Alternative SQB.6: Improve mandatory international monitoring and establish mechanisms for both domestic and international management by pursuing and participating in international management agreements for Pacific pelagic squid	250
4.11 Cumulative Effects	250
4.11.1 Methodology	251
4.11.2 Cumulative Impacts to the Pelagic Environment	251
4.11.3 Cumulative Impacts to PMUS and non-PMUS	252
4.11.4 Cumulative Impacts to Squid	253
4.11.5 Cumulative Effects to Seabirds	254
4.11.5.1 Potential Degradation of Albatross Nesting Habitats	254
4.11.5.2 Continued Exposure to Environmental Contaminants, Especially PCBs.	255
4.11.5.3 Continued Exposure to Concentrations of Small Plastic Debris in the North Pacific	255
4.11.5.4 Incidental Seabird Mortality in Longline Fisheries not Regulated Under the Pelagics FMP	255
4.11.6 Cumulative Effects to Sea Turtles	258
4.11.7 Cumulative Effects to Marine Mammals	259

4.11.8 Cumulative Effects to Economies	260
4.11.8.1 Health issues	261
4.11.8.2 Environmental Issues	263
4.11.9 Cumulative Effects to Social and Cultural Resources	264
Chapter 5 Environmental Management Issues	265
5.1 Introduction	265
5.2 Short-term Uses Versus Long-term Productivity	265
5.3 Irreversible and Irretrievable Commitments of Resources	265
5.4 Energy Requirements and Conservation Potential of the Alternatives	266
5.5 Urban Quality, Historic Resources and Design of the Built Environment, Including Re-use and Conservation Potential of the Alternatives	266
5.6 Cultural Resources and Conservation Potential of the Alternatives	266
5.7 Possible Conflicts Between the Alternatives and Other Plans.	266
5.8 Adverse Effects that Cannot be Avoided	267
5.9 Possible Mitigation Methods for Unavoidable Adverse Effects	267
Chapter 6 Preparers, Distribution and Comments	269
6.1 Preparers of the DEIS	269
6.2 Distribution of the DEIS	269
6.3 Comments on the DEIS	285
Chapter 7 Literature Cited	287
Glossary	357
Appendix A Contaminants and Debris in the Marine Environment	363
Appendix B Potential Squid PMUS	371
Appendix C Sea Turtles	403

List of Tables

1.2-2 Amendments to the Pelagics FMP	6
1.2-2 Pelagic Management Unit Species	9
1.2-3 Seabird measures proposed by WPRFMC action and those contained in the USFWS BiOp on the Effects of the Hawaii Longline Fishery on the Short-tailed Albatross; Amended October 18, 2001 and November 18, 2002	15
1.3-1 Pelagic Fisheries in the Western Pacific Region	19
1.3-2 Permit and Monitoring Mechanisms for Existing and Potential Fisheries Managed Under the Pelagics FMP	20
1.3-3 Total Pelagic Landings (lbs) by Type of Fish in the Western Pacific Region in 2002 ...	21
1.3-4 Total Pelagic Landings (lbs) by Fishery in the Western Pacific Region in 2002	22
1.3-5 Hawaii-based Longline Fishery - Historical Summary	23
1.3-6 American Samoa Tuna Landings - Historical Summary	24
1.4-1 Pelagic Fishery Information for the California-based Longline Fishery	27
1.5-1 Comparison of Total Pelagics FMP Fisheries Commercial Landings with Other Pacific Commercial Landings	35
1.6-1 Scoping Meeting Schedule	36
2.1-1 Albatross interaction rates for seabird avoidance methods tested in North Pacific Ocean pelagic longline swordfish and tuna fisheries.	51
2.1-2 Comparison of performance of seabird mitigation methods from observations conducted between 1998 and 2003	53
2.1-3 Seabird deterrent matrix	54
2.1-4 Seabird mitigation measures included in each alternative.	66
2.1-5 Matrix of Seabird Alternatives by Mitigation Measure	68
2.1-6 Effectiveness of the Seabird Alternatives	70
3.3-1 Observer data on sharks caught in the longline fishery	83
3.6.1-1 Summation of current best available data for the numbers of breeding pairs of black-footed, Laysan and short-tailed albatrosses for each known breeding locality	93
3.6.1-2 Short-tailed albatross observations in the NWHI	95
3.6.1-3 Short-tailed albatross census counts at Torishima, Japan, between 1977 and 2004 ...	98
3.6.1-4 NWHI booby counts at Johnston Atoll, Midway Atoll and Tern Island, French Frigate Shoals, between 1979 and 1996	110
3.6.1-5 NOAA Fisheries Observer Program coverage of Hawaii-based longline fishing vessels between 1994 and 2003	118
3.6.1-6 Estimated annual total incidental catch of albatrosses in the Hawaii longline fishery based on catches recorded by NMFS observers on monitored fishing trips	124
3.6.1-7 Incidental catch of albatrosses in the Hawaii longline fishery by set type based on NMFS observer records from 1994-1998	127
3.6.1-8 Estimated fleet-wide seabird takes in the Hawaii-based longline fishery between 2000 and 2001	128
3.6.1-9 Estimated fleet wide seabird catch rates during two periods in 2000 for the Hawaii-based longline fishery based on NOAA Fisheries observer records	128

3.6.1-10 Observed number of seabirds caught by Hawaii-based longline vessels between 2001 and 2003	129
3.6.2-1 Observed longline gear/turtle interactions, 2002	137
3.6.3-1 Sightings and Estimated Abundances of Cetaceans in the Hawaii EEZ from Research Cruises in 2002	138
3.6.3-2 Marine Mammals Not Listed as Threatened or Endangered Under the Endangered Species Act that have been Observed in Areas Where Fisheries in the Western Pacific Region Operate	142
3.6.3-3 Observed longline gear/marine mammal interactions, 2002	149
3.7-1 Volume and Ex-vessel Value of Landings in Hawaii's Commercial Pelagic Fisheries by Major Gear Type, 1999-2003	150
3.7-2 Volume and Ex-vessel Value of Landings in Hawaii's Commercial Pelagic Fisheries by Species, 1999-2002	151
3.7-3 Primary Fishing Method Reported on HDAR Commercial Marine Licenses, 1999-2002	152
3.7-4 Species Composition of Landings Made by Hawaii Charter Vessels, 2002	152
3.7-5 Hawaii Pelagic Longline Fishery Activity, 1999-2003	155
3.7-6 Reported Average Annual Revenue and Costs for the Hawaii-based Longline Fleet, 2000	157
3.7-7 List of Items and Their Costs Associated with Converting Gear from Targeting Swordfish to Tuna	158
3.7-8 Hawaii-based Longline Catch in the U.S. Possessions, 1991-2002	160
3.7-9 Reported Average Vessel Annual Loss of Revenue to the Hawaii-based Longline Fleet Because of the 2000 Shark Finning Regulations	163
3.7-10 Comparison of the Average Annual Revenue and Costs in Costs-Earning Studies of the Hawaii-based Longline Fleet, 1993 and 2000	164
3.7-11 Characteristics of the Vessels Participating in the Domestic Distant-Water Squid Fishery in the Pacific	183
3.7-12 Ika Shibi Fishing Locations and Seasons in the Waters Around the Island of Hawaii	186
3.7-13 The 1995-1996 Average Characteristics of Island of Hawaii Full-Time Ika Shibi Vessels	187
3.7-14 The 1995-1996 Average Annual Revenue and Costs for Full-time Ika Shibi Vessels ..	188
3.8-1 Ethnicity of Hawaii Longline Vessel Owners in 2000	193
3.8-2 Allocation of Shallow-set Certificates Among Hawaii Longline Limited Access Permit Holders	197
4.5-1 Current seabird deterrent measures contained in the USFWS BiOp on the Effects of the Hawaii Longline Fishery on the Short-tailed Albatross; Amended October 18, 2001 and November 11, 2002	210
4.5-2 Comparing the percentage reduction of different seabird deterrent methods to that of using no deterrent methods and the predicted annual seabird incidental catch of the Hawaii-based longline fleet under Alternative SB1	212
4.8-1 Predicted Annual Catch of the Hawaii-based Longline Fleet Under Alternative SB1 ..	221
4.8-2 Estimated Socioeconomic Effects of Various Mitigation Methods that May Reduce Seabird Interactions in the Hawaii-Based Longline Fishery	224
4.11-1 Estimates of Overfishing and Overfished Reference Points for WPRFMC PMUS	252

4.11-2 Comparison of Agency Guidelines for Methyl Mercury Intake 261

List of Figures

1.2-1 The U.S. EEZ in the Pacific Islands Region	4
3.6.1-1 Counts of short-tailed albatross (STAL) adults, eggs and fledglings on Torishima between 1947 and 2003	99
3.6.1-2 Counts of black-footed albatross breeding pairs at French Frigate Shoals, Midway Atoll and Laysan Island, NWHI for years 1992 to 2003	102
3.6.1-3 Combined counts of black-footed albatross (BFAL) breeding pairs on Midway Atoll (MID), Laysan Island (LAY) and French Frigate Shoals (FFS) plotted against year (1992 - 2003)	103
3.6.1-4 Counts of Laysan albatross breeding pairs at French Frigate Shoals, Midway Atoll and Laysan Island, NWHI for years 1992 to 2003	105
3.6.1-5 Combined counts of Laysan albatross (LAAL) breeding pairs on Midway Atoll (MID), Laysan Island (LAY) and French Frigate Shoals (FFS) plotted against year (1992 - 2003)	106
3.6.1-6 Abundance of black-footed albatrosses (top map) and Laysan albatrosses (bottom map) around Hawaii longline vessels during fishing operations	120
3.6.1-7 Relationships of albatross attempts, interactions and mortalities.	121
3.6.1-8 Relationships between albatross attempts, interactions and numbers present	122
3.6.1-9 Observed interactions of black-footed albatrosses (top) and Laysan albatrosses (bottom) between 1994-1999 in the Hawaii longline fishery	126
3.6.1-10 Observed interactions of black-footed albatrosses (top map) and Laysan albatrosses (bottom map) between August 25, 2000 and March 31, 2001, in the Hawaii longline fishery	130
3.6.1-11 Observed interactions of black-footed albatrosses (top map) and Laysan albatrosses (bottom map) from July 1, 2001 to July 4, 2004 in the Hawaii longline fishery	131
3.7-1 Estimated Hawaii Recreational Private Boat Catch of Pelagic Species by Number of Fish, 2002	154
3.7-2 Estimated Hawaii Recreational Private Boat Catch of Pelagic Species by Weight of Fish, 2002	154
3.7-3 Annual Squid Catch in the Southwest Atlantic and Northwest Pacific, 1950- 2000	168
3.7-4 Annual Squid Catch in the Southeast Pacific, Southwest Pacific, Western Central Pacific, Eastern Central Pacific, Eastern Indian Ocean and Northwest Atlantic, 1950-2000 . . .	169

List of Acronyms and Abbreviations

°C	Degrees Celsius	fm	Fathom
µm	Micrometer	FMP	Fishery Management Plan
BiOp	Biological Opinion	FR	Federal Register
BW	Body Weight	FSM	Federated States of Micronesia
CCL	Curved Carapace Length	FWS	Fish and Wildlife Service (U.S.)
CEQ	Council on Environmental Quality	g	Gram
C. I.	Confidence Interval	GPA	Global Programme of Action
CIF	Cost, Insurance, Freight	GSI	Gonadosomatic Index
CITES	Convention on International Trade in Endangered Species	HAPC	Habitat Area of Particular Concern
cm	Centimeters	HDAR	Hawaii Division of Aquatic Resources
CNMI	Commonwealth of the Northern Mariana Islands	HID	High Intensity Discharge
COI	Cytochrome Oxidase I	HLA	Hawaii Longline Association
CPUE	Catch-Per-Unit-Effort	HMS	Highly Migratory Species
CRE	Coral Reef Ecosystems	HSFCA	High Seas Fishing Compliance Act
CRED	Coral Reef Ecosystem Division	IATTC	Inter-American Tropical Tuna Commission
CRE FMP	Coral Reef Ecosystem Fishery Management Plan	IMO	International Maritime Organization
CV	Coefficients of Variation	ITQ	Individual Transferable Quota
DAWR	Division of Aquatic and Wildlife Resources (Guam)	IUCN	International Union for Conservation of Nature and Natural Resources
DDT	Dichlorodiphenyltrichloroethane	IUU	Illegal, Unreported and Unregulated
DEAP	Direct Economic Assistance Program	IWC	International Whaling Commission
DFW	Division of Fish & Wildlife, Northern Mariana Islands	kg/hr	Kilograms per Hour
DHA	Docosahexaenoic Acid	Kt	Kiloton
DMWR	Department of Marine and Wildlife Resources (American Samoa)	lb	Pound
DNA	Deoxyribonucleic Acid	LCD	London Dumping Convention
DWFN	Distant Water Fishing Nation	m	Meter
EEZ	Exclusive Economic Zone	MARPOL 73/78	International Convention for the Prevention of Pollution from Ships
EFH	Essential Fish Habitat	MFCMA	Magnuson Fishery Conservation and Management Act
EIS	Environmental Impact Statement	MHI	Main Hawaiian Islands
EO	Executive Order	ml	Milliliter
EPO	Eastern Pacific Ocean	mm	Millimeter
ETPO	Eastern Tropical Pacific Ocean	MMPA	Marine Mammal Protection Act
FAD	Fish Aggregating Device	MPA	Marine Protected Area
FAO	Food and Agriculture Organization (United Nations)	MPPRCA	Marine Plastic Pollution Research and Control Act
FCMA	Fishery Conservation and Management Act	MRFSS	Marine Recreational Fisheries Statistical Survey
FCZ	Fishery Conservation Zone	MSA	Magnuson-Stevens Fishery Conservation and Management Act
FDA	Food and Drug Administration (U.S.)	MSY	Maximum Sustainable Yield
FEIS	Final Environmental Impact Statement	MSST	Mean Sea Surface Temperature
FFA	Forum Fisheries Agency	mt	Megaton
FFC	Forum Fisheries Committee		

mtDNA	Mitochondrial Deoxyribonucleic Acid	STF	Subtropical Front
MUS	Management Unit Species	SWFSC	Southwest Fisheries Science Center
NEPA	National Environmental Policy Act	TBAP	Tuna and Billfish Assessment Programme
NGO	Non Governmental Organization	TCDD	Tetrachlorodibenzo-para-dioxin
nm	Nautical Mile	TZ	Transition Zone
NMFS	National Marine Fisheries Service	U.S.C.	United States Code
NOAA	National Oceanic and Atmospheric Administration	UN	United Nations
NOI	Notice of Intent	UNCLOS	United Nations Convention on the Law of the Sea
NPTZ	North Pacific Transition Zone	UNEP	United Nations Environment Programme
NWHI	Northwestern Hawaiian Islands	USCG	United States Coast Guard
O2	Oxygen	USFWS	United States Fish and Wildlife Service
OFP	Oceanic Fisheries Program	VMS	Vessel Monitoring System
OY	Optimum yield	WCPF	Western and Central Pacific Fisheries
PBR	Potential Biological Removal	WCPO	Western and Central Pacific Ocean
PCB	Polychlorinated Biphenyl	WpacFIN	Western Pacific Fisheries Information Network
PFAD	Personal Fish Aggregating Device	WPRFMC	Western Pacific Regional Fishery Management Council
PIAO	Pacific Islands Area Office	YOY	Young-of-the-year
PICES	North Pacific Marine Science Organization		
PIFSC	Pacific Islands Fishery Science Center		
PIRO	Pacific Islands Regional Office		
PMP	Preliminary Management Plan		
PMUS	Pelagic Management Unit Species		
PNG	Papua New Guinea		
POP	Persistent Organic Pollutant		
ppm	Parts per Million		
ppt	Parts per Thousand		
PRIA	Pacific Remote Island Area		
RPA	Reasonable and Prudent Alternative		
SAFZ	Sub Arctic Frontal Zone		
SARS	Severe Acute Respiratory Syndrome		
SATZ	Sub Arctic/South American Transition Zone		
SCB	Southern California Bight		
SCL	Straight Carapace Length		
SCTB	Standing Committee on Tuna and Billfish		
SEAFDEC	Southeast Asian Fisheries Development Center		
SEIS	Supplemental Environmental Impact Statement		
SEM	Scanning Electron Microscopy		
SFA	Sustainable Fisheries Act		
SPC	Secretariat of the Pacific Community		
SSTF	South Subtropical Front		
SPTT	South Pacific Tuna Treaty		
SSAP	Skipjack Survey and Assessment Programme		
SST	Sea surface temperature		
STAL	Short-Tailed Albatross		