



Chapter 4 Environmental Consequences

CHAPTER 4	Environmental Consequences	4-1
4.0	ENVIRONMENTAL CONSEQUENCES.....	1
4.1	Introduction.....	1
4.1.1	Alternative 1	4
4.1.2	Alternative 2	4
4.1.3	Alternative 3	8
4.1.4	Alternative 4	10
4.1.5	Alternative 5	10
4.1.6	Alternative 6	11
4.2	Water Quality.....	11
4.2.1	Introduction.....	11
4.2.1.1	Drinking Water Sources	12
4.2.1.2	Marine Waters	12
4.2.1.3	Shellfish Beds.....	13
4.2.2	Evaluation Criteria	14
4.2.2.1	Spills.....	14
4.2.2.2	Groundwater Contamination	15
4.2.3	Evaluation of Alternatives	16
4.2.3.1	Alternative 1	17
4.2.3.2	Alternative 2	17
4.2.3.3	Alternative 3	18
4.2.3.4	Alternative 4	19
4.2.3.5	Alternative 5	19
4.2.3.6	Alternative 6	20
4.3	Marine Habitat and Species	20
4.3.1	Introduction.....	20
4.3.2	Evaluation Criteria	21
4.3.2.1	Pelagic Environment Evaluation Criteria.....	21
4.3.2.1.1	Disturbance of Pelagic Species.....	21
4.3.2.1.2	Changes in the Pelagic Community.....	22
4.3.2.2	Benthic Environment Evaluation Criteria	22
4.3.2.2.1	Disturbance of Benthic Habitat	22
4.3.2.2.2	Changes in Disturbance-dependent Benthic Communities	23
4.3.3	Evaluation of Alternatives	24
4.3.3.1	Alternative 1	24
4.3.3.2	Alternative 2	25
4.3.3.2.1	Pelagic Environment	25
4.3.3.2.2	Benthic Environment.....	26

TABLE OF CONTENTS (CONTINUED)

4.3.3.3 Alternative 3	27
4.3.3.3.1 Pelagic Environment	28
4.3.3.3.2 Benthic Environment	28
4.3.3.4 Alternative 4	28
4.3.3.4.1 Pelagic Environment	28
4.3.3.4.2 Benthic Environment	29
4.3.3.5 Alternative 5	29
4.3.3.5.1 Pelagic Environment	29
4.3.3.5.2 Benthic Environment	29
4.3.3.6 Alternative 6	30
4.3.3.6.1 Pelagic Environment	30
4.3.3.6.2 Benthic Environment	30
4.4 ENP Gray Whale.....	31
4.4.1 Introduction.....	31
4.4.2 Evaluation Criteria	31
4.4.2.1 Change in Abundance and Viability of the ENP Gray Whale Stock	31
4.4.2.2 Change in Abundance of Gray Whales Using the Makah U&A or ORSVI Survey Areas	33
4.4.2.2.1 PBR of Whales in the ORSVI Survey Area	37
4.4.2.3 Change in Distribution or Habitat Use	39
4.4.2.4 Method of Striking and Killing; Time to Death; Hunting Efficiency	40
4.4.2.4.1 Method of Striking and Killing, Time to Death	41
4.4.2.4.2 Timing of Hunt and Time to Death	43
4.4.2.4.3 Hunting Efficiency	43
4.4.3 Evaluation of Alternatives	44
4.4.3.1 Alternative 1	45
4.4.3.2 Alternative 2	45
4.4.3.2.1 Change in Abundance and Viability of ENP Gray Whales	46
4.4.3.2.2 Change in Abundance of Gray Whales Using the Makah U&A and ORSVI Survey Areas	46
4.4.3.2.3 Change in Distribution or Habitat Use	48
4.4.3.2.4 Manner and Time to Death.....	50
4.4.3.3 Alternative 3	51
4.4.3.3.1 Change in Abundance and Viability of ENP Gray Whales	51
4.4.3.3.2 Change in Abundance of Gray Whales Using the Makah U&A and ORSVI Survey Areas	51
4.4.3.3.3 Change in Distribution or Habitat Use	53
4.4.3.3.4 Manner and Time to Death.....	54
4.4.3.4 Alternative 4	55
4.4.3.5 Alternative 5	56
4.4.3.5.1 Change in Abundance and Viability of ENP Gray Whales	56
4.4.3.5.2 Change in Abundance of Gray Whales Using the Makah U&A and ORSVI Survey Areas	56
4.4.3.5.3 Change in Distribution or Habitat Use	58
4.4.3.5.4 Manner and Time to Death.....	60
4.4.3.6 Alternative 6	60
4.4.3.6.1 Change in Abundance and Viability of ENP Gray Whales	60
4.4.3.6.2 Change in Abundance of Gray Whales Using the Makah U&A and ORSVI Survey Areas	60
4.4.3.6.3 Change in Distribution or Habitat Use	61

TABLE OF CONTENTS (CONTINUED)

4.4.3.6.4 Manner and Time to Death.....	62
4.5 Other Wildlife.....	63
4.5.1 Introduction.....	63
4.5.2 Evaluation Criteria.....	63
4.5.2.1 Disturbance.....	64
4.5.2.1.1 Marine Mammals (excluding Gray Whales).....	65
4.5.2.1.2 Other Marine Wildlife.....	70
4.5.2.2 Prey Availability.....	76
4.5.2.3 Potential Injury.....	77
4.5.2.3.1 Marine Mammals.....	77
4.5.2.3.2 Sea Turtles.....	78
4.5.3 Evaluation of Alternatives.....	79
4.5.3.1 Alternative 1.....	79
4.5.3.2 Alternative 2.....	80
4.5.3.2.1 Marine Mammals.....	81
4.5.3.2.2 Other Marine Wildlife.....	82
4.5.3.3 Alternative 3.....	85
4.5.3.3.1 Marine Mammals.....	85
4.5.3.3.2 Other Marine Wildlife.....	87
4.5.3.4 Alternative 4.....	89
4.5.3.5 Alternative 5.....	90
4.5.3.5.1 Marine Mammals.....	90
4.5.3.5.2 Other Marine Wildlife.....	92
4.5.3.6 Alternative 6.....	95
4.5.3.6.1 Marine Mammals.....	95
4.5.3.6.2 Other Marine Wildlife.....	96
4.6 Economics.....	97
4.6.1 Introduction.....	97
4.6.2 Evaluation Criteria.....	98
4.6.2.1 Tourism.....	98
4.6.2.2 Household Use of Whale Products.....	100
4.6.2.3 Whale-watching Industry.....	102
4.6.2.4 Shipping and Ocean Sport/Commercial Fishing.....	103
4.6.2.5 Management and Law Enforcement.....	105
4.6.3 Evaluation of Alternatives.....	106
4.6.3.1 Alternative 1.....	107
4.6.3.2 Alternative 2.....	107
4.6.3.2.1 Tourism.....	108
4.6.3.2.2 Household Use of Whale Products.....	108
4.6.3.2.3 Whale-watching Industry.....	109
4.6.3.2.4 Shipping and Ocean Sport/Commercial Fishing.....	109
4.6.3.2.5 Management and Law Enforcement.....	110
4.6.3.3 Alternative 3.....	111
4.6.3.3.1 Tourism.....	111
4.6.3.3.2 Household Use of Whale Products.....	112
4.6.3.3.3 Whale-watching Industry.....	112
4.6.3.3.4 Shipping and Ocean Sport/Commercial Fishing.....	113
4.6.3.3.5 Management and Law Enforcement.....	114
4.6.3.4 Alternative 4.....	114
4.6.3.5 Alternative 5.....	115

TABLE OF CONTENTS (CONTINUED)

4.6.3.5.1 Tourism	115
4.6.3.5.2 Household Use of Whale Products	116
4.6.3.5.3 Whale-watching Industry	116
4.6.3.5.4 Shipping and Ocean Sport/Commercial Fishing	117
4.6.3.5.5 Management and Law Enforcement	118
4.6.3.6 Alternative 6	118
4.7 Environmental Justice	120
4.7.1 Introduction	120
4.7.2 Evaluation Criteria	120
4.7.3 Evaluation of Alternatives	121
4.7.3.1 Alternative 1	123
4.7.3.1.1 Economics	123
4.7.3.1.2 Ceremonial and Subsistence Resources	124
4.7.3.1.3 Social Environment	124
4.7.3.2 Alternative 2	124
4.7.3.2.1 Economics	124
4.7.3.2.2 Ceremonial and Subsistence and Resources	125
4.7.3.2.3 Social Environment	125
4.7.3.3 Alternative 3	125
4.7.3.3.1 Economics	125
4.7.3.3.2 Ceremonial and Subsistence Resources	126
4.7.3.3.3 Social Environment	126
4.7.3.4 Alternative 4	127
4.7.3.5 Alternative 5	127
4.7.3.5.1 Economics	127
4.7.3.5.2 Ceremonial and Subsistence Resources	127
4.7.3.5.3 Social Environment	128
4.7.3.6 Alternative 6	128
4.8 Social Environment	129
4.8.1 Introduction	129
4.8.2 Evaluation Criteria	129
4.8.2.1 Makah Tribal Members	129
4.8.2.2 Other Tribes	130
4.8.2.3 Other Individuals and Organizations	130
4.8.3 Evaluation of Alternatives	131
4.8.3.1 Alternative 1	133
4.8.3.2 Alternative 2	133
4.8.3.3 Alternative 3	134
4.8.3.4 Alternative 4	134
4.8.3.5 Alternative 5	134
4.8.3.6 Alternative 6	135
4.9 Cultural Resources	135
4.10 Ceremonial and Subsistence Resources	137
4.10.1 Introduction	137
4.10.2 Evaluation Criteria	138
4.10.2.1 Subsistence Use	138
4.10.2.2 Traditional Knowledge and Activities	138
4.10.2.3 Spiritual Connection to Whale hunting	139
4.10.2.4 Cultural Identity	140
4.10.3 Evaluation of Alternatives	141

TABLE OF CONTENTS (CONTINUED)

4.10.3.1 Alternative 1	141
4.10.3.2 Alternative 2	142
4.10.3.2.1 Limits on Whale Hunting	143
4.10.3.2.2 Opportunity to Resume Whale Hunting	145
4.10.3.3 Alternative 3	148
4.10.3.3.1 Limits on Whale Hunting	148
4.10.3.3.2 Opportunity to Resume Whale Hunting	149
4.10.3.4 Alternative 4	152
4.10.3.4.1 Limits on Whale Hunting	152
4.10.3.4.2 Opportunity to Resume Whale Hunting	153
4.10.3.5 Alternative 5	155
4.10.3.5.1 Limits on Whale Hunting	155
4.10.3.5.2 Opportunity to Resume Whale Hunting	156
4.10.3.6 Alternative 6	158
4.10.3.6.1 Limits on Whale Hunting	158
4.10.3.6.2 Opportunity to Resume Whale Hunting	159
4.11 Noise	159
4.11.1 Introduction.....	159
4.11.2 Evaluation Criteria	160
4.11.2.1 Noise Generated by Hunt-related Activities.....	160
4.11.2.2 Noise Levels at Receiving Properties.....	161
4.11.3 Evaluation of Alternatives	163
4.11.3.1 Alternative 1	164
4.11.3.2 Alternative 2	164
4.11.3.3 Alternative 3	164
4.11.3.4 Alternative 4	165
4.11.3.5 Alternative 5	165
4.11.3.6 Alternative 6	166
4.12 Aesthetics	166
4.12.1 Introduction.....	166
4.12.2 Evaluation Criteria	167
4.12.2.1 On-scene Observers.....	167
4.12.2.2 Media Viewers	168
4.12.3 Evaluation of Alternatives	169
4.12.3.1 Alternative 1	169
4.12.3.2 Alternative 2	169
4.12.3.3 Alternative 3	170
4.12.3.4 Alternative 4	170
4.12.3.5 Alternative 5	171
4.12.3.6 Alternative 6	172
4.13 Transportation	172
4.13.1 Introduction.....	172
4.13.2 Evaluation Criteria	172
4.13.2.1 Highway Traffic	173
4.13.2.2 Marine Traffic	174
4.13.2.3 Air Traffic	175
4.13.3 Evaluation of Alternatives	175
4.13.3.1 Alternative 1	176
4.13.3.2 Alternative 2	176
4.13.3.3 Alternative 3	177

TABLE OF CONTENTS (CONTINUED)

4.13.3.4 Alternative 4	177
4.13.3.5 Alternative 5	178
4.13.3.6 Alternative 6	178
4.14 Public Services.....	179
4.14.1 Introduction.....	179
4.14.2 Evaluation Criteria	179
4.14.2.1 Law Enforcement	179
4.14.2.2 Medical Facilities	181
4.14.3 Evaluation of Alternatives	181
4.14.3.1 Alternative 1	182
4.14.3.2 Alternative 2	182
4.14.3.3 Alternative 3	183
4.14.3.4 Alternative 4	184
4.14.3.5 Alternative 5	184
4.14.3.6 Alternative 6	184
4.15 Public Safety	185
4.15.1 Introduction.....	185
4.15.2 Evaluation Criteria	185
4.15.2.1 Injury from Weapons.....	186
4.15.2.2 Injury from Boating Accidents.....	187
4.15.2.3 Injury from Land-based Protest Activities	189
4.15.3 Evaluation of Alternatives	190
4.15.3.1 Alternative 1	191
4.15.3.2 Alternative 2	191
4.15.3.3 Alternative 3	191
4.15.3.4 Alternative 4	192
4.15.3.5 Alternative 5	192
4.15.3.6 Alternative 6	193
4.16 Human Health	193
4.16.1 Introduction.....	193
4.16.2 Evaluation Criteria	194
4.16.2.1 Nutritional Benefits	194
4.16.2.2 Environmental Contaminants	195
4.16.2.3 Exposure to Food-Borne Pathogens	195
4.16.3 Evaluation of Alternatives	196
4.16.3.1 Alternative 1	196
4.16.3.2 Alternatives 2, 3, 4, 5, and 6.....	196
4.17 National and International Regulatory Environment	197
4.17.1 Introduction.....	197
4.17.2 Evaluation Criteria	197
4.17.2.1 Marine Mammals Nationally.....	197
4.17.2.1.1 Increased Take of Marine Mammals by Non-Indians	198
4.17.2.1.2 Increased Take of Marine Mammals by Indian Tribes.....	198
4.17.2.1.3 Increasing Aboriginal Subsistence Whaling and Harvest of Whales	199
4.17.2.2 Worldwide Whaling	199
4.17.2.3 Indigenous People Worldwide	205
4.17.3 Evaluation of Alternatives	205
4.17.3.1 Alternative 1	206
4.17.3.2 Alternatives 2 through 6.....	206

List of Tables

Table 4-1. Primary Differences Among Alternatives, and Associated Assumptions for Analysis	3
Table 4-2. Number of PCFA, ORSVI and Makah U&A Whales that May Be Killed under each Alternative (Maximum and Likely).....	35
Table 4-3. Estimated Costs of Enforcement-related Activities and Resources	119

List of Figures

Figure 4-1. Trend Analysis for Commercial Harvest before and after 1996.....	203
Figure 4-2. Trend Analysis for Scientific Whaling before and after 1996.....	203
Figure 4-3. Trend Analysis for Aboriginal Subsistence Whaling before and after 1996	204

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This chapter examines the potential direct and indirect effects of the six alternatives on each of the resources considered in this EIS. Direct effects are those that are caused by the action and occur at the same time and place, while indirect effects are those that are caused by the action but occur later in time and are reasonably foreseeable. Both adverse and beneficial effects are considered.

Chapter 2 described the No-action Alternative and five action alternatives and Chapter 3 described the current condition of the resources that may be affected by the alternatives. The present Chapter evaluates the direct and indirect effects each alternative is likely to have on each resource. Chapter 5 will address any cumulative effects that might occur when the direct and indirect effects of any of the alternatives are considered in the context of past actions, other contemporaneous actions, or reasonably foreseeable future actions.

For each resource, Chapter 3 included a regulatory overview, providing information about how that resource is managed, which informs the criteria presented in this Chapter for evaluating effects of the alternatives. This information was provided as background and it is not the purpose of this EIS to reach conclusions about whether the alternatives might meet all regulatory requirements. Rather, the focus of this EIS is to inform decisions regarding whether to waive the MMPA prohibition on take or to authorize whaling under the WCA. Once NMFS selects an action, it will make any necessary determinations required by applicable laws in accord with the processes and procedures of those laws.

The five action alternatives examined in this EIS vary in the total number of whales that may be harvested, the number of identified whales from the PCFA survey area that may be harvested, and the timing and location of hunting. These principal components (described in Section 2.2, Alternative Development Process) are likely to influence the time of year the Tribe would hunt, the number of days the Tribe would hunt, and the probability that the Tribe would harvest the total number of whales allowed. Also relevant to the analysis of effects is the number of whales subjected to harpoon attempts, the number of whales approached by Makah vessels, and the number of rifle shots or grenade explosions under each alternative. Table 4-1 contains the same information regarding these principal components as that contained in Table 2-1, Primary Differences Among Alternatives, and also includes additional estimates of (1) the number of

approaches and unsuccessful harpoon attempts (2) the number of rifle shots or grenade explosions, and (3) the number of days of hunting that would occur if a hunt were approved under any of the action alternatives. The estimate of when and how often the Tribe would hunt under any alternative is also relevant to analyzing the effects of other activities associated with hunting, such as the operation of vessels and aircraft, and protest and media-related activities.

The following discussion explains the basis for the assumptions about the most likely time hunting would occur, the number of days of hunting, the number of whales approached and the number subjected to harpoon attempts. It is impossible to predict any of these parameters with certainty, but including them in the analysis helps make the analysis – and the comparison among alternatives – more concrete and specific.

TABLE 4-1. PRIMARY DIFFERENCES AMONG ALTERNATIVES, AND ASSOCIATED ASSUMPTIONS FOR ANALYSIS

WHALE HUNTING COMPONENTS		ALTERNATIVES					
		1 NO-ACTION	2 PROPOSED ACTION	3 HUNT OUTSIDE STRAIT, NO TIMING RESTRICTIONS, NO IDENTIFIED WHALE LIMITS	4 SANCTUARY AND NATIONAL WILDLIFE REFUGE RESOURCE ALTERNATIVE	5 HUNT OUTSIDE STRAIT, NO TIMING RESTRICTIONS, MORE RESTRICTIVE NUMBERS, NO IDENTIFIED WHALE LIMITS	6 HUNT ANYWHERE IN U&A, NO TIMING RESTRICTIONS, NO IDENTIFIED WHALE LIMITS
Hunt timing		Not authorized	December 1 through May 31	January 1 through December 31	Same as Alternative 2	Same as Alternative 3	Same as Alternatives 3, 5
Hunt area		None	U&A west of Bonilla-Tatoosh line ¹	Same as Alternative 2	Same as Alternatives 2, 3, except would prohibit hunting within 200 yards of rocks and islands at all times	Same as Alternatives 2, 3	Entire U&A
Maximum limit for harvested, struck, and struck and lost whales	Annual	0	Up to 5 harvested, 7 struck, and 3 struck and lost	Same as Alternative 2	Same as Alternatives 2, 3	Up to 2 harvested, 3 struck, and 1 struck and lost	Same as Alternatives 2, 3, 4
	Five-year period	0	Up to 20 harvested, 35 struck, and 15 struck and lost	Same as Alternative 2	Same as Alternatives 2, 3	Up to 10 harvested, 15 struck, and 5 struck and lost	Same as Alternatives 2, 3, 4
Additional limits for identified whales		Not applicable	Yes	No	Same as Alternative 2	Same as Alternative 3	Same as Alternatives 3, 5
Analysis Assumptions, Based on the Above							
Assumed number of whales with harpoon attempts and approaches	Annual	0	Up to 28 exposed to harpoon attempts, 140 approached	Same as Alternative 2	Same as Alternatives 2, 3	12 exposed to harpoon attempts, 60 approached	Same as Alternatives 2, 3, 4
	Five-year period	0	Up to 140 exposed to harpoon attempts, 700 approached	Same as Alternative 2	Same as Alternatives 2, 3	60 exposed to harpoon attempts, 300 approached	Same as Alternatives 2, 3, 4
Assumed number of rifle shots		0	28	Same as Alternative 2	Same as Alternatives 2, 3	12	Same as Alternatives 2, 3, 4
Assumed number of grenade explosions		0	21	Same as Alternative 2	Same as Alternatives 2, 3	9	Same as Alternatives 2, 3, 4
Assumed number of hunting days		0	7-30 days per year	40 days	Same as Alternative 2	20 days	Same as Alternative 3

1 U&A west of Bonilla-Tatoosh line is the Makah Tribe's U&A fishing grounds off the coast of Washington and west of the Bonilla-Tatoosh line, excluding the Strait of Juan de Fuca. See Figure 1-1.

2 The entire Makah Tribe U&A includes the Strait of Juan de Fuca and waters off the coast of Washington, as adjudicated by *United States v. Washington* (1974 and 1985). See Figure 1-1.

4.1.1 Alternative 1

Under Alternative 1, NMFS would not authorize a Makah gray whale hunt. The current annual and five-year IWC catch limits set by the IWC for ENP gray whales are based on a joint request of the Russian Federation and the United States. The catch limit set by the IWC is 620 whales over the five-year period (2008 through 2012), with no more than 140 whales taken in any one year. A bilateral agreement between the Russian Federation and the United States, renewed each year, allocates those totals between the two countries. If NMFS does not authorize a Makah gray whale hunt, or authorizes a hunt for fewer whales than provided in the bilateral agreement, the Russian Federation could authorize the Chukotka Natives to take any of the unused catch limit. Because of this possibility, although the alternatives considered in this EIS may result in the Makah Tribe harvesting different levels of ENP gray whales, the overall harvest is likely to be the same regardless of the alternative selected (that is, the total allowed under the IWC schedule).

Beyond 2012, if NMFS did not authorize a Makah gray whale hunt, it is reasonable to expect that the Russian Federation would request a renewal of the ENP gray whale catch limit of at least 620 whales over five years, consistent with their representations at the 2007 IWC meeting that their needs are more than currently provided for under the existing allocation (IWC 2007c).

4.1.2 Alternative 2

The Makah Tribe proposed Alternative 2, which would allow harvest of four whales per year on average (with a maximum of five in any one year) and up to 20 whales in a five-year period. Hunting would be allowed in the Tribe's U&A outside the Strait of Juan de Fuca from December 1 to May 31. Hunting would not be allowed within 200 yards of Tatoosh Island and White Rock.

The number of whales that could be struck would be limited to no more than seven in any calendar year and no more than 35 over the five-year period, while the number of whales struck and lost would be limited to three annually and 15 over the five-year period. The maximum number of whales struck in any year would be seven, and the maximum number struck and lost would be three. Assuming struck and lost whales are killed, the maximum number of whales that might be killed each year under Alternative 2 would be seven (that is, the seven-strike limit would be the limiting number) (Table 4-1, Primary Differences among Alternatives, and Associated Assumptions for Analysis).

The hunting season under this alternative could occur during periods of cold weather, storms, and rough seas from December through March. These months have significantly more rain and slightly more fog (both of which affect visibility) than April and May (Table 3-42). Also, as

described in Section 3.15.3.2.2 (Description of Weather and Sea Conditions in the Project Area), wave heights show a wider range of variability during the months of December through March, when peak wave heights may exceed 30 feet (compared to peak wave heights near 20 feet during April and May; Figure 3-14). April and May are also slightly warmer than the winter months and less windy. For example, gale-force winds occur six times more frequently in January, compared to April (Table 3-42).

Southbound migrating whales have been observed in the project area in December, and Rugh et al. (2001) estimated January 5 as the peak of the southward migration at Tatoosh Island (Section 3.4.3.1.4, Seasonal Migrations). While gray whales are present in the project area during December and January, they are likely traveling more quickly and farther offshore than northbound migrants in the spring (Section 3.4.3.1.4, Seasonal Migrations). As a result, gray whales are likely to be less available for harvest from December through February than during March and April when the northward migration has begun.

The inclement weather and high seas of the winter months, combined with the greater availability and accessibility of whales in the project area in the spring, make it most probable that hunting under Alternative 2 would occur in April and May. This was the case during the 1999 and 2000 hunts, when NMFS authorized hunting under the WCA. The 1999 hunt began May 10, and the 2000 hunt began April 17. The Makah tribal Council did not issue any hunting permits during the winter of 1999/2000 because of unfavorable weather conditions. The Tribe's proposal includes the option of winter hunts, and it is possible that the Tribe could hunt during that time. Given the unfavorable weather and sea conditions during winter and early spring, the nature of the Makah hunting vessel (a canoe), and the Makah's recent history, it is reasonable to expect that most hunting under Alternative 2 would likely occur in April and May.

Not every day of April and May (a 61-day period) presents favorable hunting conditions. For example, the mean number of days with rain during these two months is 19 and 20, respectively, while for fog it is 9 and 10 days, respectively (Table 3-42). Extreme low temperatures in April can drop to 33 degrees F and as low as 37 degrees F in May (Table 3-38). In the spring of 1999, the Tribe first hunted on May 10 for 10 days. In spring 2000, the Tribe first hunted on April 17 for seven non-consecutive days. Authorizing a hunt consistent with Alternative 2 would likely result in fewer than 61 days of hunting. Given the limitations of weather and sea conditions even during April and May, it is reasonable to expect that implementation of Alternative 2 would result

in 7 to 30 days of hunting during April and May. Seven is the number of days the Tribe hunted in 2000, and 30 represents half the days available during the most likely months for hunting.

Given the limited number of actual hunting days available under Alternative 2, and based on whale hunting in the recent past, it is possible that the Tribe may not be able to harvest the average quota of four whales per year, at least initially. The 1999 hunt occurred over 10 days and resulted in the harvest of one whale. The 2000 hunt occurred over seven days and resulted in no harvest of whales. It is possible that interference by protesters decreased the effectiveness of the Makah hunters during 1999 and 2000. With experience, the Tribe is likely to become more proficient at locating and harvesting whales, but the realistic amount of time available for hunting under Alternative 2 may still prevent the Tribe from harvesting four gray whales in a year.

Under Alternative 2, the Tribe would cease hunting in any year if it killed a predetermined number of identified whales from the PCFA survey area, which it describes as an ‘allowable bycatch level.’ The Tribe proposes that this level be calculated using NMFS’ potential biological removal (PBR) methodology (Section 3.4.2.1.4, Defining and Calculating PBR), applied to annually updated minimum abundance¹ estimates of returning whales in the Oregon Southern Vancouver Island (ORSVI) survey area. The Tribe’s proposed method would result in an allowable bycatch level of 2.35 percent of the minimum estimated abundance of whales in the ORSVI survey area. The PBR method is described in greater detail in Section 3.4.2.1.4, Defining and Calculating PBR, and the Tribe’s proposal for applying it is described further in Appendix A. In particular, the Tribe proposes to calculate the allowable bycatch level based on the minimum estimated abundance of whales identified as returning to the ORSVI survey area², but apply it to the larger pool of whales identified in the PCFA survey area in any given year.³ Thus, the limit could be reached by removing whales that had never been seen in the Makah U&A and ORSVI, but had been seen elsewhere within the PCFA. The allowable by-catch level using the current minimum abundance estimate of 102 would be 2.4 whales (102 times 0.0235). This estimate would be rounded down to two whales.

¹ These estimates may lag by up to one year due to the time required to review survey annual data.

² As described in Section 3.4.3.2.1, Summer Range Distribution and Habitat Use, the abundance estimate is based on whales either observed returning, or predicted to return, to the ORSVI survey area, minus an estimated mortality rate. The abundance estimate is thus smaller than the number of all whales sighted in the ORSVI survey area, which includes whales that were only seen in one year and may not have returned.

³ As in Chapter 3, Affected Environment, Chapter 4 uses the terms “whales identified in the PCFA survey area” interchangeably with “PCFA whales.” This is also the case for ORSVI whales and Makah U&A whales. This terminology applies to whales identified in a survey area, even if they were only seen in that area in one year.

The Tribe proposes to apply the allowable bycatch level only to whales that are successfully landed and not to those that are struck and lost. Some proportion of struck and lost whales would, however, likely be whales identified from the PCFA, ORSVI, or Makah U&A survey areas. With an allowable bycatch level of 2 for PCFA whales and the restriction of 3 struck and lost, a maximum of 4 whales from the PCFA could be killed. This would happen if 2 whales from the PCFA were struck and lost before 2 whales from the PCFA were landed. This maximum number is based on the current minimum abundance estimate for ORSVI. The actual maximum would depend on the estimate for any given year, which would be adjusted as new data became available.

The previous discussion addresses the maximum number of PCFA whales that might be killed each year under Alternative 2. This analysis also considers a more likely number of identified whales that might be killed per year, based on their representation in the Makah U&A during the time the Makah propose to hunt (prior to June 1). From data collected before June 1 during 1998-2005, 17.9 percent of whales seen in the northern Washington coast survey area (coastal portion of the Makah U&A) prior to June 1 were whales identified in the PCFA survey area after June 1 (PCFA whales), 17.9 percent were also whales identified in the ORSVI survey area after June 1 (ORSVI whales), and 12.5 percent were whales identified in the Makah U&A after June 1 (Makah U&A whales) (Section 3.4.3.3.2, Winter Range Distribution and Habitat Use). If a total of seven whales are killed in a year under Alternative 2, the likely number of PCFA whales that would be killed in a year would be 1.25 (seven whales killed times 17.9 percent); the likely number of ORSVI whales would be 1.25 (seven whales killed times 17.9 percent); and the likely number of Makah U&A whales would be 0.875 (seven whales killed times 12.5 percent). These numbers are subsets of one another (the Makah U&A is contained in ORSVI, which is contained in PCFA; Figure 3-4) and should not be added together.

These more likely estimates are conservative because they are based on seven whales per year being killed. With the limit of three struck and lost, the maximum of seven whales struck (all assumed dead) can only occur if one of two situations occur:

- 1) two whales are struck and lost before four whales are killed and landed and then a final whale is struck and lost, or
- 2) two whales are struck and lost before five whales are killed and landed.

All other scenarios would result in fewer whales being killed. We have not attempted to develop probabilities for each scenario, but have instead used the conservative maximum of seven.

Based on its experience during the 1999 and 2000 hunts, the Tribe also estimates that, for every whale struck, there could be approximately four whales subjected to unsuccessful harpoon attempts and 10 whales approached. The Tribe further estimates average pod size to be two whales. Relying on these estimates, the Tribe anticipates that no more than 28 gray whales would be subject to unsuccessful harpoon attempts in any calendar year (four unsuccessful attempts for each of seven struck whales), and no more than 140 whales would be subject to approaches with no harpoon attempt in any calendar year (10 whales approached for each of seven whales struck, times two in a pod). Expanding these estimates over the five-year period, NMFS further estimates that the number of whales subjected to harpoon attempts over the five-year period could be as high as 140 (28 per year times five years), and the number of whales approached could be as high as 700 (140 per year times five years). These estimates are likely conservative, given that the estimate of seven strikes is high, and that the Tribe may not be able to harvest four whales under Alternative 2.

The Tribe proposes to use a toggle-point harpoon to strike and secure whales and a .50 caliber rifle to kill whales that have been struck and secured. This EIS also examines the alternative of using explosive grenades to strike whales, kill whales, or both. Based on the Tribe's experience with the 1999 hunt, in which four shots were fired to kill the whale that was harvested, NMFS estimates that there would be four rifle shots for each struck whale.⁴ This would result in a maximum of 28 rifle shots annually (four shots times seven struck whales) and 140 over a five-year period (28 shots annually times five years). Based on the experience of other aboriginal whale hunters (Section 3.4.3.5.4, Method of Killing and Time to Death), NMFS estimates that, if the Tribe used explosive projectiles to strike and kill whales, a maximum of three grenades per whale would be detonated. This would result in a maximum of 21 grenade explosions annually (three explosions times seven struck whales) and 105 over a five-year period (21 explosions per year times five years).

4.1.3 Alternative 3

Alternative 3 would allow the same numbers of whales harvested, struck, and struck and lost, as well as the same hunting area, as Alternative 2. This alternative would include no limitations

⁴ At least 16 shots were fired during the unauthorized gray whale hunt in 2007 (Section 1.4.2, Summary of Recent Makah Whaling – 1998 through 2007). Because the 2007 hunt followed none of the procedures (Section 1.4.2 Summary of Recent Makah Whaling – 1998 through 2007) recommended by the Tribe, that precedent is not useful for determining what would happen in a future authorized hunt.

based on the harvest of PCFA whales or on the timing of the hunt and would not limit hunting around any rocks or islands.

Under Alternative 3, hunting would be allowed year-round. This would give the Tribe the option to hunt during the summer months when weather conditions would be more conducive than during the winter months. (The Tribe did not hunt during the summer months in 1999 and 2000, but this experience is not indicative of whether they would be likely to hunt during summer months in the future, if such a hunt were authorized. In 1999, the Tribe stopped hunting after its first successful hunt on May 17. In 2000, the Tribe had intended to continue hunting in June after its unsuccessful attempts in May, but canceled plans for hunting after the Ninth Circuit issued its decision in *Metcalf v. Daley* (2000).)

The lack of a limit on the harvest of PCFA whales would also affect the months during which the Tribe might hunt. Whales in the Tribe's U&A after June 1 are, by definition, PCFA whales, because the survey area encompasses the Tribe's U&A, and June 1 marks the beginning of the summer feeding period. Removing the limit on the number of PCFA whales that may be harvested would remove a constraint that might have otherwise caused the Tribe to avoid hunting during the summer period. Because the Tribe could hunt year round and there would be no limit on PCFA whales, under this alternative all seven whales that could be killed each year (as determined by the seven-whale strike limit) could be PCFA whales.

Implementing Alternative 3 would, on average, result in as many 40 days of hunting year round. Most hunting would likely occur from April through September each year. The Tribe's successful hunt in 1999 occurred on the tenth day of hunting. Based on the ratio of days of hunting to whales harvested, it is reasonable to expect that the harvest of twenty whales over five years would result in an average of 40 days of hunting per year. It is also reasonable to expect that hunting would be spread across the season, since butchering and processing the whale and conducting community ceremonies and celebrations in 1999 were significant undertakings (Table 3-29). Based on the year round hunting season and lack of limits on PCFA whales under Alternative 3, it is also likely that the Tribe would have a greater opportunity and, therefore, a greater likelihood of harvesting 20 whales over five years than under Alternative 2.

As under Alternative 2, the maximum allowable number of whales struck in a given year would be seven, and the maximum allowable number struck and lost would be three. The Tribe's and NMFS' estimates for the number of whales exposed to unsuccessful harpoon attempts and approaches would be the same as under Alternative 2. NMFS' estimates of the number of rifle

shots and grenade explosions would also be the same as under Alternative 2. It is possible that fewer rifle shots or grenade explosions would be necessary to kill whales under Alternative 3 because of the opportunity to hunt during the summer, when better weather and sea conditions might improve hunter accuracy. Due to the uncertainty associated with such a prediction, however, the analysis makes the conservative assumption that there would be the same number of weapons discharges regardless of the hunting season.

Because Alternative 3 allows for a year-round hunting season that includes better weather conditions and does not place a limit on PCFA whales, it is more likely under Alternative 3 that the Tribe would reach the strike limit than under Alternative 2. It is also more likely that the estimated numbers of unsuccessful harpoon attempts and approaches would occur, as well as the estimated numbers of rifle shots and grenade explosions.

4.1.4 Alternative 4

Alternative 4 has the same restrictions as Alternative 2, but with the additional requirement that hunters maintain a minimum distance of 200 yards from all rocks and islands in the project area. Given the size of the area in which hunting can occur, it is reasonable to expect that the number of whales harvested, struck, struck and lost, subject to harpoon attempts, and subject to approaches would be the same as under Alternative 2, and that there would be the same number of rifle shots or grenade explosions. It is also reasonable to expect that the same number of PCFA whales could be killed as under Alternative 2. As with Alternative 2, the limitations on the hunting season and the harvest of identified whales may make it difficult to harvest the full number of whales allowed.

4.1.5 Alternative 5

Under Alternative 5, the Tribe could hunt at any time during the year within the coastal portion of their U&A, but the limits on the numbers of whales would be lower. Under Alternative 5, the Tribe could harvest two whales, strike three whales, and strike and lose one whale. There would be no limit on the harvest of PCFA whales. Hunting would not be prohibited around any rocks or islands. Given the opportunity to hunt year round and the lower harvest limit, it is reasonable to expect the Tribe would be able to harvest the full number of whales allowed under this alternative. Under Alternative 3, all three whales potentially killed could be PCFA whales. Because the harvest of one whale in 1999 occurred after 10 days of hunting, it is reasonable to expect there would be 20 days of hunting under Alternative 5. Hunting might occur year round but is more likely to occur from April through September.

Applying the Tribe's estimates of unsuccessful harpoon attempts and approaches to the lower number of whales allowed under this alternative, there would potentially be 12 whales subjected to unsuccessful harpoon attempts (four unsuccessful attempts for each of three whales struck) and 60 whales approached (10 whales approached for each of three whales struck, times two whales in a pod) each year. Over the five-year period, there would be 60 whales subjected to unsuccessful harpoon attempts (12 harpoon attempts per year times five years) and 300 whales approached (60 whales approached per year times five years). Also using the calculations described for Alternative 2, there would potentially be 12 rifle shots annually (60 over the five-year period) or nine grenade explosions annually (45 over the five-year period). Given the lower number of whales, and the opportunity to distribute hunting throughout the year, NMFS assumes the Tribe would likely harvest the maximum number of whales allowed under Alternative 5.

4.1.6 Alternative 6

Conditions under Alternative 6 would be the same as under Alternative 3, except that hunting would be allowed within the Strait of Juan de Fuca. Adding this area to the hunt would probably not change the seasons during which hunting would occur or the numbers of gray whales affected relative to those expected under Alternative 3.

4.2 Water Quality

4.2.1 Introduction

This section addresses the potential for the alternatives to affect water quality in the project area, including marine water and groundwater. No hunt-related activities would take place above the high-tide line, so there is no potential to affect surface water quality, including streams and tributaries in Water Resource Inventory Areas 19 and 20. Two issues pertain to the potential effects on water quality of whale hunt-related activities. First is the potential for spills of vessel fuel or other contaminants due to collisions or other incidents involving marine vessels associated with the hunt, including observers and protesters. Second is the potential for groundwater contamination due to leaks of fluids from whale carcasses or tissues that may be disposed of in a landfill. The method for disposing of any unused portions of harvested whales could include towing out to sea or disposal in a landfill. This analysis addresses the effects of disposal in the Neah Bay landfill or a transfer station at the same location. Effects of disposal at sea are addressed in Section 4.3, Marine Habitat and Species.

None of the alternatives has the potential to affect drinking water quality, because no hunt-related activities would have the potential to affect current or future drinking water sources in the project

area. The potential effects on water quality for the marine aquatic ecosystem (other than effects that might be related to spills, which are discussed in Section 4.2.2.1, below) would be negligible because the amount and longevity of any toxins would be minimal. Similarly, there would be no potential for any long-term effects on the management of shellfish beds in the project area because any contaminants found in whales would have no potential to affect shellfish management. The following sections discuss these points in greater detail.

4.2.1.1 Drinking Water Sources

As described in Section 3.2.3.1, Drinking Water Sources, all drinking water in the project area comes from surface water sources. Limited availability of suitable drinking water led to a moratorium on new residential and commercial building on the reservation in 2000. Under the action alternatives, activities related to hunting and butchering whales would occur in marine or intertidal areas and therefore would not expose any current drinking water sources to whale-derived contaminants. Of the three potential future water sources identified in Section 3.2.3.1, Drinking Water Sources, two are surface water and would likewise be unaffected. The third option is a desalinization plant at the outlet of the Wa'atch River. The mechanism used to treat the water at such a plant (reverse osmosis) would produce water that meets federal standards for drinking water even if contaminants are present at the water collection site (for example, reverse osmosis is used to polish secondary effluent from wastewater treatment plants, rendering it suitable for use as drinking water). There is no potential, therefore, for whale-derived contaminants to affect any of the potential future drinking water sources that have been identified in the project area. Disposal of a whale carcass or carcasses in the Neah Bay landfill (or temporary storage at a transfer station, following closure of the landfill) would have the potential to affect only groundwater, so no drinking water sources could be affected. The potential effects on groundwater are discussed in Section 4.2.2.2, below.

4.2.1.2 Marine Waters

In marine and intertidal waters, whale hunting and butchering under the action alternatives would produce two broad classes of potential contaminants: organic material (e.g., blood, lymph, digestive tract contents) and bioaccumulated contaminants (e.g., PCBs, DDTs). During a successful whale hunt, the initial strike and kill would be expected to release substantial amounts of organic matter, which would continue to leak out of the carcass as it was hauled to the beach. The likely effects of this material would be attraction of predators to the blood scent, avoidance of blood by common prey fish species, and secondary effects of decreased dissolved oxygen associated with the breakdown of the organic material by marine bacteria. These effects would

extend over a relatively short period (likely several hours) and would have a very low probability of affecting the marine environment in any detectable manner for more than a day or two.

Any bioaccumulated contaminants in a whale carcass would be associated primarily with whale blubber, most of which would be removed and used for subsistence or ceremonial purposes. As described in Section 1.4.2 (Summary of Recent Makah Whaling – 1998 through 2007), following the successful hunt in 1999, Makah tribal members removed almost all edible portions of the meat and blubber from the whale within approximately 12 hours of towing the whale to shore. Under the action alternatives, if hunting and butchering were to proceed as they did in 1999, there would be little opportunity for contaminant release into the environment through decomposition while a whale is on the beach because the portions with the highest concentrations of contaminants (primarily blubber) would be removed in approximately 12 hours. If the unused portions of the carcass were towed out to sea for post-harvest disposal, some bioaccumulated contaminants might be released into the marine ecosystem. The amount of toxins released from a flensed carcass, however, would be substantially less than the amount from a whale that died and decomposed entirely at sea and, therefore, the expected impact to the marine environment would be negligible. Given the size of the ocean area in which carcasses would be disposed, the removal of most of the blubber from carcasses prior to disposal, and the likely death and decomposition of some whales in the area naturally, the expected impact to the marine environment from carcass disposal would be negligible in any given year or over a period of years.

4.2.1.3 Shellfish Beds

As noted in Section 3.2.3.2 (Shellfish), shellfish beds can be closed to harvest due to the presence of human fecal coliforms or toxic algal blooms. Fecal coliforms are not harmful to shellfish, but may be used to indicate the presence of sewage-borne organisms (pathogens) that cause disease in humans. The release of fecal coliforms into intertidal waters, therefore, would have the potential to affect aquaculture or subsistence harvest of shellfish only if the Washington Department of Health or Makah Fisheries chose to close a beach to harvest as a precautionary measure. Under the action alternatives, butchering a whale on the beach might release fecal coliforms into the intertidal area, where filter-feeding shellfish could accumulate them. Fecal coliforms from a whale, however, do not indicate an elevated risk of the presence of human pathogens. In addition, fecal coliforms are freshwater organisms that typically start to die off within 12 to 48 hours of exposure to marine water.

Regarding toxic algal blooms, research in Puget Sound has not established a statistically significant link between natural or human activities and toxic algal blooms. There is no evidence to suggest that the death of a whale (an ongoing natural process) would affect the probability of a toxic algal bloom occurring, hence requiring a shellfish harvest closure. Based on the above, it is improbable that whale hunt-related activities under the action alternatives would lead to long-term closures of shellfish beds. If, through independent monitoring, the Washington Department of Health or Makah Fisheries found elevated levels of fecal coliforms and closed a beach (which would represent a cautious response to the presence of fecal coliforms in a whale carcass on the beach), the closure could last a few days.

4.2.2 Evaluation Criteria

Two criteria were used to determine the potential for effects on water quality under the alternatives. The first is the likelihood of an increase in the risk associated with fuel spills or the introduction of other toxic substances into the environment. The second is the likelihood of an increase in the risk associated with leakage from whales disposed of in the Neah Bay landfill or transfer facility.

4.2.2.1 Spills

Spills could result from collisions between vessels, equipment failure, or accidental release (e.g., while fueling, or if a vessel capsized). No spills were reported from the 1999 and 2000 hunts, despite a collision between a protest vessel and a law enforcement vessel. If any spills occurred, effects would be minor and short-lived, even if they occurred in a semi-contained area such as Neah Bay. The volume of fuel or other contaminants carried by any hunt-related vessels would be miniscule compared to the volume of water in any potential receiving waters (e.g., Neah Bay, the Strait of Juan de Fuca, and the Pacific Ocean). A spill of fuel or similar fluids would not mix with water, but would form a thin layer on the surface, continually spreading while it evaporated, broke apart, was hydrolyzed by ultraviolet light, and was decomposed by bacteria. This would probably occur over hours or days. The nearshore portion of the Makah U&A corresponds largely with the area to be avoided for the OCNMS, which was designated with the intention of reducing the potential for catastrophic oil spills from large ships (greater than 1,600 gross tons) carrying large amounts of bunker fuel. Any vessels involved in whale hunts, protest activities, or law enforcement would be substantially smaller than that, so any spills in the Makah U&A would not violate the intention of the area to be avoided.

The risk of spills would depend primarily on the amount of hunt-related vessel traffic in the project area (including Makah vessels and associated protest, media, and law enforcement vessels). Vessels and aircraft associated with each hunt would likely be similar to those associated with the previous hunts, described in Section 3.11.3.2.1, Atmospheric Noise. It is possible that the amount of vessel traffic associated with each hunting expedition (including observation, protests, law enforcement, and media coverage) would vary under the action alternatives. For example, alternatives that allow year-round hunting could attract more observers, protestors or media coverage because of better weather conditions. Alternatives that allow more hunts might attract less public interest over time and therefore less media coverage. Because of the difficulty of predicting such variations, and how they might affect the precise amount of vessel traffic, this analysis assumes that each hunting expedition would be accompanied by the same amount of vessel traffic.

The risk of spills might also depend on the hunting season. Hunts conducted during the winter months might face a higher risk of encountering unanticipated storms that could cause vessels to capsize, as compared with hunts conducted during the summer. Thus the risk of spills is likely to depend on the number of days of hunting and the season when hunting occurs. Under any of the action alternatives, the risk from oil spills could be addressed by modifying or supplementing existing spill response plans (Ecology 2003a)(Section 3.2.3.3, Spill Prevention).

4.2.2.2 Groundwater Contamination

As noted above, the method of disposing of any unused portions of harvested whales would either be disposal at sea or in the Neah Bay landfill. The method would likely depend on the location where the whale was landed and butchered. Under the action alternatives, if any unused portions of whale carcasses were placed in the Neah Bay landfill or transfer facility, the potential would exist for contaminants from the carcass to leak through the liner material and mix with groundwater. The risk of groundwater contamination would depend on (1) the concentration of water-soluble contaminants in the unused portions of the carcass, (2) the amount of tissue delivered to the facility, and (3) the occurrence of flaws in the landfill liner. Groundwater contamination is typically detected through monitoring near landfills, but this has not occurred in Neah Bay because that landfill receives approximately 3 tons of solid waste per day (Parametrix 2007), and EPA does not require groundwater monitoring for small landfills that receive less than 20 tons of solid waste per day (EPA 2007). In addition, groundwater does not serve as a drinking water source in the project area. The greatest concentrations of contaminants occur in blubber, most of which would be removed and used for subsistence or ceremonial purposes. Contaminants

in any residual blubber on a carcass would likely be hydrophobic substances such as PCBs and DDT. If any such substances leaked from a landfill, they would adhere to soils and would have a very low probability of reaching groundwater in quantities likely to be toxic.

It is not possible to predict in advance the proportion of harvested whale carcasses that would be disposed of in the landfill, the amount of material on any of those carcasses, or the concentration of contaminants in any of those carcasses. Therefore, the most reliable indicator of the potential risk of groundwater contamination is the number of whales that would be harvested under a particular alternative. This number would depend primarily on harvest limits. In addition, restrictions on hunting seasons and on the harvest of identified whales might affect the Tribe's ability to harvest the full limit allowed.

4.2.3 Evaluation of Alternatives

The following sections consider the potential for the alternatives to pose risks to water quality in the project area. For each alternative, the discussion addresses the potential number of occasions on which hunt-related activity may pose a risk of spills, and the potential amount of waste material from harvested whales that may pose a risk of groundwater contamination.

The lowest risk of adverse effects on water quality would occur under the No-action Alternative, because no whale hunts would be permitted. The risk under the action alternatives would increase, with the amount of increase depending on the number of days of hunting, the hunting season, and the number of whales harvested. Table 4-1 identifies the number of likely days of hunting and the number of whales likely to be harvested under each alternative, and Section 4.1, Introduction, describes the rationale for those numbers.

Compared to the No-action Alternative, the risk of spills would increase under Alternatives 2 and 4 due to increases in vessel traffic over 7 to 30 days and due to the fact that hunting would be limited to the winter and spring periods, when vessels might encounter unanticipated storms and capsize. The risk would increase further under Alternatives 3 and 6 due to an increase in the number of days of hunting (from 7-30 days to 40 days). On the other hand, because Alternatives 3 and 6 allow hunting year-round, the risk of vessels capsizing in unanticipated storms would be reduced compared to Alternatives 2 and 4.

Under Alternative 5, year-round hunting would be allowed. Thus, while Alternative 5 would result in about the same number of hunting days as Alternatives 2 and 4 (20 versus 7 to 30), it would carry a lower risk of vessels capsizing and thus a lower risk of spills. Because Alternative

5 would include fewer hunting expeditions than Alternatives 3 and 6, and all would allow year-round hunting, Alternative 5 would carry a lower risk of spills than Alternatives 3 and 6.

As described above, the most reliable indicator of the potential risk of groundwater contamination is the number of whales that would be harvested under a particular alternative. The No-action Alternative carries the least risk of groundwater contamination because no whales would be delivered to the landfill or transfer station beyond those that might be delivered under current conditions. Under Alternative 5, the number of whale carcasses could increase, relative to the No-action Alternative, by as many as two. Under Alternatives 2 and 4, the increase would be as many as four whales annually, on average, with a maximum of five whales in any one year, but limitations on the hunt might make it difficult for the Tribe to harvest the full number. Under Alternatives 3 and 6, the harvest limits would be the same as under Alternatives 2 and 4, but there is a greater likelihood the Tribe could harvest the full number because of the lack of restrictions on hunting seasons and on the harvest of identified whales.

4.2.3.1 Alternative 1

Under the No-action Alternative, no Makah whale hunt would be authorized and no whale hunting or associated activities (such as vessel traffic, protests, whale butchering and carcass disposal) would be expected to occur in the project area. The amount of marine vessel traffic in the project area would not differ from current levels, and the risk of spills would not change from current levels. With the possible exception of waste material from drift whales (which could be towed out to sea or disposed of on land), no whale tissue or carcasses would be delivered to the Neah Bay landfill or transfer station. If any leakage occurred at the Neah Bay landfill site, the effluent would not be different from current conditions, and the risk of groundwater contamination would remain at current levels.

4.2.3.2 Alternative 2

Under Alternative 2, vessel traffic associated with a hunt would be expected to occur on a total of 7 to 30 days, primarily during April and May. Compared to the No-action Alternative (under which there would be no hunt-related vessel traffic), this would result in an increased risk of fuels or other contaminants being released into the marine environment. As described above, because the vessels associated with hunting would be small, any spills would be rapidly diluted to undetectable concentrations in the Pacific Ocean or local bays. Non-water-soluble contaminants such as petroleum-based fuels would disperse and break down in hours or days. Also, risks due to

spills could be addressed by modifying or supplementing existing spill response plans (Ecology 2003a)(Section 3.2.3.3, Spill Prevention).

Under Alternative 2, the limit on the number of harvested whales would be an average of four whales per year over five years, with no more than five in any one year. It is not possible to predict the proportion of carcasses from those harvested whales that may be disposed of in the landfill or transfer station, but the maximum number would correspond to the harvest limits (an average of four per year and no more than five in any single year). If any leakage occurred at the landfill, the effluent might contain contaminants, which could enter groundwater. For the reasons described above, there would be no expected effect on drinking water sources.

The hunting season under Alternative 2 would be restricted to the period of December 1 to May 31, which would likely limit the number of days that tribal members could hunt, thus reducing their chances of harvesting the average of four whales per year. Limits on the number of identified whales that may be harvested could also reduce the chances of harvesting the average of four whales per year.

4.2.3.3 Alternative 3

Alternative 3 would include the same limits on the number of whales harvested as Alternative 2, but would impose no restrictions on the hunting season or on harvest of identified whales. Under Alternative 3, vessel traffic associated with a hunt would be expected to occur on a total of 40 days. Compared to the No-action Alternative (under which there would be no hunt-related vessel traffic), this would result in an increased risk of fuels or other contaminants being released into the marine environment.

Compared to Alternative 2, there would also be a greater risk of fuels or other contaminants being released into the marine environment because there would be more days of hunt-related vessel traffic (40 days compared to 7-30 days). The increased risk under Alternative 3 versus Alternative 2 would be reduced to some extent by the fact that hunting under Alternative 3 could occur year round (including during seasons with calmer seas), reducing the potential for vessels capsizing in unexpected storms. As described above, because the vessels associated with hunting would be small, any spills would be rapidly diluted to undetectable concentrations in the Pacific Ocean or local bays. Non-water-soluble contaminants such as petroleum-based fuels would disperse and break down in hours or days. Also, risks due to spills could be addressed by modifying or supplementing existing spill response plans (Ecology 2003a)(Section 3.2.3.3, Spill Prevention).

The maximum number of whales that could be harvested under Alternative 3 would be the same as under Alternative 2 (an average of four per year, with no more than five in any one year), but the increased hunting opportunities and the lack of restrictions on identified whales under Alternative 3 would make it more likely that the Tribe could harvest the full number. Therefore, Alternative 3 would have a greater increase in risk of groundwater contamination than would Alternative 2. For the reasons described above, there would be no expected effect on drinking water sources.

4.2.3.4 Alternative 4

Alternative 4 would include the same limits on the number of whales harvested as Alternative 2 and would impose the same restrictions on the hunting season. The additional restrictions contained in Alternative 4 (no hunting within 200 yards of rocks and islands in the Washington Islands National Wildlife Refuges) would not affect the risk of fuel or contaminant spills, nor the number of whales potentially harvested by the Tribe. Therefore, the increased risk of fuels or other contaminants being released into the marine environment, and the increased risk of groundwater contamination from material delivered to landfills, would be the same as under Alternative 2, compared to the No-action Alternative. Also, risks due to spills could be addressed by modifying or supplementing existing spill response plans (Ecology 2003a)(Section 3.2.3.3, Spill Prevention).

4.2.3.5 Alternative 5

Alternative 5 would limit the number of whales that may be harvested to two in any one year and 10 over the five-year period. Year-round hunting would be allowed, making it likely that the full number of whales would be harvested. The expected number of hunting days would be 20 per year. Compared to the No-action Alternative, this alternative would result in increased hunt-related vessel traffic over 20 days, which would lead to an increased risk that fuels or other contaminants might be released into the marine environment. Also, compared to the No-action Alternative, as many as two whales might be discarded in the landfill in any one year, increasing the potential for contaminants to enter the groundwater. For the reasons described above, there would be no expected effect on drinking water sources.

Compared to Alternatives 2 and 4, Alternative 5 might result in about the same number of days of hunting (20 versus 7 to 30) and therefore a comparable risk of fuels or other contaminants being released into the marine environment. Compared to Alternatives 3 and 6, Alternative 5 would be expected to have a lower risk of spills because of fewer days of hunting (20 days versus 40).

Also, risks due to spills could be addressed by modifying or supplementing existing spill response plans (Ecology 2003a)(Section 3.2.3.3, Spill Prevention). Compared to the other action alternatives, Alternative 5 would have a lower risk of groundwater contamination because of the lower limit on the number of whales that could be harvested.

4.2.3.6 Alternative 6

Alternative 6 would include the same provisions as Alternative 3 except that hunting would also be allowed in the Strait of Juan de Fuca portion of the Makah U&A. Alternative 6 would be expected to result in the same number of hunt attempts and the same number of whales harvested as Alternative 3. Thus the increased risk of fuels or other contaminants being released into the marine environment, and the increased risk of groundwater contamination from material delivered to landfills would be about the same as under Alternative 3, compared to the No-action Alternative. Compared to the other action alternatives, Alternative 6 would also be expected to have the same relative effects on water quality as Alternative 3. The only difference between Alternative 6 and Alternative 3 is that Alternative 6 would allow hunting in the strait, so the potential for spills would be expanded from the coastal portion of the Makah U&A to the Strait. As described above, because the vessels associated with hunting would be small, any spills would be rapidly diluted to undetectable concentrations in the Strait. Non-water-soluble contaminants such as petroleum-based fuels would disperse and break down in hours or days. Also, risks due to spills could be addressed by modifying or supplementing existing spill response plans (Ecology 2003a)(Section 3.2.3.3, Spill Prevention).

4.3 Marine Habitat and Species

4.3.1 Introduction

This section evaluates the potential for the six alternatives to affect marine habitat and associated biological resources within the project area. It includes a discussion of the likely ecological consequences of two possible types of effects that were identified through the internal and public scoping processes (Section 1.5.2.2, Marine Habitats and Species): (1) potential direct effects from hunt-related activities such as disturbance associated with marine vessel traffic or disposition of whale carcasses and (2) potential indirect effects resulting from the removal or harassment of gray whales from the local ecosystem, such as reduced benthic disturbance by feeding whales and decreased consumption of pelagic and epibenthic prey. Consistent with the description of marine habitat and associated species in Section 3.3, Marine Habitat and Species, this analysis separately examines the potential effects on pelagic and benthic habitats.

4.3.2 Evaluation Criteria

None of the action alternatives has the potential to appreciably affect the physical features and dynamic processes of the pelagic or benthic environments (described in Sections 3.3.3.1.1, Pelagic Environment, Physical Features and Processes, and 3.3.3.2.1, Benthic Environment, Physical Features and Processes, respectively). The ocean currents, seasonal variability, upwelling, downwelling, eddies, fronts, El Niño Southern Oscillation events, and Pacific Decadal Oscillation that influence the pelagic environment are large-scale, physical oceanographic and climatic processes that cannot reasonably be expected to be affected by the action alternatives, which involve comparatively small-scale, short-term, localized activities. Similarly, the substrata, features (e.g., submarine canyons), and physical disturbances that make up the benthic environment also are large-scale and cannot reasonably be expected to be affected by the small-scale, short-term and localized activities associated with the action alternatives.

Consequently, the evaluation of the action alternatives below focuses on the potential direct and indirect effects on the biological resources associated with the pelagic and benthic environments. For both the pelagic and benthic environments, two criteria were used to determine the potential for effects. The first is the amount of physical disturbance associated with conducting a whale hunt (such as vessel traffic or towing a whale), which could have direct effects on the environment. The second is the change in pelagic or benthic communities in the project area, which could result if gray whales are removed from the project area. The following sections discuss the potential effects in greater detail and how the effects for each alternative may be assessed and differentiated.

4.3.2.1 Pelagic Environment Evaluation Criteria

4.3.2.1.1 Disturbance of Pelagic Species

Hunt-related activities, such as vessel traffic or hauling of whale carcasses, could disturb fish or other pelagic species. This evaluation criterion relates to the potential risk that the action alternatives may affect the distribution and abundance of fish or other pelagic species in the project area. The amount of disturbance and any resulting change in fish distribution or abundance would depend primarily on the amount, distribution, and timing of hunt-related vessel traffic in the project area. The amount of anticipated vessel traffic would depend on the number of hunts initiated and how many whales could be struck or harvested under a given action alternative. The distribution of vessel traffic would depend on the hunt area (that is, whether the Strait of Juan de Fuca is as part of the hunt area) and the specific location of pursued whales at

the time of a hunt. Vessel traffic timing would depend on the hunting season under a given alternative.

4.3.2.1.2 Changes in the Pelagic Community

This evaluation criterion relates to the potential ecological consequences of a whale hunt on the pelagic environment. If the consumption of pelagic prey by gray whales represents a significant factor in determining zooplankton species abundance or plays a significant role in structuring planktonic communities, it is possible that the abundance, species composition, and spatial distribution of pelagic organisms could be altered if whales were harassed in or removed from the project area. The amount of ecological change induced by a whale hunt would depend on the relative change in whale presence and prey consumption, as well as the importance of whale prey consumption relative to oceanographic/climatic processes in determining the dynamics of zooplankton species assemblages in the project area.

4.3.2.2 Benthic Environment Evaluation Criteria

4.3.2.2.1 Disturbance of Benthic Habitat

Potential direct impacts to the benthic habitat from hunting gray whales might result from disturbances associated with increased vessel traffic and disposition of carcasses. Such impacts could include (1) disturbance or damage to eelgrass, surfgrass, kelp beds, or kelp rafts; (2) an increase in the number or generation of kelp rafts; (3) disturbance to nearshore rocky and soft bottom communities; and (4) disturbance or damage to shellfish resources. Each of these potential impacts is considered under the evaluation criterion for assessing disturbances to the benthic habitat and is described in more detail in the following paragraphs.

Hunt-related activities, such as nearshore vessel traffic and hauling whale carcasses, could result in the disturbance of marine plant or kelp beds at or near landing beaches. This analysis considers the frequency and severity of such hunt-related disturbances relative to the natural levels of physical disturbance in the project area. Additionally, the capacity of these marine plant and macroalgal species for growth and recolonization in response to disturbance is an important consideration. The amount of hunt-related disturbance would depend primarily on the amount of hunt-related vessel traffic in the project area. The amount of vessel traffic that may be expected would depend on the number of hunts initiated and how many whales could be struck or harvested under a given action alternative.

Floating rafts of kelp and associated biota occur within the project area. Kelp rafts are generated by storms and other disturbance events that dislodge kelp holdfasts from their attachment to the

substratum. Although kelp rafts are free-floating and associated with the pelagic environment, they are considered in this analysis as part of the benthic habitat as they are the product of benthos disturbance. They are ecologically important to benthic communities as potential vectors of dispersal for benthic species and as possible sources of organic material upon sinking. Hunt-related activities such as vessel traffic could potentially generate kelp rafts by disturbing stands of kelp. Additionally, kelp rafts are susceptible to damage or disturbance if struck by the propellers of vessels associated with the hunt. Any hunt-related generation or disturbance of kelp rafts would occur in the context of background physical processes affecting the generation and disturbance of kelp rafts in the project area. The amount of hunt-related disturbance would depend primarily on the amount of hunt-related vessel traffic in the project area. The amount of vessel traffic that may be expected would depend upon the number of hunts initiated and the number of whales that could be struck or harvested under a given action alternative.

The hauling and landing of whale carcasses on rocky or soft-bottomed nearshore habitats could result in the disturbance of associated species and communities. This analysis considers the frequency and severity of such a hunt-related disturbance relative to background levels of natural disturbance (e.g., storms, wave action, and predation). The amount of hunt-related disturbance would depend primarily on how many whales could be harvested under a given action alternative.

The landing of whale carcasses on beaches with shellfish resources could result in disturbance of these shellfish communities (the potential for hunt-related activities to result in the closure of beaches to shellfish harvest is evaluated in Section 4.2, Water Quality, above). This analysis considers the frequency and severity of such a hunt-related disturbance relative to background levels of natural disturbance (e.g., storms, wave action, and predation). The amount of hunt-related disturbance to shellfish communities would depend primarily on how many whales could be harvested under a given action alternative.

4.3.2.2 Changes in Disturbance-dependent Benthic Communities

Potential indirect impacts on the benthic habitat from hunting gray whales may occur if benthic-feeding gray whales were harassed in or removed from the ecosystem. Such impacts include change in the relative level of benthic disturbance due to a decrease in the number of benthic-feeding gray whales and change in the abundance or distribution of benthic prey species due to a decrease in the quantity of benthic food consumed by gray whales.

If feeding-associated disturbance by benthic-feeding gray whales represented a significant factor in structuring benthic communities, benthic communities could be altered if whales were harassed

in or removed from the project area. Background physical processes may include disturbance by storms, wave action, and movement and accumulation of sediments (e.g., turbidity currents). Background biological processes may include seasonality and variability of surface water productivity and delivery of organic material to the benthic communities. The amount of ecological change induced by a whale hunt would relate to changes in whale presence, as well as the importance of whale prey consumption relative to other physical and biological processes in determining the dynamics of benthic species assemblages in the project area.

This analysis also considers the potential ecological consequences of a whale hunt on the benthic environment. If the consumption of benthic prey by gray whales represents a significant factor in determining species abundance and distribution, the abundance, species composition, and spatial distribution of benthic food items might be altered if whales were removed from or harassed in the project area. The amount of ecological change induced by a whale hunt would relate to changes in whale presence and prey consumption, as well as the importance of whale prey consumption relative to other physical and biological processes in determining the dynamics of benthic species assemblages in the project area.

4.3.3 Evaluation of Alternatives

The following sections consider the potential for the alternatives to affect pelagic and benthic habitats and associated biological resources in the project area. For each alternative, risks to both pelagic and benthic environments are discussed. The analysis evaluates potential effects due to direct disturbance and indirect ecological effects of a whale hunt under a given alternative.

The marine environment of the project area, as noted in Section 3.3.1, Introduction, is highly energetic, productive, and variable due to the dynamic physical oceanographic processes and the high levels of physical disturbance characteristic of the Washington coast. The abundance, recruitment, distribution, and variation in marine species and communities in the project area strongly reflect the underlying physical environment. When evaluated in the context of this energetic and dynamic environment, evaluation of the alternatives indicates that none has the potential to appreciably affect pelagic or benthic habitats or the associated organisms and communities. The following sections discuss these conclusions in more detail.

4.3.3.1 Alternative 1

Under Alternative 1, the No-action Alternative, no whale hunt would be permitted, no associated activities (e.g., increased vessel traffic) would be expected to occur, and no whales would be harassed in or removed from the project area. The dynamic processes described in Section 3.3.3,

Existing Conditions, would be expected to continue in both the pelagic and benthic environments. No direct disturbance resulting in the altered presence or abundance of fish or other pelagic species would be expected, nor would pelagic species or the community experience any indirect ecological consequences because there would be no hunting activities. Similarly, no direct disturbance would affect marine plant or kelp beds, kelp rafts, nearshore communities, or nearshore shellfish resources, nor would benthic species and communities experience indirect ecological effects.

4.3.3.2 Alternative 2

Whale hunts would be permitted under Alternative 2, resulting in an expected increase in hunt-associated vessel traffic over the No-action Alternative, as well as the harassment or removal of whales from the project area. The number of days of hunting anticipated under Alternative 2 would be 7 to 30. An average of four whales may be harvested per year, with no more than five harvested in a single year. No more than seven whales may be struck per year, and no more than 35 may be struck over a five-year period. No more than three whales may be struck and lost in any year. Limits on the hunting season (December 1 through November 31) and limits on the numbers of identified whales that may be harvested, may make it difficult for tribal members to harvest the full number of whales allowed.

4.3.3.2.1 Pelagic Environment

Compared to the No-action Alternative, Alternative 2 would likely result in an increased level of direct disturbance due to hunt-associated vessel traffic and the hauling of whale carcasses that have been harvested. These activities might disturb fish or other pelagic species in the project area. Any such disturbance would, however, likely be minor (vessels are small and the area is large and highly energetic), local (limited to waters near the activity), and of short duration (minutes to hours). Because any disturbance would be minor, localized, and short-term, it would be unlikely to result in an appreciable change in the presence, distribution, or abundance of fish and other pelagic species in the project area, compared to current conditions under the No-action Alternative.

This alternative would involve pursuit and hunting of gray whales, and it would likely result in harassment or removal of whales from the project area. As noted above, the potential ecological effect of removing whales from the ecosystem on pelagic species and assemblages would depend on (1) the relative change in whale presence and prey consumption and (2) the relative

importance of whale prey consumption in determining the dynamics of zooplankton species assemblages in the project area.

The consumption of pelagic prey by gray whales is not likely a significant factor in structuring pelagic communities relative to the highly variable and energetic oceanographic and climatic processes characteristic of the project area. As discussed in Section 3.3.3.1, Pelagic Environment, the physical features and ephemeral, seasonal, interannual, and interdecadal physical oceanographic processes largely control the abundance, distribution, and species composition of pelagic prey in the region. However, even assuming that gray whales do play a substantial role in structuring pelagic communities, the potential relative change in the number of whales under this and the other action alternatives would probably not result in any appreciable ecological effects. The number of whales allowed to be removed represents a small proportion of the ENP gray whale population or the number of whales observed migrating through the project area (less than 1 percent of some 20,000 whales, and less than 5 percent of the 464 whales observed in the Makah U&A [Section 3.4.3.3, Distribution and Habitat Use]). Furthermore, the number of whales potentially removed is substantially smaller than the observed levels of interannual variability in whale abundance within the project area. Consequently, any relative change in the quantity of pelagic prey consumed due to removal of whales under Alternative 2 would be negligible and lower than the expected levels of natural variability.

4.3.3.2.2 Benthic Environment

Compared to the No-action Alternative, an increased level of direct disturbance would probably occur under Alternative 2 due to hunt-associated vessel traffic and the hauling of whale carcasses. The expected amount of disturbance to eelgrass, surfgrass, kelp beds, and shellfish communities would depend on the specific route of hunt-associated vessels, as well as the location of these communities relative to the landing beach for any whale carcasses. The marine plant, macroalgal, and shellfish communities in the project area thrive in a highly energetic and disturbance-prone nearshore environment such that any hunt-associated disturbance effects would likely be insignificant relative to the high levels of natural background disturbance. Furthermore, the high capacity of these species for growth and recolonization suggests that hunt-associated disturbance effects, if any, would be short-lived. Similarly, any direct disturbance to kelp rafts would likely be insignificant relative to the background physical processes affecting the generation and distribution of kelp rafts in the project area.

As discussed above, in evaluating the potential consequences of whale removal for the pelagic environment, the potential change in the number of whales under this and the other action alternatives would be small relative to the overall whale population and natural levels of variability in whale presence. Consequently, the removal of whales would probably not appreciably change background levels of benthic disturbance or the quantity of benthic prey consumed. Furthermore, whale foraging does not appear to play a significant role in structuring benthic and epibenthic communities in the project area. Rather, these benthic communities are most strongly affected by the presence of benthic features (e.g., submarine canyons), physical disturbance processes (such as storms, wave action, and the movement and accumulation of sediments), and ephemeral, seasonal, interannual, and interdecadal physical and biological processes affecting the delivery of organic material from productive surface waters.

Any whales struck and killed but lost would affect the benthic environment by providing ‘whale fall’ microhabitats. This would also be the case for carcasses of any whales harvested and disposed of at sea. As the whale decays on the ocean floor, it provides an ephemeral habitat associated with a unique and diverse invertebrate community. Whale falls occur naturally when individuals die and sink to the sea floor. Under Alternative 2, up to three whales may be struck and lost per year (presumably resulting in whale falls), and up to 15 whales may be struck and lost over a five-year period. No estimates are available for the annual level of natural mortality that may occur within the project area. Such an estimate would be useful for establishing a background level of whale falls expected to occur naturally, enabling a comparison with the number of additional whale falls that might be generated under Alternative 2. Compared to the annual level of natural mortality for the ENP gray whale stock (with a population of some 20,000), the addition of three whale falls annually would be minor.

4.3.3.3 Alternative 3

Alternative 3 would include the same limits on total numbers of whales struck, harvested, and struck and lost as Alternative 2, but there would be no limits on identified whales and no seasonal restrictions on hunting. Tribal members would likely hunt year round, including during summer and early autumn, when weather conditions would be less likely to interfere with hunting opportunities and compromise hunter safety. Compared to Alternative 2, more opportunities for hunting would probably result in a greater number of hunting expeditions (40 days under Alternative 3 compared to 7-30 days under Alternative 2), with an attendant increase in vessel traffic. There is also a greater likelihood under Alternative 3 than under Alternative 2 that the full number of whales could be harvested, because of the year-round opportunity to hunt and the lack

of limits on identified whales. The increased number of days of hunting and greater likelihood that the full number of whales would be towed to shore would be expected to result in slightly increased effects over those anticipated under Alternative 2, compared to the No-action Alternative.

4.3.3.3.1 Pelagic Environment

The risk of direct disturbance of fish and other pelagic species under this alternative, although potentially higher than under Alternative 2, would still be minor, localized, and of short duration. Similarly, for the reasons described under Alternative 2, even though there is a greater chance that the full number of whales may be removed, any removal of whales under Alternative 3 is not likely to result in indirect ecological effects on pelagic communities. Thus, compared to the No-action Alternative, Alternative 3 is not likely to result in an appreciable change in the presence, distribution, or abundance of fish and other pelagic species in the project area.

4.3.3.3.2 Benthic Environment

The risk of direct disturbance of benthic marine plant, macroalgal, shellfish, and kelp raft communities under this alternative, although potentially greater than under Alternative 2, would be negligible relative to the high levels of background disturbance and the strong capacity of these species for growth and recolonization. Similarly, for the reasons described under Alternative 2, any removal of whales under Alternative 3 is not likely to result in indirect ecological effects on pelagic communities. Thus, Alternative 3 would probably not result in an appreciable change in benthic communities compared to current conditions under the No-action Alternative.

4.3.3.4 Alternative 4

Alternative 4 would include the same limits on the number of whales harvested as Alternative 2 and would impose the same restrictions on the hunting season. The additional restrictions contained in Alternative 4 (no hunting within 200 yards of rocks and islands in the Washington Islands National Wildlife Refuges) would not affect the likely number of hunting expeditions, patterns of vessel traffic, or the number of whales potentially struck, harvested, or struck and lost. Therefore effects on marine habitat and species under Alternative 4 would likely be the same as those described under Alternative 2.

4.3.3.4.1 Pelagic Environment

Similar to Alternative 2, this alternative would likely result in minor, local and short-term effects on pelagic communities through direct disturbance. Similarly, for the reasons described under

Alternative 2, any removal of whales under Alternative 4 is not likely to result in indirect ecological effects on pelagic communities. Thus Alternative 4 would probably not result in appreciable changes in the presence, distribution, or abundance of fish and other pelagic species in the project area compared to current conditions under the No-action Alternative.

4.3.3.4.2 Benthic Environment

Similar to Alternative 2, the risk of direct disturbance of benthic marine plant, macroalgal, shellfish, and kelp raft communities under this alternative would be negligible relative to the high levels of background disturbance and the strong capacity of these species for growth and recolonization. Similarly, for the reasons described under Alternative 2, any removal of whales under Alternative 4 is not likely to result in indirect ecological effects on pelagic communities. Thus, Alternative 4 would probably not result in an appreciable change in benthic communities compared to current conditions under the No-action Alternative.

4.3.3.5 Alternative 5

Alternative 5 would limit the number of whales that may be struck, harvested and struck and lost in any one year to three, two and one, respectively. Year-round hunting would be allowed, making it likely that the full number of whales would be harvested. The expected number of hunting days would be 20 per year. Therefore effects on marine habitat and species under Alternative 4 would likely be less than those described under Alternative 2.

4.3.3.5.1 Pelagic Environment

Any direct disturbance effects under this alternative on fish and other pelagic species would likely be local and short-term, for the reasons described under Alternative 2. Similarly, for the reasons described under Alternative 2, any removal of whales under Alternative 5 is not likely to result in indirect ecological effects on pelagic communities. Because Alternative 5 would result in fewer hunting expeditions and fewer whales removed from the project area than Alternatives 2, 4, 3 and 6, it would have less potential for effects than these alternatives. Alternative 5 would probably not result in appreciable changes in the presence, distribution, or abundance of fish and other pelagic species in the project area compared to current conditions under the No-action Alternative.

4.3.3.5.2 Benthic Environment

Any direct disturbance effects under this alternative on benthic marine plant, macroalgal, shellfish, and kelp raft communities would be negligible relative to the high levels of background disturbance and the strong capacity of these species for growth and recolonization, as described under Alternative 2. Similarly, for the reasons described under Alternative 2, any removal of

whales under Alternative 5 is not likely to result in indirect ecological effects on pelagic communities. Because Alternative 5 would result in fewer hunting expeditions and fewer whales removed from the project area than Alternatives 2, 4, 3, and 6, it would have less potential for effects than these alternatives. Thus, Alternative 4 would probably not result in an appreciable change in benthic communities compared to current conditions under the No-action Alternative.

4.3.3.6 Alternative 6

Alternative 6 would include the same provisions as Alternative 3 except that hunting would also be allowed in the Strait of Juan de Fuca portion of the Makah U&A. Alternative 6 would be expected to result in the same number of hunt attempts and the same number of whales struck, harvested, and struck and lost as Alternative 3. Therefore effects on marine habitat and species under Alternative 6 would likely be the same as those described under Alternative 3, except that the geographic scope of potential effects would expand to the Strait of Juan de Fuca.

4.3.3.6.1 Pelagic Environment

As described under Alternative 3, the risk of direct disturbance of fish and other pelagic species under this alternative, although potentially higher than under Alternative 2, would still be minor, localized, and of short duration. Similarly, for the reasons described under Alternative 2, even though there is a greater chance that the full number of whales may be removed, any removal of whales under Alternative 6 is not likely to result in indirect ecological effects on pelagic communities. Thus, compared to the No-action Alternative, Alternative 6 is not likely to result in an appreciable change in the presence, distribution, or abundance of fish and other pelagic species in the project area.

4.3.3.6.2 Benthic Environment

As described under Alternative 3, the risk of direct disturbance of benthic marine plant, macroalgal, shellfish, and kelp raft communities under this alternative, although potentially greater than under Alternative 2, would be negligible relative to the high levels of background disturbance and the strong capacity of these species for growth and recolonization. Similarly, for the reasons described under Alternative 2, any removal of whales under Alternative 6 is not likely to result in indirect ecological effects on pelagic communities. Thus, Alternative 6 would probably not result in an appreciable change in benthic communities compared to current conditions under the No-action Alternative.

4.4 ENP Gray Whale

4.4.1 Introduction

This section addresses the potential for the alternatives to affect ENP gray whales at three scales: the ENP gray whale stock as a whole, whales using local summer feeding areas (specifically the Makah U&A and Oregon Southern Vancouver Island [ORSVI]), and individual whales. For the ENP gray whale stock as a whole, the analysis considers potential effects on abundance and viability. For whales using the Makah U&A and ORSVI summer feeding areas, the analysis considers potential effects on abundance and on distribution and habitat use. The reasons for analyzing effects in these two summer feeding areas are described more fully below. For effects on individual whales, the analysis considers time to death and hunting efficiency (the ratio of harvested to struck-and-lost whales) associated with the alternative methods of striking and killing whales. These methods are limited to what NMFS considers reasonable options for striking and killing whales (Section 2.4.5, Employ Different Hunting Methods), including using either a toggle-point harpoon as the primary striking method and .50 caliber rifle as the killing method, or using an explosive projectile as the striking and killing method.

Chapter 5 considers whether the effects on gray whales that might result from implementing any of the alternatives would be likely to have cumulative effects in the context of past actions, other contemporaneous actions, or reasonably foreseeable future actions that may affect gray whales, such as other human or natural sources of mortality, potential development in the project area, or global climate change.

4.4.2 Evaluation Criteria

Four criteria were used to determine the potential for effects on ENP gray whales under the alternatives: (1) change in abundance and viability of the ENP gray whale stock, (2) change in abundance of gray whales using the Makah U&A and ORSVI summer feeding areas, (3) change in distribution or habitat use of gray whales in the Makah U&A or elsewhere in the Pacific Coast Feeding Aggregation (PCFA) survey area, and (4) welfare of struck or harvested whales. The following sections discuss risks to gray whales at each of these scales and how the effects of the alternatives may be assessed and differentiated.

4.4.2.1 Change in Abundance and Viability of the ENP Gray Whale Stock

As described in Section 4.1, Introduction, the catch limit for the ENP gray whale stock set by the IWC would remain the same under all six alternatives – 620 whales over five years (annual average of 124), with a limit of 140 whales in any one year. The difference among the

alternatives is how much of the catch would be allocated to the Makah Tribe. Because the ENP gray whale stock is a single stock, and all six alternatives contemplate the same overall catch limit for the stock, the effect on the abundance and viability of the ENP gray whale stock as a whole is likely to be the same under any alternative – there would be a decrease in abundance in any year by an average of 124 whales, and there would be no effect on the viability of the gray whale stock as a whole because the IWC catch limit is well within the level that is sustainable for the stock.

Section 3.4.3.4.1, Abundance, and Table 3-2 summarize NMFS' abundance estimates for the ENP gray whale stock as a whole. NMFS currently considers the ENP gray whale stock to be within its optimum sustainable population level (Section 3.4.3.4.5, Estimates of Carrying Capacity (K), OSP, and PBR) and considers a stock that is at OSP to be viable and remain viable as long as total human-caused mortality remains below PBR (Section 3.4.2.1.4, Defining and Calculating PBR, and Section 3.4.3.4.5, Estimates of Carrying Capacity (K), OSP, and PBR). NMFS has calculated an acceptable PBR for the ENP gray whale stock as 417 whales per year. Under all of the alternatives, the abundance of the gray whale stock would be reduced by an average of 124 whales each year, and no more than 140 whales in any one year. Because this mortality level is well below the PBR of 417, none of the alternatives would be expected to change the viability of the ENP gray whale stock.

Hunt-related activities, particularly pursuit and unsuccessful harpoon attempts, may cause stress that increases whales' susceptibility to predation or disease, ultimately increasing the level of mortality beyond whales directly killed during hunting (Section 3.4.3.5.2, Whale Response to Being Pursued). Gray whales being pursued by whale-watching vessels have been observed to change course and alter swimming speed and respiratory patterns, potentially indicating stress (Section 3.4.3.6.6, Vessel Interactions). The Tribe estimates that over the five-year period of its proposed hunting, a maximum of 700 whales might be approached and 140 whales exposed to unsuccessful harpoon attempts. As described above, if no harvest is allocated to the Makah Tribe, the entire IWC catch limit of 620 gray whales over five years would be available for harvest by the Chukotka Natives. No information is available on the proportion of whales approached and subjected to unsuccessful harpoon attempts in the Chukotkan hunt. Such information would allow a comparison of the ENP gray whale stocks' likely exposure to stressful hunt-related activities under any of the action alternatives (involving a Makah hunt) versus the No-action Alternative (involving only a Chukotkan hunt). However, given the total number of ENP gray whales hunted, there is likely to be no appreciable difference in stress-related mortality between an alternative in

which the Chukotka Natives harvest an average of 124 whales per year while the Makah harvest none (the No-action Alternative), and alternatives in which the Chukotka Natives harvest an average of 120 whales per year while the Makah harvest 20 (the most the Makah can harvest under any of the action alternatives).

4.4.2.2 Change in Abundance of Gray Whales Using the Makah U&A or ORSVI Survey Areas

As noted in Section 4.1, Introduction, all six alternatives include the same level of harvest from the ENP gray whale stock as a whole. The alternatives vary, however, in the number of whales that would be harvested from the Makah Tribe's U&A. Under Alternatives 2, 3, 4, and 6, 20 of the 620 whales allowed under the IWC five-year catch limit would be allocated to the Makah Tribe (with an annual maximum limit of five) and subject to harvest in the Tribe's U&A. Under Alternative 5, 10 of the 620 whales would be allocated to the Makah Tribe (with an annual maximum limit of two). In addition, Alternatives 2 to 6 vary in (1) the number of whales that may be struck and lost during hunting, (2) the number of identified whales from the PCFA survey areas that may be harvested, and (3) the timing and location of hunting. These variations may have different effects on the abundance of gray whales using local survey areas.

This analysis considers effects on abundance of gray whales in two local survey areas – the Makah Tribe's U&A (which includes the northern Washington coast and Strait of Juan de Fuca survey areas), and ORSVI. As described in Section 3.4.3.3.1, Summer Range Distribution and Habitat Use, this analysis considers these local survey areas as a way to evaluate local effects of the alternatives. The survey areas themselves are not biological designations but have been defined by researchers because whales can be found using these areas or because of some management objective relevant to these areas (such as the Tribe's proposed hunt).

The court in *Anderson v. Evans* (2004) found that NMFS' previous environmental review did not adequately consider potential local effects of a Makah gray whale hunt because it did not address the number of gray whales in the area from which they would be removed (the Makah U&A) (Section 3.4.3.3.1, Summer Range Distribution and Habitat Use). Accordingly, this analysis addresses likely effects of the alternatives on abundance of ENP gray whales in the Tribe's U&A. Although Alternatives 2 through 5 restrict hunting to the coastal portion of the Tribe's U&A, and only Alternative 6 allows hunting in the Strait of Juan de Fuca portion of the Tribe's U&A, the analysis of all of the alternatives considers abundance in both portions of the Tribe's U&A. This is because of the overlap of whales identified in both areas. If there were a decrease in abundance of whales using the coastal portion of the Tribe's U&A under alternatives that limit hunting to

that area, it could also result in a decrease in abundance of whales using the Strait of Juan de Fuca. The joint consideration of these two areas in evaluating gray whale abundance in the Makah U&A is in contrast to the individual consideration they receive in evaluating distribution and habitat use in the Makah U&A (Section 4.4.2.3, Change in Distribution or Habitat Use).

In addition to the Makah U&A, this analysis focuses on the ORSVI survey area. Calambokidis et al. (2004a) recommended using the ORSVI as a logical and reasonable management area for considering impacts of gray whale harvests in the Makah U&A because of the relatively high rates of interchange between the ORSVI survey area and the Makah U&A. About 50 percent of whales seen in the ORSVI are also seen in the northern Washington coast/Strait of Juan de Fuca survey areas, compared to about 30 percent of whales seen in the PCFA also being seen the northern Washington coast/Strait of Juan de Fuca survey areas (Section 3.4.3.3.1, Summer Range Distribution and Habitat Use). They also recommended using the PBR method for estimating a sustainable level of removal of whales from the ORSVI. Because Calambokidis et al. (2004a) consider the ORSVI survey area to be appropriate for managing a gray whale harvest in the Makah U&A, because the Tribe's proposal adopts that recommendation, and because the MMPA includes the PBR approach as a management tool, this EIS evaluates the alternatives by comparing whale mortalities that would occur under each alternative to the PBR level that would be appropriate for the abundance of whales in the ORSVI.

The analysis also discusses effects on whales identified in the larger PCFA survey area, though not in the same level of detail as whales in the Makah U&A and ORSVI survey areas. This is the area NMFS considered relevant in its 2001 EA. It is also relevant to the Makah's proposal (Alternative 2) because the Tribe proposes to set an allowable bycatch level that would apply to any PCFA whale.

This portion of the analysis considers change in abundance in these local survey areas that might result if whales are killed during hunting (either harvested or struck and lost). It is also possible that animals could stop using an area because of the disturbance associated with a hunt. That possibility is evaluated in Section 4.4.2.3, Change in Distribution or Habitat Use. Section 4.1, Introduction, describes both the maximum and the likely number of PCFA whales that could be killed under each alternative from a combination of being harvested or struck and lost. That information is summarized in Table 4-2.

TABLE 4-2. NUMBER OF PCFA, ORSVI AND MAKAH U&A WHALES THAT MAY BE KILLED UNDER EACH ALTERNATIVE (MAXIMUM AND LIKELY)

Alternatives	No-Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
PCFA Whales		Annual/Five-Year	Annual/Five-Year	Annual/Five-Year	Annual/Five-Year	Annual/Five-Year
<i>Maximum</i>	0	4/20	Up to 7/35	4/20	Up to 3	Up to 7/35
<i>Likely*</i>	0	1.25/6.27	Up to 7/35	1.25/6.27	Up to 3	Up to 7/35
ORSVI Whales						
<i>Maximum</i>	0	4/20	Up to 7/35	4/20	Up to 3	Up to 7/35
<i>Likely*</i>	0	1.25/6.27	unknown**	1.25/6.27	unknown**	unknown**
Makah U&A Whales						
<i>Maximum</i>	0	4/20	Up to 7/35	4/20	Up to 3	Up to 7/35
<i>Likely*</i>	0	0.88/4.38	unknown**	0.88/4.83	unknown**	unknown**

* These numbers represents an estimate based on early season photo-identification data collected from 1998-2005 and on an assumption of seven whales struck each year (Calambokidis 2007). For the reasons described in section 4.1.2, Alternative 2, this assumption is conservative.

** Alternatives 3, 5, and 6 would allow year-round hunting. Without knowing when the Tribe would hunt, it is not possible to estimate a likely number of identified whales that would be killed, so only the maximum is estimated.

Additional stress-related mortalities resulting from pursuit or unsuccessful harpoon attempts are possible (Section 4.4.2.1, Change in Abundance and Viability of the ENP Gray Whale Stock), but no information is available or could reasonably be obtained that would support an estimate of stress-related mortality of identified summer-feeding whales.

Section 3.4.3.3.1, Summer Range Distribution and Habitat Use, describes gray whale use of local survey areas during the summer feeding period. As described in that section, during 1 June-30 November for 1998-2005, 464 unique whales were observed in the PCFA, with 311 observed within the smaller ORSVI region, and 115 observed within the smaller Makah U&A (Table 3-4). Tables 3-2 through 3-4 also report the number of newly observed whales in each survey area, and newly observed whales that then return in a subsequent year to each survey area. These tables show that new whales visit the PCFA, ORSVI, and Makah U&A survey areas each year, and many of those return in subsequent years.

In any given year in which a harvest occurred under Alternatives 2 to 6, the abundance of gray whales in the Makah U&A and ORSVI survey areas would be at least temporarily reduced by the number of identified whales killed (either harvested or struck and lost). It is possible that an identified whale removed from these areas could be replaced during the same year by a whale from outside the area. Calambokidis et al. (2004a) observed that many whales feeding during the summer throughout the PCFA survey area move great distances among areas, and that the presence of prey is likely what attracts whales to certain areas. During the course of the summer feeding period it is therefore possible that whales from outside the Makah U&A or the ORSVI survey areas would be traveling through these areas and stay to feed on available prey. Whether replacement would occur in the same year would depend on the number of whales removed, the availability of prey within the local survey areas relative to its availability in outside areas, and the opportunity for whales from outside the area to discover an unexploited source of prey. As a matter of probabilities, the smaller the number of whales removed, the greater the chance a removed whale would be randomly replaced by a new whale in the same year. Thus alternatives with lower rates of removal are likely to have less effect on gray whale abundance in local survey areas during the year in which hunting occurs.

In subsequent years, it is likely that new whales would replace identified whales removed from the Makah U&A or the ORSVI survey areas, because of the recruitment of new whales, but it is difficult to predict at what rate this would occur. There are no population-driven reasons why new whales would not replace whales that were removed: (1) gray whales identified as using local survey areas are not genetically distinct from the ENP gray whale stock as a whole, (2) there is no evidence of familial recruitment in the local survey areas, and (3) PCFA whales are not demographically independent from the ENP gray whale stock. Calambokidis et al. (2004a) proposed that individuals recruit into the local survey areas in the southern portion of the summer range from the migratory population as feeding habitat becomes available along the migration route. Alternatives with lower rates of removal are likely to have less effect on gray whale abundance in local survey areas in subsequent years because there are fewer whales to replace.

Over the long term, assuming prey continues to be available in these areas, it is likely that whales removed from the Makah U&A or ORSVI survey areas would be replaced, although it is not possible to predict how long it would take for replacement to occur. Regardless of whether hunting occurs, gray whale use of the Makah U&A or ORSVI survey areas can be expected to fluctuate over time as prey availability fluctuates in these areas relative to other feeding areas.

4.4.2.2.1 PBR of Whales in the ORSVI Survey Area

As described above, this analysis also considers the number of PCFA whales that might be removed under each alternative relative to the Tribe's proposed allowable bycatch level, which is based on a PBR that would be appropriate for the abundance of ORSVI whales. This analysis is included because it is an important component of the Tribe's proposal, because the MMPA explicitly adopts a PBR approach to marine mammal management, and because it provides continuity with the PBR method NMFS used in its 2001 EA. NMFS' 2001 EA focused on a PBR appropriate for the abundance of PCFA whales. The present analysis focuses instead on a PBR appropriate for ORSVI whales because that is what the Tribe proposed and what Calambokidis et al. (2004a) recommended. Alternatives 2 and 4 would adopt the Makah proposal to set an allowable bycatch level for PCFA whales that is established annually using the PBR approach applied to the minimum estimated abundance of ORSVI whales. The allowable bycatch level would be set each year based on an annually updated minimum estimate of abundance of ORSVI whales⁵. If the Tribe harvested a whale identified from anywhere in the PCFA survey area (an area larger than the ORSVI survey area and containing more identified whales), those would be counted against the allowable bycatch level.

Under the Makah proposal, the allowable bycatch level for PCFA whales would be adjusted annually based on the estimated minimum abundance of ORSVI whales. Using the Tribe's proposed method (which results in a 2.35 percent rate) and the current minimum abundance of ORSVI whales (106), the annual PBR would be 2.49 and the five-year PBR would be 12.45 (2.49 times five years). As described above, struck and lost whales may be ORSVI (or PCFA) whales, but would not count toward the allowable bycatch level under the Tribe's proposal. Section 4.1, Introduction, and Table 4-2, describe the maximum and likely number of ORSVI whales killed under each of the five action Alternatives (2 to 6). Under Alternatives 2 and 4, the maximum number of ORSVI whales killed could, over the five years of hunting, be 15, which would exceed by 2.5 whales the PBR level resulting from the Tribe's proposed method. The likely number of PCFA whales killed, however, would be 5.6 over five years, well under the 12.5 PBR level resulting from the Tribe's proposed method.

⁵ As described in Section 3.4.3.3.1, Southern Portion of the Summer Range, the abundance of ORSVI whales is not the total number of whales identified in the ORSVI, but the number of whales observed in more than one year, or observed over a long enough period during a single year that it could be predicted it would return. Subtracted from this is an estimated annual mortality based on the mortality rate for the entire ENP gray whale stock.

Alternatives 3 and 6 would allow the same number of whales to be harvested, struck and struck and lost as Alternatives 2 and 4, but would not place limits on the hunting season or the harvest of PCFA whales. Under these alternatives, the number of whales killed each year from the PCFA, ORSVI, and/or Makah U&A survey areas would depend on when the Tribe chose to hunt. Any whales killed during the period June 1 through November 30 would, by definition, be Makah U&A whales (as well as ORSVI and PCFA whales). For a whale killed outside of this period, as described above, there would be some probability it would be an identified summer-feeding whale (18 percent chance of a PCFA whale, 16 percent chance of an ORSVI whale, and 11 percent chance of a Makah U&A whale). Without knowing when the Tribe would hunt, it is not possible to estimate the likely number of identified whales that would be removed each year, so this analysis considers the maximum potential removals, which would be seven annually and 35 over five years (Table 4-2). This five-year number would exceed the five-year PBR of 12.5 for ORSVI-identified whales.

Alternative 5 would limit the number of whales that could be harvested in any year to two and the number that could be struck to three, thus limiting the total number potentially killed each year to three. As described above for Alternatives 3 and 6, all of these could be PCFA whales. The five-year number of 15 identified whales would exceed the PBR of 12.5 for ORSVI whales by 2.5 whales over five years.

Concerns about exceeding the PBR under any of the action alternatives could be addressed through a variety of methods, some of which are incorporated in the Tribe's proposal (for example, by limiting the timing and location of the hunt, and the number of identified whales that may be landed). Estimates of the proportion of PCFA whales present in the Makah U&A during April and May (the time when hunting is most likely to occur under Alternatives 2 and 4) are based on a small number of observations. Improved monitoring in the Makah U&A during April and May could increase confidence about the likelihood that any whale struck and lost was a PCFA whale.

Concerns about exceeding the Tribe's proposed PBR could also be addressed for any alternative by reducing the number of whales that could be struck and lost (and therefore the number of whales of unknown identity) or, for Alternatives 2 and 4, the number of identified whales that could be killed and landed. For Alternatives 3, 5, and 6 (which permit hunting year-round), concerns about exceeding PBR could be partially addressed by requiring some portion of the allowable harvest to be taken outside the summer feeding period.

4.4.2.3 Change in Distribution or Habitat Use

This analysis considers the potential for ENP gray whales to change their distribution and habitat use in response to a tribal hunt under the action alternatives. Responses could include changes in the distance whales travel from shore during migration; changes in numbers or location of whales feeding within the Makah U&A or elsewhere in the PCFA survey area; changes in the amount of time spent by whales feeding while in the Makah U&A or elsewhere in the PCFA survey area; changes in the numbers of whales using an area; or changes in the approachability of whales.

Gray whales being pursued by whale-watching vessels have been observed to change course and alter swimming speed and respiratory patterns temporarily (Section 3.4.3.6.6, Vessel Interactions). Studies of whale-watching activities in the lagoons of Baja California documented that gray whales were less likely to flee as the season progressed (Section 3.4.3.6.5, Offshore Activities and Underwater Noise). It is reasonable to expect that whales approached by Makah whale-hunting vessels would react in a similar, temporary manner. It is uncertain what the longer term effects would be on whales exposed to repeated approaches. The studies of whale-watching activities suggest the whales might become habituated and have less of a reaction the more frequently they are approached. It is uncertain how whales would react to unsuccessful harpoon attempts, but the reaction may be similar to that observed in whales that are tagged or biopsied. Such reactions are likely to be dramatic but temporary changes in behavior (Section 3.4.3.6.6, Vessel Interactions). Whales may be less likely to habituate to unsuccessful harpoon attempts than to approaches of vessels. It is unknown whether whales in the vicinity of successful harpoon attempts will develop an association between vessel approaches and harpoon strikes and over time begin to avoid vessels.

During migration, it is uncertain what factors affect gray whale distribution and habitat use. While there is evidence that gray whales will alter course or swimming speed in response to disturbances, there is no evidence that the disturbance is more than temporary (Section 3.4.3.6, Known and Potential Anthropogenic Impacts). Clarke and Moore (2002) found there was little evidence that gray whales disturbed by human activities travel far in response or remain disturbed for long.

During feeding, the factor most strongly affecting gray whale distribution and habitat use is likely the availability of prey. Darling et al. (1998) and Moore et al. (2007) document abandonment of feeding areas and establishment of new feeding areas linked to natural variation in prey availability. Feeding gray whales change location and habitat to exploit the optimum prey species

at any one time, based on abundance, density, size, caloric content, and predation pressure. Such factors may vary by season and year, depending on environmental variability and the population dynamics of prey (Section 3.4.3.1.3, Feeding Ecology and Role in the Marine Ecosystem).

Gray whales using the southern portion of the summer range tend to move up and down the coast during the feeding period, presumably searching for prey. Some whales remain in local areas for weeks or months; others may be present only for brief periods (Section 3.4.3.3.1, Summer Range Distribution and Habitat Use). It is possible that a hunt and associated activities in the Makah U&A might disturb whales, causing them to move elsewhere in search of feeding opportunities away from these activities. The severity of this effect would depend, in part, on the extent of the disturbance. Thus alternatives that result in more whales approached or subjected to harpoon attempts, or result in more days of hunting, are likely to cause more disturbance of feeding gray whales. The severity of the effect would also depend, in part, on the sensitivity of gray whales to disturbance in feeding areas. Available information indicates that feeding gray whales may not abandon feeding areas because of hunt-related disturbance. The pursuit of gray whales during the aboriginal hunt in the Chukotkan region of Russia does not appear to have diminished the opportunity for that subsistence hunt, as it has been ongoing for several years. This indicates that, at least in one part of their summer range, gray whales have not abandoned areas where they are subject to hunting.

Concerns about whales avoiding or abandoning the Makah U&A as a result of hunt-related activity could be addressed by continued monitoring aimed at detecting changes in whale distribution and habitat use (although changes in distribution would more likely be related to changes in prey distribution rather than hunt-related activity). Other options to address this concern include setting limits on the numbers of whales that could be approached or subjected to strike attempts or reducing the number of whales that may be struck and lost.

4.4.2.4 Method of Striking and Killing; Time to Death; Hunting Efficiency

The Tribe proposes to hunt gray whales using a toggle-point harpoon to strike and secure whales and a .50 caliber rifle to kill those that have been struck and secured. The Tribe also proposes a number of measures to contribute to the safety and efficiency of the hunt, including a minimum distance from a whale before firing, minimum visibility conditions under which a weapon may be fired, motorized chase vessels to pursue whales and provide a shooting platform and to tow killed whales to shore, and training for hunters. In addition to the Tribe's proposed hunting weapons, this analysis considers the option of using explosive projectiles to strike and kill gray whales,

either attached to a hand-thrown harpoon or delivered by a shoulder gun. These techniques have been used in the Chukotka Native gray whale hunt. Explosive projectiles may contain black powder or penthrite. Section 2.3.3.2.5, Overview of Proposed Hunting Method, describes these hunting methods, either of which may be used with any of the action alternatives (Alternatives 2 through 6).

This analysis examines the manner of death and the time to death of individual whales using either of two different general hunting methods: (1) a toggle-point harpoon for striking whales and a .50 caliber rifle for killing whales, or (2) an explosive projectile for both striking and killing whales, delivered either using a hand-thrown darting gun (a striking weapon that attaches a line and floats to the whale), or a shoulder gun (a killing weapon that does not secure the whale and is not used until the whale is secured). It also examines the potential for individual whales to be struck and lost, compared to whales struck and successfully landed (referred to as hunting efficiency). The more efficient the hunt, the greater the likelihood that fewer whales would be struck and killed in reaching the hunting quota, thus limiting impacts to fewer individual whales.

This section does not focus on the welfare of individual whales (Section 3.4.3.5, Welfare of Individual Whales) that would be the target of pursuit or unsuccessful harpoon attempts. Welfare effects on those whales are considered at the scale of the ENP gray whale stock and of whales that use local survey areas (Section 4.4.2.1, Change in Abundance and Viability of the ENP Gray Whale Stock, and Section 4.4.2.2, Change in Abundance of Gray Whales Using the Makah U&A or ORSVI Survey Areas) (this section does, however, consider whether approaches by Makah hunting vessels and unsuccessful harpoon attempts would affect gray whale distribution and habitat use).

4.4.2.4.1 Method of Striking and Killing, Time to Death

A toggle-point harpoon penetrates the epidermis and blubber of the whale and toggles open to secure the whale. The area of trauma is the area penetrated by the harpoon. There is evidence that a harpoon strike causes pain as whales may respond to being struck by diving, thrashing, or ramming a boat (Section 3.4.3.5.3, Whale Response to Being Struck). The .50 caliber bullet is targeted at the brain or central nervous system of the whale and causes death by penetrating and damaging the brain or central nervous system. Like the harpoon strike, a bullet causes trauma in the area of penetration. Time to death for the whale killed in the Makah hunt in 1999 was 8 minutes from the time the whale was struck with the harpoon until it was apparently rendered insensible from the second of two rifle shots. Time to death for the whale killed in the

unauthorized hunt in 2007 was 11 hours from the time the whale was struck (or the first shot was fired) until the whale apparently died and sank. In the 2006 Chukotka Native hunt, for whales killed using rifles only as the killing weapon, they reported an average time to death of 47 minutes for 40 whales (minimum 5 minutes, maximum 3 hours and 20 minutes, median 35 minutes). It is reasonable to expect that average time to death in a Makah hunt using a .50 caliber rifle as the killing weapon would be shorter than average time to death in the Chukotka Native hunt because the Makah Tribe would use a higher-caliber rifle, which would kill a gray whale more effectively than a lower-caliber rifle used by the Chukotka Native hunters (Section 3.4.3.5.4, Method of Killing and Time to Death). It is also possible that other requirements of the Makah hunt – minimum visibility conditions, minimum shooting distance, use of a look-out, and training – would result in a shorter time to death than documented in the Chukotka Native hunt.

It is difficult to compare the time to death of the whale during the unauthorized Makah gray whale hunt in 2007 to expected time to death in a future authorized hunt. During the 2007 hunt many of the procedures proposed by the Makah were not followed (such as training of the shooter). In addition, the at-sea intervention of the Coast Guard and NOAA's subsequent deliberation regarding what action to take with the wounded whale potentially prevented the tribal members or tribal authorities from taking further action to ensure the whale was killed more expeditiously. In addition, it is not known what ammunition the unauthorized hunters used nor the number of times that each rifle was fired. The experience of the 2007 unauthorized hunt emphasizes the importance of adopting and enforcing procedures governing the safety and humaneness of the hunt, in the event a hunt is authorized.

Concerns about time to death for individual whales, particularly in light of the unauthorized Makah hunt in September 2007, could be addressed by improved enforcement of the regulations proposed by the Makah to govern a hunt, including training of marksmen, maintenance and control of weapons and ammunition, and requirements for a chase boat with a look-out. It is uncertain whether use of an explosive projectile could reduce time to death. Other options for reducing time to death include improved enforcement of the moving exclusionary zone (MEZ) and allowing a hunt during better weather conditions (Alternatives 3, 5, and 6).

The alternative method of striking and killing whales is the use of explosive projectiles, delivered either by a hand-thrown darting gun or a shoulder gun. Explosive projectiles cause more extensive trauma at the site of penetration than a harpoon or bullet and can cause trauma at a farther distance from the site of penetration. Unlike a toggle-point harpoon, which would not kill

a whale immediately, an explosive projectile used for striking a whale may result in instantaneous or nearly instantaneous insensibility or death. In 2006, for whales killed using a darting gun with a black powder explosive projectile, Chukotka Native hunters reported an average time to death of 32 minutes for 88 whales (minimum 3 minutes, maximum 3 hours, median 30 minutes). In field trials testing the use of penthrite grenades in the Alaska bowhead hunt, time to death was on average 50 percent of the time to death using black powder grenades. It is uncertain what the average time to death would be for gray whales killed in a Makah gray whale hunt using explosive projectiles as the striking and killing weapon, though it is possible that average time to death would be lower than with the alternative method (toggle-point harpoon and rifle), because the striking weapon has the potential to quickly kill the whale or render it insensible.

4.4.2.4.2 Timing of Hunt and Time to Death

Regardless of the method selected, alternatives that would allow year-round hunting (Alternatives 3, 5, and 6) might result in shorter times to death for individual whales than alternatives that would limit hunting to the period of December 1 through May 31 (Alternatives 2 and 4). This is because the limited hunting season would include periods of rougher weather and sea conditions, which might hamper the accuracy of hunters using harpoons, rifles, or explosive projectiles. Less accurate weapon strikes would likely increase the time to death (Section 3.4.3.5.4, Method of Killing and Time to Death).

4.4.2.4.3 Hunting Efficiency

The proportion of gray whales struck and lost in the Chukotka Native hunt averaged about 4 percent (approximately a 95 percent efficiency rate) over three hunting seasons from 2004 to 2007. The Russian Federation reported that Chukotka Native hunters experienced fewer whales struck and lost when explosive projectiles were used. Given the lack of experience with a Makah gray whale hunt, it is not possible to predict the proportion of whales likely to be struck and lost under any of the alternatives, nor is it possible to predict the relative proportion of struck and lost whales using the alternative hunting methods. The Makah proposal (Alternative 2) would allow for 15 whales struck and lost over 5 years and 20 harvested (a 57 percent efficiency rate).

Concerns about hunting efficiency could be addressed by decreasing the allowable numbers of whales struck and lost in a Makah hunt. Concerns could also be addressed by allowing hunting during more favorable weather conditions. Regardless of the hunting method selected, alternatives that would allow year-round hunting (Alternatives 3, 5, and 6) might result in greater hunting efficiency than alternatives that would limit hunting to the period of December 1 through

May 31 (Alternatives 2 and 4). This is because the limited hunting season would include periods of rougher weather and sea conditions, which might hamper the accuracy of hunters using harpoons, rifles, or explosive projectiles. Less accurate strikes might result in more whales struck and lost. In addition, rough weather conditions might make it more difficult to land a killed whale, potentially increasing the proportion of struck and lost whales.

4.4.3 Evaluation of Alternatives

The following sections consider the potential for the alternatives to affect the ENP gray whale stock as a whole; gray whales in the Makah U&A, ORSVI, or elsewhere in the PCFA survey area; gray whale distribution and habitat use within the Makah U&A or elsewhere in the PCFA survey area; and the manner and time to death of individual whales. The risk of adverse effects on the ENP gray whale stock as a whole would be small under any of the alternatives, including the No-action Alternative. This is because the IWC catch limit remains the same under all alternatives, so the same total number of whales is likely to be removed from the stock by hunting. The difference between the No-action Alternative and the action alternatives is that under the action alternatives, some of that harvest would take place in the Makah U&A. Thus none of the action alternatives would result in an increased risk to the ENP gray whale stock as a whole, beyond the No-action Alternative.

The lowest risk to the abundance of whales in the Makah U&A and ORSVI survey areas would occur under the No-action Alternative, under which no Makah whale hunts would be authorized. It is unlikely that Makah U&A whales and ORSVI whales would be present in the area of the Chukotka hunt and thus killed under the No-action Alternative. In contrast, the risks to the abundance of whales in the Makah U&A and ORSVI survey areas would be higher under the action alternatives due to the likelihood that some Makah U&A whales and ORSVI whales would be killed in a Makah hunt. Alternatives 3 and 6 would carry the greatest risks to the abundance of whales in the Makah U&A and ORSVI survey areas because no seasonal restrictions would be imposed on whale hunting activities, increasing the chances of a Makah U&A or ORSVI whale being killed, and because there would be no limits on the number of PCFA whales that could be killed. Alternatives 2 and 4 would carry the least risk to the abundance of whales in the Makah U&A and ORSVI survey areas because hunting would be limited to the migration period and because a limit would be set on the number of PCFA whales that could be harvested. Alternative 5 would carry an intermediate risk to the abundance of whales in the Makah U&A and ORSVI survey areas. The lower total limit on strikes would limit the number of whales potentially killed

to three per year, but all three whales could be Makah U&A and ORSVI whales because hunting would be allowed year round and there would be no limits on the numbers of PCFA whales that could be harvested.

4.4.3.1 Alternative 1

Under the No-action Alternative, NMFS would not allocate a gray whale quota to the Makah Tribe, and no authorized hunting by the Makah would occur. As described in Section 4.1, Introduction, the current annual and five-year IWC allowable catch limits set for ENP gray whales are based on a joint request of the Russian Federation (for Chukotka Natives) and the United States (for the Makah Tribe). The number of gray whales that may be removed from the ENP stock during the five-year period from 2008 through 2012 would be no more than the catch limit of 620 whales, with no more than 140 whales taken in any one year. The effects on the abundance and viability of the ENP gray whale stock would not differ from current conditions; current data indicate that the ENP gray whale population is at or near the upper limit of its OSP (Section 3.4.3.4.4, Population Dynamics and Trends). The IWC catch limit of not more than 140 whales per year is well below the limit NMFS calculates as the PBR for this stock. It is not possible to estimate the difference in stress-related mortality that the ENP gray whale stock would experience if 8 to 20 whales are killed in the Chukotka hunt under the No-action Alternative instead of being killed in a Makah hunt under the action alternatives.

Under the No-action Alternative, ENP gray whale health, abundance, and habitat conditions would remain as the status quo for the stock as a whole and for whales in the Makah U&A and ORSVI survey areas. Domestic prohibitions on gray whale take pursuant to Section 101 of the MMPA would continue, would require authorization from NMFS, and would be subject to public review.

Factors that could cause a change in distribution or habitat use, such as variability in prey abundance from environmental perturbation, vessel traffic and noise, or commercial fisheries, would similarly be expected to remain at present levels.

4.4.3.2 Alternative 2

Under Alternative 2, whale hunting may occur from December 1 through May 31 in the Makah U&A. An average of four whales could be harvested by the Makah, seven struck, and three struck and lost per year. During any five-year period, up to 20 whales might be harvested, with 35 struck and 15 struck and lost. Whales that are struck are considered killed. As many as 140 whales may be approached by whale hunting vessels in any one year and up to 28 whales may be exposed to

unsuccessful harpoon attempts. With seven strikes allowed, there could be a maximum of 28 rifle shots fired or 21 grenade explosions. Inclement weather conditions during the hunting season might practically limit hunting to a total of 7 to 30 days during April and May. Given the limited number of actual hunting days available under Alternative 2, the Tribe might not be able to harvest the full number of whales allowed.

4.4.3.2.1 Change in Abundance and Viability of ENP Gray Whales

The potential direct and indirect mortality resulting from the whale hunt and hunt-related activities under Alternative 2 would be unlikely to change ENP gray whale stock abundance or viability compared to the No-action Alternative. As noted in Section 4.1, Introduction, the catch limit for the ENP gray whale stock set by the IWC would not change under this or any of the other alternatives, thus the same number of ENP gray whales would likely be harvested over five years under Alternative 2 as under the No-action Alternative. The ENP gray whale stock is within its OSP range (Section 3.4.3.4, Current Status of the Gray Whale Population), and the anticipated annual gray whale mortality under Alternative 2 (or any of the alternatives, including the No-action Alternative) would not exceed PBR for the ENP gray whale stock. If a Makah hunt for 20 whales over five years resulted in a higher level of stress-related mortality than would occur if those 20 whales were harvested in a Chukotkan hunt under the No-action Alternative, the difference is unlikely to have an appreciable effect on the abundance and viability of the ENP gray whale stock as a whole. This is because the stress-related mortality associated with harvesting 20 whales over five years is likely to be minor in the context of the existing Chukotkan harvest level of 600 whales over five years.

4.4.3.2.2 Change in Abundance of Gray Whales Using the Makah U&A and ORSVI Survey Areas

Under Alternative 2 there could be an increased risk to abundance of gray whales using the Makah U&A and ORSVI survey areas, compared to the No-action Alternative, though the increased risk would be small. Under Alternative 2, the Makah hunt would occur between December 1 and May 31, during the migration period, to reduce the likelihood of killing identified summer-feeding whales. As described in Table 4-2, the maximum number of Makah U&A whales killed would be 4 per year and 20 over five years and the likely number would be 0.88 per year and 4.38 over five years. The maximum number of ORSVI whales would be 4 per year or 20 over five years and the likely number would be 1.25 per year or 6.27 over five years.

It is uncertain whether other whales would take the place of killed Makah U&A whales or ORSVI whales during the year in which they were killed. Under Alternative 2, the most likely scenario is

that about one Makah U&A whale or ORSVI whale would be killed annually. Whales identified in the PCFA survey area could take the place of whales removed from the ORSVI, and whales identified in the ORSVI survey area could take the place of whales removed from the Makah U&A. Gray whales feeding in the southern portion of the summer range move great distances within a year (Section 3.4.3.3.1, Summer Range Distribution and Habitat Use). Thus it is reasonable to expect that one removed whale could be replaced in the year in which it was removed.

In subsequent years, it seems likely that a whale removed under Alternative 2 would be replaced. As described in Section 3.4.3.3.1, Summer Range Distribution and Habitat Use, Calambokidis et al. (2004a) propose that whales likely recruit to the Makah U&A or other parts of the PCFA survey area from the migratory population, as feeding habitat becomes available along the migration route. From the 1999-2005 data, an annual average of 4.66 new whales (Table 3-4) were seen in the Makah U&A and were subsequently seen in another year (Section 3.4.3.3.1, Summer Range Distribution and Habitat Use) which demonstrates that the observed level of annual recruitment is greater than the likely and maximum number of removals from the entire PCFA. The recruitment numbers in the ORSVI and PCFA were even larger. Therefore, replacement in subsequent years appears to be almost certain. If for some reason new whales did not take the place of killed whales in subsequent years, the Tribe's allowable bycatch level would decrease over time, because of the Tribe's proposal to base its allowable bycatch limits on the annually-updated lower abundance estimate of whales identified in the ORSVI survey area.

Compared to the No-action Alternative, in which no Makah U&A or ORSVI whales are likely to be killed by hunting, Alternative 2 represents an increase in risk to the abundance of gray whales using the Makah U&A and ORSVI survey areas during the summer period. The risk of a change in abundance compared to the No-action Alternative is slight when considered in the context of the numbers of whales available to replace killed whales.

PBR of Whales in the ORSVI

This EIS also evaluates each alternative relative to the PBR calculated for whales identified in the ORSVI survey area, as proposed by the Makah. As described in Section 4.1, Introduction, the PBR for whales identified in the ORSVI survey area, under the Tribe's proposed method, would be 2.5 whales per year, or 12.5 whales over five years. As described in Table 4-2, the most likely scenario is that under Alternative 2 about one ORSVI whale would be killed each year (estimated 1.12) and about six ORSVI whales would be killed over five years (estimated 6.27). If the

maximum potential number of ORSVI whales were killed under Alternative 2, that number would exceed the PBR level of whales in the ORSVI (a total of 20 whales over five years, versus a PBR of 12.5 whales over five years). This risk may be mitigated by the fact that under Alternative 2, harvest of a whale identified anywhere in the PCFA survey area (as opposed to only whales from the smaller ORSVI) would be counted against the allowable bycatch level.

Implementing Alternative 2 would increase the risk of exceeding the PBR of whales identified in the ORSVI survey area compared to the No-action Alternative. Under the No-action Alternative, there is no possibility of exceeding the PBR of ORSVI whales because none would be hunted. Under Alternative 2, the most likely scenario is that the PBR of ORSVI whales would not be exceeded (6.27 whales would be killed over five years compared to a PBR of 12.5 whales over five years); under the maximum scenario, the PBR of ORSVI whales could be exceeded (20 whales killed over five years compared to a PBR of 12.5 whales over five years).

4.4.3.2.3 Change in Distribution or Habitat Use

There is a risk that implementing Alternative 2 could cause a change in gray whale distribution or habitat use in the coastal portion of the Makah U&A or elsewhere in the PCFA survey area compared to the No-action Alternative. Gray whales that are approached by vessels often exhibit temporary behavioral responses, such as changing course, swimming speed, and respiratory patterns (Section 3.4.3.6.6, Vessel Interactions). There is no evidence that gray whales have altered their distribution or habitat use in lagoons in their winter range in response to the presence of whale-watching vessels (Section 3.4.3.6.6, Vessel Interactions). While some researchers have suggested that gray whales may have altered their migration distance from shore in response to vessels and other human activity, other researchers concluded there is no evidence suggesting such a relationship (Section 3.4.3.6.6, Vessel Interactions). Little information is available on interactions between vessels and gray whales in their summer range. No studies are available regarding changes in distribution or habitat use of gray whales feeding in areas where a hunt by Chukotka Natives hunt has been ongoing for many years (Table 3-49), suggesting whales continue to be available for harvest in feeding areas that are regularly harvested. Thus available information indicates that gray whale distribution and habitat use will not change compared to the No-action Alternative.

Migrating Whales

Migrating whales travel 1 to 2 miles offshore on their northward migration and may travel further from shore during the southward migration (Section 3.4.3.1.4, Seasonal Migrations). Because

hunting under Alternative 2 would occur over a total of 7 to 30 days, primarily during April and May, it would affect mostly migrating whales. The number of whales potentially exposed to an approach by a Makah canoe (140 per year) represents less than one percent of the total gray whale population of 20,000, while the number exposed to unsuccessful harpoon attempts (28), would be an even smaller fraction. Thus while there is a potential for implementation of Alternative 2 to result in migrating gray whales changing their distribution or habitat use, the risk is likely small, suggesting that gray whale distribution and habitat use will not change compared to the No-action Alternative.

Feeding Whales

During the hunting season under Alternative 2, 12.5 percent would be expected to be whales that have been seen in the Makah U&A during June 1 to November 30, while 17.9 percent would be expected from those seen in the larger ORSVI region (Section 3.4.3.3.2, Winter Range Distribution and Habitat Use). Thus of the 140 whales potentially approached, 17.5 (on average) would be expected from the Makah U&A, and 25 would be expected from the ORSVI region. Of the 28 whales potentially subjected to harpoon attempts, 3.5 would be expected from the Makah U&A, and five would be expected from the larger ORSVI region. Surveys have identified between seven and 31 whales in the coastal portion of the Makah U&A in a single year, and between 129 and 206 whales in the PCFA survey area in a single year (Section 3.4.3.3.1, Summer Range Distribution and Habitat Use).

It is reasonable to expect that approaches by Makah whale-hunting canoes would cause a disturbance similar to or less than that observed from approaches of motorized whale-watching vessels or vessels used for photo identification work. Thus whale response to approaches is likely to be temporary (minutes or hours). It is less certain what effect an unsuccessful harpoon attempt would have. For PCFA whales, the percentage of whales exposed to unsuccessful harpoon attempts is likely small enough to not affect overall gray whale use of the PCFA survey areas outside the Makah U&A. It is uncertain whether the intensity of unsuccessful harpoon attempts would result in more than a temporary disturbance of Makah U&A whales and cause them to avoid portions of the Makah U&A either for a short period (days to weeks), or a longer period (for example, over a period of years). As described in Section 4.4.2.3, Change in Distribution or Habitat Use, availability of prey may be the factor most strongly affecting gray whale distribution during feeding. If prey is available in the Makah U&A, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Many new whales are seen in the Makah U&A every year (Section 3.4.3.3.1, Summer Range Distribution and

Habitat Use). Thus even if some whales do abandon the area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area.

The example of gray whale distribution in areas hunted by Chukotka Natives may be instructive in trying to predict whether there would be a change in distribution or habitat use of gray whales in the larger PCFA survey area. Scores of whales have been hunted by Chukotka Natives for several years (Table 3-43). The fact that whales continue to be available for harvest suggests that the disturbance associated with the Chukotka Native hunt may not have resulted in a change in distribution or habitat use. On the other hand, gray whales using the southern portion of the summer range tend to move up and down the coast extensively during the feeding period, presumably searching for prey (Section 3.4.3.3.1, Summer Range Distribution and Habitat Use). Moreover, the areas under consideration for hunting are a small portion of the whales' summer range; if there are other feeding areas that are not subject to hunting disturbance, the whales can and may easily move to those other areas. Thus available information indicates that gray whale distribution and habitat use will not change compared to the No-action Alternative.

4.4.3.2.4 Manner and Time to Death

As discussed in Section 4.1, Introduction, the number of gray whales that might be harvested from the ENP stock under all alternatives, including Alternative 2 and the No-action Alternative, would not change. It would remain at the existing IWC catch limit of 620 whales in a five-year period, and no more than 140 whales in any one year. The difference is that under the No-action Alternative, the entire catch could be taken by Chukotka Natives, while under Alternative 2, the Makah Tribe could take up to 20 of the 620 catch limit.

Whales killed with a rifle in a Makah hunt under Alternative 2 could experience a shorter time to death than whales killed with a rifle in a Chukotka Native hunt because of the requirements proposed by the Makah (such as minimum visibility) and because the Makah would use a higher caliber killing weapon than the Chukotka Natives use. Whales killed with an explosive grenade in either hunt would likely experience a similar time to death, thus Alternative 2 would probably not represent a difference in manner and time to death from the No-action Alternative. Thus compared to the No-action Alternative, Alternative 2 could result in the same or lesser time to death, depending on the weapon used.

The proportion of whales struck and lost could be greater in a Makah hunt under Alternative 2 than a Chukotka Native hunt under the No-action Alternative because the Chukotka Natives have more recent hunting experience. The Chukotka Natives report that 4 percent of the whales struck

in their hunt are lost. It is not possible to predict a proportion of whales that would be struck and lost in a Makah hunt under Alternative 2, but the Tribe's proposal includes a potential of three whales struck and lost for four whales harvested before the seven-strike limit would be reached. The proportion of whales struck and lost under Alternative 2 could also be greater than the proportion in a Chukotka Native hunt because seasonal restrictions on the Makah hunt under Alternative 2 could result in hunts occurring in rough weather and sea conditions. Hunting under unfavorable conditions could reduce the accuracy of the hunters and make it more difficult to successfully land a killed whale (thus increasing the proportion of whales struck and lost).

4.4.3.3 Alternative 3

Under Alternative 3, whale hunting may occur year round in the coastal portion of the Makah U&A. An average of four whales per year could be harvested, seven whales could be struck, and three struck and lost. During any five-year period, up to 20 whales might be harvested, with 35 struck and 15 struck and lost. Whales that are struck are considered killed. As many as 140 whales may be approached by whale-hunting vessels in any one year and up to 28 whales may be subjected to harpoon attempts. Hunting could potentially occur on a total of 40 days. With seven strikes allowed, the analysis assumes there could be a maximum of 28 rifle shots fired or 21 grenade explosions. Given the opportunity to hunt year round, it is likely the Tribe would be able to harvest the full number of whales allowed.

4.4.3.3.1 Change in Abundance and Viability of ENP Gray Whales

Under Alternative 3, as with all of the alternatives, including the No-action Alternative, the same number of whales would likely be harvested – 620 over five years and no more than 140 in any single year. The potential effects on the abundance of the ENP gray whale stock would likewise be the same – an average annual reduction of 124 whales per year. The potential effect on viability of the ENP gray whale stock would be negligible because the mortality level would not approach PBR, as discussed above under the No-action Alternative and Alternative 2. Alternative 3 would not change the risk to the abundance and viability of the ENP gray whale stock compared to the No-action Alternative.

4.4.3.3.2 Change in Abundance of Gray Whales Using the Makah U&A and ORSVI Survey Areas

Under Alternative 3 there could be an increased risk to abundance of gray whales using the Makah U&A and ORSVI survey areas, compared to the No-action Alternative. Under this alternative, there would be no limit on the hunting season or the number of identified whales that could be harvested. All of the hunting could occur during the summer period (June 1 through

November 30), when any whale present in the Makah U&A would, by definition, be a Makah U&A and ORSVI whale. It is not possible to predict the likely number of identified whales that would be killed under this Alternative without knowing when tribal members would hunt. Of the seven whales that could be killed per year under this Alternative, all seven could be Makah U&A and ORSVI whales.

If seven Makah U&A/ORSVI whales were killed under Alternative 3, it is uncertain whether other whales would take their place during the year in which they were killed. Seven whales are more than the observed annual recruitment to the Makah U&A. So it is possible that there would be a decrease in abundance under this alternative compared to the No-action Alternative. Whales identified in the PCFA survey area could take the place of whales removed from the ORSVI, and whales identified in the ORSVI survey area could take the place of whales removed from the Makah U&A (Section 3.4.3.3.1, Summer Range Distribution and Habitat Use). Gray whales feeding in the southern portion of the summer range move great distances within a year (Section 3.4.3.3.1, Summer Range Distribution and Habitat Use), thus it is reasonable to expect that some removed whales could be replaced in the year in which they were removed. It is also uncertain how quickly Makah U&A/ORSVI whales removed under Alternative 3 would be replaced in subsequent years. As described in Section 3.4.3.3.1, Summer Range Distribution and Habitat Use, Calambokidis et al. (2004a) propose that whales likely recruit to the Makah U&A or other parts of the PCFA survey area from the migratory population randomly, as feeding habitat becomes available along the migration route. Thus it appears likely that at least some of the removed whales could be replaced in subsequent years. Under Alternative 3, the Tribe's harvest would not be adjusted based on abundance of ORSVI whales, although presumably if whales were not available to harvest the Tribe's harvest level would potentially decrease as a practical matter.

Compared to the No-action Alternative, in which no Makah U&A or ORSVI whales are likely to be killed by hunting, Alternative 3 represents an increase in risk to the abundance of gray whales using the Makah U&A and ORSVI survey areas during the summer period. Although the precise number of Makah U&A and ORSVI whales removed cannot be predicted, as many as seven could be killed each year. Given the numbers of whales available to replace them, it is unlikely all seven would be replaced during the year in which they were removed. It is uncertain whether seven would be replaced in the subsequent year. Compared to Alternative 2, Alternative 3 represents a potential seven-fold increase in the risk to abundance of whales in the Makah U&A and ORSVI survey areas, because of the potential for seven of these whales to be killed per year compared to about one whale per year under Alternative 2.

PBR of Whales in the ORSVI

If seven whales from the ORSVI survey area were killed, this would exceed the PBR for whales in the ORSVI survey area proposed by the Makah (potentially seven whales killed compared to the PBR of 2.5 using current abundance estimates). In comparison, under the No-action Alternative there would be no risk of exceeding PBR. Alternative 3 would also result in an increased risk of exceeding PBR, compared to Alternative 2, under which the most likely scenario would result in the death of one ORSVI whale, and the maximum scenario would result in the death of three ORSVI whales.

4.4.3.3.3 Change in Distribution or Habitat Use

There is a risk that implementing Alternative 3 could result in a change in gray whale distribution or habitat use in the coastal portion of the Makah U&A or elsewhere in the PCFA survey area, for the same reasons as described under Alternative 2.

Migrating Whales

Migrating whales travel 1 to 2 miles offshore on their northward migration and may travel further from shore during the southward migration (Section 3.4.3.1.4, Seasonal Migrations). Because hunting under Alternative 3 could occur year round, it could affect both migrating and feeding gray whales. Thus fewer than 140 migrating gray whales would potentially be approached in a year and fewer than 28 would be subjected to unsuccessful harpoon attempts. The number of whales approached would be less than one percent of the total gray whale population of 20,000, while the number exposed to unsuccessful harpoon attempts (28) would be an even smaller fraction. Thus while there is a potential for implementation of Alternative 3 to result in migrating gray whales changing their distribution or habitat use, the risk is likely small, suggesting that gray whale distribution and habitat use will not change compared to the No-action Alternative..

Feeding Whales

Hunting under Alternative 3 could occur year round and much of it would potentially take place during the period from May through September. During the period from June 1 through November 30, any gray whale found in the Makah U&A would, by definition, be a Makah U&A whale, and, by extension, a PCFA whale. As described previously, between seven and 31 whales have been identified in the coastal portion of the Makah U&A in a single year, and between 129 and 206 have been identified in the PCFA in a single year. While the actual number of whales in the Makah U&A is likely larger, it is probably not larger than the number of whales in the larger ORSVI. With the potential for 140 approaches and 28 unsuccessful harpoon attempts over 40

days, it is mathematically possible that every Makah U&A whale could be approached by tribal hunting vessels on multiple occasions, and that every Makah U&A whale could be subject to harpoon attempts. For PCFA whales, the number of whales present in any year is also likely larger than the number observed, although the actual number is unknown.

It is reasonable to expect that approaches by Makah whale-hunting canoes would cause a disturbance similar to or less than that observed from approaches of motorized whale-watching vessels. Thus whale response to approaches is likely to be temporary (minutes or hours). It is less certain what effect an unsuccessful harpoon attempt would have. It is uncertain whether the intensity of unsuccessful harpoon attempts would result in more than a temporary disturbance of Makah U&A whales and cause them to avoid portions of the Makah U&A either for a short period (days to weeks), or a longer period (for example, over a period of years). It is also uncertain whether such disturbance in the Makah U&A would cause PCFA whales to change their distribution or habitat use in the larger PCFA survey area. As described in Section 4.4.2.3, Change in Distribution or Habitat Use, availability of prey may be the factor most strongly affecting gray whale distribution during feeding. If prey is available in the Makah U&A or PCFA, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Many new whales are seen in the Makah U&A every year (Section 3.4.3.3.1, Summer Range Distribution and Habitat Use). Thus even if some whales do abandon the area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area, suggesting that gray whale distribution and habitat use will not change compared to the No-action Alternative.

Compared to Alternative 2, Alternative 3 has a greater potential for resulting in a change in distribution or habitat use of feeding gray whales in the coastal portion of the Makah U&A and PCFA survey areas. The opportunity for year-round hunting under Alternative 3 means that all whales subject to approaches or unsuccessful harpoon attempts could be summer-feeding whales, representing a much larger proportion of Makah U&A and PCFA whales than would be the case under Alternative 2. In addition, the potential time in which feeding whales are exposed to hunting is much greater under Alternative 3.

4.4.3.3.4 Manner and Time to Death

As discussed in Section 4.1, Introduction, the number of gray whales that might be harvested from the ENP stock under all alternatives, including Alternative 3 and the No-action Alternative, would not change. It would remain at the existing IWC catch limit of 620 whales in a five-year

period, and no more than 140 whales in any one year. The difference is that under the No-action Alternative, the entire catch could be taken by Chukotka Natives, while under Alternative 3, the Makah Tribe could take up to 20 of the 620 catch limit.

Whales killed with a rifle in a Makah hunt under Alternative 3 could experience a shorter time to death than whales killed with a rifle in a Chukotka Native hunt under the No-action Alternative because of the requirements proposed by the Makah (such as minimum visibility) and because the Makah would use a higher caliber killing weapon than the Chukotka Natives use. Whales killed with an explosive grenade in either hunt would likely experience a similar time to death, thus Alternative 3 would probably not represent a difference in manner and time to death from the No-action Alternative. Thus compared to the No-action Alternative, Alternative 3 could result in the same or lesser time to death, depending on the weapon used.

The proportion of whales struck and lost could be greater in a Makah hunt under Alternative 3 than a Chukotka Native hunt under the No-action Alternative because the Chukotka Natives have more recent hunting experience. The Chukotka Natives report that 4 percent of the whales struck in their hunt are lost. It is not possible to predict a proportion of whales that would be struck and lost in a Makah hunt under Alternative 3, but the Tribe's proposal includes a potential of three whales struck and lost for four whales harvested before the seven-strike limit would be reached.

Compared to Alternative 2, under Alternative 3 it would be more likely that the Makah could take the total number of whales allowed because of the year-round season and the lack of limitations on identified whales. Implementation of Alternative 3 could also result in shorter times to death and fewer whales struck and lost than under Alternative 3. The ability to hunt in better weather and sea conditions than under Alternative 2 would likely improve the accuracy of the Makah harpooner and rifleman, increasing the chances that a projectile would hit its intended target and that a struck whale could be harvested.

4.4.3.4 Alternative 4

Alternative 4 would include the same limits on the number of whales harvested as Alternative 2 and would impose the same restrictions on the hunting season. The additional restrictions contained in Alternative 4 (no hunting within 200 yards of rocks and islands in the Washington Islands National Wildlife Refuges) would not affect the likely number of hunting expeditions, patterns of vessel traffic, or the number of whales potentially struck, harvested, or struck and lost. The potential effects to gray whale abundance, viability, distribution, and habitat use under this alternative would therefore likely be similar to that expected under Alternative 2. The methods of

striking and killing and the time to death under Alternative 4 would not differ from those anticipated under Alternative 2. The comparison between Alternative 4 and the No-action Alternative would be similar to the comparison between Alternative 2 and the No-action Alternative.

4.4.3.5 Alternative 5

Alternative 5 limits the number of whales that may be struck, harvested and struck and lost in any one year to three, two and one, respectively. There would be no limit on the harvest of PCFA whales. Year-round hunting would be allowed, making it likely that the full number of whales would be harvested. The expected number of hunting days would be 20 per year. Each year an estimated 60 whales would be approached by Makah whale-hunting vessels and an estimated 12 whales would be subjected to unsuccessful harpoon attempts.

4.4.3.5.1 Change in Abundance and Viability of ENP Gray Whales

Under Alternative 5, as with all of the alternatives, including the No-action Alternative, the same number of whales would likely be harvested – 620 over five years and no more than 140 in any single year. The potential effects on the abundance of the ENP gray whale stock would likewise be the same – an average annual reduction of 124 whales per year. The potential effect on viability of the ENP gray whale stock would be negligible because the mortality level would not approach PBR, as discussed above under the No-action Alternative. Alternative 5 would not change the risk to the abundance and viability of the ENP gray whale stock compared to the No-action Alternative.

4.4.3.5.2 Change in Abundance of Gray Whales Using the Makah U&A and ORSVI Survey Areas

Under Alternative 5 there could be an increased risk to abundance of gray whales using the Makah U&A and ORSVI survey areas, compared to the No-action Alternative. Under this alternative, there would be no limit on the hunting season or the number of identified whales that could be harvested. All of the hunting could occur during the summer period (June 1 through November 30), when any whale present in the Makah U&A would, by definition, be a Makah U&A and ORSVI whale. It is not possible to predict the likely number of identified whales that would be killed under this Alternative without knowing when tribal members would hunt. Of the three whales that could be killed per year under this Alternative, all three could be Makah U&A and ORSVI whales.

If three Makah U&A and ORSVI whales were killed under Alternative 5, it is uncertain whether other whales would take their place during the year in which they were killed. Whales identified in the PCFA survey area could take the place of whales removed from the ORSVI, and whales identified in the ORSVI survey area could take the place of whales removed from the Makah U&A. Gray whales feeding in the southern portion of the summer range move great distances within a year (Section 3.4.3.3.1, Summer Range Distribution and Habitat Use), thus it is reasonable to expect that some removed whales could be replaced in the year in which they were removed.

It is also uncertain how quickly Makah U&A and ORSVI whales removed under Alternative 5 would be replaced in subsequent years. All three whales killed under this scenario could be Makah U&A whales, which is higher than the average annual recruitment of 4.66 whales described under Alternative 2. As described in Section 3.4.3.3.1, Summer Range Distribution and Habitat Use, Calambokidis et al. (2004a) propose that whales likely recruit to the Makah U&A or other parts of the PCFA survey area from the migratory population randomly, as feeding habitat becomes available along the migration route. Thus it appears likely that at least some of the removed whales could be replaced in subsequent years. Under Alternative 5, the Tribe's harvest would not be adjusted based on abundance of ORSVI whales, although presumably if whales were not available to harvest, the Tribe's harvest level would potentially decrease as a practical matter.

Compared to the No-action Alternative, in which no Makah U&A or ORSVI whales are likely to be killed by hunting, Alternative 5 represents an increase in risk to the abundance of gray whales using the Makah U&A and ORSVI survey areas during the summer period. Although the precise number of Makah U&A and ORSVI whales removed cannot be predicted, as many as three could be killed each year. It is uncertain whether all three would be replaced during the year in which they were removed, or in the subsequent year.

Compared to Alternatives 2 and 4, Alternative 5 represents a potential three-fold increase in the risk to abundance of whales in the Makah U&A and ORSVI survey areas, because of the potential for three of these whales to be killed per year compared to about one whale per year under Alternatives 2 and 4. Compared to Alternative 3, Alternative 5 represents a lower risk because the maximum number of Makah U&A and ORSVI whales that could be removed would be smaller (three compared to seven).

PBR of Whales in the ORSVI

If three whales from the ORSVI survey area were killed, it would slightly exceed the PBR for whales in the ORSVI survey area proposed by the Makah (potentially three whales killed compared to the PBR of 2.5 using current abundance estimates). In comparison, under the No-action Alternative there would be no risk of exceeding PBR. Alternative 5 could also result in an increased risk of exceeding PBR compared to Alternatives 2 and 4. The likely scenario under Alternatives 2 and 4 is that one ORSVI whale would be killed, while the maximum scenario is that three Makah ORSVI whales would be killed. Compared to Alternative 3, Alternative 5 would have a lower risk of exceeding PBR because the potential number of ORSVI whales killed would be smaller (three versus seven).

4.4.3.5.3 Change in Distribution or Habitat Use

There is a risk that implementing Alternative 5 could result in a change in gray whale distribution or habitat use in the coastal portion of the Makah U&A or elsewhere in the PCFA survey area, for the same reasons as described under Alternative 2.

Migrating Whales

Migrating whales travel 1 to 2 miles offshore on their northward migration and may travel further from shore during the southward migration (Section 3.4.3.1.4, Seasonal Migrations). Because hunting under Alternative 3 could occur year round, it could affect both migrating and feeding gray whales. Thus fewer than 60 migrating gray whales would potentially be approached in a year and fewer than 12 would be subjected to unsuccessful harpoon attempts. The number of whales approached would be less than one percent of the total gray whale population of 20,000, while the number exposed to unsuccessful harpoon attempts (12) would be an even smaller fraction. Thus while there is a potential for implementation of Alternative 5 to result in migrating gray whales changing their distribution or habitat use, the risk is likely small, suggesting that gray whale distribution and habitat use will not change compared to the No-action Alternative.

Feeding Whales

Hunting under Alternative 5 could occur year round and much of it would potentially take place during the period from May through September. During the period from June 1 through November 30, any gray whale found in the Makah U&A would, by definition, be a Makah U&A whale, and, by extension, a PCFA whale. As described previously, between seven and 31 whales have been identified in the Makah U&A in a single year, and between 129 and 206 have been identified in the PCFA in a single year. While the actual number of whales in the Makah U&A is

likely larger, it is probably not larger than the number of whales in the larger ORSVI. With the potential for 60 approaches and 12 unsuccessful harpoon attempts over 40 days, it is mathematically possible that every Makah U&A whale could be approached by tribal hunting vessels on multiple occasions, and that a substantial proportion of Makah U&A whales could be subjected to harpoon attempts. For PCFA whales, the number of whales present in any year is also likely larger than the number observed, although the actual number is unknown.

It is reasonable to expect that approaches by Makah whale-hunting canoes would cause a disturbance similar to or less than that observed from approaches of motorized whale-watching vessels. Thus whale response to approaches is likely to be temporary (minutes or hours). It is less certain what effect an unsuccessful harpoon attempt would have. It is uncertain whether the intensity of unsuccessful harpoon attempts would result in more than a temporary disturbance of Makah U&A whales and cause them to avoid portions of the Makah U&A either for a short period (days to weeks), or a longer period (for example, over a period of years). It is also uncertain whether such disturbance in the Makah U&A would cause PCFA whales to change their distribution or habitat use in the larger PCFA survey area. As described in Section 4.4.2.3, Change in Distribution or Habitat Use, availability of prey may be the factor most strongly affecting gray whale distribution during feeding. If prey is available in the Makah U&A or PCFA, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Many new whales are seen in the Makah U&A every year (Section 3.4.3.3.1, Summer Range Distribution and Habitat Use). Thus even if some whales do abandon the area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area, indicating that gray whale distribution and habitat use will not change compared to the No-action Alternative.

Compared to Alternatives 2 and 4, Alternative 5 has a greater potential for resulting in a change in distribution or habitat use of feeding gray whales in the Makah U&A and PCFA survey areas. The opportunity for year-round hunting under Alternative 5 means that all whales subject to approaches or unsuccessful harpoon attempts could be summer-feeding whales, representing a larger proportion of Makah U&A and PCFA whales than would be the case under Alternatives 2 and 4. Compared to Alternative 3, Alternative 5 has a lower potential for resulting in a change in distribution or habitat use of feeding gray whales in the Makah U&A and PCFA survey areas. Although both alternatives allow year-round hunting and could result in most hunting occurring during the summer period, fewer whales would be approached or subjected to unsuccessful harpoon attempts.

4.4.3.5.4 Manner and Time to Death

Alternative 5 would have the same effects regarding manner and time to death for gray whales as described under Alternatives 2, 3, and 4, except that the total number of whales killed in a Makah hunt would be 10 rather than 20. Hunting efficiency could be one whale struck and lost for two whales harvested and so would be about the same as under Alternatives 2, 3, and 4, as compared to the No-action Alternative.

4.4.3.6 Alternative 6

Under Alternative 6, whale hunting may occur year round in both the coastal and Strait of Juan de Fuca portions of the Makah U&A. An average of four whales per year could be harvested, seven whales could be struck, and three struck and lost. During any five-year period, up to 20 whales might be harvested, with 35 struck and 15 struck and lost. Whales that are struck are considered killed. As many as 140 whales may be approached by whale-hunting vessels in any one year and up to 28 whales may be subjected to harpoon attempts. Hunting could potentially occur on a total of 40 days. Given the opportunity to hunt year round, it is likely the Tribe would be able to harvest the full number of whales allowed.

4.4.3.6.1 Change in Abundance and Viability of ENP Gray Whales

Under Alternative 6, as with all of the alternatives, including the No-action Alternative, the same number of whales would likely be harvested – 620 over five years and no more than 140 in any single year. The potential effects on the abundance of the ENP gray whale stock would likewise be the same – an average annual reduction of 124 whales per year. The potential effect on viability of the ENP gray whale stock would be negligible because the mortality level would not approach PBR, as discussed above under the No-action Alternative. Alternative 6 would not change the risk to the abundance and viability of the ENP gray whale stock compared to the No-action Alternative.

4.4.3.6.2 Change in Abundance of Gray Whales Using the Makah U&A and ORSVI Survey Areas

Under Alternative 6 there could be an increased risk to abundance of gray whales using the Makah U&A and ORSVI survey areas, compared to the No-action Alternative. This increase would be the same as that described under Alternative 3, for the reasons described in Section 4.4.2.2, Change in Abundance of Gray Whales Using the Makah U&A or ORSVI Survey Areas.

4.4.3.6.3 Change in Distribution or Habitat Use

There is a risk that implementing Alternative 6 could result in a change in gray whale distribution or habitat use in the overall Makah U&A or elsewhere in the PCFA survey area, for the same reasons as described under Alternative 2.

Migrating Whales

Migrating whales travel 1 to 2 miles offshore on their northward migration and may travel further from shore during the southward migration (Section 3.4.3.1.4, Seasonal Migrations). Because hunting under Alternative 3 could occur year round, it could affect both migrating and feeding gray whales. Thus fewer than 140 migrating gray whales would potentially be approached in a year and fewer than 28 would be subjected to unsuccessful harpoon attempts. The number of whales approached would be less than one percent of the total gray whale population of 20,000, while the number exposed to unsuccessful harpoon attempts (28) would be an even smaller fraction. Thus while there is a potential for implementation of Alternative 6 to result in migrating gray whales changing their distribution or habitat use, the risk is likely small, indicating that gray whale distribution and habitat use will not change compared to the No-action Alternative.

Feeding Whales

Hunting under Alternative 6 could occur year round and much of it would potentially take place during the period from May through September. Hunting would also likely occur in the Strait of Juan de Fuca portion of the Makah U&A. During the period from June 1 through November 30, any gray whale found in the Makah U&A would, by definition, be a Makah U&A whale, and, by extension, a PCFA whale. As described in Section 3.4.3.3.1, Summer Range Distribution and Habitat Use, between 8 and 35 whales have been identified in the overall Makah U&A in a single year, and between 129 and 206 have been identified in the PCFA in a single year. While the actual number of whales in the Makah U&A is likely larger, it is probably not larger than the number of whales in the larger ORSVI. With the potential for 140 approaches and 28 unsuccessful harpoon attempts over 40 days, it is mathematically possible that every Makah U&A whale could be approached by tribal hunting vessels on multiple occasions, and that every Makah U&A whale could be subject to harpoon attempts. For PCFA whales, the number of whales present in any year is also likely larger than the number observed, although the actual number is unknown.

It is reasonable to expect that approaches by Makah whale-hunting canoes would cause a disturbance similar to or less than that observed from approaches of motorized whale-watching

vessels. Thus whale response to approaches is likely to be temporary (minutes or hours). It is less certain what effect an unsuccessful harpoon attempt would have. It is uncertain whether the intensity of unsuccessful harpoon attempts would result in more than a temporary disturbance of Makah U&A whales and cause them to avoid portions of the Makah U&A either for a short period (days to weeks), or a longer period (for example, over a period of years). It is also uncertain whether such disturbance in the Makah U&A would cause PCFA whales to change their distribution or habitat use in the larger PCFA survey area. As described in Section 4.4.2.3, Change in Distribution or Habitat Use, availability of prey may be the factor most strongly affecting gray whale distribution during feeding. If prey is available in the Makah U&A or PCFA, hunting by the Makah Tribe might not result in either a short- or long-term response from summer-feeding whales. Many new whales are seen in the Makah U&A every year (Section 3.4.3.3.1, Summer Range Distribution and Habitat Use). Thus even if some whales do abandon the area as a result of hunting disturbance, new whales that had not previously been exposed to hunting might come into the area, suggesting that gray whale distribution and habitat use will not change compared to the No-action Alternative.

Compared to all other action alternatives, the opportunity to hunt in the Strait of Juan de Fuca portion of the Makah U&A under Alternative 6 means that a change in gray whale distribution could occur in the strait as well as in the coastal portion of the Makah U&A.

Compared to Alternatives 2 and 4, Alternative 6 has a greater potential for resulting in a change in distribution or habitat use of feeding gray whales in the Makah U&A and PCFA survey areas. The opportunity for year-round hunting under Alternative 6 means that all whales subject to approaches or unsuccessful harpoon attempts could be summer-feeding whales, representing a much larger proportion of Makah U&A and PCFA whales than would be the case under Alternatives 2 and 4.

Compared to Alternative 3, Alternative 6 would have similar effects, except that the opportunity to hunt in the Strait of Juan de Fuca portion of the Makah U&A means that a change in gray whale distribution could occur in that area as well. Compared to Alternative 5, Alternative 6 has a greater potential to result in a change in distribution or habitat use of gray whales because more whales would be subjected to approaches and unsuccessful harpoon attempts.

4.4.3.6.4 Manner and Time to Death

Alternative 6 would have the same effects regarding manner and time to death for gray whales as described under Alternatives 2 through 4. Hunting efficiency could be one whale struck and lost

for two whales harvested and so would be about the same as under Alternatives 2 through 4, as compared to the No-action Alternative.

4.5 Other Wildlife

4.5.1 Introduction

This section addresses the potential for the proposed alternatives to affect wildlife species in the project area. Species analyzed in this section include marine mammals (other than gray whales, see Section 4.5), birds, and reptiles (i.e., sea turtles). Analyses in this section address all species identified in Section 3.5, Other Wildlife Species, as occurring in the project area, including those listed as threatened or endangered under the ESA and those not listed. This analysis focuses on wildlife species that may occur in the project area and that have potential to be affected by hunt-related activities. For species that are not likely to occur near proposed hunt activities, no effects are expected.

There are three primary sources of potential effects of whale-hunt-related activities on wildlife considered in this analysis. First are the potential direct effects related to visual and noise disturbance from anticipated concentrations of aircraft and boat traffic and the use of guns and explosives associated with any hunt. Such disturbance may disrupt the behavior of individuals or groups of animals in the project area. Second are the potential indirect effects from visual and noise disturbance that may disrupt prey distribution or abundance, resulting in decreased foraging efficiency. Third is the potential for direct harm to marine mammals (other than gray whales) from increased vessel traffic and hunt-related activities that could cause injury or death if a marine mammal was struck by a vessel or a projectile associated with a hunt. The following sections discuss these issues in greater detail.

4.5.2 Evaluation Criteria

Three evaluation criteria were used to assess the potential direct and indirect effects of the alternatives on other wildlife species in the project area: potential changes in behavior due to disturbance (visual and noise), potential changes in prey availability, and potential for physical injury (e.g., from ship strikes or weapons). These criteria provide a way to analyze the potential effects of the alternatives on wildlife.

The following sections describe the potential for the alternatives to affect wildlife in the project area. For each alternative, the discussion addresses potential disturbance and injury and, where relevant, potential changes in prey availability. For each criterion, potential effects on marine

mammals (excluding gray whales) are described first, followed by birds and reptiles (turtles). For each species group, ESA-listed endangered and threatened species are addressed first, followed by those species that are not listed. Non-listed seabirds and other birds that use coastal habitats are analyzed by habitat association, described under Section 3.5.3.2.2, Non-listed Birds and Their Associated Habitats. That section reviews the habitat associations and discusses which species of birds are included in each zone. To reduce repetition, species that would probably be affected similarly under a particular evaluation criterion are addressed together.

4.5.2.1 Disturbance

Section 4.11, Noise, describes the sources and level of noise-related disturbance that may occur during a hunt. Section 3.5.3.3, Sensitivity of Wildlife to Noise and Other Disturbance, describes how wildlife typically respond to these types and sources of noise. Many activities associated with a whale hunt have the potential to generate noise levels that would exceed ambient levels in parts of the project area (Section 4.11.2.1, Noise Generated by Hunt-related Activities). Under current conditions, noise from vehicles, marine vessels, and aircraft is commonly heard throughout the Makah U&A. Other sources of noise include commercial areas, sports fields, logging operations, and the foghorn at Tatoosh Island. Natural sounds, such as those of wind and surf, contribute to high ambient noise levels in portions of the project area, particularly in areas close to the shoreline of the Pacific coast and the Strait of Juan de Fuca. A whale hunt and associated monitoring, protests, and law enforcement would be expected to result in increased noise and human activity levels. In addition, firearms and other explosive devices used to strike and kill a whale would produce high-intensity, short-duration noise.

Sources of noise and visual disturbance associated with whale hunt activities include aircraft overflights (both fixed wing and helicopter), boat traffic (including both motorized and non-motorized craft), gunfire, and explosives. Anthropogenic noise can be either transient or continuous and can result in a variety of effects on wildlife with consequences ranging from none to severe (Würsig and Richardson 2002). Examples of transient noise associated with whale-hunting under the action alternatives would include helicopters, planes, and explosions; examples of continuous noise include vessels underway.

Among the proposed alternatives, the No-action Alternative would pose the lowest risk of disturbance to other species of wildlife. Under all of the action alternatives, the greatest potential for direct effects on other wildlife species would be from noise and visual disturbance related to

increased human activity directly and indirectly associated with a whale hunt. This analysis considers the likelihood of effects on wildlife due to such increased disturbance.

Analyses in this section consider the nature and magnitude of hunt-related activities in relation to wildlife occurrence and behavior (e.g., nesting, migration, foraging, nursing, and other critical survival activities). For each species, species group, or habitat type, the analysis examines the proximity of hunt-related activities to sensitive areas (e.g., rookeries, nest sites, haulout sites). Alterations in wildlife behavior may occur if vessels, or aircraft associated with hunt-related activities travel through locations close enough to sensitive areas to disturb animals (Section 3.5.3.3.2, Boat Traffic, and Section 3.4.3.6.6, Vessel Interactions).

It is possible that the number and types of vessels and aircraft that would participate in each hunting expedition (including observation, protests, law enforcement, and media coverage) would vary among the action alternatives. For example, alternatives that allow year-round hunting could result in a greater number of observers overall because of an increased likelihood of more hunting occurring during periods of good weather. Conversely, alternatives that allow more hunts might attract less public interest over time and less media coverage. Because of the difficulty of predicting such variations, and how they might affect the precise numbers of vessels and aircraft participating in each hunt, this analysis assumes each hunting expedition would be accompanied by the same amount of vessel and aircraft activity and associated disturbance. Vessels and aircraft associated with each hunt would likely be similar to those associated with the previous hunts, described in Section 3.11.3.2.1, Atmospheric Noise. It is not possible to predict the specific location of hunt-related activity on a given day under any action alternative. The area in which hunting would be allowed would be the same among the action alternatives with two exceptions: (1) under Alternative 4, hunting would not be allowed within 200 yards of rocks and islands in the project area, and (2) under Alternative 6, hunting could also occur in the Strait of Juan de Fuca.

4.5.2.1.1 Marine Mammals (excluding Gray Whales)

As described in detail in Section 3.5.3.3, Sensitivity of Wildlife to Noise and Other Disturbance, marine mammals in the coastal environment (e.g., seals, sea lions, and sea otters) may react to changes in noise and human presence by altering behaviors such as breeding, nursing, grooming, foraging, or resting. The effects of such disturbance on marine mammals would be related primarily to the type, level, timing, and location of disturbance relative to species locations and activity. Animals might be disturbed at haulout sites and spend more time in the water, thereby

reducing rest periods, altering nursing frequency, and modifying thermoregulation. Species that breed in the project area (i.e., harbor seals and sea otters) could be disturbed during the summer, when hunt activities might disrupt pupping or breeding activities or interrupt the female/pup bond during nursing.

Whales, dolphins, and porpoises might react to increased disturbance related to a hunt by changing their swim speed or direction or increasing dive duration. The sight and sound of vessels might also disturb the foraging behavior of seals and sea lions in the water and may affect foraging and grooming behaviors of sea otters. Noise from vessels, aircraft, and weapons associated with whale hunting might disrupt the ability of predatory species (e.g., killer whales) to communicate and to locate or obtain prey. For all of these species of marine mammals, any resultant effects would likely be temporary (lasting a few minutes to a few hours) and localized (occurring near the hunt).

Section 4.11.2.1, Noise Generated by Hunt-related Activities, discusses the level and duration of noise anticipated from weapon use and vessel and aircraft activity associated with hunting. It is not possible to predict in advance the exact level of atmospheric or underwater noise that vessels and aircraft would produce on a typical day of hunting. Depending on the method used to kill a struck whale, the loudest noise levels associated with hunting would be from gunshots (atmospheric noise) or grenade explosions (underwater noise) (Section 4.11.2.1, Noise Generated by Hunt-related Activities). Noise from a gunshot would probably decay to ambient levels within 1 or 2 miles of the source (although this distance cannot be determined with certainty), while a grenade explosion underwater might not decay to ambient levels for several miles. Noise from these sources would last only a few seconds.

Overall, the number of marine mammals that would potentially occur close enough to hunting activities to be affected by the associated noise would probably be low. As presented in Table 3-11, frequency of occurrence of about half of the federal- and state-listed species of marine mammals in the project area is uncommon or rare. Nearly all of the species of marine mammals that may occur in the project area, including ESA-listed species, are wide-ranging and may travel long distances as part of their normal daily movements. Sea otters do not typically travel long distances on a daily basis but are known to travel extensively in the vicinity of the Makah U&A (Lance et al. 2004). Thus, any changes in behavior of these species due to disturbance from whale hunt-related activities would likely be temporary and would probably not have lasting effects on

individuals or populations. Noise effects specific to particular species and species groups of wildlife are discussed below.

ESA-listed Marine Mammals

Several ESA-listed species of wildlife are known to occur in the project area but would probably not be affected by the proposed whale-hunt-related activities because of their rare to uncommon occurrence along the Washington coast and/or their use of habitats too far from shore to encounter any hunt-related activities in the project area (Table 3-11). These species include five ESA-listed species of whales (sperm, blue, sei, fin, and right) and one ESA-listed pinniped (Steller sea lion). When present in Washington waters, all of the whale species typically occur in pelagic deep waters offshore in the Makah U&A beyond the bounds of where proposed hunting would likely occur. There may be brief periods during hunt-related activities, particularly as a result of aircraft activities or grenade explosions, when ESA-listed marine mammals would be exposed to increased noise levels and might modify their behavior (dive duration, swim direction, etc.) in response. Although ESA-listed species of marine mammals have a low likelihood of encountering hunt-related activities, the species that would have the highest likelihood of encountering hunt-related activities include the Steller sea lion, killer whale, and humpback whale. These species are discussed in further detail below.

As mentioned above, all species of marine mammals that may occur in the project area, including ESA-listed species, are wide-ranging and may travel long distances as part of their normal daily movements. Any changes in behavior of these species due to whale hunt-related disturbance would likely be temporary and would probably not have lasting effects.

Steller Sea Lion

Steller sea lions are common in and near the project area throughout the year and are most abundant in late summer, fall, and winter. They use offshore islands and rocks for resting and to nurse pups. Most offshore islands and rocks in the project area are less than 1 mile from the shoreline, whereas most hunting under the action alternatives would probably take place 1 mile or more offshore (as was the case with previous hunts). It is unlikely that any whale hunt activities would occur close to haulout sites for Steller sea lions, although the noise associated with helicopters and gunshots, especially, would carry much farther than the immediate hunt area. Steller sea lions also forage in waters within the Makah U&A. Disturbance associated with the use of vessels associated with a hunt might occasionally disrupt foraging behavior of Steller sea lions in the project area. As with other species of marine mammals that may occur in the project

area, Steller sea lions are wide-ranging and may travel long distances as part of their normal daily movements. Any changes in behavior due to whale-hunt-related disturbance would likely be localized and temporary and would probably not have lasting effects.

Killer Whale

Offshore, transient, and southern resident killer whales might occur in or near the project area year round. Of these, southern residents are the most likely to occur in the project area and may be present at any time of year (Section 3.5.3.1.1, ESA-Listed Marine Mammal Species). Transient whales may also be present sporadically. The greatest number of southern resident killer whales have been sighted in the summer in inland waters east of the Makah U&A. Very little information is available about the movements of southern resident killer whales off the Washington coast. It is unclear whether these whales spend a substantial amount of their time in the Strait of Juan de Fuca (71 FR 69054, November 29, 2006). Nonetheless, the potential exists for killer whales to be in the vicinity of a whale hunt and thus disturbed by the associated activities under any of the action alternatives.

As with other species of marine mammals, noise and human activity related to the use of vessels associated with whale hunting might cause killer whales to modify their behavior. As discussed in 3.5.3.3.1, ESA-listed Marine Mammal Species, listing factors for the killer whale included, among other things, noise and disturbance from vessel traffic. Killer whales may temporarily change dive duration or swim direction, for example, in response to hunt-related disturbance, particularly disturbance associated with the use of aircraft. Disturbance from vessels, aircraft, and weapons associated with whale hunting also has the potential to disrupt the ability of killer whales to communicate or find prey. As with other species of marine mammals that may occur in the project area, killer whales are wide-ranging and may travel long distances as part of their normal daily movements. Any changes in behavior of these species due to whale hunt-related disturbance would likely be localized and temporary and would probably not have lasting effects.

As discussed in 3.5.3.3.1, ESA-listed Marine Mammal Species, the primary constituent elements for the southern resident killer whale critical habitat include (1) water quality to support growth and development; (2) prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth; and (3) passage conditions to allow for migration, resting, and foraging. None of the proposed alternatives would appreciably affect these elements of critical habitat for this species.

Humpback Whale

Humpback whales occur occasionally in or near the project area and might occur in the vicinity of a whale hunt. Noise and visual disturbance from vessels, aircraft, or weapons could thus affect humpback whales above or below the water. Potential effects would include changed swim speed or direction or increased dive duration to avoid the noise.

As mentioned above, all species of marine mammals that may occur in the project area, including humpback whales, are wide-ranging and may travel long distances as part of their normal daily movements. Thus, any changes in behavior (migration, movements, and habitat use) of these species due to whale-hunt-related activities would likely be temporary and would probably not have lasting effects.

Non-ESA-listed Cetaceans

Of the 15 non-listed species of cetaceans discussed in Section 3.5.3.1, Marine Mammals, 12 are rare or uncommon off the Washington coast and/or use habitats in the pelagic environment, far from the vicinity of whale-hunting activities in the project area (Table 3-11). Thus these 12 species would probably not be affected by whale-hunt-related activities and are not considered further in this analysis. These 12 species include northern right whale dolphin, common dolphin, striped dolphin, Risso's dolphin, false killer whale, pilot whale, pygmy sperm whale, minke whale, Baird's beaked whale, curvier beaked whale, Hubb's beaked whale, and Stejneger's beaked whale. The three exceptions are harbor porpoise, which occur in the coastal environment, and Dall's porpoise and Pacific white-sided dolphins, which are infrequent visitors there. When any of these three species are present in coastal areas during a hunt, they would probably be affected by disturbance from vessels, aircraft, or weapons associated with a whale hunt. Whales, dolphins, and porpoises might react to hunt-related disturbance by changing their swim speed or direction or increasing dive duration. Noise from vessels, aircraft, and weapons associated with whale hunting might disrupt the ability of predatory species (e.g., killer whales) to communicate and to locate or obtain prey.

As mentioned above, all species of marine mammals that may occur in the project area, including the non-ESA-listed species of cetaceans, are wide-ranging and may travel long distances as part of their normal daily movements. Any changes in behavior of these species due to whale hunt-related activities would likely be temporary and would probably not have lasting effects.

Non-ESA-listed Pinnipeds

As discussed in Section 3.5.3.1, Marine Mammals, four non-ESA-listed species of pinnipeds are known to occur in the project area: harbor seal, California sea lion, northern elephant seal, and

northern fur seal. Of these species, only the California sea lions and harbor seals have a reasonable potential to occur in the vicinity of a hunt in the project area (Section 3.5.3.1.2, Common Species off Washington Coast). Northern fur seals and northern elephant seals occur infrequently and in relatively low abundance in the project area, or they occur in the pelagic environment where they would probably not encounter whale hunt-related activities. California sea lions and harbor seals are, however, common in the project area. Similar to Steller sea lions, both species use offshore islands and rocks for resting (California sea lions) or to nurse pups (harbor seals), thus their haulout sites would have a very low likelihood of being affected by hunt-related activities in the project area. California sea lions and harbor seals also forage in waters throughout the Makah U&A. Any potential effects on these species would likely be identical to those described above for Steller sea lions; any changes in behavior of these species due to whale hunt-related disturbance would likely be temporary and localized.

Northern Sea Otter

Northern sea otters are common in the project area throughout the year and can travel extensively or shift their distribution seasonally to forage or seek more sheltered waters (Lance et al. 2004). They generally inhabit shallow coastal waters less than 1 mile from shore, but they may occasionally be seen as far as 3 miles offshore. Disturbance from the use of vessels, aircraft, or weapons associated with whale hunting (as discussed in Section 4.5.2.1.1, Marine Mammals (excluding gray whales)) might affect sea otters that are swimming, foraging, or grooming in or near the project area, by causing them to spend time avoiding the activity and thus reducing foraging, resting, grooming, and breeding activities, including nursing or caring for young.

4.5.2.1.2 Other Marine Wildlife

ESA-Listed Species

Several ESA-listed species of wildlife are known to occur in the project area, including three ESA-listed species of birds (short-tailed albatross, brown pelican, and marbled murrelet) and four species of sea turtles (leatherback, green, loggerhead, and olive ridley). Although the bald eagle was recently delisted, the species is still protected under the Bald and Golden Protection Act, and is thus addressed with the other ESA-listed species below.

Short-tailed Albatross

When present in Washington waters, short-tailed albatrosses typically occur in pelagic, deep waters offshore in the Makah U&A beyond the bounds of where proposed hunting would occur. There may be brief periods during hunt-related activities, particularly as a result of aircraft

activities or grenade explosions, when a short-tailed albatross would be exposed to increased noise levels and might modify its behavior in response, but the likelihood of such an encounter would be low.

As is the case for most marine mammals in the project area, short-tailed albatrosses are wide-ranging and may travel long distances as part of their normal daily movements. Any changes in behavior of these species due to whale hunt-related disturbance would likely be temporary and localized.

Brown Pelican

Brown pelicans typically breed outside the region and arrive along the coast of Washington in June, foraging on schools of fish in and near the project area. Disturbance associated with vessel traffic, weapons discharge, or aircraft may inhibit foraging activities of brown pelicans in a particular area. If this occurs, pelicans would most likely move to other food sources nearby without detriment to energy resources, because schools of fish typically are available at numerous points along the coast. It is unknown how far away a hunt could occur without interfering with pelicans' foraging activities. Any negative impacts would probably be temporary and localized. The more often the hunt were conducted during the period pelicans are present, the greater the chance that it would disrupt pelican foraging activities.

Marbled Murrelet

Murrelets either dive or paddle away when approached by a boat, depending on the speed of the boat. If disturbance occurs in a foraging area where murrelets congregate, the birds potentially could lose an opportunity to find a fish. It is unknown how murrelets react to gunfire, helicopters, and other loud disturbances to which these birds are unaccustomed, although helicopters and gunfire would probably cause them to either dive or fly away from the area completely (Nelson 1997). Flushing birds might stress their energy reserves, given that they have to fly long distances to bring fish to their young during the breeding season (April 1 through September 15). The time of day that the disturbance occurred might also make a difference in the degree of impacts on this species. During the breeding season, most foraging takes place during the early morning hours (Nelson 1997).

Whale hunts and associated activities under action alternatives could disturb adult murrelets foraging at sea, potentially reducing the amount of prey brought to chicks. The likelihood of any disturbance is low, however, because hunt-related activities would occupy a small proportion of

the project area at any given time. Marbled murrelets would likely be able to find foraging opportunities in areas where no disturbance would occur, although this could be more difficult for birds undergoing a two-month molt (which occurs during the latter half of the year).

Bald Eagle

As mentioned above, although bald eagles were recently removed from the ESA list of threatened species, this analysis includes them in the section on ESA-listed species, to provide them particular consideration. Bald eagles are present in the project area throughout the year and they nest, roost, and forage along the coastline. Bald eagles are known to flush off nests and roost sites when people or vessels get too close, and they may be deterred from foraging in an area where many vessels congregate on the water (Stinson et al. 2001). Bald eagles are more sensitive to disturbance during the spring months when they nest. Flushing off their nests, particularly at the beginning of the breeding season, might cause nest abandonment or a reduction in physical conditions, which could in turn affect the ability to feed chicks. Once chicks hatch in May, there would be less likelihood of nest abandonment.

It is unlikely that any whale hunt activities would occur close to active bald eagle nests, as previous hunts have occurred 1 to 2 miles offshore; however, the noise associated with helicopters and gunshots, especially, would carry much farther than the immediate hunt area. The first few years would potentially result in the greatest risk of negative effects from noise to nesting bald eagles, as over the longer term they might acclimate to the noise and visual disturbance associated with hunt activities. Thus, production of chicks might drop for a few years until the eagles became acclimated.

Helicopters and fixed-wing aircraft and increased human activity associated with hunt-related activities would probably alter the behavior of bald eagles that may be present in the project area during a hunt. Bald eagles flush away from nesting or foraging sites when approached by helicopters as close as 0.4 mile. Flushing distances are greater in the breeding season than in winter. While eagles would flush when helicopters come within 1,000 feet in the winter, they would flush if helicopters would approach to within 1,500 feet when on a nest (Stalmaster and Kaiser 1997). It is likely that some eagles cannot tolerate human presence and its associated noise within a particular distance of their feeding or nesting activities.

Sea Turtles

Four species of sea turtles occasionally occur along the Washington coast: leatherback, green, loggerhead, and olive ridley. Leatherback sea turtles are seldom seen in the project area, but they may migrate along the Washington coast during non-breeding years; thus, they could be found in the project area at any point in time. This species occasionally forages in the deep pelagic waters off the Washington coast. Rarely, leatherbacks appear in bays and estuaries, although such venues are not their preferred habitat. Green, loggerhead, and olive ridley sea turtles are found in warmer waters and only approach the Washington coast in El Niño years. All four of these species of turtles would most likely continue to forage along the Washington coast under the action alternatives, especially during warm winter years. These species of turtles are not easily disturbed during foraging activities; if approached by boats, they would most likely move slowly away from any sources of disturbance. There may be some short-term effects related to temporary disturbance from hunt-related activities that would cause them to move away from a preferred feeding area, but this would probably be temporary. Since none of these species of turtles nests in Washington State, there would be no expected impacts from whale-hunt-related activities on their nests or nesting habitat.

Non-Listed Marine Birds and Their Associated Habitat

The project area includes some of the largest seabird colonies in the continental United States, with more than 100 species of birds using this area for nesting, wintering, or foraging. Analyses in this section focus on the six types of habitat these species use and the effects that the alternatives would have on these habitat types. All six habitat associations (beaches, bays, and estuaries; headlands and islands; nearshore marine habitat; inland marine habitat; marine shelf habitat; and oceanic habitat) are present in the project area and are discussed individually where appropriate.

Beaches, Bays, and Estuaries

The beaches, bays, and estuaries along the Olympic coast support large numbers of marine and shorebirds for both breeding and foraging, particularly during migration. These habitat associations support the highest numbers of species compared with other habitat associations. Disturbance from vessels and aircraft that pass near beaches, bays, and estuaries may have short-term effects on breeding colonies and migrating birds that use these habitat associations. Gunfire and helicopter noise is particularly likely to flush birds off nests if it is close to shore where these birds are nesting or if they are foraging just offshore. Additionally, noise from powerboats that approach the shore could cause birds unaccustomed to this activity temporarily to flush off nests.

If disturbance occurred during the breeding season (generally spring and summer), some nest abandonment might occur. It is difficult to determine what impact this type of direct short-term effect would have on the long-term productivity of populations as a whole, although it might be a negligible loss.

Potential disturbance of individual pairs of nesting birds that happened to be close to a whale butchering site on the shore could cause loss of that year's chicks. Any harvested whale would probably be brought to a beach on the Makah Reservation, so nesting colonies (and migrating aggregations) on the reservation would face the greatest risk of disturbance and displacement under the action alternatives. That risk would be associated primarily with the number of whales harvested.

As mentioned in Section 3.5.3.2.2, Non-listed Birds and Their Associated Habitats, human-made structures, such as jetties, pilings, and buoys, provide important roosting habitat for cormorants, gulls, and other birds. None of the proposed alternatives would alter any existing human-made structures, or result in the construction of new ones, that may be used by these species for roosting.

Coastal Headlands and Islands

Large numbers of ledge-nesting birds inhabit offshore rocks and islands in the project area. Coastal headlands and islands provide critical nesting, foraging, and overwinter migratory habitat for these species. Species of ledge-nesting birds in the project area may be easily flushed off nest sites, leading to abandonment, predation, and subsequent nest failure. In addition, raptors, passerines, and other marine birds also use these habitat associations. Noise associated with hunt activities, should hunting occur close to the headlands and islands, could potentially flush birds off nest sites, similar to the short- and long-term impacts discussed above under Beaches, Bays, and Estuaries. The potential for ledge-nesting species of birds to be affected by whale hunt-related activities in the project area, and the degree of effect, would depend largely on the timing and proximity of any potential hunt-related disturbance. The potential for such disturbance, and impacts to these species, would be greater under alternatives associated with higher numbers of days of hunting and those with hunting potentially occurring during the breeding season. Concerns about disturbance of birds on islands might be reduced under Alternative 4, which is the same as the Makah proposed hunt but restricts hunt-related activity around all rocks and islands.

Nearshore Marine Zone

Birds in the project area use nearshore marine habitats primarily for foraging. A variety of common marine birds also use this area as a migration corridor. Species richness and bird abundance are greatest in winter, although some seabirds may concentrate in large numbers during the summer. Species richness is relatively low in inland marine waters, with richness and bird densities higher in winter than summer. Most species found in this area forage in the winter or during migration.

Nearshore marine habitats are one of the zones where whale hunting could occur under the action alternatives. The nearshore zone occurs mostly within 1 mile of the shoreline. As with the previous hunts, most hunting under the action alternatives would probably take place 1 mile or more offshore. Noise from vessels and aircraft, gunfire, and other hunt-related activities would probably not be as intense as in the continental shelf zone farther offshore. The potential for hunt-related activities to result in disturbance of birds using nearshore marine habitats, therefore, would be relatively low compared to the potential for disturbance in habitats farther offshore. Whale hunting during summer (under Alternatives 3, 5, and 6), however, may target whales that are feeding in the project area, and may therefore take place closer to shore than hunting during winter or spring, which may target migrating whales further offshore (Alternatives 2 and 4).

Vessel noise and human activity associated with hunt activities would displace foraging birds. When a whale is harpooned, all birds foraging within a few hundred feet of the whale hunt would probably flush in response to the sounds of gunfire, helicopters, or other loud devices. Interrupted foraging might lead to increased stress on birds' metabolism, but the short- or long-term effects on the populations as a whole would be difficult to determine. Because bird densities are moderate in these habitat associations, the risk of losing nesting, foraging, and migrating birds would also be at moderate levels, even under current conditions.

Continental Shelf

This zone provides foraging habitat and a migration corridor for a variety of marine birds and turtles, primarily during winter and during late summer/early fall when both residents and migrants abound. Because bird densities are lower in this habitat association, the risk of losing foraging and migrating birds is also lower, compared to other zones closer to shore.

Much of this zone is 1 mile or more offshore, which corresponds with the area where most hunting under the action alternatives would probably take place (as was the case with previous hunts). Because the density of birds in this zone is lower than in areas closer to shore, and

because no breeding or roosting occurs in this zone, the risk of disturbance in these habitat associations would be lower than the risk in nearshore zones.

Continental Slope

The continental shelf hosts the lowest species richness among the habitat associations considered in this analysis and is limited to foraging birds or turtles as they migrate, or residents that forage in deep waters. Species associated with this zone are primarily gulls and terns. This area is approximately 9 miles offshore (Buchanan et al. 2001), and fewer bird species use this zone than other habitat associations closer to shore. It is likely that hunt-associated activities would occur closer to shore (within 1 to 2 miles). For these reasons, it is likely that any effects of whale hunting on foraging and migrating birds that use these deep ocean waters would be negligible.

4.5.2.2 Prey Availability

Transient killer whales consume gray whales. The analysis considers the likelihood and significance of reduced abundance or availability of prey for foraging killer whales. Under the action alternatives, the abundance of gray whales in the project area could decrease due to hunting or movement out of the area in response to noise and human presence. Such decreases might reduce abundance or availability of prey for killer whales, causing them to spend more time foraging and increasing the risk of predation or compromised health. The amount of whale hunting activity would indicate the likelihood that this might occur.

Regardless of the amount of whale hunting activity that would likely occur under any of the action alternatives, the loss of potential prey to killer whales due to removal of gray whales is unlikely to have individual or population-level effects on killer whales in the project area. The endangered southern resident killer whales eat fish and do not consume gray whales (or other marine mammals). Gray whales account for only 8 percent of observed predation by transient killer whales on marine mammals on the west coast of North America; calves and juvenile make up the bulk of the gray whales taken. Gray whales are also abundant in the project area. Thus, removal of a maximum of seven adult gray whales per year by whale-hunters under the action alternatives is unlikely to affect the prey base of killer whales in the project area. As noted in Section 4.4.3.2.3, ENP Gray Whale – Change in Distribution or Habitat Use, whale-hunt-related activities would likely have negligible effects on the present or future distribution of, or habitat use by, gray whales in the project area.

It is unlikely that any of the action alternatives would affect prey availability for other marine mammals, birds, or sea turtles through disturbance to the food chain (Section 4.3, Marine Habitat

and Species). Any disturbance of prey species would probably be temporary and localized. Because of the low likelihood of prey-related effects, potential effects on species other than killer whales are not discussed further.

4.5.2.3 Potential Injury

The analysis considers the likelihood of injury to cetaceans, pinnipeds, sea otters, and sea turtles due to being struck by a ship or impacts associated with a projectile (harpoon, bullet, or grenade) used during the hunt (as measured by the amount of whale hunting activity). It is extremely unlikely that birds would sustain injury from vessels or weapons used in a whale hunt. Any birds that might be near an area where a hunt was underway would almost certainly flush from the area. This analysis, therefore, addresses potential effects on marine mammals or turtles. Increased vessel activities associated with hunt activities and other vessels present as protester, observer, or enforcement would likely focus on hunt activities, and animals in the area inadvertently might be struck and injured.

4.5.2.3.1 Marine Mammals

Under all of the action alternatives, the potential for any marine mammals to be struck by projectiles would be remote and would be possible only if another animal were mistaken for a gray whale or were immediately adjacent to a gray whale during a strike attempt. Some larger whale species could be mistaken for a gray whale during offshore hunt activities due to similar size. Makah whalers would, however, probably be able to distinguish other species from gray whales because of the characteristic blow of each species, skin color, position of the dorsal fin, behavior, and other characteristics that the whalers are trained to identify. The Tribe's proposal includes safety measures before firing a weapon. Examples are minimum visibility and a signal from the lookout. Implementation of these measures would ensure a greater likelihood of positively identifying a gray whale before attempting a strike. Therefore, there is a very low likelihood that marine mammals, other than the target species (gray whales) would be struck by projectiles used during a whale hunt under the action alternatives.

Any killer whales that occur near gray whales would most likely be transients surveying the gray whales as possible prey. The killer whales would most likely associate only with female gray whales with calves, focusing on the calves as easy prey. Under all of the action alternatives, no strikes would be allowed on calves or adults accompanied by calves. Killer whales would probably not be near gray whales targeted by whale-hunt activities because of the age and size of the targeted whales. Makah whalers would probably not mistake a killer whale for a gray whale,

and killer whales would most likely not remain close enough to whale hunting activities to be hit by an errant harpoon or projectile. For these reasons, the chances of a killer whale being struck by a harpoon or projectile during a hunt would be negligible.

There is a slight possibility that a marine mammal other than a gray whale could be injured by a ship or an errant projectile associated with the hunt. Other marine mammals do not swim close to gray whales, except transient killer whales that may be preying on gray whales, as mentioned above. For this reason, along with the safety measures the Tribe has proposed (Section 2.3.3.2.7, Public Safety Measures and Enforcement), the chances that a harpoon or errant projectile might strike marine mammals other than killer whales are considered negligible and are, therefore, not discussed further.

It is unlikely that hunt-related activities could result in injury to marine mammals due to a ship strike or propeller injury. As discussed at Section 3.4.3.6.8, Ship Strikes, ships at least 263 feet long that travel at least 14 knots cause most lethal or severe injuries to whales. Vessels engaged in a hunt and associated activities would be much smaller. The largest ship involved in the previous hunts was the 95-foot protest vessel M/V Sirenian, which remained in Neah Bay during most hunt activities. Vessels engaged in and monitoring the hunt would travel mostly at the rate of the human-powered canoe, although law enforcement vessels might have to move more rapidly to intercept protest vessels violating the MEZ.

Because of their keen acoustic capabilities, killer whales would be aware of vessels in the area and would likely move away before the vessels were close enough to cause injury. Killer whales are adept, proficient swimmers, and they would most likely avoid vessels associated with the hunt. Other marine mammals, including seals, sea lions, and cetaceans, are also adept, fast swimmers that tend to avoid moving vessels. If they were in the path of a moving vessel, they would likely dive below and away from the vessel, out of harm's way. Sea otters are relatively slow swimmers (compared to pinnipeds) and might approach vessels when near shore. However, any otters near hunt activities would probably swim rapidly away, or dive below and away, from oncoming vessels.

4.5.2.3.2 Sea Turtles

Leatherback turtles are slow swimmers and are susceptible to collision with fast-moving vessels. Under the action alternatives, whale hunts and associated activities would result in temporary and localized increases in the number of fast-moving vessels in the vicinity of a whale hunt in the project area. Chase boats engaged in a whale hunt, as well as protest vessels and law enforcement

vessels, could inadvertently strike a turtle as it surfaced for air, causing injury or death. Given the highly endangered status of this species population, the loss of even one leatherback turtle in this manner could hinder recovery efforts for this species. However, given that leatherback turtles only rarely occur off the coast of Washington, the likelihood of such incidents would be negligible.

4.5.3 Evaluation of Alternatives

The effects of the six alternatives would differ among individual species and species groups (including those identified by habitat association) depending on their use of and occurrence in the project area. For example, hunt-related activities under the action alternatives would more likely affect certain pinnipeds than most cetaceans (except gray whales), given characteristics of their foraging behavior and distribution in the project area. Pelagic species (e.g., sperm whales, leatherback turtles) would less likely be affected by the action alternatives than those that commonly occur in the coastal environment (e.g., harbor seals, bald eagles). Among pinnipeds, harbor seals and California sea lions use haulout sites in the project area (Section 4.5.2.1.1, Marine Mammals (excluding gray whales)). They would, therefore, more likely experience effects of hunt-related activities than elephant seals or fur seals, which do not breed or haul out in the area.

The potential for hunt activity to result in disturbance, reduced prey availability, or injury to wildlife would depend on the timing of the hunt, the location of the hunt, and the number of days hunting occurs. Hunting that takes place at a time when a species is present (particularly breeding) in the project area would have a higher likelihood of affecting that species than hunting that takes place when the species is not present in the project area. Hunting that takes place more than 200 yards from rocks and islands (Alternative 4) has a lower likelihood of affecting species that are present on the rocks and islands. The more days of hunting that occur, the more potential there is for effects on wildlife. As mentioned above, this analysis assumes that the amount of hunt-related activity would be the same on any given day of a hunt. Thus each day of hunting during a given season would present the same potential for effects on wildlife, as would each day of hunting that occurs outside of 200 yards around rocks and islands.

4.5.3.1 Alternative 1

Under the No-action Alternative, no whale hunt would be permitted, and no whale hunting or associated activities (e.g., monitoring, protests, law enforcement) would be expected to occur. Levels of noise and human presence in the project area would vary with time and location, but

would probably not exceed current levels. Similarly, neither prey availability nor the risk of injury or death from collision or projectiles would likely change from current conditions.

Trends in the status of health, abundance, and habitat conditions for wildlife species would continue through state and federal conservation efforts pursuant to ESA, MMPA, and the Migratory Bird Treaty Act. Prohibitions on take under these acts would continue and would require permits from NMFS and USFWS that would be subject to public review (except in the case of the Migratory Bird Treaty Act). For all species (listed and non-listed), direct mortality from anthropogenic sources would probably remain low and (for marine mammals) would not approach the PBR level. Natural mortality from predation, disease, and other sources would most likely match current levels.

Some marine mammals, specifically those in the coastal environment (e.g., harbor seals, California sea lions, Steller sea lions, and sea otter), and most birds and turtles would continue to encounter noise and vessel traffic from sport and commercial fisheries vessels, sight-seeing boats, and other sources such as military vessels. Effects on these species at current levels are unknown.

Loss of gray whales as prey to transient killer whales would continue to be variable as the gray whale population naturally fluctuates. The timing and magnitude of killer whale foraging efforts on gray whales would probably not change under this alternative. The prey base for other species (e.g., other cetaceans, pinnipeds, sea otters, and birds) would continue to vary due to natural events and human perturbations such as fishing. Ongoing variations in prey abundance would have varying effects on individual species.

A small number of marine mammals in the coastal environment would continue to be exposed to vessel traffic. This might result in vessel strikes from commercial and recreational vessels. Turtles, which are slower swimmers, may be more susceptible than other species to vessel strikes. Implementation of the No-action Alternative would not result in any increase in current low levels of injury.

4.5.3.2 Alternative 2

Under Alternative 2, whale hunting would be allowed from December 1 through May 31 in the coastal portion of the Makah U&A. Four whales could be harvested per year, on average, seven whales could be struck, and three struck and lost. If a whale were struck, it would be presumed killed. For purposes of this analysis, the maximum number of gray whales killed in any year would be seven. The Tribe estimates there could be approximately four whales exposed to unsuccessful harpoon attempts and 10 whales approached for every whale struck (Section

2.3.3.2.2, Number Harvested). Any hunting would most likely occur principally during April and May and would probably occur over 7 to 30 days (Table 4-1). With seven strikes allowed, the analysis assumes there could be a maximum of 28 rifle shots fired or 21 grenade explosions.

As part of this alternative, the Tribe would not approach within 200 yards of Tatoosh Island and White Rock during May to minimize disturbance to feeding and nesting sea birds there. No hunting would occur after June 1, additionally protecting nesting sea birds during the fledging and post-fledging period. Section 4.5.2.1, Disturbance, describes the amount of vessel and aircraft activity expected to occur on any given day of hunting.

4.5.3.2.1 Marine Mammals

Under Alternative 2, effects associated with 7 to 30 days of whale-hunting in the coastal portion of the Makah U&A could lead to an increased risk to marine mammals other than gray whales, compared to the No-action Alternative (effects on gray whales are addressed in Section 4.4, ENP Gray Whale). The greatest potential for effects would be from vessel and noise disturbance. For most species, effects would probably not differ from those described in Section 4.5.2.1.1, Marine Mammals (excluding gray whales). Species for which the effects of Alternative 2 might differ from that generalized discussion are discussed below. The intensity of the effects would depend on the number of occasions on which such disturbance occurred (related to the number of days of hunting) and the portion of the animals' life history during which they occurred (hunt timing). Any effects would probably be temporary (lasting for a few minutes to a few hours) and localized (occurring close to the hunt), and would probably not have lasting deleterious effects on individuals or populations. For all species, the number of animals close enough to hunting activities to be disturbed would likely be low.

As noted in Section 4.5.2.1.1, Marine Mammals (excluding gray whales), transient or resident killer whales might be subject to increased disturbance by noise and human activity associated with a whale hunt under Alternative 2, compared to current conditions under the No-action Alternative. The number of animals close enough to hunting activities to be affected would likely be small; any hunt-related disturbance would be localized, of short duration and would probably not have lasting effects.

Alternative 2 would most likely not affect prey availability for killer whales, as gray whales are generally abundant in the project area, and hunting regulations would prohibit the killing of calves, the primary target of killer whales. As discussed in Section 4.5.2.3, Potential Injury, the

likelihood that any marine mammals might sustain an injury from a vessel or errant projectile would be extremely remote.

Steller sea lions are most abundant in the coastal portion of the Makah U&A during the time that hunting would most likely occur under Alternative 2. As mentioned above, Steller sea lions use offshore islands and rocks, closer to shore than the area where most hunting would occur, for resting and to nurse pups. Thus their haulout sites would have a very low likelihood of being affected by hunt-related activities under Alternative 2. Steller sea lions also forage in waters within the coastal portion of the Makah U&A. Hunt-related activity would increase the level of disturbance in this area beyond current levels under the No-action Alternative, thus increasing the potential for Steller sea lion foraging to be disrupted. The potential increase in disruption would likely occur over a period of 7 to 30 days during April and May. While Steller sea lions might be exposed to increased disturbance from whale hunting, beyond the level of disturbance that already occurs under current conditions (the No-action Alternative), the number of animals close enough to hunting activities to be affected by noise would probably be low. Any effects would most likely be localized and temporary. Overall effects on Steller sea lions would probably be negligible.

Sea otters are common in the coastal portion of the Makah U&A throughout the year. Vessel activity or noise from vessels, aircraft, or weapons associated with whale hunting might disturb otters that are swimming, foraging, or grooming, causing them to spend time avoiding the activity and reducing rest and grooming periods. Hunt-related activity and noise could also disrupt nursing or caring for young (Section 4.5.2.1.1, Marine Mammals (excluding gray whales)). While northern sea otters in the coastal portion of the Makah U&A might be exposed to increased levels of disturbance under Alternative 2 over a period of 7-30 days, compared to current levels of disturbance under the No-action Alternative, few animals (if encountered) are expected to remain close enough to hunting activities to be affected. Any disturbance would likely be focused on one or a few individual animals and be localized and temporary in nature. Therefore, overall effects on northern sea otters are expected to be minor.

4.5.3.2.2 Other Marine Wildlife

Under Alternative 2, effects associated with whale-hunt activities could lead to an increased risk to birds and turtles compared to the No-action Alternative. The greatest potential for effects on most species would be from vessel and noise disturbance, as described in Section 4.5.2.1.2, Other Marine Wildlife. Species for which the effects of Alternative 2 may differ from that generalized

discussion are discussed below. Such effects would probably be temporary (lasting for a few minutes to a few hours) and localized (occurring near the hunt). For all species, the number of animals close enough to hunting activities to be affected by disturbance would most likely be low. Any disturbance would be localized and of short duration and would probably not cause lasting deleterious effects for individuals or populations.

Brown Pelican

Hunting under Alternative 2 hunting would be limited to the period from December 1 through May 31. Since pelicans typically do not arrive along the coast of Washington until June, there would probably be no direct or indirect impacts from this alternative. If any pelicans arrived earlier than June 1, foraging individuals could be disturbed while feeding within the nearshore marine and islands habitat associations, should a whale hunt occur nearby. The risk of such encounters would be very remote, as pelicans would be unlikely to be in the area at this time of year and if they were, they would avoid congregations of vessel activity and forage elsewhere. For any pelicans present, the amount of disturbance would probably be minor, as brown pelicans are wide-ranging and the project area is large relative to the amount of area in which hunting would take place, giving pelicans a large area in which to forage undisturbed.

Bald Eagle

Hunting would most likely occur during April and May under Alternative 2, coinciding with the early portion of the breeding season for bald eagles, and leading to increased risks over the No-action Alternative. However, most hunt-related activities would occur 1 to 2 miles offshore and would thus be unlikely to disturb eagles at active nests. If any eagles were disturbed and flushed from their nests, they might abandon their nests, particularly if the disturbance occurs before chicks hatch in May, resulting in loss of that year's chicks. Some eagles in the project area may have developed tolerance for amounts of noise and human presence, as evidenced by the continued presence of breeding pairs when recreational and commercial boating traffic has increased (Table 3-39). Over the long term, eagles may also acclimate to increases in noise and human activity associated with whale hunts. The risk of negative effects associated with hunt-related disturbance would be greatest in the short term.

Marbled Murrelet

Under Alternative 2 there could be an increased risk to marbled murrelets compared to the No-action Alternative. Hunting during April and May would have the potential to disturb adult murrelets foraging at sea, potentially reducing the amount of prey brought to chicks. Pre-breeding

behaviors such as courtship and pair-bonding may also be affected during this period. The likelihood of any disturbance is low, however, because hunt-related activities would occupy a small proportion of the project area at any given time. Marbled murrelets would likely be able to find foraging opportunities in areas where no disturbance would occur. In addition, there would be no potential for hunt-related disturbance during most of the breeding season, which extends from April 1 through September 15.

Sea Turtles

Under Alternative 2 there would be a negligible increase in risks to sea turtles compared to the No-action Alternative. This is because it is extremely unlikely (though not impossible) that any of the four ESA-listed species of sea turtles would frequent areas in which a whale hunt would occur. In the unlikely event that a sea turtle was in the vicinity of whale hunting, any effects due to noise and human activity would probably be short-term and not result in any adverse effects. As discussed in Section 4.5.2.3, Potential Injury, the potential for injury to sea turtles due a ship or weapon strikes associated with a hunt would be extremely low due to the low abundance of these species throughout their range, including the project area.

Non-Listed Marine Birds and Their Associated Habitat

Under Alternative 2, hunting would likely occur in April and May over a period of 7 to 30 days in the coastal portion of the Makah U&A. Both the location and the time of year of the whale hunt coincide with the large number of marine birds using beaches, bays, and entrances to estuaries during the breeding and the winter migratory seasons. Compared to No-action Alternative, Alternative 2 would result in a greater potential for disturbance to breeding, roosting, and migrating birds. Depending on the severity of the effects, some birds' nesting attempts could fail. The potential for such occurrences to result in long-term effects on local populations of species breeding in this zone can not be determined with certainty. On one hand, many individuals may already be acclimated to a high level of human disturbance, especially in the northern portion of the Makah U&A (e.g., 4,000 annual angler trips out of Neah Bay [Table 3-23], along with other commercial and recreational vessel and aircraft traffic). On the other hand, the levels of noise and human activity associated with harpooning, securing, and dispatching a whale would be greater at that particular site than the largely transient activities that occur under current conditions. For species that use headlands and islands, Alternative 2 would provide no specific protection for the islands (other than Tatoosh and White Rock Islands) and small clusters of rock that provide breeding habitat. Hunt-related activities near these sites might disrupt nesting activity, with

potential effects similar to those described for species associated with beaches, bays, and estuaries.

4.5.3.3 Alternative 3

Under Alternative 3, whale-hunting would be allowed year round in the coastal portion of the Makah U&A. Four whales could be harvested per year, on average, seven whales could be struck, and three struck and lost. If a whale were struck, it would be presumed to be killed. For purposes of this analysis, the maximum number of gray whales killed in any year would be seven. The Tribe estimates there could be approximately four whales exposed to unsuccessful harpoon attempts and 10 whales approached for every whale struck (Section 2.3.3.2.2, Numbers and Status of Whales Harvested). Hunting would most likely occur over a period of 40 days (Table 4-1). With seven strikes allowed, the analysis assumes there could be a maximum of 28 rifle shots fired or 21 grenade explosions. Alternative 3 does not prohibit hunting around any rocks and islands.

4.5.3.3.1 Marine Mammals

Under Alternative 3, effects associated with 40 days of whale-hunting the coastal portion of the Makah U&A could lead to an increased risk to marine mammals compared to the No-action Alternative. The greatest potential for effects would be from vessel and noise disturbance. For most species, effects would probably not differ from those described in Section 4.5.2.1.1, Marine Mammals (excluding gray whales). Species for which the effects of Alternative 2 might differ from that generalized discussion are discussed below. The intensity of the effects would depend on the number of occasions on which such disturbance occurred (related to the number of days of hunting) and the portion of the animals' life history during which they occurred (hunt timing). Any effects would probably be temporary (lasting for a few minutes to a few hours) and localized (occurring close to the hunt), and would probably not have lasting deleterious effects on individuals or populations. For all species, the number of animals close enough to hunting activities to be disturbed would likely be low.

For the reasons described under Alternative 2, transient or resident killer whales might be subject to increased disturbance from a whale hunt under Alternative 3, compared to current conditions under the No-action Alternative, but the number of animals close enough to hunting activities to be affected would likely be small, any disturbance would be localized and temporary, and there would likely be no lasting effects. Also for the reasons described under Alternative 2, Alternative 3 would most likely not affect prey availability for killer whales, as gray whales are generally

abundant in the project area, and hunting regulations would prohibit the killing of calves, the primary target of killer whales. As discussed in Section 4.5.2.3, Potential Injury, the likelihood that any marine mammals might sustain an injury from a vessel or errant projectile would be extremely remote.

Whale hunts would likely occur year round under Alternative 3, including during the summer when Steller and California sea lions are less abundant than at other times of year, because all but a few males and juveniles of each species move out of the project area for breeding sites in Oregon or British Columbia. Hunt-related activities could, however, adversely affect harbor seals breeding on coastal islands or rocks in the project area during June and July by disrupting pupping or breeding activities or interrupting the female/pup bond during nursing. While harbor seals might be exposed to these sources of noise, the number of animals close enough to hunting activities to be affected would probably be low. Any disturbance would be localized and temporary, and overall effects on Steller and California sea lions would probably be minor.

Sea otters are common in the project area throughout the year and are most abundant during the spring. Vessel activity or noise from vessels, aircraft, or weapons associated with whale hunting that occurs during this time might disturb otters that are swimming, foraging, or grooming causing them to spend time avoiding the activity and reducing rest periods. Hunt-related activity and noise could also disrupt nursing or caring for young at haulout sites in the project area (Section 4.5.2.1.1, Marine Mammals (excluding gray whales)). While northern sea otters might be exposed to these sources of noise, the number of animals close enough to hunting activities to be affected would probably be low. Any disturbance would likely be focused on one or a few individual animals and be localized and temporary in nature. Therefore, overall effects on northern sea otters are expected to be minor.

Compared to Alternative 2, Alternative 3 could have greater potential to disturb marine mammals generally because there would be more days of hunting (40 versus 7 to 30). In addition, there would be a greater potential for hunting to occur at all times of year under Alternative 3, making it more likely that hunting activities would overlap with periods when all species might be present and/or during all sensitive periods for all species. Also compared to Alternative 2, Alternative 3 would have an increased potential for injury because there would be more days of hunting, though the potential for injury would still be negligible.

4.5.3.3.2 Other Marine Wildlife

Under Alternative 3, effects associated with whale-hunt activities could lead to an increased risk to birds and turtles compared to the No-action Alternative. The greatest potential for effects on most species would be from vessel and noise disturbance, as described in Section 4.5.2.1.2, Other Marine Wildlife. Species for which the effects of Alternative 3 may differ from that generalized discussion are discussed below. Such effects would probably be temporary (lasting for a few minutes to a few hours) and localized (occurring near the hunt). For all species, the number of animals close enough to hunting activities to be affected by disturbance would most likely be low. Any disturbance would be localized and of short duration and would probably not cause lasting deleterious effects for individuals or populations.

Brown Pelican

Hunting under Alternative 3 would likely occur year round in the coastal portion of the Makah U&A. Some hunting would likely occur after June 1, the time that the pelicans typically arrive along the coast of Washington. Potentially as many as 40 days of hunting could occur when pelicans are present. Compared to current conditions under the No-action Alternative, the increased level of activity in the area could increase the number of times that foraging pelicans are disturbed. Any pelicans foraging in the vicinity of a hunt would likely flush and move to another foraging area away from the disturbance. Brown pelicans are a wide-ranging species and the size of the project area is large relative to the amount of area in which hunting would take place at any given time; thus, pelicans would have a large area in which to forage undisturbed. Any effects on pelicans from hunt-related disturbance over the 40 days of hunting under Alternative 3 would likely be short-term and temporary and would probably not cause lasting deleterious effects for individuals or the population.

Compared to Alternative 2, Alternative 3 would have a greater risk of disturbing brown pelicans because hunting would be allowed during the time the pelicans are likely to be present and because Alternative 3 would likely result in more days of hunting (40 versus 7 to 30).

Bald Eagle

Hunting would most likely occur year round under Alternative 3, potentially coinciding with both the early portion of the breeding season for bald eagles, as well as during the fledging period (after chicks hatch in May), leading to increased risks over the No-action Alternative. Most hunt-related activities would occur 1 to 2 miles offshore and would thus be unlikely to disturb eagles at active nests on shore. If any eagles were disturbed and flushed from their nests, there would be a

risk that they might abandon their nests, resulting in a loss of that year's chicks. If the disturbance occurred after chicks hatch in May, nest abandonment would be less likely. Some eagles in the project area may have developed tolerance for amounts of noise and human presence, as evidenced by the continued presence of breeding pairs when recreational and commercial boating traffic has increased (Table 3-39). Over the long term, eagles may also acclimate to increases in noise and human activity associated with whale hunts. The risk of negative effects associated with hunt-related disturbance would be greatest in the short term.

Compared to Alternative 2, Alternative 3 could result in greater disturbance of bald eagles primarily because of the increased number of hunting days (40 versus 7 to 30).

Marbled Murrelet

Hunting under Alternative 3 would likely occur year round over a period of 40 days. Hunting would be likely to occur during the breeding season for marbled murrelets (April 1 through September 15), which could disturb foraging murrelets and potentially reduce the amount of prey brought to chicks. Pre-breeding behaviors such as courtship and pair-bonding may also be affected during the spring. The likelihood of any disturbance is low, however, because hunt-related activities would occupy a small proportion of the project area at any given time. Marbled murrelets would likely be able to find foraging opportunities in areas where no disturbance would occur, although this could be more difficult for birds undergoing a two-month molt (which occurs during the latter half of the year).

Compared to Alternative 2, Alternative 3 has a greater potential for adverse impacts to marbled murrelets from hunt-related disturbance because hunting could occur over more days (40 versus 7 to 30) and could occur during the breeding season, when the severity of the disturbance would likely be greater.

Sea Turtles

Under Alternative 3 there would be a negligible increase in risks to sea turtles compared to the No-action Alternative. This is because it is extremely unlikely (though not impossible) that any of the four ESA-listed species of sea turtles would frequent areas in which a whale hunt would occur. In the unlikely event that a sea turtle was in the vicinity of whale hunting, any effects due to noise and human activity would probably be short-term not result in any adverse effects. As discussed in Section 4.5.2.3, Potential Injury, the potential for injury to sea turtles due a ship or weapon strikes associated with a hunt would be extremely low due to the low abundance of these species throughout their range, including the project area.

Compared to Alternative 2, there would be a slight increase in risk to sea turtles because of the increased number of days of hunting (40 versus 7 to 30).

Non-listed Marine Birds and Their Associated Habitat

Under Alternative 3, hunting would likely occur year round over a period of 40 days in the coastal portion of the Makah U&A. Both the location and the time of year of the whale hunt coincide with the large number of marine birds that uses beaches, bays, and entrances to estuaries during the breeding and the winter migratory seasons. Compared to No-action Alternative, Alternative 3 would result in a greater potential for disturbance to breeding, roosting, and migrating birds. Depending on the severity of the effects, some birds' nesting attempts could fail. The potential for such occurrences to result in long-term effects on local populations of species breeding in this zone can not be determined with certainty. On one hand, many individuals may already be acclimated to a high level of human disturbance (e.g., 4,000 annual angler trips out of Neah Bay [Table 3-23], along with other commercial and recreational vessel and aircraft traffic). On the other hand, the levels of noise and human activity associated with harpooning, securing, and dispatching a whale would be greater at that particular site than the largely transient activities that occur under current conditions. For species that use headlands and islands, Alternative 3 would not include specific protection around any rocks and islands. Hunt-related activities near these sites might disrupt nesting activity, with potential effects similar to those described for species associated with beaches, bays, and estuaries.

Compared to Alternative 2, Alternative 3 might pose a greater risk of disturbance to non-listed marine birds because hunting, and its related noise impacts, would occur throughout the breeding season, rather than just during the beginning of the breeding season. Also compared to Alternative 2, Alternative 3 would not afford specific protection to birds using Tatoosh Island and White Rock. On the other hand, due to the ability of tribal members to hunt year round, whale hunting under Alternative 3 could be more spread out over the year and less concentrated during the breeding season of April and May.

4.5.3.4 Alternative 4

Under Alternative 4, the same number of gray whales could be harvested, struck, and struck and lost as under Alternative 2 during the same season (December 1 and May 31) and in the same area (along the coastal portion of the Makah U&A). Alternative 4 would restrict hunting within 200 yards of rocks and islands in the Washington Islands National Wildlife Refuges, a restriction that would probably not change the number of hunting days, vessels, aircraft, or weapons

discharges. The restriction around rocks and islands would likely reduce some of the effects analyzed under Alternative 2 for harbor seals, California sea lions, and sea otters foraging in sanctuary and refuge waters or using refuge lands for resting or breeding. As under Alternative 2, few marine mammals would likely be exposed to hunting activities, and any effects would probably be localized and temporary. Possible adverse impacts to sea birds and turtles foraging in sanctuary and refuge waters or using refuge lands for resting or breeding would be reduced due to restrictions under this alternative. Therefore, the increased potential for adverse impacts to birds and turtles under Alternative 4, compared to current conditions under the No-action Alternative, would be similar to but slightly less than the increased potential under Alternative 2, as a larger area would be protected from frequent vessel traffic and associated noise.

4.5.3.5 Alternative 5

Under Alternative 5, whale-hunting would be allowed year round in the coastal portion of the Makah U&A. Up to two whales could be harvested per year, on average, three whales could be struck, and one struck and lost. If a whale were struck, it would be presumed to be killed. For purposes of this analysis, the maximum number of gray whales killed in any year would be three. The Tribe estimates there could be approximately four whales exposed to unsuccessful harpoon attempts and 10 whales approached for every whale struck (Section 2.3.3.2.2, Numbers and Status of Whales Harvested). Hunting would most likely occur over a period of 20 days (Table 4-1). With three strikes allowed, the analysis assumes there could be a maximum of 12 rifle shots fired or 9 grenade explosions. Alternative 5 does not prohibit hunting around any rocks or islands.

4.5.3.5.1 Marine Mammals

Under Alternative 5, effects associated with 20 days of whale-hunting the coastal portion of the Makah U&A could lead to an increased risk to marine mammals compared to the No-action Alternative. The greatest potential for effects would be from vessel and noise disturbance. For most species, effects would probably not differ from those described in Section 4.5.2.1.1, Marine Mammals (excluding gray whales). Species for which the effects of Alternative 5 might differ from that generalized discussion are discussed below. The intensity of the effects would depend on the number of occasions on which such disturbance occurred (related to the number of days of hunting) and the portion of the animals' life history during which they occurred (hunt timing). Any effects would probably be temporary (lasting for a few minutes to a few hours) and localized (occurring close to the hunt), and would probably not have lasting deleterious effects on individuals or populations. For all species, the number of animals close enough to hunting activities to be disturbed would likely be low.

For the reasons described under Alternative 2, transient or resident killer whales might be subject to increased disturbance from a whale hunt under Alternative 5, compared to current conditions under the No-action Alternative, but the number of animals close enough to hunting activities to be affected would likely be small, any disturbance would be localized and temporary, and there would likely be no lasting effects. Also for the reasons described under Alternative 2, Alternative 5 would most likely not affect prey availability for killer whales, as gray whales are generally abundant in the project area, and hunting regulations would prohibit the killing of calves, the primary target of killer whales. As discussed in Section 4.5.2.3, Potential Injury, the likelihood that any marine mammals might sustain an injury from a vessel or errant projectile would be extremely remote.

Whale hunts would likely occur year round under Alternative 5, including during the summer when Steller and California sea lions are less abundant than at other times of year, because all but a few males and juveniles of each species move out of the project area for breeding sites in Oregon or British Columbia. Hunt-related activities could, however, adversely affect harbor seals breeding on coastal islands or rocks in the project area during June and July by disrupting pupping or breeding activities or interrupting the female/pup bond during nursing. While harbor seals might be exposed to these sources of noise, the number of animals close enough to hunting activities to be affected would probably be low. Any disturbance would be localized and temporary, and overall effects on northern sea otters would probably be minor.

Sea otters are common in the project area throughout the year and are most abundant during the spring. Vessel activity or noise from vessels, aircraft, or weapons associated with whale hunting that occurs during this time might disturb otters that are swimming, foraging, or grooming, causing them to spend time avoiding the activity and reducing rest periods. Hunt-related activity and noise could also disrupt nursing or caring for young in the project area (Section 4.5.2.1.1, Marine Mammals (excluding gray whales)). While northern sea otters might be exposed to these sources of noise, the number of animals close enough to hunting activities to be affected would probably be low. Any disturbance would likely be focused on one or a few individual animals and be localized and temporary in nature. Therefore, overall effects on northern sea otters are expected to be minor.

Compared to Alternatives 2 and 4, Alternative 5 would have about the same number of occasions on which hunting, and potential disturbance, could occur (20 versus 7 to 30 days). There would be a greater potential for hunting to occur at all times of year under Alternative 5, making it more

likely that hunting activities would overlap with periods when all species might be present and/or during all sensitive periods for all species. Potential for injury would be about the same because of a similar number of days of hunting.

Compared to Alternative 3, Alternative 5 would have half as many occasions on which hunting, and potential disturbance, could occur (20 versus 40 days). Weapons discharges would also likely be fewer under Alternative 5 (12 rifle shots or 9 grenade explosions versus 28 rifle shots and 21 grenade explosions). Under both alternatives, hunting could occur year round and so overlap with periods when all species might be present and/or during all sensitive periods for all species. Potential for injury would be less under Alternative 5 because of a similar number of days of hunting.

4.5.3.5.2 Other Marine Wildlife

Under Alternative 5, effects associated with whale-hunt activities could lead to an increased risk to birds and turtles compared to the No-action Alternative. The greatest potential for effects on most species would be from vessel and noise disturbance, as described in Section 4.5.2.1.2, Other Marine Wildlife. Species for which the effects of Alternative 3 may differ from that generalized discussion are discussed below. Such effects would probably be temporary (lasting for a few minutes to a few hours) and localized (occurring near the hunt), and would probably not cause lasting deleterious effects for individuals or populations. For all species, the number of animals close enough to hunting activities to be affected by disturbance would most likely be low.

Brown Pelican

Hunting under Alternative 5 would likely occur year round in the coastal portion of the Makah U&A. Some hunting would likely occur after June 1, the time that the pelicans typically arrive along the coast of Washington. Potentially as many as 20 days of hunting could occur when pelicans are present. Compared to current conditions under the No-action Alternative, the increased level of activity in the area could increase the number of times that foraging pelicans are disturbed. Any pelicans foraging in the vicinity of a hunt would likely flush and move to another foraging area away from the disturbance. Brown pelicans are a wide-ranging species and the size of the project area is large relative to the amount of area in which hunting would take place at any given time; thus, pelicans would have a large area in which to forage undisturbed. Any effects on pelicans from hunt-related disturbance over the 20 days of hunting under Alternative 3 would likely be short term and temporary and would probably not cause lasting deleterious effects for individuals or populations.

Compared to Alternatives 2 and 4, Alternative 5 would have increased risk of disturbing brown pelicans because hunting would be allowed during the time the pelicans are likely to be present.

Compared to Alternative 3, Alternative 5 would have less risk of disturbing brown pelicans. Although hunting would occur year round under both alternatives, including times when brown pelicans are present, there would be half as many occasions on which hunting would occur (20 versus 40 days).

Bald Eagle

Hunting would most likely occur year round under Alternative 5, potentially coinciding with both the early portion of the breeding season for bald eagles, as well as during the fledging period, leading to increased risk over the No-action Alternative. Most hunt-related activities would occur 1 to 2 miles offshore and would thus be unlikely to disturb eagles at active nests. If any eagles were disturbed and flushed from their nests, there would be a risk that they might abandon their nests, resulting in a loss of that year's chicks. If the disturbance occurred after chicks hatch in May, nest abandonment would be less likely. Some eagles in the project area may have developed tolerance for amounts of noise and human presence, as evidenced by the continued presence of breeding pairs when recreational and commercial boating traffic has increased (Table 3-39). Over the long term, eagles may also acclimate to increases in noise and human activity associated with whale hunts. The risk of negative effects associated with hunt-related disturbance would be greatest in the short term.

Compared to Alternatives 2 and 4, Alternative 5 would result in about the same approximate number of occasions on which disturbance would occur (20 versus 7 to 30 days). There could, however, potentially be less risk of disturbance under Alternative 3 because some of the hunting would occur after chicks hatch in May, when eagles are less likely to abandon their nest.

Compared to Alternative 3, Alternative 5 would result in less risk of disturbance to bald eagles, because there would likely be fewer occasions on which disturbance might occur (20 versus 40 days). Under both alternatives, hunting would occur year round, so the likely severity of the disturbance would be about the same under both alternatives for each hunting occasion.

Marbled Murrelet

Hunting under Alternative 5 would likely occur year round over a period of 20 days. Hunting would be likely to occur during the breeding season for marbled murrelets (April 1 through September 15), which could disturb foraging murrelets and potentially reduce the amount of prey brought to chicks. Pre-breeding behaviors such as courtship and pair-bonding may also be

affected during this period. The likelihood of any disturbance is low, however, because hunt-related activities would occupy a small proportion of the project area at any given time. Marbled murrelets would likely be able to find foraging opportunities in areas where no disturbance would occur, although this could be more difficult for birds undergoing a two-month molt (which occurs during the latter half of the year).

Compared to Alternatives 2 and 4, Alternative 5 has a greater potential for adverse impacts to marbled murrelets from hunt-related disturbance. Although there would be about the same number of occasions on which disturbance could occur (20 versus 7 to 30 days), hunting under Alternative 5 could occur during the breeding season, when the severity of the disturbance would likely be greater.

Sea Turtles

Under Alternative 5 there would be a negligible increase in risks to sea turtles compared to the No-action Alternative, for the same reasons as described under Alternative 2.

Compared to Alternatives 2 and 4, there would be about the same level of risk to sea turtles because of the number of days of hunting would be about the same (20 versus 7 to 30 days).

Compared to Alternative 5 there would likely be half as much risk because there would likely be half as many days of hunting (20 versus 40).

Non-listed Marine Birds and Their Associated Habitat

Under Alternative 5, hunting would likely occur year round over a period of 20 days in the coastal portion of the Makah U&A. Both the location and the time of year of the whale hunt coincide with the large number of marine birds that uses beaches, bays, and entrances to estuaries during the breeding and the winter migratory seasons. Compared to No-action Alternative, Alternative 5 would result in a greater potential for disturbance to breeding, roosting, and migrating birds. Depending on the severity of the effects, some birds' nesting attempts could fail. The potential for such occurrences to result in long-term effects on local populations of species breeding in this zone cannot be determined with certainty. On one hand, many individuals may already be acclimated to a high level of human disturbance (e.g., 4,000 annual angler trips out of Neah Bay [Table 3-23], along with other commercial and recreational vessel and aircraft traffic). On the other hand, the levels of noise and human activity associated with harpooning, securing, and dispatching a whale would be greater at that particular site than the largely transient activities that occur under current conditions. For species that use headlands and islands, Alternative 5 would not include specific protection around any rocks or islands. Hunt-related activities near

these sites might disrupt nesting activity, with potential effects similar to those described for species associated with beaches, bays, and estuaries.

Compared to Alternatives 2 and 4, Alternative 5 would result in about the same number of occasions on which non-listed marine birds could be exposed to disturbance. Alternative 5 might pose a greater risk of disturbance, however, because hunting would occur throughout the breeding season, rather than just during the beginning of the breeding season. Also compared to Alternatives 2 and 4, Alternative 5 would not afford specific protection to birds using rocks and islands in the project area. On the other hand, due to the ability of tribal members to hunt year round, whale hunting under Alternative 5 could be more spread out over the year and less concentrated during the breeding season of April and May.

Compared to Alternative 5 there would likely be half as much risk to non-listed marine birds because there would likely be half as many days of hunting (20 versus 40) spread throughout the year.

4.5.3.6 Alternative 6

Alternative 6 would include the same provisions as Alternative 3 except that hunting would also be allowed in the Strait of Juan de Fuca portion of the Makah U&A. Alternative 6 would be expected to result in the same number of hunt attempts and the same number of whales struck, harvested, and struck and lost as Alternative 3. The potential for adverse impacts to other wildlife would thus be about the same under Alternative 6 as under Alternative 3. Some effects might be slightly different either because a species might occur more or less in the Strait or might complete a part of its life history differently (including at a different time) in the Strait than in the coastal portion of the Makah U&A. The following sections discuss any potential differences between effects under Alternative 3 and 6 due to these differences.

4.5.3.6.1 Marine Mammals

Sea otters are more likely to use the coastal portion of the Makah U&A than the Strait, although they briefly moved into the Strait in the 1990s. If some hunting under Alternative 6 were diverted to the Strait, Alternative 6 would thus have a lower risk of disturbance to sea otters. Harbor seals have a longer pupping season in the Strait than in the coastal portion of the Makah U&A (June to August in the Strait versus June and July on the coast). Thus there is a longer period of time that hunting in the strait could disturb harbor seals and nursing pups. Whale-hunt-related activities from June through August near seal pupping or nursing sites could cause short-term interruption of the mother/pup relationship. As with effects described under Alternative 3 for the coastal

portion of the Makah U&A, few marine mammals of any species would likely be disturbed by hunting activities, and any disturbance would probably be localized, temporary, and not have lasting effects.

4.5.3.6.2 Other Marine Wildlife

Under Alternative 6, more potential habitat for wintering, nesting, and foraging eagles and foraging marbled murrelets would potentially be exposed to disturbance from hunt-related activities, as more coastline would be exposed to hunting. On the other hand, because of the larger area in which hunting could occur, noise from hunting activities potentially affecting other marine wildlife would be more spread out. Overall, such noise would probably not affect any more eagles than if the hunt were confined to the outer Washington coast. The density of marbled murrelets is known to be higher in the Strait of Juan de Fuca (Huff et al. 2006) so more individual birds may be disturbed by hunt-related activities in this area. Marbled murrelets would likely be able to find foraging opportunities in areas where no disturbance would occur, although this could be more difficult for birds undergoing a two-month molt (which occurs during the latter half of the year).

It is unlikely that any ESA-listed species of sea turtles would come into the Strait of Juan de Fuca while migrating or foraging off the Washington coast. Thus risks would be lower under Alternative 6.

Under Alternative 6, more habitat for non-listed nesting and foraging sea birds in the project area would potentially be exposed to disturbance from hunt-related activities than under the other action alternatives, because more area around coastline and islands would be exposed to hunting. However, as mentioned above, the disturbance associated with hunt-related activities under this alternative would probably be more widely distributed than under the other action alternatives. Furthermore, because more rocks, islands, and associated densities of nesting sea birds occur along the outer coast of the project area, expanding the hunting area to the strait would probably result in a shift of some of the hunting away from these sensitive areas and to the strait. This shift in hunting activity would result in a lower risk to nesting seabirds in the project area as compared to Alternative 3.

4.6 Economics

4.6.1 Introduction

This section addresses the potential for the alternatives to affect economic conditions in the project area. Whale-hunt-related activities have the potential to affect tourism, the household use of whale products, the whale-watching industry, shipping, sport and commercial fishing, and hunt-related management and law enforcement. As discussed in Section 3.6, Economics, the labor force residing on the Makah Reservation in 2000 was about 613 persons, or approximately 3 percent of the total wage and salary workforce in Clallam County. Total personal income for the Makah Reservation is probably an even smaller proportion of countywide total personal income, because per capita income of reservation residents is substantially lower than countywide per capita income (Section 3.6.3.2.3, Personal Income). Because the economic contribution of the Makah Reservation to the countywide economy is so small, the potential for any changes on the reservation under the alternatives to have a noticeable effect on economic conditions in Clallam County as a whole is negligible. Moreover, economic effects outside the reservation are expected to be negligible in the context of the countywide economy. For these reasons, potential effects on Clallam County as a whole will not be addressed in this analysis.

One potential economic effect of the action alternatives that was not included in this analysis was the economic burden on individuals or households engaged in hunting if the cost of hunting is borne by individuals rather than by the tribal government. In 2002, the Makah tribal Council decided not to provide financial support for a hunt, leaving it up to whale-hunting families to support any hunts, consistent with tribal tradition. However, the Council did not indicate whether it would financially support future hunts should they be authorized. If individual families were to finance hunts under the action alternatives, the economic impacts on some Makah households could be substantial, given the high costs of supplies and services necessary to participate in the numerous activities related to whale hunting. Aside from the expenses of actually engaging in the hunt, there would be the costs of acquiring seagoing canoes and other whale-hunting equipment, training time, and hosting ceremonial feasts. These costs must be viewed in the light of both the depressed economic situation of many Makah households (Section 3.6.3.2.3, Personal Income) and the Makah Tribe restriction that prohibits tribal members who participate in a whale hunt from receiving monetary compensation. It is likely that a family would launch its own whale hunting enterprise only if that family were economically successful during the several months between whale hunting seasons.

These economic constraints would likely affect the number of hunts that could take place in any given year. However, the magnitude of the household costs arising from the whale hunt, and the distribution of these costs across the Makah community, were not reasonably foreseeable because of uncertainty about what costs families would bear rather than the community as a whole, and about the number of families that would organize a whale-hunting crew.

4.6.2 Evaluation Criteria

The criteria used to determine the potential for effects on economic conditions under the alternatives include the potential change in revenue, employment, and/or economic value associated with (1) tourist-related business activity, (2) household consumption of whale products and manufacture and sale of traditional handicrafts, (3) the whale-watching industry, (4) commercial shipping and sport and commercial fishing, and (5) hunt-related management and law enforcement. The following sections discuss these matters in greater detail and identify how the effects of the alternatives may be assessed and differentiated.

4.6.2.1 Tourism

Tourism is a relatively large industry in Clallam County; visitors spent \$140 million in the County in 2003 (Table 3-17). Spending in the food and beverages services sector accounted for about 28 percent of total visitor spending and in the accommodations sector accounted for about 19 percent of total visitor spending. Figures are not available for the amount of revenue generated by reservation tourism and recreation or the number of jobs and amount of personal income that depend on visitor spending, but about 10 percent of jobs in the local area are in sectors that depend directly on tourism (Table 3-22).

Activities associated with a whale hunt, including the hunt itself and harvest-related ceremonies and celebrations, have the potential to affect the tourism industry in Clallam County by changing the number of visitors to the area and their travel expenditures. Persons seeking opportunities to view a whale hunt may visit trails and beaches in the Olympic National Park, OCNMS, and the Makah Reservation. It is possible that visitation to these areas would increase under the action alternatives, as interested observers seek vantage points to view the hunt. Also, there is the potential for persons attracted to the area by hunt-related activities (such as protesters, law enforcement officers, media representatives, or other observers) to engage in other activities, such as camping, sightseeing, or wildlife viewing. Spending associated with these activities could increase under the action alternatives.

As described in Section 3.6.3.3.1, Summary of Economic Effects of the Makah Gray Whale Hunts, no quantitative information is available concerning the economic effects of the Makah Tribe's practice whale hunt exercises in late 1998, or their whale hunting in the spring of 1999 and of 2000. Protests and media coverage of these events may have temporarily generated an increase in the number of people in the area, who might have sought accommodations and services in the communities of Neah Bay, Clallam Bay, and Sekiu. Some anecdotal information suggests this was the case, while other anecdotal information suggests it was not. No economic data demonstrate that the influx of visitors during previous hunt-related events resulted in an increase in the number of rooms rented or in other economic activity. Given the likely influx of visitors coming to Neah Bay to observe, protest, or report on the hunt, or to participate in tribal ceremonies and celebrations, it is reasonable to expect there would be a short-term increase in tourist-related business activity associated with these visitors. Any short-term effect is likely to be minor, and may diminish as more hunts occur. Section 3.6.3.3.1, Summary of Economic Effects of the Makah Gray Whale Hunts, indicates that there were fewer protestors at the 2000 hunt than the 1999 hunt. Over the long term, there is no information suggesting that the hunts in 1999 and 2000 had any lasting effect on tourism in Clallam County or Neah Bay. Thus, while a whale hunt might attract visitors to the Neah Bay area, it is likely that any positive effect would be short-term and minor.

In addition to attracting visitors to Clallam County when hunt-related activities occurred, Makah whale hunting might have a broader and longer-term positive effect on the Tribe's efforts to bolster the tribal tourism sector of the reservation economy. As Jollie and Green (2001) report:

Visitors mostly learned about the Makah Tribe through whaling notoriety and Olympic National Park and hiking trail advertisements. . . . The controversy over whaling has had a direct impact on tourism as people are drawn to the area by media reporting of the whaling events.

Controversy surrounding resumption of whale hunting has rekindled international interest in the Makah people at the same time as tribal tourism and other types of cultural tourism are rapidly gaining popularity throughout the world (Washington State Parks 2004). The Makah Tribe has been an active participant in programs by Washington State and the Affiliated Tribes of Northwest Indians to market tribal tourism (Affiliated Tribes of Northwest Indians undated; Jollie and Green 2001; May 2001). Although the government sector is the dominant employer on the Makah Reservation (Section 3.6.3.2.2, Employment), tourism is also considered a key element of the local economy (Section 3.6.3.2.4, Contribution of Tourism to the Local Economy).

Any positive effects of a whale hunt on tourism (both locally and County-wide) could be offset to some extent if opposition to the hunt resulted in boycotts of Olympic Peninsula tourism activities, including boycotts of Neah Bay specifically. Section 3.6.3.3.1, Summary of Economic Effects of the Makah Gray Whale Hunts, describes efforts to organize a boycott of the Makah nation, but no available information indicates the boycott had any effect on tribal enterprises. Similarly there is no evidence that calls for boycotts of Olympic Peninsula tourism had any negative economic impact on tourist-related businesses in the area. It is possible that some persons who might participate in a boycott would not do so if the whale hunting is conducted with restrictions on hunt timing, area, or the number or identity of whales that may be struck. Protest activities and vocal opposition to the hunt have come from groups that have expressed opposition to whale hunting under any conditions, however (Section 4.8.3, Social Environment, Evaluation of Alternatives). Persons opposed to whale hunting under any conditions would be likely to participate in a boycott under any of the action alternatives.

The effects on tourism would depend primarily on (1) the anticipated number of persons who might be attracted to the area by hunt-related activities (such as reporters, protestors, or observers), and (2) the anticipated amount, intensity, duration, scope, and content of media coverage. These two factors are also discussed in Section 4.12, Aesthetics.

4.6.2.2 Household Use of Whale Products

Under current conditions, Makah tribal members do not have the opportunity to consume freshly harvested whale products. Drift whales or whales incidentally caught in fishing operations may provide an opportunity to consume whale products or to produce hand-crafted articles made from whale products (Section 2.4.2, Subsistence Use of Drift Whales). If a whale hunt were authorized under any of the action alternatives, Makah tribal members could consume the meat, blubber, and other edible products obtained from harvested whales (Section 2.3.3.2.6, Whale Product Use and Distribution). Moreover, within the borders of the United States, tribal members could share whale products from any hunt with relatives of participants in the harvest, with others in the local community (both non-relatives and relatives), or with persons in locations other than the local community with whom local residents share familial, social, cultural, or economic ties.

Subsistence foods products from a whale would not generate revenue through market sales, but would meet nutritional needs of Makah families. Thus attaching a dollar value to food products from harvested whales is difficult. Nevertheless, the harvest of whales for food has economic value to households as they potentially replace foods that families would otherwise have to

purchase. The distribution of subsistence products through sharing networks makes it likely that many households and individuals would enjoy the economic benefits of a whale harvest.

The Tribe's 2006 household whale hunting survey indicated that 80 percent of those surveyed desired whale meat as part of their regular diet (Section 3.10.3.5.1, Makah Whaling). Considering the numbers of whales that could be harvested under the action alternatives, and the customary sharing of subsistence resources among tribal members (Section 3.10.3.5.2, Makah Subsistence Consumption), the per capita economic value of whale products as a food resource would probably be small. The whale products consumed in 1999 equaled approximately 2.4 pounds per capita (Section 3.10.3.5.1, Makah Whaling). Nevertheless, the reintroduction of whale food products into the Makah community could help offset potential food shortages if other subsistence resources diminish, and could prevent people from having to spend cash to replace subsistence foods (Renker 1996; 2007).

In addition, the Makah Tribe could sell or offer for sale non-edible whale products used to create authentic articles and native handicraft and clothing, including artwork, within the United States under any of the action alternatives (Section 2.3.3.2.6, Whale Product Use and Distribution). A whale hunt would likely increase the availability of non-edible whale products for the manufacture and sale of traditional handicrafts. The Makah have a long tradition of manufacturing carvings, baskets, and other items for sale to collectors and tourists (Erikson 2003), and “[t]ribal artisans also produce carvings, jewelry, and silk screen designs for sale in local shops and regional galleries” (Section 3.6.3.2.1, General Description of the Local Economy). Seventy-six percent of Makah households expressed a desire for whale bones, possibly to revitalize certain crafts (Section 3.10.3.5.1, Makah Whaling). Hand-crafted articles made from whale products could become sources of income for some Makah households and a means of perpetuating indigenous art forms and crafts. Renker (1996) notes that the bones of a gray whale incidentally caught in 1995 were distributed to Makah artists through the Makah Cultural and Research Center, which is one of the largest retail outlets of Makah artwork on the reservation (Erikson 2003). According to Renker (2007), some Makah indicated they were disappointed that the bones of the whale harvested in the 1999 hunt were not made available to the community for private use. They were used by the local school for a bone preservation project instead (Section 3.10.3.5.1, Makah Whaling).

The amount of whale products for household consumption and the manufacture and sale of traditional handicrafts would depend on the number of whales that could be harvested.

4.6.2.3 Whale-watching Industry

Whale-watching is not economically important in Clallam County, but there are whale-watching operations outside the county in Westport, Washington and Vancouver Island, British Columbia (Section 3.6.3.3.2, Commercial Value of Whales). Information on the current numbers of whale-watching expeditions, whale-watching passengers, whale-watching revenues in these areas, or people employed in the whale-watching sector is not available. A Makah gray whale hunt could affect whale-watching revenues or employment if a hunt caused prospective passengers to avoid whale-watching, if a hunt occurred in the vicinity of whale-watch operations and disturbed whales away from the area, or if whales altered their behavior as a result of hunting and avoided whale-watching vessels. For the reasons discussed below, it is unlikely that whale-hunting under any of the action alternatives would have more than a negligible effect on whale-watching revenues or employment within or outside the project area through any of these mechanisms.

First, while negative publicity about Makah whale hunting could reduce public participation in whale-watching in general, there is no information demonstrating such an effect. In addition, it is unlikely that whale-hunting activities under the action alternatives would interfere with whale-watching tours in the project area. There is no evidence that whale-watching operators conduct tours targeting gray whales in the project area. There are few whale-watching tours or charters in Clallam County, although whale-watching charters are available through one resort in Sekiu and may be available through some sport fishing boat operators (Section 3.6.3.3.2, Commercial Value of Whales). Most whale-watching operations in Washington State focus on killer whales in Puget Sound and the eastern portion of the Strait of Juan de Fuca (an area outside the Makah U&A) (NMFS 2001). While gray whale watching is an important tourist activity off Westport, located on Washington's Pacific coastline at Grays Harbor (Section 3.6.3.3.2, Commercial Value of Whales), that area is approximately 80 miles south of the Makah U&A. Most of Westport's charter boat businesses offer whale-watching trips from March to May, when gray whales can be viewed just off the coast during their annual migration. It is unlikely that these tour operators would expend the time and fuel to travel to the Makah U&A when gray whales are present immediately offshore. Whale-watching tours from Westport, therefore, would be unlikely to encounter hunt-related activities under any of the action alternatives. The gray whales are northbound at that time and pass Westport before reaching the Makah U&A farther north. Whale-hunting activities under any of the action alternatives, therefore, would be extremely unlikely to scare whales away from areas where they may be encountered by whale-watching tours out of Westport, even during the peak tour period of March through May.

Whale-watching is also an important tourist activity off Vancouver Island (Section 3.6.3.3.2, Commercial Value of Whales). Although most Vancouver Island-based whale-watch operators also advertise opportunities for viewing other wildlife, including gray whales, the whale-watching tours and charters focus largely on opportunities for viewing killer whales. Further, none of these operators describes tours that include the Makah U&A.

Finally, it is unlikely that gray whales would respond to a Makah tribal hunt by avoiding whale-watch vessels (Section 3.4.3.6.6, Vessel Interactions). ENP gray whales have been exposed to hunting for decades by Chukotka natives, yet that ongoing hunt has not translated into a general avoidance of boats by gray whales (NMFS 2001; Hoyt and Hvenegaard 2002). There is no evidence to suggest that hunting by the Makah Tribe would cause a change in behavior that has not yet been demonstrated to result from a far more extensive hunt. ENP gray whale behavior also does not appear to have been affected by other types of human and vessel activity. As described in Section 3.4.3.6.6, Vessel Interactions, these whales migrate through waters occupied by large numbers of commercial and private vessels. Off the coast of Los Angeles, California, during the whale-watching season, Rugh et al. (1999) reported that 8 to 12 boats may follow a single whale. The number of approaches incident to Makah whale hunting would be minor compared to the whales' existing level of exposure to vessels.

If a Makah gray whale hunt were to alter gray whale behavior, it is not possible to estimate the amount of decrease that might occur in revenues of whale-watch operators. Current revenues of whale-watch operators are unknown, and there is no information available or that could reasonably be obtained that would allow an estimation of how much whale-watching revenues might decrease if gray whale behavior were altered by a Makah hunt. The extent to which a Makah hunt had an effect on gray whale behavior, and a subsequent indirect effect on whale-watching revenues, would depend primarily on factors that could cause whales to avoid boats, including the number of whales that could be struck and the estimated number of whales with harpoon attempts and approaches.

4.6.2.4 Shipping and Ocean Sport/Commercial Fishing

Under current conditions, the value of commercial shipping in Washington State is \$63 billion, a substantial proportion of which is the result of shipping that passes through the project area (Washington Joint Transportation Committee 2007, see Section 3.6.3.1.4, Commercial Shipping). Estimated revenues from sport fishing trips from Neah Bay that targeted salmon, steelhead, groundfish, halibut, and albacore tuna ranged between about \$1.6 million and \$2.4 million

annually (in 2000 dollars) from 1997 to 2004 (Section 3.6.3.2.5, Contribution of Ocean Sport Fishing to the Local Economy). Most fishing derbies in Clallam County take place during late spring through early autumn. The value of commercial fish landings at the Port of Neah Bay since 2000 has ranged from \$4.0 to \$5.7 million annually (Section 3.6.3.2.6, Contribution of Ocean Commercial Fishing to the Local Economy).

If whale-hunting restricted the operations of commercial shipping traffic or sport and commercial fishing vessels, it could affect revenues or employment associated with these sectors. Vessels not involved in whale hunting would have to maintain prudent distances from whale hunts as a safety precaution. As discussed in Section 2.3.3.2.7, Public Safety Measures and Enforcement, there would be a moving exclusionary zone (MEZ) with a 500-yard radius centered on tribal vessels actively engaged in a whale hunt under any of the action alternatives. No person or vessel would be able to enter the MEZ when it was activated, except for the authorized Makah whale hunt vessel, a media pool vessel preauthorized by the Coast Guard, or another vessel or person preauthorized by the Coast Guard. The requirement to remain outside the MEZ could increase operating costs if it caused vessels to take longer routes to reach their destinations or could decrease revenues if it prevented fishing vessels from accessing fishing grounds. It is possible that revenues associated with shipping, sport fishing, or commercial fishing could decrease in response to these restrictions.

The small size and limited duration of the MEZ would likely result in negligible disruption of commercial shipping or sport and commercial fishing. Further, as described in Section 4.13.2.2, Marine Traffic, hunt-related activities would probably not interfere with commercial shipping traffic because most, if not all, hunting would likely occur within the Coast Guard RNA, which lies almost entirely within the OCNMS area to be avoided.

The potential for any of the alternatives to affect shipping or sport and commercial fishing would depend primarily on the number of times the MEZ would be activated. It is not possible to predict how many times the MEZ would be activated on a given day of hunting, but it is reasonable to expect that the number of times per day of hunting would be the same, on average. For sport fishing operations, the potential for an effect could also depend on the season that hunting is allowed. Sport fishing for salmon occurs during the summer and early fall, while sport fishing for other species occurs year round (Section 3.6.3.2.5, Contribution of Ocean Sport Fishing to the Local Economy). Hunting that occurs on summer days would have a greater potential to affect sport fishing than hunting that occurs on winter days.

4.6.2.5 Management and Law Enforcement

Under current conditions, NMFS' annual budget for marine mammal management in the Northwest Region ranges from zero to \$500,000 per year. The overall budget for monitoring the ENP gray whale population is approximately \$65,000. Within the ENP gray whale budget, funding has been provided for photo-identification studies of gray whales in local survey areas with one purpose, among others, being management of a potential Makah gray whale hunt. It is uncertain whether NMFS would continue to fund the photo-identification program if a hunt was not authorized. Because no gray whale hunting currently occurs, there are no NMFS observers associated with a hunt.

If a whale hunt were authorized under any of the action alternatives, it is likely that hunting would be monitored and evaluated for its impact on the ENP gray whale population in general and on whales identified in local survey areas in particular. Funding would likely continue for the photo-identification studies aimed at identifying whales in local survey areas. Estimated annual costs for the photo-identification study are \$65,000 (NMFS 2008). Funding would also likely be provided for NMFS and Makah observers during and immediately following a hunt (Section 2.3.3.2.7, Other Environmental Protection Measures). Cost of a NMFS observer could be as high as \$7,000 per month (i.e., averaging \$233 per day of hunting) (NMFS 2008).

If whale hunting by the Tribe engendered protests by whaling opponents, as it has in the past, there would likely be law enforcement operations to maintain order. Past law enforcement activities have involved the United States Coast Guard, NMFS Office of Law Enforcement, the State of Washington, Clallam County Sheriff's Office and Makah tribal police. Estimated costs for all but non-tribal agencies could approach \$43,000 per day, with the bulk of costs associated with United States Coast Guard aircraft and vessels (NMFS 2008, Table 4-3). An additional \$2,790 per month could be incurred to provide mobile command facilities for enforcement personnel (NMFS 2008)

Under any of the action alternatives, costs associated with hunt observers or with law enforcement would depend primarily on the number of days of hunt-related activity (which could include preparations for hunts and protests of hunt; Table 4-3). It is not possible to predict the number of days of preparation or protests that would occur for each day of hunting. Estimated enforcement costs for any of the alternatives may therefore be conservative. Costs for photo-identification studies would likely be the same regardless of the action alternative implemented.

4.6.3 Evaluation of Alternatives

The following sections consider the potential for the alternatives to affect economic conditions both within and outside the project area. Potential effects outside the project area include such things as changes in revenue or employment associated with whale-watching and tourism. For each alternative, the discussion addresses the potential effects on tourism, household use of edible and non-edible whale products, the whale-watching industry, commercial shipping and sport and commercial fishing, and management and law enforcement.

Under any of the action alternatives, tourist-related enterprises in and around the project area could experience a minor increase in business activities over the short term. Interested tourists and other visitors would most likely visit the project area to observe the whale hunt and might participate in harvest-related celebrations as media stories raised public awareness of the Makah whale hunt and the Tribe's whale hunting tradition. Some individuals might decide not to visit the project area based on negative publicity about the whale hunt. Overall, it is reasonable to expect more visitors would be drawn to the area than avoid the area as a result of a whale hunt, potentially resulting in a minor short-term increase in tourism-related business activity. The amount of any such potential short-term increase would likely depend on the number of days of hunting under a particular alternative. Thus alternatives with more days of hunting would likely result in a greater increase.

The potential also exists for increased long-term business activity as a result of expansion of the tribal tourism sector of the reservation economy. Such a potential is likely linked to whether hunting occurs at all and is therefore likely to be similar across all of the action alternatives.

Under any of the action alternatives, the potential for whale products to become available for household consumption and the making and selling of handicraft articles would increase due to the opportunity for tribal members to harvest whales. The amount of any increase would depend on the number of whales likely to be harvested under a particular alternative. Thus alternatives with higher harvest levels would likely result in a greater increase.

The lowest risk of adverse effects on whale-watching operators, commercial shipping traffic and sport and commercial fisheries would occur under the No-action Alternative because no whale hunts would be permitted under this alternative. Under any of the action alternatives, it is unlikely that Makah whale hunting would have more than a negligible effect on whale-watching, for the reasons described above (Section 4.6.2.3, Whale-watching Industry). To the extent such an impact did occur, its amount would probably depend on the number of whales that could be

struck or exposed to harpoon attempts and approaches. Thus alternatives that result in greater numbers of strikes, harpoon attempts, or approaches would have a greater potential to adversely affect whale-watch operators.

The potential for disruption of commercial shipping traffic and sport and commercial fisheries would probably be negligible because of the small size and duration of the MEZ. To the extent such an impact did occur, its amount would probably depend on the number of times the MEZ was activated, which would depend on the number of days of hunting. Thus alternatives that result in more days of hunting would have a greater potential to adversely affect commercial shipping traffic and sport and commercial fisheries.

The potential for economic effects associated with the costs of law enforcement and management would be lowest under the No-action Alternative, while alternatives that involve more days of hunting and longer hunting seasons could potentially have higher associated costs.

4.6.3.1 Alternative 1

Under the No-action Alternative, no whale hunt would be permitted, and no whale hunting or associated activities (e.g., ceremonies, celebrations, protests, monitoring, law enforcement) would be anticipated. There would be no potential for visitors to view hunt-related activities in the project area or to participate in harvest-related celebrations. There would also be no potential for media coverage of the whale hunt that might, in turn, generate interest in the Makah Reservation as a cultural tourism destination. Consequently, the level of business activity for tourist-related enterprises in and around the project area would not be expected to differ from the current level.

With the possible exception of products from drift whales, there would be no potential for households to consume whale meat and blubber or use non-edible whale products for the manufacture and sale of traditional handicrafts. There would be no potential for a whale hunt to disrupt the whale-watching industry, commercial shipping, or sport or commercial fishing. Consequently, the economic conditions of the whale-watching industry, commercial shipping, and sport and commercial fishing would probably not differ from current conditions. The lack of whale hunting would make monitoring and enforcement unnecessary, so there would be no additional costs associated with these activities. The current costs for photo-identification studies may or may not continue.

4.6.3.2 Alternative 2

Under Alternative 2, hunting would be expected to occur on a total of 7 to 30 days, mostly during April and May. The limit on the number of struck whales would be seven and the limit on the

number of harvested whales would be an average of four per year with a maximum of five in any one year. Approximately 28 whales would be exposed to harpoon attempts and 140 would be approached annually. Compared to the No-action Alternative, under which there would be no hunting, Alternative 2 is likely to result in (1) minor short-term increases in tourism from the likely 7 to 30 days of hunting, (2) an increase of four whales annually available for household use by Makah tribal members, (3) negligible changes in whale-watching revenues, (4) minor increases in interference with shipping and sport/commercial fishing vessels, and (5) an increase in expenditures for management and law enforcement.

4.6.3.2.1 Tourism

Under Alternative 2 visitors would likely be drawn to the project area on the 7 to 30 days that whale-hunting that would occur, potentially creating a minor increase in the level of business activity for nearby tourist-related businesses, compared to the No-action Alternative (under which no visitors would come to the project area to observe whale hunts). The increased business activity would likely be short-term (lasting only during the period that the whale hunt was occurring), as visitors would come to observe the hunt and to participate in harvest-related celebrations. Hunting would be allowed from December 1 through May 31, but would most likely occur during April and May. Potential inclement weather during April and May could deter visitors from coming to observe a whale hunt or participate in harvest-related ceremonies.

It is uncertain whether a hunt would result in a long-term increase in tourism. Publicity about the whale hunt could generate interest in the Makah Reservation as a cultural tourism destination, while some individuals might not visit the project area due to negative publicity about the whale hunt.

4.6.3.2.2 Household Use of Whale Products

Compared to the No-action Alternative (under which no whales could be harvested and the Tribe would have access only to drift whales or whales incidentally caught in fishing gear), up to five whales annually could be harvested under Alternative 2, with an average annual harvest of four whales allowed. Limits would be placed on the harvest of identified whales, which could affect the Tribe's ability to harvest the full number of whales allowed. The hunting season would be restricted to the period from December 1 through May 31, with most hunts likely occurring during April and May. Potential inclement weather during these months would likely affect the number of days the Tribe could hunt, which could also affect the Tribe's ability to harvest the full number of whales allowed.

Under Alternative 2 the amount of whale products available for household consumption, manufacturing, and selling of traditional handicrafts would increase over current conditions (the No-action Alternative). The increase would come from whales the Tribe was actually able to harvest, which would likely be four whales annually. The actual number of whales harvested each year may be lower because of the constraints on identified whales and hunting season.

4.6.3.2.3 Whale-watching Industry

Compared to the No-action Alternative (under which no whales would be struck, exposed to harpoon attempts, or approached by hunters), under Alternative 2, up to seven whales may be struck annually, 28 exposed to unsuccessful harpoon attempts, and 140 approached. Limits would be placed on the harvest of identified whales, which could affect the Tribe's ability to harvest the full number of whales allowed. This in turn could affect the number of whales struck, exposed to unsuccessful harpoon attempts, and approached. The hunting season would be restricted to the period from December 1 through May 31, with most hunts likely occurring during April and May. Potential inclement weather during these months would likely affect the number of days the Tribe could hunt, which could also affect the number of whales struck, exposed to unsuccessful harpoon attempts, and approached.

As described in Section 4.6.2.3, Whale-watching Industry, there is no information to suggest individuals would avoid whale-watching tours if a Makah hunt is authorized, and it is unlikely that Makah hunting would activities would overlap geographically with whale-watching tours. It is also unlikely that gray whales would respond to a Makah tribal hunt by avoiding whale-watch vessels. As described in Section 4.5, Other Wildlife, it is likely that any effects of a hunt on other marine mammals, which might be a target of whale-watch operators, would be localized and temporary. To the extent such an effect might occur under Alternative 2, it is not possible to estimate the amount of decrease that might occur in revenues of whale-watch operators. Current revenues of whale-watch operators are unknown, and there is no information available or that could be obtained that would allow an estimation of how much revenues might decrease if ENP gray whale behavior were altered by a Makah hunt.

4.6.3.2.4 Shipping and Ocean Sport/Commercial Fishing

Compared to the No-action Alternative (under which there would be no whale hunts and no activation of the MEZ) activation of the MEZ on 7 to 30 days during a whale hunt under Alternative 2 would lead to an increased potential for restricting operations of commercial

shipping vessels and sport and commercial fisheries. Hunting would occur primarily in April and May.

The small size and limited duration of the MEZ would likely result in negligible disruption of commercial shipping or sport and commercial fishing. Further, as described in Section 4.13.2.2, Marine Traffic, hunt-related activities would probably not interfere with commercial shipping traffic because most, if not all, hunting would likely occur within the Coast Guard RNA, which lies almost entirely within the OCNMS area to be avoided. Also, most sport fishing for salmon occurs outside the time that whale hunting would take place under Alternative 2. Consequently, only minor economic impacts to commercial shipping or sport and commercial fisheries would be expected as a result of implementing Alternative 2.

4.6.3.2.5 Management and Law Enforcement

Compared to the No-action Alternative (under which no whale-hunting or associated protests would occur) Alternative 2 could result in 7 to 30 days of hunting and associated protests. The costs for hunt observers would increase over current conditions by the number of days of hunting. The cost for law enforcement would increase over current conditions by the number of days activities occurred that required a law enforcement presence. Such activities might include hunting, protests, and ceremonies. Actual days of hunting would represent the minimum number of days on which a law enforcement presence might be required, while the number of days requiring a law enforcement presence might be twice as many days as actual days of hunting. It is uncertain whether the existing photo-identification study would continue to be funded under the No-action Alternative. If not, then its continuation under Alternative 2 would represent an increased cost beyond current conditions.

Under Alternative 2, costs would be incurred for NMFS and Makah observers during the 7 to 30 days that hunting occurred, resulting in an increase in costs over current conditions (the No-action Alternative). Estimated costs for a NMFS observer for 7 to 30 days could be as high as \$7,000 (based on a monthly rate) (NMFS 2008).

If whale hunting by the Tribe engenders protests by whaling opponents, as it has in the past, there could also be costs associated with law enforcement activities. It is not possible to predict how many of the 7 to 30 days of hunting likely under Alternative 2 would require a law enforcement presence, or which governmental entities would provide law enforcement (federal, state, local and tribal). As described under Section 4.6.2.5, Management and Law Enforcement, estimated costs for all non-tribal enforcement agencies could approach \$43,000 per day, with overall costs

ranging from \$529,232 to as much as \$1.5 million depending on the number of hunt days (Table 4-3). As with the other alternatives, the bulk of costs would be associated with United States Coast Guard aircraft and vessels (NMFS 2008).

4.6.3.3 Alternative 3

Under Alternative 3, hunting would be expected to occur on a total of 40 days year round. The limit on the number of struck whales would be seven and the limit on the number of harvested whales would be an average of four per year with a maximum of five in any one year. Approximately 28 whales would be exposed to harpoon attempts and 140 would be approached annually. Compared to the No-action Alternative, under which there would be no hunting, Alternative 3 is likely to result in (1) minor short-term increases in tourism from the likely 40 days of hunting, (2) an increase of four whales annually available for household use by Makah tribal members, (3) negligible changes in whale-watching revenues due to changes in whale behavior as a result of interactions between hunters and whales, (4) minor increases in interference with commercial shipping and sport and commercial fishing vessels, and (5) an increase in expenditures for management and law enforcement over the likely 40 days of hunting.

4.6.3.3.1 Tourism

Compared to the No-action Alternative (under which no whale hunts would occur to draw visitors to the project area), the whale hunt and associated activities under Alternative 3 would likely draw visitors to the project area on the days that hunting occurred, potentially creating a minor increase during those days in the level of business activity for tourist-related enterprises nearby. The increased business activity would likely be short term (lasting only as long as the hunt), as visitors would come to observe the hunt and to participate in harvest-related celebrations. Thus potential increases in business activity under Alternative 3 would likely occur on a total of 40 days. Because there would be no limits on the hunting season, hunting would likely occur year round. It is uncertain whether a hunt would result in a long term increase in tourism. Publicity about the whale hunt could generate interest in the Makah Reservation as a cultural tourism destination, while some individuals might not visit the project area due to negative publicity about the whale hunt.

Compared to Alternative 2, the increased number of days of hunting (40 versus 7 to 30) would probably result in more visitors who would come to the Makah Reservation to observe a whale hunt and/or participate in activities associated with the hunt, such as harvest-related celebrations. The number of whale hunts portrayed in the media would also likely increase, increasing the

interest in the Makah Reservation as a cultural tourism destination. In addition, because hunts would likely occur during the summer when visitation by tourists to the Olympic Peninsula is comparatively higher than April and May (when hunting would likely occur under Alternative 2), this could further increase business activity for tourist-related enterprises in and around the project area.

4.6.3.3.2 Household Use of Whale Products

Compared to the No-action Alternative (under which no whales could be harvested and the Tribe would have access only to drift whales or whales incidentally caught in fishing gear) up to five whales annually could be harvested, with an average annual harvest of four whales allowed. No limits would be placed on the harvest of identified whales, and no limits would be placed on the hunting season. Hunting would likely occur year round. Under Alternative 3 the amount of whale products available for household consumption, manufacturing, and selling of traditional handicrafts would increase over current conditions (the No-action Alternative). The increase would come from whales the Tribe was actually able to harvest, which would likely be four whales annually, on average. The lack of limits on harvest of identified whales and hunting seasons would make it likely the Tribe could harvest the full number allowed.

Compared to Alternative 2, the lack of restrictions on the harvest of identified whales and the lack of restrictions on hunting seasons would increase the Tribe's ability to harvest the full number of whales. Consequently, the potential for whale products to be available for household consumption and the making and selling of traditional handicraft articles would likely be higher than under Alternative 2. The potential increase in income for households that participate in the making and selling of such articles would likewise be higher.

4.6.3.3.3 Whale-watching Industry

Compared to the No-action Alternative (under which no whales would be struck, exposed to harpoon attempts, or approached by hunters), under Alternative 3, up to seven whales may be struck annually, 28 exposed to unsuccessful harpoon attempts, and 140 approached. No limits would be placed on the harvest of identified whales or hunting seasons.

As described in Section 4.6.2.3, Whale-watching Industry, there is no information to suggest individuals would avoid whale-watching tours if a Makah hunt is authorized, and it is unlikely that Makah hunting activities would overlap geographically with whale-watching tours. It is also unlikely that gray whales would respond to a Makah tribal hunt by avoiding whale-watching vessels. As described in Section 4.5, Other Wildlife, it is likely that any effects of a hunt on other

marine mammals, which might be a target of whale-watching operators, would be localized and temporary. To the extent such an effect might occur under Alternative 3, it is not possible to estimate the amount of decrease that might occur in revenues of whale-watching operators. Current revenues of whale-watching operators are unknown, and there is no information available or that could be obtained that would allow an estimation of how much revenues might decrease if ENP gray whale behavior were altered by a Makah hunt.

The number of whales allowed to be harvested or struck under Alternative 3 would be the same as under Alternative 2. However, the lack of restrictions on the hunting season and the harvest of identified whales would make it more likely the Tribe could harvest the full number of whales allowed. Therefore, the potential for a change in revenues of whale-watching operators, compared to the No-action Alternative, could be somewhat higher than the potential described under Alternative 2.

4.6.3.3.4 Shipping and Ocean Sport/Commercial Fishing

Compared to the No-action Alternative (under which there would be no whale hunts and no activation of the MEZ) activation of the MEZ on 40 days during a whale hunt under Alternative 3 would lead to an increased potential for restrictions on the movement of commercial shipping traffic and sport and commercial fisheries. However, the small size and duration of the MEZ would make it likely that restrictions on vessel movement or fishing operations caused by activation of the MEZ would be negligible. Further, as described in Section 4.13.2.2, Marine Traffic, hunt-related activities would most likely not interfere with commercial shipping traffic because most, if not all, hunting would probably occur within the Coast Guard RNA, which lies almost entirely within the OCNMS area to be avoided. Consequently, only minor economic impacts to commercial shipping or sport and commercial fisheries would be expected as a result of implementing Alternative 3.

Compared to Alternative 2, the additional days of hunting (40 versus 7-30) would result in more instances of the MEZ being activated. This would increase the potential for whale hunting to interfere with commercial shipping or sport and commercial fishing operations beyond the potential under Alternative 2. In addition, under Alternative 3, hunting could occur year round, compared to Alternative 2, which would restrict hunting to the period from December 1 through May 31, with most hunting likely occurring in April and May. Although commercial shipping and fishing occur year round, sport fishing is more likely to occur during summer months, particularly sport fishing vessels departing from Neah Bay. Thus for hunting that occurs after June 1 under

Alternative 3, there is a greater potential for activation of the MEZ to interfere with sport fishing, compared to the interference likely on a day of hunting under Alternative 2.

4.6.3.3.5 Management and Law Enforcement

Compared to the No-action Alternative (under which no whale-hunting or associated protests would occur) Alternative 3 could result in 40 days of hunting and associated protests. The amount of increase in costs for hunt observers and law enforcement would increase over current conditions by the number of days of hunting. It is uncertain whether the existing photo-identification study would continue to be funded under the No-action Alternative. If not, then its continuation under Alternative 3 would represent an increased cost beyond current conditions.

Under Alternative 3, costs would be incurred for NMFS and Makah observers during the 40 days that hunting occurred, resulting in an increase in costs over current conditions (the No-action Alternative). Estimated costs for a NMFS observer for 40 days of hunting could be as high as \$42,000 (based on rate of \$7,000 per month over a span of six months) (NMFS 2008).

If whale hunting by the Tribe engenders protests by whaling opponents, as it has in the past, there could also be costs associated with law enforcement activities. It is not possible to predict how many of the 40 days of hunting likely under Alternative 3 would require a law enforcement presence, or which governmental entities would provide law enforcement (federal, state, local and tribal). As described under Section 4.6.2.5, Management and Law Enforcement, estimated costs for all non-tribal enforcement agencies could approach \$43,000 per day, with overall costs estimated at \$2.1 million. As with the other alternatives, the bulk of costs would be associated with United States Coast Guard aircraft and vessels (NMFS 2008; Table 4-3). Compared to Alternative 2, these costs would be greater because of the potentially greater time span allowed for hunting.

4.6.3.4 Alternative 4

Alternative 4 would include the same limits on the number of whales harvested as Alternative 2 and would impose the same restrictions on the hunting season. The additional restrictions contained in Alternative 4 (no hunting within 200 yards of rocks and islands in the Washington Islands National Wildlife Refuges) would not be expected to influence the number of days of hunting, the number of whales struck or harvested, or the number of whales exposed to harpoon attempts or approaches. Therefore, Alternative 4 has the same potential as Alternative 2 to result in a change in revenue, employment, and/or economic value, relative to the No-action Alternative, associated with (1) tourist-related business activity, (2) household consumption and

manufacture and sale of traditional handicrafts, (3) the whale-watching industry, (4) commercial shipping, sport/commercial fishing, and (5) hunt-related management and law enforcement.

4.6.3.5 Alternative 5

Under Alternative 5, hunting would be expected to occur on a total of 20 days year round. The limit on the number of struck whales would be three and the limit on the number of harvested whales would be two in any one year. Approximately 12 whales would be exposed to harpoon attempts and 60 would be approached annually. Compared to the No-action Alternative, under which there would be no hunting, Alternative 5 is likely to result in (1) minor short-term increases in tourism from the likely 20 days of hunting, (2) an increase of up to 2 whales annually available for household use by Makah tribal members, (3) negligible changes in whale-watching revenues due to changes in whale behavior as a result of interactions between hunters with whales, (4) minor increases in interference with shipping and sport/commercial fishing vessels, and (5) an increase in expenditures for management and law enforcement over the likely 20 days of hunting.

4.6.3.5.1 Tourism

Compared to the No-action Alternative (under which no whale hunts would occur to draw visitors to the project area), the whale hunt and associated activities under Alternative 5 would likely draw visitors to the project area on the days that hunting occurred, potentially creating a minor increase during those days in the level of business activity for tourist-related enterprises nearby. The increased business activity would likely be short term (lasting only as long as the hunt), as visitors would come to observe the hunt and to participate in harvest-related celebrations. Thus potential increases in business activity under Alternative 5 would likely occur on a total of 20 days. Because there would be no limits on the hunting season, hunting would likely occur year round, including during the summer period. Thus inclement weather would not be likely to deter visitors from coming to observe whale hunts. It is uncertain whether a hunt would result in a long-term increase in tourism over current conditions under the No-action Alternative. Publicity about the whale hunt could generate interest in the Makah Reservation as a cultural tourism destination, while some individuals might not visit the project area due to negative publicity about the whale hunt.

Compared to Alternative 2, there would be about the same number of days of hunting under Alternative 5 (20 versus 7 to 30), but they would likely occur during the summer, compared with April and May under Alternative 2. More visitors are likely to come observe a hunt during

summer months, when weather conditions are more favorable. Thus it is likely that more visitors would come to observe the hunts under Alternative 5 than Alternative 2, with an attendant potential minor increase in business activity for tourist-related enterprises.

4.6.3.5.2 Household Use of Whale Products

Compared to the No-action Alternative (under which no whales could be harvested and the Tribe would have access only to drift whales or whales incidentally caught in fishing gear) up to two whales annually could be harvested annually under Alternative 5. No limits would be placed on the harvest of identified whales, and no limits would be placed on the hunting season. Hunting would likely occur year round.

Under Alternative 5 the amount of whale products available for household consumption, manufacturing, and selling of traditional handicrafts would increase over current conditions (the No-action Alternative). The increase would come from whales the Tribe was actually able to harvest, which would likely be two whales annually. The lack of limits on harvest of identified whales and hunting seasons, and the relatively low harvest level, would make it likely the Tribe could harvest the full number allowed.

Compared to Alternatives 2, 3, and 4, the lower number of whales that may be harvested (two per year versus an average of four per year) is likely to result in fewer whale products being available for household consumption and the making and selling of traditional handicraft. The potential increase in income for households that participate in the making and selling of such articles would likewise be lower.

4.6.3.5.3 Whale-watching Industry

Compared to the No-action Alternative (under which no hunts would occur and no whales would be struck, exposed to harpoon attempts, or approached by hunters), under Alternative 5, there may be 20 days of hunting, up to three whales may be struck annually, up to 12 whales may be exposed to unsuccessful harpoon attempts, and up to 60 whales may be approached.

As described above (Section 4.6.2.3, Whale-watching Industry) there is no information to suggest that individuals would avoid whale-watching tours if a Makah hunt were authorized, and it is unlikely that Makah hunting activities would overlap geographically with whale-watching tours. It is also unlikely that gray whales would respond to a Makah tribal hunt by avoiding whale-watching vessels. As described in Section 4.5, Other Wildlife, it is likely that any effects of a hunt on other marine mammals, which might be a target of whale-watching operators, would be localized and temporary. To the extent such an effect might occur under Alternative 5, it is not

possible to estimate the amount of decrease that might occur in revenues or employment associated with whale-watching. Current revenues and employment in whale-watching operations are unknown, and there is no information available or that could be obtained that would allow an estimation of how much revenues might decrease if ENP gray whale behavior were altered by a Makah hunt.

Compared to Alternatives 2, 3, and 4, fewer whales could be harvested (two versus four per year), struck (three versus seven per year), exposed to harpoon attempts (12 versus 28) and approaches (60 versus 140). Therefore, the potential for interactions between hunting and whale-watching, or for whale-hunting to affect whale behavior around whale-watching vessels, is less than under Alternatives 2, 3, or 4.

4.6.3.5.4 Shipping and Ocean Sport/Commercial Fishing

Compared to the No-action Alternative (under which there would be no whale hunts and no activation of the MEZ) activation of the MEZ on 20 days of whale hunting under Alternative 5 would lead to an increased potential for restrictions on the movement of commercial shipping traffic and sport and commercial fisheries. However, the small size and duration of the MEZ would make it likely that restrictions on vessel movement or fishing operations caused by activation of the MEZ would be negligible. Any resulting economic effects on commercial shipping or sport and commercial fishing operations would also likely be negligible. In addition, hunt-related activities would most likely not interfere with commercial shipping traffic because most, if not all, hunting would probably occur within the Coast Guard RNA, which lies almost entirely within the OCNMS area to be avoided (Section 4.13.2.2, Marine Traffic). Consequently, only minor economic impacts to commercial shipping or sport and commercial fisheries would be expected as a result of implementing Alternative 5.

Compared to Alternatives 2 and 4, there would be about the same number of days of hunting (20 versus 7 to 30), likely resulting in about the same number of instances of the MEZ being activated. Thus there would be about the same potential for whale hunting to interfere with commercial shipping or sport and commercial fishing operations under Alternative 5 as under Alternatives 2 and 4. Because hunting would be allowed year round and would likely occur in the summer under Alternative 5, there is greater potential for a given instance of activating the MEZ to interfere with sport salmon fishing. Thus Alternative 5 could have a slightly greater potential to affect sport salmon fishing.

Compared to Alternative 3, Alternative 5 would result in fewer days of hunting (20 versus 40) and fewer instances of the MEZ being activated. Hunting under both alternatives would be allowed year round and would likely occur in the summer so there would not be a difference between the two alternatives for each instance of the MEZ being activated. For these reasons, there would be a lower potential for whale hunting to interfere with commercial shipping or sport and commercial fishing operations under Alternative 5 as under Alternative 3.

4.6.3.5.5 Management and Law Enforcement

Compared to the No-action Alternative (under which no whale-hunting or associated protests would occur) Alternative 5 could result in 20 days of hunting and associated protests. The amount of increase in costs for hunt observers and law enforcement would increase over current conditions by the number of days of hunting. It is uncertain whether the existing photo-identification study would continue to be funded under the No-action Alternative. If not, then its continuation under Alternative 5 would represent an increased cost beyond current conditions.

Under Alternative 5, costs would be incurred for NMFS and Makah observers during the 20 days that hunting occurred, resulting in an increase in costs over current conditions (the No-action Alternative). Estimated costs for a NMFS observer for 20 days could be as high as \$42,000 (based on rate of \$7,000 per month over a span of six months) (NMFS 2008).

If whale hunting by the Tribe engenders protests by whaling opponents, as it has in the past, there could also be costs associated with law enforcement activities. It is not possible to predict how many of the 20 days of hunting likely under Alternative 5 would require a law enforcement presence, or which governmental entities would provide law enforcement (federal, state, local and tribal). As described under Section 4.6.2.5, Management and Law Enforcement, estimated costs for all non-tribal enforcement agencies could approach \$43,000 per day, with overall costs estimated at \$1 million (Table 4-3). As with the other alternatives, the bulk of costs would be associated with United States Coast Guard aircraft and vessels (NMFS 2008). Compared to Alternatives 2 and 4, costs for management and law enforcement would be about the same because the number of days of hunting would be about the same (20 days versus 7 to 30). Compared to Alternative 3, costs would be less (approximately half) under Alternative 5 because fewer hunting days are expected (NMFS 2008).

4.6.3.6 Alternative 6

Alternative 6 would include the same provisions as Alternative 3 except that hunting would also be allowed in the Strait of Juan de Fuca portion of the Makah U&A. Alternative 6 would be

expected to result in the same number of hunting days year round as Alternative 3, the same number of whales harvested, struck, exposed to harpoon attempts and approaches, and the same number of instances of the MEZ being activated. Therefore, Alternative 6 has the same potential as Alternative 3 to result in a change in revenue, employment, and/or economic value, relative to the No-action Alternative, associated with (1) tourist-related business activity, (2) household consumption and manufacture and sale of traditional handicrafts, (3) the whale-watching industry, and (4) hunt-related management and law enforcement.

Regarding shipping and fishing, the ability to hunt in the Strait of Juan de Fuca could result in activation of the MEZ in the Strait (although current Coast Guard regulations regarding an MEZ for a Makah gray whale hunt do not extend into the strait). As described in Section 4.6.2.4, Shipping and Ocean Sport/Commercial Fishing, any effects on vessel movements are expected to be negligible. The potential for the MEZ to be activated in the strait under Alternative 6 would not be expected to result in different effects on shipping and fishing activities than would occur under Alternative 3. Therefore, Alternative 4 has the same potential as Alternative 2 to result in a change in revenue, employment, and/or economic value, relative to the No-action Alternative, associated with shipping or fishing.

TABLE 4-3. ESTIMATED COSTS OF ENFORCEMENT-RELATED ACTIVITIES AND RESOURCES

Entity	Unit Cost	No-action Alternative		Alternatives 2 & 4		Alternatives 3 & 6		Alternative 5	
		Freq.	Cost	Freq.	Cost	Freq.	Cost	Freq.	Cost
U.S. Coast Guard	\$55,544 per day	*	*	7-30 days	\$277,172 - \$1,187,880	40 days	\$1,583,840	20 days	\$791,920
Washington State Patrol	\$1,072 per day	*	*	60 days	\$64,320	120 days	\$128,640	30 days	\$32,160
Clallam County Sheriff	\$1,640 per day	*	*	60 days	\$98,400	120 days	\$196,800	30 days	\$49,200
NMFS Enforcement (Variable)	\$680 per day	*	*	7-60 days	\$4,760 - 20,400	56 days	\$38,080	28 days	\$19,040
NMFS Enforcement (Fixed) & Compliance Monitoring	\$9,790 per month	*	*	2 months	\$19,580	6 months	\$58,740	6 months	\$58,740
NMFS Gray Whale Monitoring	\$65,000 per year	*	*	Annual	\$65,000	Annual	\$65,000	Annual	\$65,000
Total Costs		*		\$529,232 - \$1,455,580		\$2,071,100		\$1,016,060	

Freq. = Frequency

* Assumes no change from existing costs.

4.7 Environmental Justice

4.7.1 Introduction

Executive Order 12898, *Environmental Justice*, requires that federal agencies “identify and address the . . . disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” Based on assessment of the demographic data presented in Section 3.7, Environmental Justice, and preliminary analysis of the type and location of effects potentially resulting from the proposed action, the potential population of concern for this environmental justice analysis consists of members of the Makah Tribe, which is a Native American population. As described in Section 3.7, Environmental Justice, this is a low-income, as well as a minority, population.

4.7.2 Evaluation Criteria

The EPA Office of Civil Rights and Environmental Justice developed guidance for all federal agencies conducting environmental justice analyses. This environmental justice analysis follows the EPA guidelines, which offer a range of categories to indicate the presence or absence of environmental justice effects (EPA 1998). This evaluation draws topically from the range of indicator categories EPA (1998) outlined. These categories correspond to effects described in Section 4.6, Economics, Section 4.8, Social Environment, and Section 4.10, Ceremonial and Subsistence Resources, of this EIS. The EPA environmental justice guidelines also indicate that impacts on human health should be considered in environmental justice analyses. As discussed in Section 4.16, Human Health, available information is insufficient to assess the potential of any of the alternatives to affect human health, either positively or negatively.

Analyses in this section also do not address the potential for the alternatives to affect the safety of Makah tribal members because environmental justice contemplates impacts imposed on minority and low-income populations by a federal agency. The proposed action is based on the Tribe's MMPA waiver request and the other action alternatives include variations on the restrictions identified in the Tribe's request. Risks associated with whale hunting would be undertaken voluntarily by the Tribe. The safety of hunt participants and others is addressed in Section 4.15, Public Safety. Authorization of a whale hunt under the action alternatives would likely result in some level of whale hunting activity by Makah tribal members, increasing the potential for hunt-related injury above the current level of injury under the No-action Alternative.

This analysis was based on a qualitative assessment of adverse effects that would result from the proposed alternatives for each of the three resource areas evaluated. A determination of an

environmental justice impact would occur if these adverse effects were to have a disproportionate effect on the environmental justice population of concern. A disproportionately high and adverse effect on minority and low-income populations means an adverse effect that (1) is predominantly borne by a minority population and/or a low-income population; or (2) will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non low-income population.

4.7.3 Evaluation of Alternatives

The following sections compare the potential for the alternatives to affect economic conditions in the project area. For each alternative, the discussion addresses the potential economic; ceremonial and subsistence resources; social environment; and human health effects on the Makah Tribe and other low-income or minority populations.

Business activity at tourist-related enterprises in Neah Bay generates jobs and income for tribal members (Section 3.6.3.2.4, Contribution of Tourism to the Local Economy). As described in Section 4.6.2.1, Tourism, whale hunts may create short-term increases in tourist-related business activity during a whale hunt. A whale hunt may also create an opportunity over the long term for the Tribe to attract visitors to Neah Bay who are interested in observing traditional cultural activities. On the other hand, hunting could also lead to boycott attempts by whale-hunting opponents, which could reduce the number of visitors to Neah Bay. If, on balance, the absence of a whale hunt resulted in less tourism-related business activity in Neah Bay (compared to under the action alternatives), a disproportionate share of the adverse economic effects might fall on the Makah Tribe.

Potential short-term increases in business activity for tourist-related enterprises on the Makah Reservation would likely be lower under Alternatives 2 and 4 compared to Alternatives 3 and 6 because hunting would be limited to winter periods under Alternatives 2 and 4, when visits to the Olympic Peninsula by tourists are relatively lower. Potential tourism benefits to the Tribe under Alternative 5 would probably be lower than under Alternatives 3 and 6, because there would likely be fewer days of hunting (20 versus 40). Potential tourism benefits to the Tribe under Alternative 5 would probably be slightly higher than under Alternatives 2 and 4, because the number of days of hunting would be about the same (20 versus 7 to 30), but hunting days would likely occur during a period of better weather and greater tourist activity. Regarding the Tribe's

ability to attract more visitors over the longer term because of a hunt, all of the action alternatives are likely to have an equal effect, compared to the No-action Alternative.

Under the No-action Alternative, no freshly harvested whale products would be available to Makah households. The quantity of whale products available to Makah households for consumption and making and selling handicraft articles would be limited to drift whales or whales taken incidentally in fisheries. A disproportionate share of these adverse effects would fall upon the Makah Tribe, which would have been the primary users of such products. Lack of such product would make largely unavailable a traditional subsistence resource for household members and the Makah community as a whole.

The potential for edible and non-edible whale products to become available would probably be lower under Alternatives 2 and 4 than Alternatives 3 and 6 because weather and other logistical considerations related to the timing of the hunt might constrain the Tribe's ability to reach the full limit on the number of whales allowed for harvested in any given year. The potential for whale products to become available under Alternative 5 would be lower under the other Alternatives because of the lower limit on the number of whales that may be harvested.

Under the No-action Alternative, subsistence and cultural activities related to whale hunting (e.g., preparation, hunting, butchering, sharing, consuming, dancing, singing, and rituals) would be more limited than under the action alternatives. A disproportionate share of the adverse effects on subsistence uses, traditional knowledge and activities, spiritual connection to whale hunting, and cultural identity would fall upon the Makah Tribe. The Makah's stated need for the whale hunt is to allow the Tribe to exercise its treaty whale hunting rights to provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whale hunting traditions. Alternatives 2, 4, and 5 would have the positive ceremonial and subsistence effects associated with a resumption of Makah whale hunting, but would restrict whale hunting in various ways that might make these benefits lower than under Alternatives 3 and 6.

Under the No-action Alternative, the benefits to the social environment (for example, community cohesion) that the Makah Tribe attributes to whale hunting would not be realized, potentially increasing social tension within the Makah Tribe. To the extent they occurred, these adverse social impacts would be borne predominantly by Makah Tribe members. Other treaty tribes could view NMFS' action under the No-action Alternative as a breach of faith by the United States government in upholding treaty rights, depending on the reasons for the denial of the request.

Any social tension created by this perception would not fall equally on all populations, but would predominantly be borne by Native Americans. Under any of the action alternatives, the social benefits that the Makah Tribe attributes to whale hunting would be realized; however, whale hunts would also probably exacerbate the social tensions between Tribe members who do and those who do not support the hunt. There is insufficient information to determine whether the potential social benefits to the Makah Tribe would offset the potential adverse social effects. Consequently, it is not possible to determine if the action alternatives would result in disproportionately high and adverse social effects on the Makah Tribe. Under any of the action alternatives, official recognition that traditional activities such as whale hunting are culturally valuable, despite their controversial nature, could be reassuring to Native Americans in general.

4.7.3.1 Alternative 1

4.7.3.1.1 Economics

Under the No-action Alternative, no whale hunt would be permitted, and there would be no short-term increases in business activity as visitors come to Neah Bay to view hunt-related activities or to participate in harvest-related celebrations. In addition, there be no potential for media coverage of the whale hunt to generate interest in the Makah Reservation as a cultural tourism destination. As a result, this alternative might limit the long-term opportunities for the Makah to expand the tribal tourism sector of the reservation economy. On the other hand, under the No-action Alternative it is unlikely there would be attempts to boycott Neah Bay because of whale hunting. If, on balance, the absence of a whale hunt under the No-action Alternative resulted in less tourism-related business activity in Neah Bay (compared to under the action alternatives), a disproportionate share of these adverse effects might fall on the Makah Tribe.

With the possible exception of products from drift whales or whales incidentally caught in fisheries, there would be no potential for households to consume whale meat and blubber or use non-edible whale products for the manufacture and sale of traditional handicrafts. The potential for households to gain additional income from making and selling traditional handicrafts would not be realized. As noted in Section 3.7.3.3.3, Makah Tribe, Native Americans living on the Makah Reservation have substantially lower incomes and experience higher poverty rates than residents throughout Clallam County. The adverse impact of this unrealized household income would be borne predominantly by Makah households. The Makah households would principally use the whale products to provide a traditional subsistence resource to household members and the wider Makah community and to derive income from the manufacture and sale of traditional native handicrafts.

4.7.3.1.2 Ceremonial and Subsistence Resources

Under the No-action Alternative, some subsistence and cultural activities related to whale hunting (e.g., preparation, hunting, butchering, sharing, consuming, dancing, singing, and rituals) would not be expected to occur. A disproportionate share of the adverse effects on subsistence uses, traditional knowledge and activities, and spiritual connection to whale hunting, and cultural identity would fall upon the Makah Tribe. The Makah's stated need for the whale hunt is to allow the Tribe to exercise treaty whale hunting rights to provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whale hunting traditions.

4.7.3.1.3 Social Environment

Under the No-action Alternative, the benefits to the social environment (for example, community cohesion) that the Makah Tribe attributes to whale hunting would not be realized, potentially increasing social tension within the Makah Tribe. To the extent that they would occur, these adverse social impacts would be borne predominantly by members of the Makah Tribe.

The No-action Alternative could also create social tensions between the Makah Tribe and other social groups, or between Native Americans generally and other social groups. The social tension created by this perception would not fall equally on all populations, but would predominantly be borne by Native American populations.

4.7.3.2 Alternative 2

4.7.3.2.1 Economics

In comparison to the No-action Alternative, there could be a minor increase in the level of business activities of tourist-related enterprises in and around the project area. Over the longer term, the Tribe would have opportunities to bolster the tribal tourism sector of the reservation economy, as media stories would increase public awareness of the Makah whale hunt and the Tribe's whale hunting tradition. Boycott attempts, however, could reduce any long term benefits from tourism.

Compared to the No-action Alternative, the potential for whale products to become available to Makah households for consumption and the making and selling of handicraft articles would increase as a result of the resumption of Makah whale hunting. The increased potential for whale products to become available for household consumption and the making and selling of traditional handicraft articles would have a beneficial effect on Makah households.

4.7.3.2.2 Ceremonial and Subsistence and Resources

In contrast to the No-action Alternative, Alternative 2 would have multiple positive ceremonial and subsistence effects on the Makah Tribe associated with a resumption of whale hunting. Alternative 2, like the other action alternatives, would be consistent with the Makah's stated need for the whale hunt, which is to allow the Tribe to exercise its treaty whale hunting rights to provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whale hunting traditions.

4.7.3.2.3 Social Environment

In contrast to the No-action Alternative, the benefits to the social environment (for example, increased increase social bonding within the Makah Tribe) that the Tribe attributes to whale hunting would be realized. However, social tensions exist between tribal members who support the hunt and those who do not. Whale hunts under Alternative 2 would probably exacerbate these tensions. There is insufficient information to determine whether the potential social benefits to the Makah Tribe would offset the potential adverse social effects. Consequently, it is impossible to determine if Alternative 2 would result in disproportionately high and adverse social effects.

Alternative 2 would make it possible for the Tribe to carry on traditional whale hunting that is sanctioned by the IWC. In contrast to the No-action Alternative, official recognition that traditional activities such as whale hunting are culturally valuable, despite their controversial nature, would likely be reassuring to Native Americans in general.

4.7.3.3 Alternative 3

4.7.3.3.1 Economics

In comparison to the No-action Alternative, there could be a minor increase in the level of business activities of tourist-related enterprises in and around the project area. Over the longer term, the Tribe would have opportunities to bolster the tribal tourism sector of the reservation economy, as media stories would increase public awareness of the Makah whale hunt and the Tribe's whale hunting tradition. Boycott attempts, however, could reduce any long term benefits from tourism.

Compared to the No-action Alternative, the potential for whale products to become available to Makah households for consumption and the making and selling of handicraft articles would increase as a result of the resumption of Makah whale hunting. The increased potential for whale products to become available for household consumption and the making and selling of traditional handicraft articles would have a beneficial effect on Makah households.

Compared to Alternative 2, Alternative 3 would afford more days of hunting (40 versus 7-30) on which there could be increased business activity caused by an influx of visitors. The ability to hunt year round and the lack of limits on identified whales would make it more likely the Tribe could harvest the full number of whales under Alternative 3, thus more whale products would be available for consumption and the production of handicrafts.

4.7.3.3.2 Ceremonial and Subsistence Resources

In contrast to the No-action Alternative, Alternative 3 would have multiple positive ceremonial and subsistence effects on the Makah Tribe associated with a resumption of whale hunting. Alternative 3, like the other action alternatives, would be consistent with the Makah's stated need for the whale hunt, which is to allow the Tribe to exercise its treaty whale hunting rights to provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whale hunting traditions.

Compared to Alternative 2, the ability to hunt year round would increase the opportunities for hunting whales and for resident participation. Consequently, the positive ceremonial and subsistence effects that the Makah would experience as a result of a resumption of whale hunting would be greater under Alternative 3 than under Alternative 2. Alternative 3, like the other action alternatives, would be consistent with the Makah's stated need for the whale hunt.

4.7.3.3.3 Social Environment

In contrast to the No-action Alternative, the benefits to the social environment (for example, increased increase social bonding within the Makah Tribe) that the Tribe attributes to whale hunting would be realized. However, social tensions exist between tribal members who support the hunt and those who do not. Whale hunts under Alternative 3 would probably exacerbate these tensions. There is insufficient information to determine whether the potential social benefits to the Makah Tribe would offset the potential adverse social effects. Consequently, it is impossible to determine if Alternative 3 would result in disproportionately high and adverse social effects.

Alternative 3 would make it possible for the Tribe to carry on traditional whale hunting that is sanctioned by the IWC. In contrast to the No-action Alternative, official recognition that traditional activities such as whale hunting are culturally valuable, despite their controversial nature, would likely be reassuring to Native Americans in general.

The amount of social benefit the Makah Tribe experiences under Alternative 3 would probably be the same as under Alternative 2.

4.7.3.4 Alternative 4

Alternative 4 would include the same limits on the number of whales harvested as Alternative 2 and would impose the same restrictions on the hunting season. The additional restrictions contained in Alternative 4 (no hunting within 200 yards of rocks and islands in the Washington Islands National Wildlife Refuges) would not be expected to influence the number of days of hunting or the number of whales struck or harvested. Therefore, Alternative 4 has the same potential as Alternative 2 to result in a change in the economic circumstances, ceremonial and subsistence resources, or social environment of the Makah Tribe.

4.7.3.5 Alternative 5

4.7.3.5.1 Economics

In comparison to the No-action Alternative, there could be a minor increase in the level of business activities of tourist-related enterprises in and around the project area. Over the longer term, the Tribe would have opportunities to bolster the tribal tourism sector of the reservation economy, as media stories would increase public awareness of the Makah whale hunt and the Tribe's whale hunting tradition. Boycott attempts, however, could reduce any long term benefits from tourism.

Compared to the No-action Alternative, the potential for whale products to become available to Makah households for consumption and the making and selling of handicraft articles would increase as a result of the resumption of Makah whale hunting. The increased potential for whale products to become available for household consumption and the making and selling of traditional handicraft articles would have a beneficial effect on Makah households.

Compared to Alternatives 2 and 4, Alternative 5 would afford about the same number of days hunting (20 versus 7 to 30) on which there could be increased business activity caused by an influx of visitors. The lower limits on harvest whales (three versus five) would result in fewer whale products being available for Makah households. Compared to Alternative 3, Alternative 5 would afford fewer days of hunting (20 versus 40) and therefore fewer days of increased business activity.

4.7.3.5.2 Ceremonial and Subsistence Resources

In contrast to the No-action Alternative, Alternative 5 would have multiple positive ceremonial and subsistence effects on the Makah Tribe associated with a resumption of whale hunting. Alternative 3, like the other action alternatives, would be consistent with the Makah's stated need for the whale hunt, which is to allow the Tribe to exercise its treaty whale hunting rights to

provide a traditional subsistence resource to the community and to sustain and revitalize the ceremonial, cultural, and social aspects of its whale hunting traditions.

Compared to Alternatives 2 and 4, the number of days of hunting would be about the same (20 versus 7 to 30), but the ability to hunt year round could increase the opportunities for hunting whales and for resident participation. Consequently, the positive ceremonial and subsistence effects that the Makah would experience as a result of a resumption of whale hunting could be greater than under Alternatives 2 and 4. Compared to Alternative 3, Alternative 5 would afford fewer days of hunting (20 versus 40) and therefore potentially fewer opportunities for resident participation and less subsistence/cultural satisfaction.

4.7.3.5.3 Social Environment

In contrast to the No-action Alternative, the benefits to the social environment (for example, increased increase social bonding within the Makah Tribe) that the Tribe attributes to whale hunting would be realized. However, social tensions exist between tribal members who support the hunt and those who do not. Whale hunts under Alternative 5 would probably exacerbate these tensions. There is insufficient information to determine whether the potential social benefits to the Makah Tribe would offset the potential adverse social effects. Consequently, it is impossible to determine if Alternative 5 would result in disproportionately high and adverse social effects.

Alternative 3 would make it possible for the Tribe to carry on traditional whale hunting that is sanctioned by the IWC. In contrast to the No-action Alternative, official recognition that traditional activities such as whale hunting are culturally valuable, despite their controversial nature, would likely be reassuring to Native Americans in general.

The amount of social benefit the Makah Tribe experiences under Alternative 5 would probably be the same as under Alternatives 2, 3, and 4.

4.7.3.6 Alternative 6

Alternative 6 would include the same provisions as Alternative 3 except that hunting would also be allowed in the Strait of Juan de Fuca portion of the Makah U&A. Alternative 6 would be expected to result in the same number of hunting days year round as Alternative 3 and the same number of whales harvested. Therefore, Alternative 6 has the same potential as Alternative 3 to result in a change in the economic circumstances, ceremonial and subsistence resources, or social environment of the Makah Tribe.

4.8 Social Environment

4.8.1 Introduction

This section addresses the potential for the alternatives to affect the social environment of the Makah Tribe, other tribes, and the general public. As described in Section 3.8, Social Environment, various groups and individuals either oppose or support the Makah whale hunt. Makah tribal members and other tribes generally support the hunt, while feelings among the general public are more mixed. Many adamantly oppose the hunt. NMFS' denial of a whale hunt under the No-action Alternative could create tension on the part of the Makah and other Indian tribes toward whale hunting opponents and the federal government, depending on the reasons for a denial. Conversely, a decision to authorize a whale hunt, and subsequent hunting, could lead to tensions on the part of whale hunting opponents towards the Makah and other Indian tribes and the federal government. Regardless of the decision, like-minded groups could experience moments of increased social bonding.

4.8.2 Evaluation Criteria

Any of the alternatives could affect relationships and interactions among members of the Makah Tribe, other tribes, and the general public. These effects would be expressed to varying degrees as social tension or social bonding, depending on the feelings of individual group members about whale hunting. The criteria for determining the potential effects of the alternatives on the social environment are primarily qualitative, based on the anticipated magnitude and duration of changes in social tensions or social bonding. The amount and content of media coverage might intensify protests and local social tensions. The following three sections describe how social interactions within and among the three interest groups identified in Section 3.8, Social Environment, might be affected under the alternatives.

4.8.2.1 Makah Tribal Members

As noted in Section 3.10.3.5.1, Makah Whaling, the 1999 whale hunt appeared to bolster social accord within the Makah community. Participants in the hunt reported enduring intense physical and spiritual training, which culminated in a deep bond between whalers (Section 3.10.3.5, Contemporary Makah Society). More broadly, most tribal members believe that restoration of whale hunting improved social and cultural conditions on the reservation (Section 3.8.3.1, Makah tribal members). Based on these experiences, as well as the potential benefits associated with reinforcing cultural identity (Section 4.10, Ceremonial and Subsistence Resources), whale hunts under the action alternatives could increase social bonding within the Tribe. Conversely, a

decision to deny the Tribe's request to hunt whales could lead to feelings of resentment toward the federal government by those tribal members who support the hunt, depending on the reason for the denial (Section 4.10.3.1, Ceremonial and Subsistence Resources – Alternative 1).

A whale hunt might also generate social tension between tribal members who support the hunt and those who do not. Whale hunts under the action alternatives would probably exacerbate tensions, which might be expressed as vocal dissent and public or private criticism of tribal members who speak out against the hunt.

Under the action alternatives, tension would also increase between tribal members who support the hunt and individuals or group members (including some members of other tribes) who oppose the hunt. As mentioned in Section 3.8.3.1, Makah Tribal Members, tribal members have expressed frustration with protesters and others who oppose the hunt, and some engaged in physical conflicts with protesters during the previous hunts.

4.8.2.2 Other Tribes

Many native organizations have expressed support for Makah whale hunting. In addition, some members of other regional tribes have stated the importance of solidarity with the Makah (Section 3.8.3.2, Other Tribes). Following the successful hunt in 1999, members of other tribes attended a community potlatch hosted by the Makah, witnessing the proceedings and sharing food. Whale hunts under the action alternatives would probably increase social bonding between the Makah and other native groups in the region, the United States, and worldwide. At the same time, members of other tribes might be subject to anti-whaling and anti-Indian sentiments expressed by whaling opponents. Similar to the Makah, other tribes might respond to the No-action Alternative with reinforced feelings of disillusionment with the federal government.

4.8.2.3 Other Individuals and Organizations

Section 3.8.3.3, Other Individuals and Organizations, describes the range of attitudes about Makah whale hunting held by people locally, statewide, nationally, and internationally, as well as people affiliated with various organizations. Those expressing support for the Makah gray whale hunt have mentioned treaty rights, the relative health of the gray whale population, and the cultural meaning ascribed to whaling by the Makah. Opponents of the hunt have commented on the beauty, intelligence, and community structure of whales, the existence value of gray whales (collectively and individually), the pain individual whales experience if struck or killed in a hunt, and the possibility that the local economy might be impacted by a boycott in response to a whale

hunt. Organizations that oppose whaling in general include animal-rights and marine conservation organizations, the whale-watching industry, and anti-treaty constituents.

Based on the experience of previous hunts, whale hunting under the action alternatives would inspire a wide range of feelings among persons and groups who oppose the hunt, including sorrow, frustration, and anger (Section 3.8.3.3, Other Individuals and Organizations). These feelings would be based in the concerns listed above, among others. Experience from the hunts and hunt exercises in 1998, 1999, and 2000 indicates that the resulting tensions might be expressed through demonstrations, attempts to interfere with hunt activities, or other forms of protest. These expressions might be directed at Makah tribal members, other tribes, and other individuals and organization members who have expressed support for the Makah whale hunt. Several incidents involving violent or near-violent confrontations between hunt opponents and tribal members occurred before and during the previous hunts (Section 3.8.3.3, Other Individuals and Organizations). Other expressions of tension that followed the successful 1999 hunt included death threats and anti-whaling messages delivered to tribal members and the Coast Guard, as well as incidents of Makah tribal members being refused service in area businesses. Some expressions of social tension directed at the Makah are founded in racism and anti-Indian sentiment, as well as resentment over the previous whale hunts. Such expressions would likely continue under all of the alternatives, including the No-action Alternative.

A whale hunt could also increase social bonding among whaling opponents, through a sense of shared adversity and a common cause. Under the No-action Alternative, hunt opponents might bond by celebrating a decision not to issue a permit. Similarly, supporters of the Makah gray whale hunt may bond through celebration under the action alternatives and through shared frustration under the No-action Alternative.

4.8.3 Evaluation of Alternatives

The following sections consider the potential for the alternatives to affect the social environment of the Makah Tribe, other tribes, and the general public. Under the action alternatives, each hunt attempt would probably result in protests and media coverage, with the associated effects described above, under Section 4.8.2, Evaluation Criteria. Most protest activities and vocal opposition to the hunt have come from groups that have expressed opposition to whale hunting under any conditions. For example, the website of one of the most active protest organizations states, “Whales should not be slaughtered anytime or anywhere by any people. These are socially complex, intelligent mammals whose numbers worldwide have been diminished severely” (Sea

Shepherd Conservation Society 2007). It is possible that restrictions on the total number of whales harvested, or on the number of identified whales harvested, would reduce the amount and intensity of opposition to a hunt. There is information that would allow a prediction of the difference in social tensions under alternatives that would place limits on harvest of identified whales versus those that would not. This analysis therefore treats the potential type and magnitude of effects on the social environment as depending on whether hunting occurs, the number of hunting expeditions, and the amount and content of associated media coverage. Alternatives that include more hunting expeditions would provide opportunities for more expression of social tension among those with opposing viewpoints the hunt, as well as added opportunities for increased bonding among persons sharing similar viewpoints.

As noted in Section 3.8.3.3, Other Individuals and Organizations, many people who watch whales in the project area on a regular basis attach existence values to individual whales that have been identified through photo-identification studies. It is possible that these people may express greater opposition to alternatives that do not include limits on the number of photo-identified whales (Alternatives 3, 5, and 6), compared to alternatives that do (Alternatives 2 and 4).

The lowest risk of adverse effects on the social environment would occur under the No-action Alternative, because no whale hunts would be permitted and there would be fewer occasions for confrontation between supporters and opponents of whale hunting compared to any of the action alternatives. Under all of the action alternatives, whale hunts would result in episodes of increased social tension between hunt supporters and opponents. Each hunt would be expected to result in increased tension as well as increased opportunities for social bonding between like-minded observers, compared to the No-action Alternative. The number of occasions that social tensions would likely exceed conditions under the No-action Alternative would likely correspond to the number of days that hunting would occur under each alternative. As discussed in Section 4.1, Introduction, Alternatives 2 and 4 would likely result in 7 to 30 days of hunting, Alternative 5 would likely result in 20 days of hunting, and Alternatives 3 and 6 would likely result in as many as 40 days (Table 4-1). Among the action alternatives, therefore, Alternatives 2 and 4 would have the lowest risk of adverse effects on the social environment, Alternative 5 would have a moderate risk, and Alternatives 3 and 6 would have the greatest risk, based on the number of occasions of elevated tension due to whale hunting.

The alternative with the lowest potential of providing benefits to Makah tribal members through social bonding would be the No-action Alternative. Any of the action alternatives would provide some potential for benefits to tribal members through social bonding.

4.8.3.1 Alternative 1

Under the No-action Alternative, no whale hunt would be permitted, and no whale hunting or associated activities (e.g., ceremonies, celebrations, protests, law enforcement) would be anticipated. Individuals and organizations who oppose the Makah gray whale hunt would not engage in demonstrations, attempts to interfere with hunt activities, or other forms of protest. There would, therefore, be no potential for episodes of increased social tensions associated with a whale hunt. Supporters of the Makah whale hunt might bond through a sense of shared adversity and a common cause, and hunt opponents (including some Makah tribal members) might bond by celebrating a decision not to authorize a hunt. Similarly, social bonding and other potential social benefits described above and in Chapter 3 would not be realized under the No-action Alternative. Renker (2007) cited observations of a connection between unhealthy social behaviors and the inability to practice traditional rituals. Such behaviors could become more common among Makah tribal members. In addition, the Makah and other tribes might feel continued tension toward hunt opponents and the federal government, due in part to anger over a perceived lack of respect for tribal traditions and treaty rights.

4.8.3.2 Alternative 2

Any whale hunts that occurred under Alternative 2 would result in increased tension between hunt supporters and opponents, compared to the No-action Alternative. As described under 4.8.3, Evaluation Criteria, the potential type and magnitude of effects on the social environment would likely be affected by the number of hunting expeditions. As described in Section 4.1, Introduction, there would likely be 7 to 30 days of hunting per year under Alternative 2. The degree of tension expressed by some hunt opponents might also be affected by the number of identified whales that could be killed. Alternative 2 would likely result in about one identified whales being killed each year.

Supporters and opponents would be drawn from all three of the interest groups (i.e., Makah tribal members, other tribes, and other individuals and organizations) described above and in Section 3.8.3, Existing Conditions. The reactions of individual members of interest groups would be determined primarily by each person's set of values and beliefs. Members of specific organizations, which are generally made up of people who share similar values and beliefs, would

likely express similar reactions. Members of local communities and Indian tribes (including the Makah) would be more likely to differ from one another, because those groups are based on cultural, geographical, or familial ties instead of particular belief systems.

Individuals and organizations who oppose the Makah gray whale hunt may engage in demonstrations, attempts to interfere with hunt activities, or other forms of protest. Some tribal members or other hunt supporters may engage in confrontations with protesters. Social tensions might be expressed as described above or in other ways.

4.8.3.3 Alternative 3

Any whale hunts that occurred under Alternative 3 would result in increased tension between hunt supporters and opponents, compared to the No-action Alternative. As described under Section 4.8.2, Evaluation Criteria, the potential type and magnitude of effects on the social environment would likely be affected by the number of hunting expeditions. As described in Section 4.1, Introduction, there would likely be 40 days of hunting per year under Alternative 3. This would create more opportunities for the expression of social tension than under Alternative 2, and more opportunities relative to the No-action Alternative. The degree of tension expressed by some hunt opponents might also be affected by the number of identified whales that could be killed. Alternative 3 could result in as many as seven identified whales being killed each year, which is seven times as many as would be likely under Alternative 2. Thus there would be a greater potential for social tension regarding killing identified whales than under Alternative 2, and greater potential relative to the No-action Alternative.

The types of reactions and social tensions would be similar to those described under Alternative 2 and in Section 4.8.2, Evaluation Criteria, but would likely occur with greater frequency under Alternative 3 because of the increased number of days of hunting. The social tensions also might be more intense because of the lack of limits on harvesting identified whales.

4.8.3.4 Alternative 4

Alternative 4 would likely result in the same number of days of hunting and the same harvest of identified whales as Alternative 2. Therefore, effects on the social environment under this alternative would be similar to those under Alternative 2, and the comparison to the No-action Alternative would be similar.

4.8.3.5 Alternative 5

Any whale hunts that occurred under Alternative 5 would result in increased tension between hunt supporters and opponents, compared to the No-action Alternative. As described under

Section 4.8.2, Evaluation Criteria, the potential type and magnitude of effects on the social environment would likely be affected by the number of hunting expeditions. As described in Section 4.1, Introduction, there would likely be 20 days of hunting per year under Alternative 5. This would create about the same number of opportunities for the expression of social tension as under Alternatives 2 and 4, fewer opportunities relative to Alternative 3, and more opportunities relative to the No-action Alternative. The degree of tension expressed by some hunt opponents might also be affected by the number of identified whales that could be killed. Alternative 5 could result in as many as three identified whales being killed each year, which is three times as many as would be likely under Alternative 2, but less than half as many as would be possible under Alternative 3. Thus there would be a greater potential for social tension regarding killing identified whales than under Alternative 2, a lesser potential relative to Alternative 3, and greater potential relative to the No-action Alternative.

4.8.3.6 Alternative 6

Alternative 6 would likely result in the same number of days of hunting and the same harvest of identified whales as Alternative 3. Therefore, effects on the social environment under this alternative would be similar to those under Alternative 3, and the comparison to the No-action Alternative would be similar.

4.9 Cultural Resources

This section addresses the potential for the alternatives to affect cultural resources in the project area, including historic sites, archaeological sites, and traditional cultural properties. The analysis considers the potential for whale hunting or related activities to affect physical sites with cultural significance. Ways in which hunt-related activities could affect cultural sites include physical damage from towing a whale to shore, or trampling of sensitive sites by persons observing or participating in a hunt or related activities. Potential effects on cultural practices and the cultural identity of the Makah Tribe are addressed in Section 4.10, Ceremonial and Subsistence Resources.

Three historic sites listed on the National Register of Historic Places occur in the waters or shoreline of the Makah U&A (Section 3.9.3.1, National Historical Register Sites). These are Quimper's Landing, Tatoosh Island, and the Wedding Rock Petroglyphs. Under the No-action Alternative, the potential for adverse effects on these sites would not differ from the potential under current conditions. There is a low risk of intentional or unintentional damage or disturbance by recreational users or other people in the areas where these sites occur.

It is improbable that any of these historic sites would be affected by activities directly related to harvesting a whale (such as towing the whale to shore, butchering, and transporting whale products from the landing site) under any of the action alternatives. Quimper's Landing is in the northeast waters/shore of Neah Bay and would not be affected by towing a whale to shore or landing it at Front Beach, which is at the opposite side of the bay. At Tatoosh Island, logistical challenges related to the transport of people, equipment, and butchered whale products make it unlikely that any whales would be landed at that site. In addition, the Tatoosh Island lighthouse is geographically separate from the rocky shore. Moreover, the island is owned by the Tribe and was traditionally used for landing whales, so few (if any) non-tribal onlookers would be present at the landing site and landing a whale there would be in keeping with Makah cultural tradition. The beach where the Wedding Rock Petroglyphs occur is a remote, off-reservation location that lacks vehicle access, making it an unlikely site for landing whales.

The potential for listed historic sites to be damaged by hunt observers or onlookers is also low. The only site where this could occur is the Wedding Rock Petroglyphs, because Quimper's Landing is in the water and access to Tatoosh Island is restricted by the Makah Tribe. Although it is unlikely that a whale would be landed at the beach where the Wedding Rock Petroglyphs are found, interested parties at certain vantage points along the access trail could view some hunt activities on the water. It is possible that persons viewing a whale hunt might accidentally tread or encroach upon an existing archaeological or historic site. Because many activities associated with whale hunting would occur in marine locations not visible from the shoreline, the possibility of such accidental harm to this site is remote. Any damage to the Wedding Rocks Petroglyphs from shore-based visitors would likely be unrelated to any whale-hunting activities.

Unlisted sites, such as the shell midden sites along eroding beach terraces in the Olympic National Park, are also unlikely to be affected for the reasons described above. Makah whalers would be most likely to choose a beach on reservation lands for landing a whale, to facilitate access for butchering and celebrations. Moreover, any whale that is landed and butchered would be close to the water's edge and not as far upland as the midden sites.

Many unlisted sacred sites on the Makah Reservation were traditionally used by Makah whalers and their families to prepare for whale hunting. Some ceremonial use of these sites would likely occur under the No-action Alternative, but the use would not necessarily be related to whale hunting. Under the action alternatives, the cultural value of these sacred sites would be enhanced by their use for whale hunting-related ceremonies. As noted in Section 3.9.3.3, Other Culturally

Important Sites, the only traditional cultural property identified for this analysis is First Beach. Under the No-action Alternative, this site would not be used for any practices directly related to whale hunting. Use of this site for butchering whales under the action alternatives would be consistent with its traditional use by the Makah.

4.10 Ceremonial and Subsistence Resources

4.10.1 Introduction

This section addresses the potential for the alternatives to affect the Makah Tribe's efforts to revive ceremonial and subsistence practices associated with hunting and using whales, which in turn affect Makah culture. The Makah Tribe has a long history of hunting whales (Section 3.10.3.4, Makah Historic Whaling), as well as culturally significant treaty language reserving the right to hunt whales. Despite a more than 70-year hiatus in hunting whales before the 1999 and 2000 hunts, the Makah have maintained a close cultural and ceremonial association to this traditional activity. Makah ceremonial and subsistence practices associated with whale hunting undertaken by some members include preparation for the hunt, the hunt itself, processing and distribution of the products, and consumption of products from the hunt (Section 3.10.3.5.1, Makah Whaling). Also important is the satisfaction many tribal members derive from harvesting, preparing, sharing and eating traditional food; practicing traditional activities and applying and transmitting traditional knowledge; participating in ceremonial practices and spiritual connections associated with whales and whale hunting; and reinforcing cultural identity associated with the whale hunt and related activities (Section 3.10.3.5.1, Makah Whaling).

Persons whose ceremonial and subsistence practices could be affected by the alternatives include residents of the Makah Reservation, members of the Tribe who live elsewhere, nearby treaty tribes, and more widespread indigenous people. Makah tribal members who live off the reservation could be affected because strong kinship and cultural ties extend beyond the reservation's boundaries. Non-Makah tribes and other indigenous people could be affected due to the close social and cultural ties among indigenous people (Section 3.8.3.2, Other Tribes).

Potential effects of the alternatives on archaeological resources associated with whale hunting are addressed in Section 4.9, Cultural Resources. Potential effects on the exercise of ceremonial and subsistence practices of indigenous people worldwide (by influencing the behavior of other countries toward indigenous people within their borders) are addressed in Section 4.17, National and International Regulatory Environment.

4.10.2 Evaluation Criteria

Several criteria were used to determine the potential effects of the alternatives on the Tribe's ceremonial and subsistence practices related to whale hunting and the subsistence use of whales. They can be grouped into four categories: (1) subsistence use, (2) traditional knowledge and activities, (3) spiritual connection to whale hunting, and (4) cultural identity. The following four sections describe these categories in greater detail, and subsequent sections discuss the effects of each alternative on these aspects of ceremonial and subsistence practices. All of the alternatives have the potential to affect the Tribe's ceremonial and subsistence practices and Makah culture (Braund et al. 2007).

4.10.2.1 Subsistence Use

Subsistence use includes, among other things, harvesting, processing, sharing and consuming foods. The ability to use a customary resource for subsistence depends on the availability of and access to that resource in traditional harvest locations. The resource must be available in sufficient numbers and of adequate health to allow a locally satisfactory harvest. A satisfactory harvest, in turn, would allow the subsistence community to participate in related activities. Access to resources can be affected by roads or trails that enhance access, by physical barriers (such as demonstrators who block access), by regulatory barriers, or by social barriers (such as an influx of recreational boaters into an area, displacing traditional users or resources). Traditional subsistence users of a resource may derive satisfaction from harvesting, processing, sharing, and consuming traditional foods. These activities reinforce traditional knowledge through use, exchange of knowledge, and training in traditional ways of performing subsistence activities (Section 3.10.3.5.2, Makah Subsistence Consumption).

Under any of the alternatives, the extent to which the Tribe can engage in subsistence use of whales would depend on the ability to hunt, the timing and area of the hunt, and the number of whales that could be harvested.

4.10.2.2 Traditional Knowledge and Activities

Surviving on locally available resources requires an intimate understanding of the environment based on a long-term relationship with the surrounding land, water, and resources. This knowledge comes from continued interaction with and observation of the surrounding environment and resources through subsistence activities as well as through oral tradition passed down from elders to other community members, and shared by active community residents. Individuals who carry and transfer this knowledge are generally those with a long history of

participation in subsistence activities. The more a culturally important activity is practiced, the more likely it is that knowledge of that activity will pass from generation to generation. This valuable knowledge is not simply given away. Instead, community members who perform culturally important activities relay the knowledge, and younger participants earn the right to help as they learn from their elders. In some cases, only a limited number of people know specific skills (e.g., a harpooner) (Section 3.10.3.5.1, Makah Whaling).

If there is a hiatus in practicing the activity, the knowledge may be lost. It may take a long time, but eventually knowledge of specific elements of the activity wanes as elders die, especially if the cultural activities are not actively practiced. Maintaining traditional and cultural knowledge regarding whale hunting requires active participation in whale hunting (Section 3.10.3.4.1, Cessation of the Hunt).

Along with the knowledge of an activity, there are specific indigenous words (vocabulary) used to describe the activity, preparation for the activity, the hunting equipment, the weather and elements, the food, and ways to prepare the food, comprising a seemingly endless and detailed list. Participation in the traditional activity results in more use of indigenous words and language to describe the activity; this, in turn, results in increased cultural awareness and more people and communities identifying themselves with their indigenous culture (cultural identity through shared language). In time, knowledge, activity, and transmission from generation to generation become part of an oral tradition (Section 3.10.3.5.1, Makah Whaling).

Under any of the alternatives, the number of traditional activities tribal members can practice and the number of times they can practice them, as well as the amount of traditional knowledge tribal members can apply and transmit, would depend on the number of opportunities to hunt and harvest whales and the number of whales available for the Tribe to use. The number of opportunities to hunt, and the number of whales available, would depend on the timing and area of the hunt and on the number of whales that could be harvested.

4.10.2.3 Spiritual Connection to Whale hunting

Makah whale hunting rituals, spiritual and physical training, songs, dances, and ceremonial activities are well documented historically and in association with the 1999 and 2000 whale hunts (Section 3.10.3.4, Makah Historic Whaling, and Section 3.10.3.5.1, Makah Whaling). Whale hunts increase participation in ceremonial activities and rituals related to whale hunting. Similarly, the spiritual connection to whale hunting is strengthened as participants prepare for and conduct the whale hunt and then share the proceeds of the harvest. Makah whale hunting

reinforces the relationship between the Makah and the whales. Makah tribal lore indicates that when the hunters and family prepare for the hunt and conduct it properly, perform the appropriate rituals, and live the culturally correct way, the whale gives itself to the Makah.

The amount of spiritual connection that tribal members have to whale hunting would depend primarily on the ability to hunt. The extent of that opportunity could also affect tribal members' spiritual connection to whale hunting. The extent of the opportunity to hunt would depend on the timing and area of the hunt and on the number of whales that could be harvested.

4.10.2.4 Cultural Identity

Under current conditions, the cultural identity of Makah tribal members is expressed in a variety of ways, including fishing, singing, dancing, potlatching, making traditional handicraft articles, and using the Makah language. Section 3.10.3.5, Contemporary Makah Society, describes the various activities available to tribal members to experience and strengthen their cultural identity. The Makah tribal and cultural identity associated with whale hunting in particular is well documented (Section 3.10.3.5.3, Symbolic Expression of Whaling). Actively hunting whales enhances the community's connection to its whale hunting history and reinforces the sense of connection to the local marine environment and to ancestors who used the resource in the past. Other measures of cultural identity associated with whale hunting include the following:

- Use of the whale as a cultural symbol
- Pride in whale hunting traditions
- Traditional values of pride, self esteem, responsibility, and identification with the past
- Local perceptions of community cultural identity with whale hunting
- Tribal identity
- A sense of the community cooperatively working together toward the common cultural goal of preparing to hunt, harvesting, processing, distributing, and eating the product of their communal labor
- A sense of autonomy

The amount of cultural identity associated with whale hunting would depend primarily on the ability to hunt. The extent of the opportunity to hunt could also affect the amount of cultural identity derived from whale hunting. The extent of the opportunity to hunt would in turn depend on the timing and area of the hunt and on the number of whales that could be harvested.

4.10.3 Evaluation of Alternatives

The following sections compare the potential for the alternatives to affect Makah ceremonial and subsistence practices. For each alternative, the analysis considers its effect on ceremonial and subsistence practices, including subsistence uses, traditional knowledge and activities, spiritual connection to whale hunting, and cultural identity that would result from a decision by the federal government to permit or deny the Makah Tribe's request to hunt whales. For those alternatives that would allow hunting, the analysis also considers the effect of hunting regulations on the same set of ceremonial and subsistence practices.

The No-action Alternative carries the greatest risk of adverse effects on the Makah Tribe's ceremonial and subsistence practices associated with whale hunting. This is because under the No-action Alternative, no whale hunting would be allowed so these practices either could not occur or would be restricted. In contrast, Alternatives 2 through 6 would all allow the Makah to hunt whales, with variations in season, area, and harvest limits. Having an opportunity to hunt whales would enable the Tribe to engage more frequently in a greater range of ceremonial and subsistence practices, compared to current conditions under the No-action Alternative. The amount of increase could be affected by regulations on hunting. Possible regulations include limits on the timing and area that a hunt would be allowed, and on the number of whales that could be struck and harvested, including limits on identified whales. Alternative 6, with the least amount of regulation on hunting, has the greatest potential to benefit the Tribe's ceremonial and subsistence practices associated with hunting whales.

In the following discussions of Alternatives 2 through 6, the degree of change from the current condition (No-action Alternative), and the comparison to other alternatives, is included in the summary of effects section.

4.10.3.1 Alternative 1

Under the No-action Alternative, no whale hunt would be permitted. Gray whales would continue to be available in that they are abundant in traditional harvest areas, but the Makah would not have access to hunt them. Tribal members could engage in some activities associated with whale hunting, such as performing ceremonies and rituals; building whale-hunting canoes; or processing, sharing and consuming drift whales or whales incidentally caught in fisheries. Only four whales have been reported entangled in nets in the past 15 to 20 years, and the Tribe used only one such whale in 1995 (Section 2.4.2, Subsistence Use of Drift Whales). Moreover, many of these permitted activities have limited cultural value if they are not practiced in connection

with actual whale hunts. Many other activities associated with the actual hunt would not be permitted and could not occur, such as approaching, striking, killing and towing whales to shore.

Under the No-action Alternative, transfer of knowledge related to whale hunting would be limited to discussions of past whale hunting, and revitalized culture bearers who would participate in whale hunting would not be forthcoming. There would be no language and vocabulary growth related to whale-hunting activities, and the oral tradition of whale hunting would focus on historic activities and would not include ongoing participation in this culturally central activity.

Under current conditions, the opportunity for tribal members to experience a spiritual connection to whale hunting is limited to a connection with past whale hunting. Whale hunting songs and dances would likely remain within whale hunting families, but the 70-year hiatus would resume and there would be little reason or opportunity to perform and share them with the larger community. Without any whale hunting activity, the spiritual connection to whale hunting may eventually wane, and young Makah tribal members would lack any active whaler role models living what the Makah consider a culturally proper life that they could respect, admire, and emulate. The community connection to whale hunting would remain a connection to the past without any present reinforcement based on active participation in whale hunting activities.

Although the amount of whale hunting activity and associated cultural use of whales would not differ from current levels, tribal identity could erode in the absence of opportunities to participate in an activity central to Makah cultural identity. The community would have little or no opportunity or incentive to work cooperatively to prepare for the hunt; to harvest, butcher, share, and eat whale; or to participate in song and dance festivals celebrating a successful harvest. Individual and community pride associated with conducting these activities would not occur, and self-esteem could decline among those Makah tribal members (88.8 percent) (Renker 2007) who believe the Tribe should continue to hunt whales.

In addition, because contemporary Makah cultural identity includes the 150-year-old treaty right to hunt whales, this alternative would continue to reinforce the sense that the Makah are not in control of their destiny, and it would undermine a sense of autonomy within the community. For Makah who believe strongly in their cultural heritage and treaty rights, this alternative would reinforce their feeling of disillusionment with the federal government.

4.10.3.2 Alternative 2

Under Alternative 2, the Tribe may strike up to seven whales per year, harvest four whales on average per year (with a maximum of five in any one year) and strike and lose three whales per

year. Hunting is limited to the period from December 1 through May 1, in the coastal portion of the Makah U&A. Limits would be imposed on the harvest of identified whales. Section 4.1, Introduction, describes the number of days of hunting likely to occur under Alternative 2, and the reasons for expecting that it may be difficult for the Tribe to harvest the full limit of whales allowed under this Alternative. The first part of this analysis describes some of the practical effects of the hunting conditions imposed by Alternative 2, and the Makah's perceptions and expectations regarding these conditions. The second part of the analysis considers the potential effect of implementing Alternative 2 on the Makah's subsistence use of whales; practice of traditional activities and application and transmission of traditional knowledge; spiritual connection to whaling; and cultural identity.

4.10.3.2.1 Limits on Whale Hunting

Hunt Timing

Under Alternative 2, the Makah Tribe has proposed to limit hunting to the period from December 1 through May 31. The period December 1 through May 31 is characterized by inclement weather that would likely limit the number of times the Makah could engage in a hunt to approximately 7 to 30 days per year. Whale hunting traditionally occurred year-round, whenever whales were present, and there was a need for them Braund et al. (2007). Historically, the hunting season for gray whales began in March, when they appeared in numbers off Tatoosh Island on their coastal migration north, and resumed in November during their migration south. Pods of humpback and grays may have remained in the area all summer (Huelsbeck 1994), permitting whale hunting to occur from early spring through the fall (Section 3.10.3.4, Makah Historic Whaling). Some tribal members view summer and fall as the best times to hunt whales because they are migrating south and weather conditions are ideal (Braund et al. 2007).

By allowing hunting only during the winter and spring months, when severe weather would be a frequent occurrence, Alternative 2 would likely limit the number of hunting days to 7 to 30 days. This in turn could make it difficult to harvest the four whales annually allowed under Alternative 2. In addition, tribal members would not have the latitude to harvest whales at opportune times, such as when whales are available or when hunters are prepared.

Hunting Area

Restricting whale hunts to the portions of the U&A west of the Bonilla-Tatoosh line would keep the Makah from hunting whales in the Strait of Juan de Fuca. Historically, Makah whaled both in the ocean and in the Strait, depending on weather, wind, and the presence of whales. Disallowing

whale hunts in the Strait would eliminate a large area from hunter access. It would also reduce opportunities to kill a whale close to the community. A greater distance between the site of a whale kill and the location of the landing beach would mean a greater distance over which the whale carcass would have to be towed, with a greater chance of the meat spoiling. Enforcing this restriction would also eliminate a traditional whale-hunting territory.

Some Makah tribal members believe that excluding the Strait of Juan de Fuca from their hunting area would place whalers at increased risk, would prohibit them from whale hunting where their ancestors had traditionally whaled, and would affect their ability to successfully take a whale (Braund et al. 2007). The Makah traditionally hunted in the Strait, where boating conditions are safer because the weather is calm, compared to the ocean, which can have 25-foot waves (Braund et al. 2007). The restriction on location would contrast with traditional hunting, which occurred when and where the whales presented themselves, including in the Strait (Braund et al. 2007).

By allowing hunting only in the coastal portion of the Makah U&A, combined with restrictions on hunt timing, Alternative 2 would likely limit the number of hunting days to 7 to 30 days. This in turn could make it difficult to harvest the four whales annually allowed under Alternative 2. In addition, tribal members would not have the latitude to harvest whales at opportune locations, such as when whales are available in the Strait or weather conditions are more favorable.

Strike and Harvest Limits

Because the Makah have harvested only one whale in the last seven-plus years (the 1999 harvest), there are few current whale harvest data upon which to assess the effect of the size of the harvest in terms of meeting Makah needs. However, as described in Section 3.10.3.5.2, Makah Subsistence Consumption, the Makah do rely on subsistence foods for a significant portion of their diet and emphasize marine resources. Furthermore, the 2001 tribal survey found that 81 percent of the respondents consumed whale products (blubber, meat, or oil) obtained from the 1999 hunt, and 87 percent would like to have these products available in the future (Renker 2002 in Section 3.10, Ceremonial and Subsistence Resources). According to Renker's 2006 household survey (Renker 2007), 71.7 percent of survey respondents wanted whale meat in the households on a regular basis, and 67.1 percent wanted whale oil.

Sepez (2001) calculated that the Makah households received an estimated 2.4 pounds of whale meat (.55 pounds) and blubber (1.8 pounds) per capita from the 1999 whale hunt. Makah members have commented that the one whale was not adequate to feed the entire community (Braund et al. 2007). It was not large enough to go around as a meaningful source of food.

According to Sepez's (2001) analysis (Section 3.10.3.5.1, Makah Whaling), the 1999 whale harvested by the Makah yielded approximately "2,000 to 3,000 pounds of meat and 4,000 to 5,000 pounds of blubber, most of which was consumed at the community potlatch."

This information indicates that there is a high demand for whale products, and one whale would not likely meet that need. It is uncertain whether four whales annually would meet contemporary Makah needs. The primary indication they would is the fact that the Makah have requested an average of four whales annually (i.e., approximately one whale per year per Makah village) (Renker 2007). If the Tribe had the opportunity to strike seven whales, harvest four, and strike and lose three annually, that would provide substantial opportunity to the Makah to prepare for, hunt, process, share, and participate in ceremonial activities associated with whale hunting. Under Alternative 2, limits on timing and area of the hunt along with limits on the number of identified whales that may be harvested from the PCFA survey area, would make it difficult for the Makah to harvest the full quota. Thus the number of whales the Makah could actually hunt and harvest under Alternative 2 may in practice be somewhat fewer than the average annual limit of four allowed under Alternative 2.

4.10.3.2.2 Opportunity to Resume Whale Hunting

Subsistence use

Under Alternative 2, the opportunity to resume hunting and harvesting whales would increase the Makah Tribe's ability to engage in a broad range of subsistence practices that are currently not possible or are severely limited. Under Alternative 2 the Makah could hunt for gray whales, a traditional marine resource, from December 1 through May 31 in the coastal portion of their U&A, using many of their traditional methods. It is reasonable to expect that the hunt timing would allow 7 to 30 days of hunting per year. The Tribe could harvest as many as four whales per year, and the Makah community could process, share, and consume this traditional food.

Under Alternative 2, the amount of the Tribe's subsistence use would thus increase from no opportunity to hunt under current conditions to an opportunity to hunt in the coastal portion of the Tribe's U&A for 7 to 30 days, from December 1 through May 31. The amount of subsistence use of whales would also increase by four harvested whales per year compared to the current potential use of perhaps one whale every five years under the No-action Alternative. Under Alternative 2, with its limited hunting season, it may be difficult for the Tribe to harvest the full limit of four whales on average per year. On the other hand, the hunting season under Alternative 2 occurs during the whales' southward migration when, according to some tribal members, the

whales are fatter and would thus provide more products for ceremonial and subsistence use than whales harvested during the fall northward migration or early in the summer feeding period (which begins June 1).

The amount of satisfaction the Tribe would derive from this increased subsistence use of whales would also likely increase compared to current conditions. The Tribe's needs statement indicated that 67.1 percent of surveyed households would like whale oil on a regular basis, 71.7 percent would like whale meat on a regular basis, and 47.4 percent would like whale blubber on a regular basis (Renker 2007).

Traditional Knowledge and Activities

As described above, under current conditions tribal members may engage in some, but not all, of the traditional activities associated with subsistence use of whales. The ability to actively hunt whales, which is prohibited under current conditions, would be allowed under Alternative 2, increasing the number of traditional activities that tribal members could practice. Specifically, tribal members could search for and find whales and strike, harvest, and tow whales to shore. The number of times tribal members could participate in searching for and finding whales would increase compared to the No-action Alternative by approximately 7 to 30 days per year, from December 1 through May 31. The number of times they could participate in striking, harvesting, and towing whales to shore would increase by up to seven whales struck per year and four whales harvested per year on average. The increase in the number of times these activities are performed would also increase the amount of traditional knowledge associated with the activities, and the opportunities to apply and transmit that knowledge.

In addition to permitting some currently-prohibited activities, thus increasing the number of traditional activities that could be practiced, implementation of Alternative 2 could increase the number of times tribal members engage in activities that are not currently prohibited. Specifically, tribal members are not currently prevented from building large whale-hunting canoes or fabricating and maintaining whale-hunting equipment, but there is little practical reason for them to do so. If a whale hunt were authorized under Alternative 2, there would likely be an increase in the number of times that tribal members practice these activities.

Similarly, tribal members are not currently prohibited from processing and consuming whale products from drift whales, but the opportunity to do so is limited. The number of times tribal members could participate in processing whales would increase from the current potential of perhaps one whale every five years to four whales per year. The amount of whale products tribal

members could share and consume would similarly increase from one whale every five years to four whales per year, although limits on hunt timing and harvest of identified whales might make it difficult for tribal members to harvest the full limit.

Under Alternative 2 tribal members would again actively practice the skills necessary to build large whale-hunting canoes; fabricate and maintain whale hunting-equipment; search for and find whales; strike, harvest, and tow whales to shore; butcher and distribute them; and perform ceremonial songs and dances to celebrate successful hunts. As a result, words and vocabulary related to preparing to hunt, hunting, harvesting, towing, and processing whales, as well as sharing, preparing, and consuming whale products, could become more widely used than they currently are (Braund et al. 2007). Makah cultural awareness, both inside and outside of the Tribe, would become more pronounced, and the whale-hunting component of the Makah oral tradition would grow.

In contrast to the No-action Alternative, Alternative 2 would enable new generations to participate in whale hunting activities; develop, apply and transmit knowledge of whale hunting; and learn and use words related to whale hunting. Makah youth would have active whalers as role models. With a resumption of whale hunting,

Spiritual Connection to Whale Hunting

Under Alternative 2, the ability to resume whale hunting could increase the Makah's spiritual connection to whale hunting over the current connection, as whale-hunting activity could resume and recur year after year. This is because the connection would be current and ongoing, rather than a connection to a past activity that can no longer be pursued (Braund et al. 2007).

Cultural Identity

As described above and in Section 3.10.3.5, Contemporary Makah Society, Makah tribal members currently have a variety of ways to express and reinforce their cultural identity. Also as described above and in Sections 3.10.3.4, Makah Historic Whaling, and 3.10.3.5.3, Symbolic Expression of Whaling, whale hunting was a culturally central activity in historic Makah society and the Tribe's whale-hunting past remains culturally important. Under Alternative 2, Makah whale-hunting rituals, spiritual training, songs, dances, and ceremonial activities would likely increase over current conditions, and regularly recur, reinforcing Makah cultural identity. The opportunity under Alternative 2 to regularly harvest, process, share, and consume whale products could lead to increased communal activities and an increase in tribal members' sense of community. The whale hunting ceremonies that whalers and family members would follow for

the hunt could provide the Makah with an additional social framework, which could contribute to community social and spiritual stability.

4.10.3.3 Alternative 3

Under Alternative 3, the Tribe could strike up to seven whales per year, harvest four whales on average per year (with a maximum of five in any one year) and strike and lose three whales per year. Hunting would be allowed year round in the coastal portion of the Makah U&A and no limits would be imposed on the harvest of identified whales. Section 4.1, Introduction, describes the number of days of hunting likely to occur under Alternative 2, and the reasons for expecting the Tribe would be able to harvest the full limit of whales allowed under this Alternative. The first part of this analysis describes some of the practical effects of the hunting conditions imposed by Alternative 3, and the Makah's perceptions and expectations regarding these conditions. The second part of the analysis considers the potential effect of implementing Alternative 3 on the Makah's subsistence use of whales; practice of traditional activities and application and transmission of traditional knowledge; spiritual connection to whaling; and cultural identity.

4.10.3.3.1 Limits on Whale Hunting

Hunt Timing

Hunting year round under Alternative 3 would enable Makah tribal members to hunt at the most opportune time, based on sea and weather conditions, presence and availability of whales, subsistence need, and preparedness of hunters. This year-round season would also allow hunters to harvest whales on both their northward spring migration, as well as the migration south. Whales would probably be harvested during late spring, summer, and early autumn, when weather conditions would be less likely to interfere with hunting opportunities and to compromise hunter safety. Because of the year-round opportunity to hunt, including during seasons of relatively calm weather, the Makah could hunt as many days as necessary to allow harvest of the quota of four whales per year. As described in Section 4.1, Introduction, based on the 10 days of hunting required to harvest one whale in 1999, this analysis uses 40 days as a reasonable estimate of the number of days of hunting that would occur under Alternative 3.

If there were no restrictions Makah members generally indicated that they would hunt during the spring and fall whale migrations, as well as during the summer (Braund et al. 2007). Several Makah indicated that the whales are fatter in the fall on their migration south. One individual reported this, as well as stating a preference for hunting during the spring, observing that summer tourism and fall weather conditions could interfere with whale hunting during those times. By

allowing hunting year round, Alternative 3 provides the ability to harvest whales at the most opportune times for the whalers.

Hunting Area

Under Alternative 3, the hunting area would be limited to the coastal portion of the Makah U&A and exclude the Strait of Juan de Fuca. This would limit the flexibility of tribal members to hunt in the Strait when weather conditions there are more favorable. Because of the opportunity to hunt year round, however, the limitation on hunting area would likely not limit the number of days the Tribe could hunt or the number of whales the Tribe could harvest. By limiting hunting to the coastal portion of the Makah U&A, Alternative 3 precludes the ability of tribal members to hunt in their entire U&A and to harvest whales in areas that may be close to butchering sites. It also limits the flexibility of tribal members to hunt in the most opportune locations.

Strike and Harvest Limits

Strike and harvest limits would be the same under Alternative 3 as under Alternative 2. As described under Alternative 2, above, there is a high demand for whale products, and it is uncertain whether four whales annually would meet contemporary Makah needs. The primary indication they would is the fact that the Makah have requested four whales annually (Renker 2007). If the Tribe had the opportunity to strike seven whales, harvest four, and strike and lose three annually, that would provide substantial opportunity to the Makah to prepare for, hunt, process, share, and participate in ceremonial activities associated with whale hunting. The ability to hunt year round under Alternative 3, along with the lack of limits on harvesting identified whales, would make it likely that the Makah could harvest the full quota.

4.10.3.3.2 Opportunity to Resume Whale Hunting

Subsistence Use

Under Alternative 3, the opportunity to resume hunting and harvesting whales would increase the Makah Tribe's ability to engage in a broad range of subsistence practices that are currently not possible or are severely limited. Under Alternative 3 the Makah could hunt for gray whales, a traditional marine resource, year round in the coastal portion of their U&A, using many of their traditional methods. The hunt timing would likely allow hunting on as many days as required to harvest the number of whales allowed, which would most likely be 40 days of hunting per year. The Tribe could harvest as many as four whales per year, and the Makah community could process, share, and consume this traditional food.

Under Alternative 3, the amount of the Tribe's subsistence use would thus increase from no opportunity to hunt under current conditions to an opportunity to hunt in the coastal portion of the Tribe's U&A for 40 days year round. The amount of subsistence use of whales would also increase by four harvested whales per year compared to the current potential use of perhaps one whale every five years under the No-action Alternative. Because hunting would be allowed year round, it is likely the Tribe could harvest the full number of whales allowed. Moreover, the lack of limits on the hunting season would allow the subsistence use of fresh whale products year round.

Compared to Alternative 2, the Tribe's subsistence use of whales would be greater because year-round hunting would allow for more days of hunting during better weather conditions, making it more likely the Tribe could harvest the full number of whales allowed. Lack of limits on identified whales would also make it more likely tribal members could harvest the full number.

Traditional Knowledge and Activities

As described above, under current conditions tribal members may engage in some, but not all, of the traditional activities associated with subsistence use of whales. The ability to actively hunt whales, which is prohibited under current conditions, would be allowed under Alternative 3, increasing the number of traditional activities that tribal members could practice. Specifically, tribal members could search for and find whales and strike, harvest, and tow whales to shore. The number of times tribal members could participate in searching for and finding whales would increase compared to the No-action Alternative by approximately 40 days per year, year round. The number of times they could participate in striking, harvesting, and towing whales to shore would increase by up to seven whales struck per year and four whales harvested per year on average. The increase in the number of times these activities are performed would also increase the amount of traditional knowledge associated with the activities, and the opportunities to apply and transmit that knowledge.

In addition to permitting some currently-prohibited activities, thus increasing the number of traditional activities that could be practiced, implementation of Alternative 3 would likely increase the number of times tribal members engage in activities that are not currently prohibited. Specifically, tribal members are not currently prevented from building large whale-hunting canoes or fabricating and maintaining whale-hunting equipment, but there is little practical reason for them to do so. If a whale hunt were authorized under Alternative 3, there would likely be an increase in the number of times that tribal members practice these activities.

Similarly, tribal members are not currently prohibited from processing and consuming whale products from drift whales, but the opportunity to do so is limited. The number of times tribal members could participate in processing whales would increase from the current potential of perhaps one whale every five years to four whales per year. The amount of whale products tribal members could share and consume would similarly increase from one whale every five years to four whales per year.

Under Alternative 3 tribal members would again actively practice the skills necessary to build large whale hunting-canoes; fabricate and maintain whale-hunting equipment; search for and find whales; strike, harvest, and tow whales to shore; butcher and distribute them; and perform ceremonial songs and dances to celebrate successful hunts. As a result, words and vocabulary related to preparing to hunt, hunting, harvesting, towing, and processing whales, as well as sharing, preparing, and consuming whale products, would likely become more widely used than they currently are.

In contrast to the No-action Alternative, Alternative 3 would enable new generations to participate in whale hunting activities; develop, apply and transmit knowledge of whale hunting; and learn and use words related to whale hunting. Makah youth would have active whalers as role models. With a resumption of whale hunting, Under Alternative 3 the amount of satisfaction the Tribe might derive from the practice of traditional activities and the application of traditional knowledge, would increase beyond the current level.

Compared to Alternative 2, Alternative 3 is likely to result in a greater number of occasions on which tribal members can engage in traditional activities and apply traditional knowledge (40 days of hunting versus 7 to 30). It is also more likely the Tribe could harvest (and thus process) the full number of whales allowed. Thus Alternative 3 is likely to result in more occasions on which tribal members can practice traditional activities and apply traditional knowledge than Alternative 2.

Spiritual Connection to Whaling

Under Alternative 3, the ability to resume whale hunting would likely increase the Makah's spiritual connection to whale hunting over current conditions, as described under Alternative 2.

Cultural Identity

Under Alternative 3, the ability to resume whale hunting would likely increase the cultural identity of the Makah over current conditions, as described under Alternative 2.

4.10.3.4 Alternative 4

Alternative 4 contains most of the same regulations on whale hunting as Alternative 2. Under Alternative 4, the Tribe may strike up to seven whales per year, harvest four whales on average per year (with a maximum of five in any one year) and strike and lose three whales per year. Hunting would be limited to December 1 through May 31 in the coastal portion of the Makah U&A and limits would be imposed on the harvest of identified whales. Alternative 4 contains the additional restrictions that no hunting may occur within 200 yards of rocks and islands in the Washington Islands National Wildlife Refuges. This added restriction may affect the Tribe's perceived or actual ability to harvest the full number of whales allowed. Section 4.1, Introduction, describes the number of days of hunting likely to occur under Alternative 4, and the reasons for expecting that it may be difficult for the Tribe to harvest the full limit of whales allowed under this Alternative. The first part of this analysis describes some of the practical effects of the hunting conditions imposed by Alternative 4, and the Makah's perceptions and expectations regarding these conditions. The second part of the analysis considers the potential effect of implementing Alternative 4 on the Makah's subsistence use of whales; practice of traditional activities and application and transmission of traditional knowledge; spiritual connection to whaling; and cultural identity.

4.10.3.4.1 Limits on Whale Hunting

Hunt Timing

Hunt timing would be the same under Alternative 4 as under Alternative 2, with the same practical effects and tribal perceptions and expectations.

Hunting Area

Hunting only in the ocean (excluding the Strait of Juan de Fuca) would have the same effects as Alternative 2. The additional restriction under Alternative 4 of not hunting within 200 yards of rocks and islands would further restrict Makah hunters' opportunity to hunt. These areas are traditional hunting grounds (Braund et al. 2007). Additionally areas near rocks and islands are shallower and, thus, are better locations for striking whales (Braund et al. 2007).

By prohibiting hunting in a portion of the Makah U&A (the Strait of Juan de Fuca) that is often protected from severe weather, Alternative 4 could reduce the number of hunts that take place and possibly the number of whales that might be harvested, compared to alternatives that lack such restrictions. The additional restriction on hunting near certain rocks and islands would further hinder whale hunting. These restrictions would interfere with the Makah's exercise of ceremonial

and subsistence practices, but to a lesser degree than the No-action Alternative, under which no whale hunting would be allowed.

Strike and Harvest Limits

The strike and harvest limits under Alternative 4, and the limit on the harvest of identified whales, would be the same as under Alternative 2, with the same practical effects and tribal perceptions and expectations.

4.10.3.4.2 Opportunity to Resume Whale Hunting

Subsistence use

Under Alternative 4, the opportunity to resume hunting and harvesting whales would increase the Makah Tribe's ability to engage in a broad range of subsistence practices that are currently not possible or are severely limited. Under Alternative 4 the Makah could hunt for gray whales, a traditional marine resource, from December 1 through May 31 in the coastal portion of their U&A, and outside 200 yards of rocks and islands, using many of their traditional methods. The hunt timing would most likely allow 7 to 30 days of hunting per year. The Tribe could harvest as many as four whales per year, and the Makah community could process, share, and consume this traditional food.

Under Alternative 4, the amount of the Tribe's subsistence use would thus increase from no opportunity to hunt under current conditions to an opportunity to hunt in the coastal portion of the Tribe's U&A for 7 to 30 days, from December 1 through May 31. The amount of subsistence use of whales would also increase by four harvested whales per year compared to the current potential use of perhaps one whale every five years under the No-action Alternative. Under Alternative 4, with its limited hunting season and prohibition on hunting within 200 yards of rocks and islands, it may be difficult for the Tribe to harvest the full limit of four whales on average per year. On the other hand, the hunting season under Alternative 4 occurs during the whales' southward migration when, according to some tribal members, the whales are fatter and would thus provide more products for ceremonial and subsistence use than whales harvested during the fall northward migration or early in the summer feeding period (which begins June 1).

The amount of satisfaction the Tribe would derive from this increased subsistence use of whales would also likely increase over current conditions, in the ways described under Alternative 2, although possibly to a lesser extent because of the prohibition against hunting around rocks and islands.

Compared to Alternative 2, Alternative 4 could result in a somewhat lower chance that the Tribe would be able to harvest the full amount of whales allowed per year. If that happened, then Alternative 4 would represent less of an increase in subsistence use of whales over current conditions.

Compared to Alternative 3, which does not include limits on hunt timing or prohibitions against hunting around rocks and islands, Alternative 4 is likely to result in a lower chance that the Tribe would be able to harvest the full amount of whales allowed per year. In addition, the restrictions on hunt timing under Alternative 2 would result in fewer hunting days than under Alternative 3. Alternative 4 is thus likely to result in a smaller increase in the subsistence use of whales, compared to current conditions, than would Alternative 3.

Traditional Knowledge and Activities

Under Alternative 4, the increase in traditional knowledge and activities over current conditions would likely be the same as under Alternative 2 because the hunting conditions are substantially the same under the two alternatives, with the exception of the prohibition on hunting within 200 yards of rocks and islands under Alternative 4. This prohibition would not likely change the number of days of hunting as under Alternative 2 (7 to 30). Therefore, compared to the current condition, the increase in traditional knowledge and activities associated with active hunting for whales would be about the same under Alternative 4 as under Alternative 2, with the possible exception of processing, sharing and consuming whale products.

Under Alternative 4, the number of times tribal members could participate in processing whales would increase from the current potential of perhaps one whale every five years to four whales per year. The amount of whale products tribal members could share and consume would similarly increase from one whale every five years to four whales per year, although limits on hunt timing and harvest of identified whales, and on hunting near rocks and islands, might make it difficult for tribal members to harvest the full limit. Under Alternative 4, other aspects of traditional knowledge and activities would likely increase over current conditions to the same extent as under Alternative 2.

Compared to Alternative 3, which does not include limits on hunt timing, or prohibitions against hunting around rocks and islands, Alternative 4 is likely to result in fewer days of hunting and a lower chance that the Tribe would be able to harvest the full amount of whales allowed per year. Alternative 4 is thus likely to result in a smaller increase in the subsistence use of whales, compared to current conditions, than would Alternative 3.

Spiritual Connection to Whaling

Under Alternative 4, the ability to resume whale hunting would likely increase the Makah's spiritual connection to whale hunting over current conditions, as described under Alternative 2.

Cultural Identity

Under Alternative 4, the ability to resume whale hunting would likely increase the cultural identity of the Makah over current conditions, as described under Alternative 2.

4.10.3.5 Alternative 5

Under Alternative 5, the Tribe may strike up to three whales per year, harvest two whales per year and strike and lose three whales per year. Hunting may occur year round in the coastal portion of the Makah U&A and no limits would be imposed on the harvest of identified whales. Section 4.1, Introduction, describes the number of days of hunting likely to occur under Alternative 5, and the reasons for expecting that it is likely the Tribe could harvest the full limit of two whales per year. The first part of this analysis describes some of the practical effects of the hunting conditions imposed by Alternative 2, and the Makah's perceptions and expectations regarding these conditions. The second part of the analysis considers the potential effect of implementing Alternative 5 on the Makah's subsistence use of whales; practice of traditional activities and application and transmission of traditional knowledge; spiritual connection to whaling; and cultural identity.

4.10.3.5.1 Limits on Whale Hunting

Hunt Timing

Alternative 5 would allow year-round hunting, similar to Alternative 3. The practical effect of a year-round hunting season, and tribal perceptions and expectations regarding the hunting season, would therefore be the same under Alternative 5 as under Alternative 3.

Hunting Area

The hunting area under Alternative 5 would be the coastal portion of the Makah U&A, similar to Alternatives 2 and 3. The practical effect of a year-round hunting season, and tribal perceptions and expectations regarding the hunting season, would therefore be the same under Alternative 5 as under Alternative 3.

Strike and Harvest Limits

Two whales annually would represent 50 percent of the Makah request of four whales. The 1999 whale provided approximately 2.4 pounds of meat and blubber per capita, "most of which was consumed at the community potlatch" (Section 3.10, Ceremonial and Subsistence Resources).

The Makah household whale hunting surveys conducted in 2001 and 2006 documented that most Makah residents expressed a continued desire for whale products. According to 2001 household survey results, “87 percent surveyed desired whale meat as part of their regular diet, and 72 percent voiced a desire for whale oil” (Section 3.10, Ceremonial and Subsistence Resources). Five years later, during the 2006 survey, 80.3 percent of respondents reported that they continued to desire whale products (Section 3.10, Ceremonial and Subsistence Resources). In addition, Sepez (2001) reported that 73 percent of the surveyed households planned to eat whale obtained from future hunts (Section 3.10, Ceremonial and Subsistence Resources). Renker (2007) reported that Makah tribal members numbered 2,389 persons, with 1,228 of those living on the reservation. Whale products would be shared with Makah living in and outside of Neah Bay. With the high percentage of Makah residents desiring whale products for consumption and use, limiting the number of whales harvested to two would likely not satisfy the Makah’s need for whale products; would result in fewer opportunities to hunt, process, share and consume whales; and would not adequately facilitate participation in whale-hunting activities by Makah residents (Braund et al. 2007).

4.10.3.5.2 Opportunity to Resume Whale Hunting

Subsistence Use

Under Alternative 5, the opportunity to resume hunting and harvesting whales would increase the Makah Tribe’s ability to engage in a broad range of subsistence practices that are currently not possible or are severely limited. Under Alternative 5 the Makah could hunt for gray whales, a traditional marine resource, year round in the coastal portion of their U&A, using many of their traditional methods. The hunt timing would most likely allow 20 days of hunting per year. The Tribe could harvest as many as two whales per year, and the Makah community could process, share, and consume this traditional food.

Under Alternative 5, the amount of the Tribe’s subsistence use would thus increase from no opportunity to hunt under current conditions to an opportunity to hunt in the coastal portion of the Tribe’s U&A for 20 days year round. The amount of subsistence use of whales would also increase by up to two harvested whales per year compared to the current potential use of perhaps one whale every five years under the No-action Alternative.

The amount of satisfaction the Tribe would derive from this increased subsistence use of whales would also likely increase over current conditions, but as indicated above is not perceived by tribal members as adequate to meet the Tribe’s needs. The Tribe’s needs statement indicated that

67.1 percent of surveyed households would like whale oil on a regular basis, 71.7 percent would like whale meat on a regular basis, and 47.4 percent would like whale blubber on a regular basis (Renker 2007:22).

Compared to Alternatives 2, 3, and 4, which would allow the subsistence use of four whales per year, Alternative 5 would result in less subsistence use (two whales).

Traditional Knowledge and Activities

As described above, under current conditions tribal members may engage in some, but not all, of the traditional activities associated with subsistence use of whales. The ability to actively hunt whales, which is prohibited under current conditions, would be allowed under Alternative 5, increasing the number of traditional activities that tribal members could practice. Specifically, tribal members could search for and find whales and strike, harvest, and tow whales to shore. The number of times tribal members could participate in searching for and finding whales would increase compared to the No-action Alternative by approximately 20 days per year, year round. The number of times they could participate in striking, harvesting, and towing whales to shore would increase by up to three whales struck per year and two whales harvested per year on average. The increase in the number of times these activities are performed would also increase the amount of traditional knowledge associated with the activities, and the opportunities to apply and transmit that knowledge.

In addition to permitting some currently-prohibited activities, thus increasing the number of traditional activities that could be practiced, implementation of Alternative 5 would likely increase the number of times tribal members engage in activities that are not currently prohibited. Specifically, tribal members are not currently prevented from building large whale-hunting canoes or fabricating and maintaining whale-hunting equipment, but there is little practical reason for them to do so. If a whale hunt were authorized under Alternative 5, there would likely be an increase in the number of times that tribal members practice these activities.

Similarly, tribal members are not currently prohibited from processing and consuming whale products from drift whales, but the opportunity to do so is limited. The number of times tribal members could participate in processing whales would increase from the current potential of perhaps one whale every five years to two whales per year. The amount of whale products tribal members could share and consume would similarly increase from one whale every five years to up to two whales per year, although limits on hunt timing and harvest of identified whales might make it difficult for tribal members to harvest the full limit.

Under Alternative 5 tribal members would again actively practice the skills necessary to build large whale hunting canoes; fabricate and maintain whale hunting equipment; search for and find whales; strike, harvest, and tow whales to shore; butcher and distribute them; and perform ceremonial songs and dances to celebrate successful hunts. As a result, words and vocabulary related to preparing to hunt, hunting, harvesting, towing, and processing whales, as well as sharing, preparing, and consuming whale products, would likely become more widely used than they currently are.

In contrast to the No-action Alternative, Alternative 5 would enable new generations to participate in whale hunting activities; develop, apply and transmit knowledge of whale hunting; and learn and use words related to whale hunting. Makah youth would have active whalers as role models. With a resumption of whale hunting, Under Alternative 5 the amount of satisfaction the Tribe might derive from the practice of traditional activities and the application of traditional knowledge, would increase beyond the current level.

Compared to Alternatives 2, 3, and 4, the Makah Tribe would be able to practice the same number of activities and apply and transmit the same types of traditional knowledge. However, the number of times they could practice both currently allowed and currently prohibited activities, and could apply traditional knowledge, would be less under Alternative 5 than under Alternatives 2, 3, and 4.

Spiritual Connection to Whale Hunting

Under Alternative 4, the ability to resume whale hunting would likely increase the Makah's spiritual connection to whale hunting over current conditions, as described under Alternative 2.

Cultural Identity

Under Alternative 4, the ability to resume whale hunting would likely increase the cultural identity of the Makah over current conditions, as described under Alternative 2.

4.10.3.6 Alternative 6

Under Alternative 6, whale hunting would be allowed throughout the year (similar to Alternatives 3 and 5) and within the entire U&A, including the Strait of Juan de Fuca.

4.10.3.6.1 Limits on Whale Hunting

Hunt Timing

Alternative 6 would allow year-round hunting, similar to Alternatives 3 and 5. The practical effect of a year-round hunting season, and tribal perceptions and expectations regarding the hunting season, would therefore be the same under Alternative 6 as under Alternatives 3 and 5.

Hunting Area

Under Alternative 6, the Makah could hunt in their entire U&A, including the Strait of Juan de Fuca. Tribal members could hunt in all areas traditionally used by Makah whalers and some tribal members might consider this Alternative as more consistent with the Treaty of Neah Bay (although the limitation on hunting area was proposed by the Makah Tribe). Under Alternative 6 tribal members would be able to choose hunting times and locations based on whale availability and sea conditions (Braund et al. 2007).

By allowing hunting in the Strait of Juan de Fuca portion of the Makah U&A, Alternative 6 provides the ability to harvest whales in areas that may be close to butchering sites and gives tribal members the flexibility to hunt in the most opportune locations.

Strike and Harvest Limits

The strike and harvest limits under Alternative 6 would be the same as under Alternative 3, with the same practical effects and tribal perceptions and expectations.

4.10.3.6.2 Opportunity to Resume Whale Hunting

Under Alternative 6, the conditions on hunting would be sufficiently similar to those under Alternative 3 that they would lead to the same number of days of hunting, and the same likelihood that the Tribe would be able to harvest the full number of whales allowed. Thus the increase in the Tribe's amount of subsistence use of whales over current conditions would be the same as that described under Alternative 3, as would the increase in the Tribe's practice of traditional activities and application and transmission of traditional knowledge. Similarly, the increase in the Tribe's spiritual connection to whaling, compared to current conditions, would be the same under Alternative 6 as under Alternative 3.

The Tribe might experience a greater sense of cultural identity under Alternative 6 than under Alternative 3 because of the ability to hunt in the entire U&A. Residents could experience an enhanced sense of autonomy when given the power to make their own decisions regarding the timing and locations of their hunts. A sense of autonomy is one of the measures of cultural identity (Section 4.10.2.4, Cultural Identity).

4.11 Noise

4.11.1 Introduction

This section addresses the potential for the alternatives to affect sensitive noise receptors in the project area, specifically receptors in the human environment. Of particular concern is the

potential for noise from hunt-related activities (including vessels, aircraft, or firearms) to disturb residents, businesses, and visitors in the project area. Residential and commercial areas that could potentially be affected by noise from hunt-related activities include properties adjacent to Neah Bay and the Makah tribal Center, as well as low-density residential areas south of the Wa'atch River on the Pacific coast and near State Route 112 on the Strait of Juan de Fuca. Recreational users of the OCNMS, the Makah Reservation, and the Olympic National Park could also be affected by noise disturbance. The potential for hunt-related noise, including underwater noise, to disturb wildlife species is addressed in Section 4.5, Other Wildlife.

4.11.2 Evaluation Criteria

Two criteria were used to determine the potential for adverse effects on sensitive noise receptors under the alternatives. The first is the anticipated intensity and duration of noise produced by hunt-related activities (including vessels, vehicles, and aircraft involved in the hunt, protests, media, and law enforcement, as well as weapons used to strike and/or kill a whale). The second is anticipated noise levels at sensitive sites, as indicated by the distance between noise sources and potential receptors.

4.11.2.1 Noise Generated by Hunt-related Activities

Under current conditions, noise from vehicles, marine vessels, and aircraft is commonly heard throughout the project area. Other sources of noise include commercial areas, sports fields, logging operations, and the foghorn at Tatoosh Island. Natural sounds, such as those of wind and surf, contribute to high ambient noise levels in portions of the project area, particularly in areas close to the shoreline of the Pacific coast and the Strait of Juan de Fuca. A whale hunt and associated activities (such as monitoring, protests, law enforcement and weapons discharge) would be expected to result in increased noise levels in the project area. Sources of noise from hunt-related activities would include vessels and aircraft (noise would persist for the duration of each hunt) and firearms and explosive devices (noise would be intense and brief). Noise from automobile traffic would not be expected to increase at nearby properties as a result of implementing any of the action alternatives because daily and monthly traffic counts from the period of the previous hunts did not show an appreciable change in traffic volumes in the project area (Section 3.13.3.1.2, Vehicle Traffic Patterns During the 1999 Hunt).

It is possible that the number and types of vessels and aircraft participating in each hunting expedition (including observation, protests, law enforcement, and media coverage) would vary under the action alternatives. For example, alternatives that allow year-round hunting could

attract more observers because of better weather conditions, or alternatives that allow more hunts might attract less media coverage as whale hunting becomes less of a novelty. Because of the difficulty of predicting such variations, and how they might affect the precise numbers of vessels and aircraft participating in each hunt, this analysis assumes each hunting expedition would be accompanied by the same amount of vessel and aircraft activity and associated noise. Vessels and aircraft associated with each hunt would likely be similar to those associated with the previous hunts, described in Section 3.11.3.2.2, Fishing Vessel Traffic. The noise level associated with vessels and aircraft under each alternative would depend on the number of days hunting associated with the alternative.

Weapons that may be used to strike and kill whales are described in Section 3.15.3.5.2, Weapons Associated with the Hunt. The Makah propose to strike and secure a whale with a hand-thrown toggle-point harpoon and to kill it with a .50-caliber rifle. An alternative method for striking a whale would be a hand-thrown darting gun with an explosive grenade. Alternative methods for killing a whale include explosive grenades delivered either by a hand-thrown darting gun or shoulder gun. If a shoulder gun were used, the blast would likely be louder than the noise associated with a rifle. The grenade is designed to detonate after entering the whale. Atmospheric noise from the detonation would be muffled by the surrounding tissue and by the water surrounding the whale and would probably not exceed the noise level of either the rifle or shoulder gun. Underwater noise from the grenade explosion, which would likely be intense, is discussed in Section 4.5, Other Wildlife. The amount of noise produced by weapons would depend on the number of whales that may be struck and killed under a given alternative.

4.11.2.2 Noise Levels at Receiving Properties

As a general rule of thumb, sound level in an open environment (such as occurs throughout the project area) drops 6 dB for every doubling of the distance from the noise source (Occupational Safety and Health Administration 1999). Thus, if a sound has an intensity of 100 dB 50 feet from the source (a standard distance for measuring noise output levels), the intensity at 100 feet would be 94 dB; at a distance of 1 mile, the sound level would be approximately 60 dB. Thus the potential for noise from hunt-related activities to affect sensitive receptors would depend primarily on the distance between the activities and the receptors. Any activities that occur closer to shore would be more audible than activities further offshore. For example, whale hunting during summer (under Alternatives 3, 5, and 6) may target whales that are feeding in the project area, and may therefore take place closer to shore than hunting during winter or spring, which may target migrating whales further offshore (Alternatives 2 and 4). In addition, most recreation

visits occur during summer. Whale hunting activities during summer may be audible to more persons on trails and beaches in the Olympic National Park and the Makah Reservation, compared to activities at other times of year.

For firearms, the noise level at a receiving property would also depend on the direction the muzzle is facing at the moment of discharge, because gunfire noise is louder in the direction the weapon is pointed. Weapons discharged intentionally during a whale hunt would be pointed at a downward angle toward the whale:

The rifleman on the chase board may not discharge his weapon until authorized to fire by a safety officer designated by the whaling captain. The safety officer would not authorize the discharge of the rifle unless the barrel of the rifle is above and within 30 feet from the target area of the whale and the rifleman's field of view is clear of all persons, vessels, buildings, vehicles, highways and other objects or structures that if hit by a rifle shot could cause injury to human life or property (2.3.3.2.7, Other Environmental Protection Measures).

It is reasonable to expect that the direction of fire would be away from commercial or residential areas.

As with the previous hunts, most hunting under the Alternatives 2 to 5 would probably take place 1 mile or more offshore in the Pacific coast portion of the U&A. Hunting under Alternative 6 would also likely occur in the coastal portion of the Makah U&A, but could also occur in the Strait of Juan de Fuca. For hunting in the coastal portion of the U&A, noise from vessels and weapons would be audible at few, if any, residential or commercial properties, including the Makah tribal Center. Recreational users of beaches in the OCNMS, the Makah Reservation, and the Olympic National Park would be most likely to hear noise associated with whale hunts under the action alternatives. Hunting activities that occur in the Strait of Juan de Fuca (i.e., under Alternative 6) may be audible at residential properties along State Route 112. Such noise would likely be masked by highway traffic noise, however.

Aircraft engaged in monitoring and law enforcement for the hunt would be audible primarily near vessels engaged in hunt-related activities or other vessels that might be in the vicinity of a hunt, such as recreational fishing vessels. Aircraft within OCNMS boundaries would be expected to observe the requirement to stay above an altitude of 2,000 feet. Increased noise levels from aircraft taking off and landing would also be audible at commercial and residential properties near the landing pad at Coast Guard Station Neah Bay. Media helicopters would likely arrive from other areas and would be present only near a successful harvest or major protest activity. Aircraft monitoring hunt-related activities that occurred outside the OCNMS (e.g., hunting in the Strait of

Juan de Fuca under Alternative 6, or events at Neah Bay under all action alternatives) would not have to maintain an altitude of at least 2,000 feet. For this reason, aircraft noise levels at receiving properties in Neah Bay and along State Route 112 would likely be louder than those along the Pacific coast portion of the U&A.

The area with greatest potential for disturbance from hunt-related activities under any of the action alternatives is Neah Bay, where most protests and law enforcement activities occurred during the previous hunts. If protest vessels moor at Clallam Bay, as they did during the previous hunts, increased noise levels would also be expected there and possibly along the travel route between Clallam Bay and Neah Bay.

4.11.3 Evaluation of Alternatives

The following sections consider the potential for the alternatives to affect sensitive noise receptors in the project area. For each alternative, the discussion addresses the potential number of occasions on which hunt-related activity may lead to elevated noise levels, as well as the likelihood that such noise would be detectable at sensitive sites.

The lowest risk of adverse effects on sensitive noise receptors would occur under the No-action Alternative, because no whale hunts would be permitted. The risk under the action alternatives would increase, with the amount of increase depending on the number of days of hunting and the number of rifle shots or grenade explosions. Table 4-1 identifies those numbers and Section 4.1, Introduction, describes the rationale for expecting those numbers. Compared to the No-action Alternative, the risk would increase under Alternatives 2 and 4 due to increases in aircraft and vessel noise over 7 to 30 days. The risk would increase further under Alternatives 3 and 6 due to increases in aircraft and vessel noise over 40 days. Alternatives 2, 3, 4, and 6 would all be expected to result in the same amount of increased risk from weapons discharge, compared to the No-action Alternative, because they include the same limits on the number of whales that may be struck and so would likely result in the same number of rifle shots (28) or grenade explosions (21).

Alternative 5 would also result in increased risk to sensitive noise receptors over the No-action Alternative due to increases in aircraft and vessel traffic over 20 days. This risk may be comparable to that under Alternatives 2 and 4, which would result in 7 to 30 days of hunting, and would be less than that under Alternatives 3 and 6, which would result in 40 days of hunting. Alternative 5 would carry the lowest risk from noise associated with weapons discharge because of the lower number of discharges (12 rifle shots and 9 grenade explosions).

4.11.3.1 Alternative 1

Under Alternative 1, no whale hunt would be permitted, and no whale hunting or associated activities would be expected to occur. The amount of noise-generating activity in the project area would not be expected to differ from current levels, and noise levels would not change from the current conditions described in Section 3.11.3.2, Existing Noise Levels.

4.11.3.2 Alternative 2

Under Alternative 2, vessel and aircraft noise associated with a hunt would be expected to occur on a total of 7 to 30 days, mostly during April and May. Also under Alternative 2, the limit on the number of struck whales would be seven and would potentially result in as many as 28 rifle shots or 21 grenade explosions annually. Compared to the No-action Alternative (under which there would be no hunt-related noise), the noise from vessels, aircraft and weapons discharge would result in increased noise levels at receiving properties in Neah Bay. There could also be increased noise levels at receiving properties along State Route 112, east of Neah Bay, from protest vessels traveling between Clallam Bay and Neah Bay.

In contrast to the No-action Alternative, increased noise from vessels, aircraft, and weapons associated with whale hunts under Alternative 2 may be audible to recreational users of the OCNMS, the Makah Reservation, and the Olympic National Park. The number of recreational visitors who may be affected would be limited, however, because hunting would be restricted to the winter and early spring months when visitation is comparatively low.

4.11.3.3 Alternative 3

Alternative 3 would include the same limits on the number of whales struck as Alternative 2, but would impose no restrictions on the hunting season. Under Alternative 3, vessel and aircraft noise associated with a hunt would be expected to occur on a total of 40 days; the limit on the number of struck whales would be seven and would potentially result in as many as 28 rifle shots or 21 grenade explosions. Compared to the No-action Alternative (under which there would be no hunt-related noise), the noise from vessels, aircraft and weapons discharge would result in increased noise levels at receiving properties in Neah Bay on a total of 40 days. There could also be increased noise levels at receiving properties along State Route 112, east of Neah Bay, from protest vessels traveling between Clallam Bay and Neah Bay. In addition, noise from vessels, aircraft, and weapons associated with whale hunts under Alternative 3 may be audible to recreational users of the OCNMS, the Makah Reservation, and the Olympic National Park, in contrast to the No-action Alternative, which would involve no hunt-related noise.

Compared to Alternative 2, Alternative 3 would be likely to result in a greater increase in noise levels at receiving properties because there would be more days of hunt-related vessel traffic (40 days compared to 7 to 30 days). Alternative 3 would result in about the same increase in noise levels from weapons discharge as Alternative 2 because it would impose the same limit on number of whales struck as Alternative 2, and thus result in the same number of rifle shots (28) and grenade explosions (21).

Alternative 3 has a greater potential to disturb recreational users in the project area than Alternative 2 because whale hunts would likely occur during the peak period of recreational use and may target whales that are feeding relatively close to shore (compared to whales that are migrating farther offshore at other times of year).

4.11.3.4 Alternative 4

Alternative 4 would include the same limits on the number of whales harvested as Alternative 2 and would impose the same restrictions on the hunting season. The additional restrictions contained in Alternative 4 (no hunting within 200 yards of rocks and islands in the Washington Islands National Wildlife Refuges) would not be expected to influence the potential for disturbance at residential or commercial properties or to recreational users in the project area. Therefore, the likely increase in noise at receiving properties under Alternative 4 would be the same as the likely increase under Alternative 2, relative to the No-action Alternative.

4.11.3.5 Alternative 5

Alternative 5 would include a limit of three struck whales and two harvested whales in any one year. Year-round hunting would be allowed. The expected number of hunting days would be 20 per year and the expected number of weapons discharges would be 12 rifle shots or 9 grenade explosions. Compared to the No-action Alternative (under which there would be no hunt-related noise), the noise from vessels, aircraft and weapons discharge would result in increased noise levels at receiving properties in Neah Bay and along State Route 112 east of Neah Bay on a total of 20 days. In addition, noise from vessels, aircraft, and weapons associated with whale hunts under Alternative 5 may be audible to recreational users of the OCNMS, the Makah Reservation, and the Olympic National Park, in contrast to the No-action Alternative, which would involve no hunt-related noise.

Compared to Alternatives 2 and 4, Alternative 5 might result in about the same number of days of hunting (20 compared with 7 to 30) and therefore a comparable increase in aircraft and vessel noise at receiving properties. Alternative 5 would result in a smaller increase in noise from

weapons discharges, however, due to the smaller number of discharges. Compared to Alternative 3, Alternative 5 would result in fewer days of hunting (20 compared with 40) and fewer weapons discharges (12 rifle shots versus 28 and 9 grenade explosions versus 21) and would therefore result in a relatively smaller increase in noise.

Similar to Alternative 3, whale hunts under Alternative 5 would likely occur during summer (the peak period of recreational use) and may target whales that are feeding relatively close to shore (compared to whales that are migrating farther offshore at other times of year). For these reasons, Alternative 5 would have a greater potential than Alternatives 2 and 4 of disturbing recreational users in the project area.

4.11.3.6 Alternative 6

Alternative 6 would include the same provisions as Alternative 3 except that hunting would also be allowed in the Strait of Juan de Fuca portion of the Makah U&A. Alternative 6 would be expected to result in the same number of hunting days year round, and the same number of weapons discharges, as Alternative 3. Therefore, compared to the No-action Alternative, the overall increase in noise from aircraft, vessels, and weapons discharge would likely be the same under Alternative 6 as under Alternative 3.

The ability to hunt in the Strait, however, might result in effects in different locations than would occur under Alternative 3, compared to the No-action Alternative. If tribal members chose to hunt in the Strait instead of the coastal portion of the Makah U&A, this could result in fewer instances of disturbance to recreational users of beaches and trails in the OCNMS, the Makah Reservation, and the Olympic National Park, compared to Alternative 3. It could also result in elevated noise levels at residential properties along State Route 112.

4.12 Aesthetics

4.12.1 Introduction

This section addresses the potential for the alternatives to result in adverse aesthetic effects on observers, based on the potential for viewers to see the whale hunt, either directly or through the media. Media images of the previous hunt prompted reactions ranging from revulsion to admiration. Analyses in this section consider the effects on observers who may be present at sites with direct views of a whale hunt (including views of a whale dying, being towed to shore, and/or being butchered), as well as those who may see such images through various media outlets. Whale hunting and related activities under the action alternatives would be short-term and localized, and would take place upon the water; such activities, therefore, would not affect natural

visual resources in the project area, such as stacks, pillars, and islands (Section 3.12.3.1, Visual Resources in the Project Area).

4.12.2 Evaluation Criteria

Two criteria were used to determine the potential for aesthetic effects under the alternatives. The first is the anticipated number of persons who may be present at sites that may offer views of hunt-related activities, as well as their expectations (that is, whether individuals may encounter views of hunt-related activities without intending to do so). The second criterion includes the anticipated amount, intensity, duration, scope, and content of media coverage. The following two sections discuss these matters in greater detail and identify how the effects of the alternatives may be assessed and differentiated.

4.12.2.1 On-scene Observers

For each hunt, the number of interested observers (those who actively seek viewing opportunities out of concern about the outcome of the hunt) and persons engaged in monitoring, law enforcement, and media coverage would not be expected to vary under the action alternatives. The number of casual observers who could see hunt activity on the water (including pursuits, strikes, and possibly the death of a whale) would vary seasonally, with the greatest number of potential observers during the peak visitation period from June through September. The number of potential casual observers would also be expected to differ with the hunt area, as hunt-related activities in the Strait of Juan de Fuca may be visible to residents and travelers along State Route 112. Opportunities to view whale hunting in the Pacific coast portion of the Makah U&A would occur mostly from hiking trails and beaches, along with a limited number of road-based locations on the Makah Reservation (Section 3.12.3.2, Vantage Points and Viewing Opportunities). As with the previous hunts, most hunting under the action alternatives would be expected to take place 1 mile or more offshore in the Pacific coast portion of the U&A. Hunt activities would be visible from few, if any, land-based vantage points. Any activities that occur closer to shore would be more readily viewed. For example, whale hunting during summer (under Alternatives 3, 5, and 6) may target whales that are feeding in the project area, and may therefore take place closer to shore than hunting that targets migrating whales further offshore. Whale hunting activities during summer may be more readily seen by persons on trails and beaches in the Olympic National Park and the Makah Reservation.

The number of potential observers for a whale carcass being towed to shore and butchered would depend in part on the location of the beach to which the whale is brought. The whale that was

harvested in 1999 was brought to Neah Bay, where butchering and harvest-related ceremonies and celebrations were readily observable by numerous tribal members, local residents, protesters, enforcement personnel, and media representatives. Alternative locations where a whale carcass may be brought to shore and butchered would likely be in far less prominent and accessible locations along the Pacific coast portion of the Makah Reservation. Under alternatives with no hunt timing restrictions, there would be a greater potential for recreational users of such areas to encounter views of a whale carcass without actively seeking such views.

The number of potential observers would also depend on the number of days of hunting, which in turn would depend primarily on the number of days of hunting. Table 4-1 identifies the number of days of hunting expected under each Alternative. The number of potential observers would depend on the season during which hunting occurs (more potential observers during summer), the location where hunting occurs (more potential observers in the Strait of Juan de Fuca than the coastal portion of the Makah U&A), the location where a whale carcass is brought to shore (more potential observers in the Strait of Juan de Fuca than the coastal portion of the Makah U&A), and the number of days of hunting (more hunts would create more opportunities for inadvertent viewing of hunt-related activities).

4.12.2.2 Media Viewers

As described in Section 3.12.3.3, Media Coverage of Previous Authorized Hunts, previous Makah whale hunts were the focus of intense coverage in local and regional newspapers, television broadcasts, and other media outlets. Stories and images of the hunt were also distributed nationwide and internationally. As with the previous hunts, media coverage would be expected to include images of hunt activities, protests, and public ceremonies and celebrations, as well as of a whale or whale being struck, killed, brought to shore, and butchered.

The amount of media coverage would depend on the amount of hunt-related activity, which in turn would depend primarily on the number of days of hunting. Table 4-1 identifies the number of days of hunting expected under each Alternative. It is possible that media coverage would be more intense for initial hunts, and would diminish as subsequent hunts occur. Even if that were to occur, alternatives with more days of hunting are still likely to result in more media coverage overall.

4.12.3 Evaluation of Alternatives

The following sections consider the potential for the alternatives to result in aesthetic effects on observers. For each alternative, the discussion addresses the potential number of on-scene observers who might view whale-hunting activities and the amount of media coverage.

The lowest risk of adverse aesthetic effects to casual observers would occur with the No-action Alternative, under which no whale hunts would be permitted. The No-action Alternative, however, would have adverse aesthetic effects on interested observers who desire to view a hunt. Under all of the action alternatives, interested observers could view a whale being hunted, towed to shore, or butchered from numerous points along the shoreline near Neah Bay and, to a lesser degree, the Pacific coast portion of the Makah U&A. Viewers not desiring to see a hunt, such as recreational users in the portions of the OCNMS, Olympic National Park, and Makah Reservation, may encounter views of hunt-related activities without expecting to do so (Section 3.12.3.2, Vantage Points and Viewing Opportunities).

4.12.3.1 Alternative 1

Under the No-action Alternative, no whale hunt would be permitted, and no whale hunting or associated activities (e.g., ceremonies, celebrations, protests, law enforcement) would be anticipated. Therefore, there would be no potential to view hunt-related activities in the project area or through the media. With the possible exception of drift whales, no whale carcasses would be encountered by interested observers or recreational users of area beaches, trails, or campsites. Those desiring to view a hunt would not have the opportunity under this alternative.

4.12.3.2 Alternative 2

Under Alternative 2, whale hunting would be expected to occur over 7 to 30 days, most likely during April and May. Hunts might be visible to observers at beaches and vantage points along the Pacific coast portion of the project area. Hunt activities would take place during the winter and spring, when recreational use of these areas is typically lower than during the summer months. Compared to the No-action Alternative, under Alternative 2 there is an increased potential for recreational users to inadvertently encounter sights of a whale being hunted or towed to shore during a period of 7 to 30 days between December 1 and May 31. No hunting would be permitted within the Strait of Juan de Fuca, so there would be little potential for residents and travelers along State Route 112 on the Strait of Juan de Fuca to view a whale hunt.

As occurred in 1999 and 2000, whale hunts and associated activities (including protests and law enforcement) would likely receive extensive coverage in various media outlets. Public response

would likely be substantial, expressing a wide range of opinions (Section 3.12.3.3, Media Coverage of Previous Authorized Hunts).

4.12.3.3 Alternative 3

Under Alternative 3, hunting would likely occur year round, with a likely total of 40 days of hunting. Hunts might be visible to observers at beaches and vantage points along the Pacific coast portion of the project area. Hunt activities would likely take place during the summer, when recreational use of these areas is highest. Thus compared to the No-action Alternative, under Alternative 3 there is an increased potential for recreational users to inadvertently encounter sights of a whale being hunted, towed to shore, or butchered during a period of 40 days throughout the year. No hunting would be permitted within the Strait of Juan de Fuca, so there would be little potential for residents and travelers along State Route 112 on the Strait of Juan de Fuca to view a whale hunt.

Compared to Alternative 2 there would be more days of hunting (40 versus 7 to 30) and therefore more opportunities for observers at beaches and vantage points along the Pacific coast portion of the project area to inadvertently view hunting activities. Also compared to Alternative 2, hunting would occur during the summer months, when recreational use of the project area is higher. Therefore, compared to the No-action Alternative, Alternative 3 is likely to have greater potential for observers to view hunt activities than alternative 2.

As occurred in 1999 and 2000, whale hunts and associated activities (including protests and law enforcement) would likely receive extensive coverage in various media outlets. Public response to media coverage would likely be substantial, with a variety and intensity of response similar to that described in Section 3.12.3.3, Media Coverage of Previous Authorized Hunts. Because there would be more days of hunting under Alternative 3 than under Alternative 2, Alternative 3 would likely result in a greater increase in the amount of media broadcasts over the No-action Alternative, compared to Alternative 2.

4.12.3.4 Alternative 4

Alternative 4 would include the same limits on the number of whales harvested as Alternative 2, and include the same hunting season. The additional restrictions contained in Alternative 4 (no hunting within 200 yards of rocks and islands in the Washington Islands National Wildlife Refuges) would not be expected to affect the number of days of hunting or the numbers of whales harvested. Therefore, the likely increase in adverse aesthetic effects under Alternative 4 would be the same as under Alternative 2, compared to the No-action Alternative.

4.12.3.5 Alternative 5

Under Alternative 5, hunting would likely occur year round, with a likely total of 20 days of hunting. Hunts might be visible to observers at beaches and vantage points along the Pacific coast portion of the project area. Hunt activities would likely take place during the summer, when recreational use of these areas is highest. Thus compared to the No-action Alternative, under Alternative 5 there is an increased potential for recreational users to inadvertently encounter sights of a whale being hunted or towed to shore during a period of 20 days throughout the year, including the heaviest periods of recreational use. No hunting would be permitted within the Strait of Juan de Fuca, so there would be little potential for residents and travelers along State Route 112 on the Strait of Juan de Fuca to view a whale hunt, although it is possible that pursuit of a struck whale could lead Makah hunters into the Strait.

Compared to Alternatives 2 and 4,, Alternative 5 would likely result in about the same number of days of hunting (20 versus 7 to 30), but hunting would occur during summer months when more recreational users would be present. Therefore, compared to the No-action Alternative, Alternative 5 is likely to have greater potential for observers at beaches and vantage points along the Pacific coast portion of the project area to inadvertently view hunting activities than the potential that exists under Alternatives 2 or 4.

As occurred in 1999 and 2000, whale hunts and associated activities (including protests and law enforcement) would likely receive extensive coverage in various media outlets. Public response to media coverage would likely be substantial, with a variety and intensity of response similar to that described in Section 3.12.3.3, Media Coverage of Previous Authorized Hunts. Because there would be about the same number of days of hunting under Alternative 5 as under Alternatives 2 and 4, Alternative 5 would likely result in about the same increase in media broadcasts as these Alternatives 2 and 4, as compared to the No-action Alternative.

Compared to Alternative 3, Alternative 5 would allow hunting throughout the year, but there would be about half as many days of hunting. Thus under Alternative 5, fewer on-site observers at beaches and vantage points along the Pacific coast portion of the project area would likely see a whale being hunted, brought to shore, or butchered, compared to Alternative 3. Because there would likely be fewer days of hunting under Alternative 5 than under Alternative 3, there would also likely be fewer media broadcasts.

4.12.3.6 Alternative 6

Alternative 6 would include the same provisions as Alternative 3 except that hunting would also be allowed in the Strait of Juan de Fuca portion of the Makah U&A. Alternative 6 would be expected to result in the same number of hunting days year round as Alternative 3. The ability to hunt in the Strait, however, might result in effects in different locations than would occur under Alternative 3. If tribal members chose to hunt in the Strait instead of the coastal portion of the Makah U&A, this could result in residents and travelers along State Route 112 inadvertently viewing a whale being hunted, brought to shore, or butchered. If some hunting occurs in the Strait rather than the Pacific coast portion of the Makah U&A, the number of opportunities for on-site observers at beaches and vantage points to see a whale being hunted, brought to shore, or butchered would be less than anticipated under Alternative 3, because fewer whale hunts would likely occur in the coastal portion of the U&A. Thus compared to the No-action Alternative, Alternative 6 would result in about the same increase in inadvertent observations of whale hunting activities, but in different locations. Regardless of the location of hunting, the amount of media coverage would likely be similar under Alternatives 3 and 6, compared to the No-action Alternative. Public response to media coverage would likely be substantial, with a variety and intensity of response similar to those described in Section 3.12.3.3, Media Coverage of Previous Authorized Hunts.

Compared to Alternatives 2 and 4, it is likely that more observers on shore would see a whale being hunted, brought to shore, or butchered.

4.13 Transportation

4.13.1 Introduction

This section addresses the potential for a whale hunt and hunt-related activities in the project area to interfere with normal traffic patterns on highways, marine waters, and air routes near Neah Bay. In addition, analyses address the potential for changes in traffic patterns to result in an increased risk of traffic accidents or to impede access by emergency services.

4.13.2 Evaluation Criteria

For this analysis, transportation resources in the project area are subdivided into three categories – land, water, and air. Two criteria were used to determine the potential for effects on transportation under the alternatives. The first is the extent to which a particular alternative may affect traffic volumes or impede the movement of vehicles, vessels, or aircraft. Because each hunt would be expected to result in the same change in highway, marine, and air traffic volumes in the

project area, the change in traffic would depend primarily on the amount of hunt-related activity. The amount of hunt-related activity would vary depending on the number of days that hunting occurs. Table 4-1 identifies the number of days of hunting expected under each alternative and Section 4.1, Introduction, describes the rationale for those numbers.

The analysis next considers whether changes in traffic patterns under each alternative might result in an increased risk of traffic accidents or might impede access by emergency services. An alternative would be more likely to result in problems if it impeded or created a substantial increase in traffic during a time of year when volumes were higher than average. The following sections describe the potential effects of each alternative on transportation, based on the extent and timing of traffic changes in each of the three categories.

4.13.2.1 Highway Traffic

It is unlikely that whale-hunt-related activities under the action alternatives would have a detectable effect on highway traffic volumes in the project area. Table 3-37 shows monthly averages of weekday traffic counts on Highway 101 near State Route 113. Average traffic counts for the months during which previous hunts or practice exercises took place (November 1998, May 1999, April 2000, and May 2000) are no higher than the 10-year averages for those months. For example, the average weekday traffic count for May 1999 was 2,572 vehicles, while the 1995-to-2004 average weekday count for May was 2,588 vehicles. In addition, there is no evidence of an increase in the number of collisions on project area highways during the years in which previous hunts or practice exercises took place (Table 3-38).

As noted in Section 3.13.3.1.2 (Vehicle Traffic Patterns during the 1999 Hunt), previous hunts affected highway traffic flow in the project area on one occasion when protesters and local police responding to them blocked traffic on State Route 112 for approximately 2.5 hours. The likelihood of a blockage occurring under the action alternatives cannot be predicted, but the potential for such an occurrence would be expected to increase with the number of days of hunting. Table 4-1 identifies the number of hunting days anticipated for each alternative. The intensity of any roadway blockage would depend on the time of year during which it occurred. Therefore, hunts during the peak travel season (June through September; Figure 3-11) would affect more travelers and have a greater risk of impeding emergency vehicles, compared to a blockage at other times of year. Summer is also the period with the greatest number of visitors to the Makah Reservation (Section 3.13.3.1.1, Typical Vehicle Traffic Volume Patterns). A road

blockage during summer would also be expected to have a greater impact on access to the reservation than a blockage at other times of year.

4.13.2.2 Marine Traffic

Accounts from previous hunts indicated that protesters operated approximately 15 vessels near hunt activities, including Neah Bay and Sekiu (Section 3.15.3.4, Behavior of People Associated with the Hunt). There were no reports of whale hunting or protest vessels hindering the passage of commercial or recreational fishing vessels, or of marine accidents associated with hunt-related traffic. The incident in 2000, in which a protester on a jet ski collided with a Coast Guard vessel enforcing the MEZ, was a direct result of the actions of the parties involved, rather than a byproduct of increased traffic volume.

Hunt-related activities would be unlikely to interfere with commercial shipping traffic, because most (if not all) hunting would probably occur within the Coast Guard RNA, which lies almost entirely within the OCNMS area to be avoided. Commercial shipping traffic largely honors the area to be avoided (Section 3.6.3.1.4, Commercial Shipping) and would, therefore, be unlikely to encounter any hunt-related vessels. The only area where commercial shipping traffic could reasonably be expected to encounter hunt-related vessels is in the Strait of Juan de Fuca, because the area to be avoided does not extend eastward of Cape Flattery. Traffic lanes for commercial ships in the Strait are generally 3 to 4 miles from the northern shore of the Olympic Peninsula. Based on the experience of the whale hunts in 1999, most hunt activities would likely take place within 1 or 2 miles of shore, or possibly closer; vessels engaged in hunts, protests, media coverage, or law enforcement would not be likely to venture into the commercial shipping traffic lanes farther offshore. Hunts that take place during summer (under Alternatives 3, 5, or 6) would likely target whales that are feeding in the project area, and may therefore take place closer to shore than hunting that targets migrating whales further offshore (Alternatives 2 and 4). The likelihood for hunt-related traffic to interfere with commercial shipping traffic is very low, therefore, because most hunt activities would be unlikely to occur in commercial shipping lanes. Hunt-related activities in areas south of the traffic lanes would have the potential to interfere with slow-moving vessels, such as small fishing vessels and tugs with barges, which are allowed to transit eastbound and westbound south of the commercial traffic lanes.

While it is possible that vessels engaged in hunts, protests, media coverage, or law enforcement could interfere with vessels entering or leaving Neah Bay, the likelihood of such interference occurring under the action alternatives cannot be predicted. The potential for interference or

marine accidents depend primarily on the number of days of hunting. Table 4-1 identifies the number of days of hunting expected under each Alternative. The potential for interference would also depend on the time of year that hunting occurs. As noted in Section 3.13.3.2, Marine Vessel Traffic, approximately 83 percent of all boat trips (commercial and recreational) from Neah Bay occur during the months of May through August. Less than 5 percent of all trips occur during the five-month period from November through March, and 5 percent occur during April. Hunt-related activities that occur during the summer peak period for marine traffic would have a greater potential to affect commercial or recreational fishing vessel traffic, compared to activities at other times of year. If the number of boat trips from Neah Bay continues to increase at a rate similar to what has been observed in recent years (Table 3-39), the likelihood of hunt-related vessel traffic interfering with other marine traffic (particularly recreational fishing trips) would likewise be expected to increase.

4.13.2.3 Air Traffic

There is no indication from accounts of previous hunts that law enforcement or media aircraft interfered with air traffic in the project area. The likelihood of such interference occurring under the action alternatives cannot be predicted, but the potential would be expected to increase each time a hunt takes place. Hunt-related activities that occur during a peak period for aircraft use would have a greater potential to affect air traffic, compared to activities at other times of year. No data are readily available to quantify seasonal differences in air traffic in the project area, but the peak period of aircraft use likely coincides with the summer months, when conditions of low wind and good visibility are relatively common.

4.13.3 Evaluation of Alternatives

The following sections consider the potential for the alternatives to affect transportation in the project area. For each alternative, the discussion addresses the anticipated increases in the volume or patterns of highway, marine, and air traffic in the project area, as well as changes in the risk of traffic accidents and the potential for highway blockages to interfere with emergency vehicles. The lowest risk of adverse effects on transportation would occur with the No-action Alternative, under which no whale hunts would be permitted and traffic volumes and patterns on highways, marine waters, and air routes near Neah Bay would not be expected to differ from their current levels. Under all of the action alternatives, elevated levels of marine and air traffic associated with whale hunts would have the potential to interfere with normal traffic patterns and could result in an increased risk of accidents. Although none of the alternatives is likely to increase the

volume of highway traffic, it is possible there could be road blockages associated with protests and ensuing law enforcement responses, creating the possibility of traffic accidents or impediments to access by emergency services.

During each hunt, there would be an increased likelihood, relative to the No-action Alternative, that (1) protests and/or ensuing law enforcement responses could result in highway blockages, (2) vessels involved in the hunt, protests, media, and law enforcement could interfere with fishing or shipping traffic, or (3) aircraft involved in law enforcement or media coverage could interfere with other air traffic in the project area. The number of occasions on which this potential would exceed current conditions under the No-action Alternative would correspond to the number of days on which hunting would occur under a particular alternative.

The risk of adverse effects on transportation would also be related to the time of year in which whale hunting takes place. Alternatives that allow whale hunting during summer months would be more likely to affect commercial and recreational fishing boat trips from Neah Bay. Changes in traffic patterns as a result of highway blockages could have a greater effect during summer months, when traffic volumes are typically higher.

4.13.3.1 Alternative 1

Under the No-action Alternative, no whale hunt would be permitted, and no whale hunting or associated activities (e.g., protests, law enforcement, media coverage) would be expected to occur. Traffic volumes in the project area would not be expected to differ from current levels. There would be no potential for hunt-related activities to interfere with highway, marine, or air traffic; result in an elevated risk of accidents, or impede access by emergency vehicles.

4.13.3.2 Alternative 2

Under Alternative 2, whale hunting would be expected to occur on a total of 7 to 30 days, primarily during April and May. Compared to the No-action Alternative, increased vessel and air traffic associated with whale hunts under Alternative 2 would result in an increased potential for interference with marine or air traffic in the project area and, possibly, an increased risk of accidents. Potential highway blockage resulting from protest activities and law enforcement response could result in traffic accidents or impediments to emergency vehicles. During each hunt, there would be an increased likelihood (relative to the No-action Alternative) that (1) protests and/or ensuing law enforcement responses could result in highway blockages, (2) vessels involved in the hunt, protests, media, and law enforcement could interfere with fishing or shipping traffic, or (3) aircraft involved in law enforcement or media coverage could interfere

with other air traffic in the project area. These risks would occur on a total of 7 to 30 days, most likely during April and May, compared to no occurrences under the No-action Alternative.

Because whale hunting under Alternative 2 would be limited to the winter and early spring months, it would not overlap the peak periods for highway traffic. If most hunts take place during April and May, they would overlap the period during which there is a high volume of marine vessel traffic, particularly for recreational fishing. More boat trips from Neah Bay occur during the months of June through August, compared to May, however (Figure 3-12).

4.13.3.3 Alternative 3

Under Alternative 3, no seasonal restrictions would be imposed on whale hunting activities and hunting would be expected to occur throughout the year over 40 days. Compared to the No-action Alternative, increased vessel and air traffic associated with whale hunts under Alternative 3 would result in an increased potential for interference with marine or air traffic in the project area and, possibly, an increased risk of accidents. Potential highway blockage resulting from protest activities and law enforcement response could result in traffic accidents or impediments to emergency vehicles. During each hunt, there would be an increased likelihood (relative to the No-action Alternative) that (1) protests and/or ensuing law enforcement responses could result in highway blockages, (2) vessels involved in the hunt, protests, media, and law enforcement could interfere with fishing or shipping traffic, or (3) aircraft involved in law enforcement or media coverage could interfere with other air traffic in the project area. These risks would occur on a total of 40, most likely throughout the year.

Compared to Alternative 2, Alternative 3 would result in increased risks to transportation resources because there would be more days of hunting and because hunting would occur year round, including periods of greater highway, vessel and air traffic.

4.13.3.4 Alternative 4

Alternative 4 would include the same limits on the number of whales harvested as Alternative 2, and include the same hunting season. The additional restrictions contained in Alternative 4 (no hunting within 200 yards of rocks and islands in the Washington Islands National Wildlife Refuges) would not be expected to affect the hunting season or the number of days of hunting. Therefore, the likely increase in adverse transportation effects under Alternative 4 would be the same as under Alternative 2, compared to the No-action Alternative.

4.13.3.5 Alternative 5

Under Alternative 5, hunting would likely occur year round, with a likely total of 20 days of hunting. Hunt activities would likely take place during the summer, when highway, vessel and air traffic are highest. Thus compared to the No-action Alternative, under Alternative 5 there is an increased potential for adverse effects on transportation during a period of 20 days throughout the year. Potential adverse effects include interference with highway, marine, or air traffic in the project area and, possibly, an increased risk of traffic accidents or impediment with emergency vehicles. During each hunt, there would be an increased likelihood (relative to the No-action Alternative) that (1) protests and/or ensuing law enforcement responses could result in highway blockages, (2) vessels involved in the hunt, protests, media, and law enforcement could interfere with fishing or shipping traffic, or (3) aircraft involved in law enforcement or media coverage could interfere with other air traffic in the project area. Whale hunts during the summer months, when highway, marine, and air traffic volumes are typically higher than during other times of year, would have a greater potential to affect traffic, compared to activities at other times of year.

Compared to Alternatives 2 and 4, Alternative 5 would likely result in about the same number of days of hunting (20 versus 7 to 30), but hunting would occur during summer months when traffic volumes are higher. Therefore, compared to the No-action Alternative, Alternative 5 is likely to have greater adverse effects on transportation than Alternatives 2 or 4.

Compared to Alternative 3, Alternative 5 would result in half as many days of hunting (20 versus 40), during the same year-round period. Therefore, compared to the No-action Alternative, Alternative 5 is likely to have fewer adverse effects on transportation than Alternative 3.

4.13.3.6 Alternative 6

Alternative 6 would include the same provisions as Alternative 3 except that hunting would also be allowed in the Strait of Juan de Fuca portion of the Makah U&A. Alternative 6 would be expected to result in the same number of hunting days year round as Alternative 3. The ability to hunt in the Strait might result in effects in different locations than would occur under Alternative 3, but would not be expected to have different effects overall compared to the No-action Alternative.

If tribal members chose to hunt in the Strait instead of the coastal portion of the Makah U&A, this could result in hunt-related vessel traffic in the Strait (including Makah vessels and associated protest, media, and law enforcement vessels). Such vessel traffic would not be likely to venture into commercial shipping traffic lanes and would therefore have a very low likelihood of

interfering with the passage of commercial shipping vessels. Unlike any of the other alternatives (including No-action), hunt-related vessel traffic under Alternative 6 could impede or be impeded by slow-moving vessels, such as small fishing vessels and tugs with barges, south of the commercial traffic lanes in the Strait. Any instances of interference would likely occur over a matter of minutes or hours in a small area immediately adjacent to the hunting activity, and would not be likely to have appreciable effects on the ability of slow-moving vessels to pass through the Strait of Juan de Fuca.

4.14 Public Services

4.14.1 Introduction

This section addresses the potential for the alternatives to affect public services in the project area. This section analyzes the potential for a whale hunt and hunt-related activities to impede the ability of law enforcement to maintain order and medical professionals and facilities to treat injuries. Section 4.13, Transportation, discusses the potential for the alternatives to have transportation-related effects on access by emergency vehicles.

4.14.2 Evaluation Criteria

Two criteria were used to determine the potential for effects on public services under the alternatives. The first is the anticipated number of events requiring the attention of law enforcement personnel, and the second is the anticipated number of events requiring the attention of medical personnel.

4.14.2.1 Law Enforcement

Activities by protesters or counter-protesters could result in conflicts or legal infractions that would require intervention by law enforcement agents at sea or on land. A sudden, unanticipated increase in the number or frequency of such incidents could overwhelm the ability of local law enforcement personnel or facilities to respond. Even if such an occurrence were prevented through careful planning and coordination, hunt-related incidents could divert law enforcement resources from other missions. An increase in traffic incidents requiring law enforcement intervention could also divert law enforcement resources from other missions. Section 4.13.3, Transportation, Evaluation of Alternatives, also evaluates the potential for the alternatives to result in changes in traffic incidents, which could require law enforcement intervention or medical response.

As with the previous hunts, a law enforcement task force (Section 3.14.3.2, Police) would probably be assembled to ensure public safety during any whale hunts permitted under the action alternatives. The task force would coordinate county, state, federal, and tribal authorities' efforts to address any potential public disturbances related to whale hunts. Planning undertaken by the previous whale hunt task force included logistics (including assuring the availability of adequate staffing, equipment, and facilities), communications, interagency cooperation, crowd control, and establishment of incident command systems. Similar planning would most likely precede any whale hunts under the action alternatives, reducing the potential for hunt-related incidents to overwhelm law enforcement personnel or facilities.

As noted in Section 3.14.3.2, Police, the Clallam County Sheriff's Department did not find that the previous hunts and associated activities imposed a substantial burden on department staff. The reported increase in traffic stops by the Washington State Patrol on State Route 113 in 1999 could have been related to the Makah whale hunt, but it is not possible to determine from the available data whether that increase occurred before, during, or after the period of the whale hunt. There is no evidence of an increase in traffic volumes or the number of collisions on project area highways during the years in which previous hunts or practice exercises took place (Section 4.13.2.1, Evaluation Criteria, Highway Traffic). Because there is no clear indication of an increase in traffic stops or collisions with previous hunting activities, it is reasonable to conclude there would be no substantial increases in these rates in the project area under any of the alternatives.

During the previous Makah whale practice exercise in 1998 and hunts in 1999 and 2000, Coast Guard personnel were responsible for ensuring the safety of persons and vessels near the hunt, which included enforcing the moving exclusionary zone around Makah whale hunt vessels. The Coast Guard used helicopters, a cutter, and several utility boats and Zodiacs, and issued citations for negligent vessel operations, MMPA take violations, and violations of the moving exclusion zone (Section 3.14.3.1, Coast Guard). The Coast Guard would likely resume these activities under any of the action alternatives. In addition to participating in law enforcement activities, the Coast Guard would likely be the first to respond to any incidents requiring search and rescue in marine waters, for example, if a vessel capsized due to inclement weather or a collision. The risk of such events occurring would probably be greater under alternatives that restricted whale hunting to winter and spring (i.e., Alternatives 2 and 4), when adverse weather and sea conditions would more likely occur (Section 4.15.2.2, Injury from Boating Accidents). As noted in Section 3.14.3.1, Coast Guard, most search and rescue cases occur during the summer months, when sports fishers and tourists are present in greatest numbers. Under alternatives in which Makah

tribal members could hunt year-round (i.e., Alternatives 3, 5, or 6), therefore, there would be a greater potential for a hunt-related boating incident to occur simultaneously with another incident requiring Coast Guard attention.

The potential for incidents requiring a law enforcement response would likely be similar for all hunt attempts. The risk of hunt-related incidents leading to law enforcement responses that overwhelmed the ability of local law enforcement personnel or facilities to respond would thus depend on the number of days hunting occurred. The severity of the effect on public services could vary according to the time of year the hunts occur. If law enforcement is diverted during periods when demand might be higher (such as during the busier summer season), the consequences of the diversion could be greater.

4.14.2.2 Medical Facilities

As noted in Section 4.15 (Public Safety), hunt-related activities might result in injuries from boating accidents, mishaps with weapons, violence associated with protests, or possible traffic accidents. A sudden influx of persons requiring medical attention could exceed the physical or technical capacities of tribal and other local public health facilities. Additional trauma care facilities are available nearby. They include a Level 3 trauma care facility in Port Angeles and a Level 1-2 facility in Seattle. During the spring 2000 hunt, one protester sustained a shoulder injury and was transported to Port Angeles for medical care (Section 3.15.3.4, Behavior of People Associated with the Hunt).

The potential for injuries requiring medical attention would likely be similar for all hunt attempts, though hunt attempts during inclement weather might increase the risk of boating accidents for both protesters and hunters (Section 4.15.2.2, Injury from Boating Accidents). The risk of injury associated with any given alternative would, therefore, depend mainly on the number of hunt attempts that took place and also on the seasonal restrictions on hunting (that is, the ability of the Tribe to hunt year-round and, therefore, choose hunting opportunities with better weather conditions).

4.14.3 Evaluation of Alternatives

The following sections consider the potential for the alternatives to affect public services in the project area. For each alternative, the discussion addresses the anticipated change in the number of incidents requiring law enforcement intervention and injuries requiring medical attention.

The lowest risk of adverse effects on public services would occur under the No-action Alternative, because no whale hunts would be permitted, and the need for law enforcement and

medical attention in the project area would not be expected to differ from current levels. Under all of the action alternatives, protests and other activities associated with whale hunts would have the potential to divert law enforcement resources from other missions. Hunt-related activities could also result in an increase in the number of injuries, exceeding the capabilities of local health facilities. This potential might be lower under Alternatives 2 and 4 (with an estimated 7-30 days of hunting) compared to Alternatives 3 and 6 (with an estimated 40 days of hunting). In addition, hunting under Alternatives 2 and 4 would be limited to periods when the number of recreational visitors in the project area is comparatively low, reducing the likelihood that hunt-related incidents might occur when public services resources were engaged elsewhere. On the other hand, hunt attempts under Alternatives 3 and 6 would probably occur in better weather conditions, reducing the risk of boating accidents.

Alternative 5 would result in an estimated 20 days of hunting, about the same as Alternatives 2 and 4 (7 to 30 days) and about half as many days as Alternatives 3 and 6. Alternative 5 would also allow hunting year-round, likely resulting in hunts occurring during the summer. Summer hunts would have a reduced risk of boating accidents, but would also occur during a busier time of year when law enforcement and medical services are more likely to be engaged elsewhere.

4.14.3.1 Alternative 1

Under the No-action Alternative, no whale hunt would be permitted, and no whale hunting or associated activities (e.g., protests, law enforcement) would be expected to occur. The need for law enforcement and medical services in the project area would probably not differ from current levels. There would be no potential for injuries or incidents associated with hunt-related activities to overwhelm personnel and facilities or divert resources away from other duties. As under current scenarios, any persons who sustained injuries unrelated to hunt activities exceeding the physical or technical capacities of local public health facilities could be transported to other facilities in the region.

4.14.3.2 Alternative 2

Under Alternative 2, whale hunting would be expected to occur on a total of 7 to 30 days, primarily during April and May. Compared to the No-action Alternative, protest activities associated with whale hunts under Alternative 2 could result in an increased number of incidents requiring law enforcement intervention on those days, possibly diverting law enforcement resources from other missions. If a law enforcement task force were implemented, similar to

previous hunts, protests or other activities would probably not overwhelm the combined personnel and facilities of county, state, federal, and tribal authorities.

Similarly, Alternative 2 could result in injuries requiring medical assistance during the expected 7 to 30 days of hunting. The increased risk of injuries over current conditions under the No-action Alternative could result in an increased risk of exceeding the capabilities of local health facilities. Whale hunting would be limited to the winter and early spring months, outside the period when most search and rescue cases typically occur but also during a period when weather and sea conditions can contribute to boating accidents. If hunt-related activities resulted in injuries that exceeded the physical or technical capacities of local public health facilities, persons requiring medical attention could be transported to other facilities in the region.

4.14.3.3 Alternative 3

Under Alternative 3, no seasonal restrictions would be imposed on whale hunting activities and hunting would be expected to occur on a total of 40 days throughout the year. Compared to the No-action Alternative, activities associated with whale hunts under Alternative 3 could result in an increased number of incidents requiring law enforcement intervention on those days, possibly diverting law enforcement resources from other missions. If a law enforcement task force were implemented, similar to previous hunts, protests or other activities would probably not overwhelm the combined personnel and facilities of county, state, federal, and tribal authorities.

Similarly, Alternative 3 could result in injuries requiring medical assistance during the expected 40 days of hunting. The increased risk of injuries over current conditions under the No-action Alternative could result in an increased risk of exceeding the capabilities of local health facilities. Whale hunting would occur year round, including during the summer period when most search and rescue cases typically occur. If hunt-related activities resulted in injuries that exceeded the physical or technical capacities of local public health facilities, persons requiring medical attention could be transported to other facilities in the region.

Compared to Alternative 2, more opportunities for hunting would be expected to result in a greater number of hunting expeditions, with an attendant increase in the potential for diverting law enforcement resources from other missions, or for causing injuries that require medical attention. Because hunting would be allowed year-round, a greater proportion of hunt attempts would likely take place during summer, when the risk of boating accidents due to inclement weather would be lower than during other times of year. On the other hand, hunting under

Alternative 3 could occur during the busier summer season, when law enforcement and medical services are more likely to be engaged elsewhere.

4.14.3.4 Alternative 4

Alternative 4 would include the same limits on the number of whales harvested as Alternative 2, and include the same hunting season. The additional restrictions contained in Alternative 4 (no hunting within 200 yards of rocks and islands in the Washington Islands National Wildlife Refuges) would not be expected to affect the hunting season or the number of days of hunting. Therefore, any increase in incidents requiring the services of law enforcement or medical personnel are likely to be the same under Alternative 4 as under Alternative 2, compared to the No-action Alternative.

4.14.3.5 Alternative 5

Under Alternative 5, hunting could occur year round, with a likely total of 20 days of hunting. Hunt activities would likely take place during the busier summer season, when law enforcement and medical services are more likely to be engaged elsewhere. Thus compared to the No-action Alternative, under Alternative 5 there is an increased potential for adverse effects on public services during a period of 20 days throughout the year.

Compared to Alternatives 2 and 4, Alternative 5 would probably result in about the same number of days of hunting (20 versus 7 to 30). Under Alternative 5, however, hunts would be likely to occur during the busier summer season, when law enforcement and medical services are more likely to be engaged elsewhere. On the other hand, hunts during the summer would be less likely to result in injuries from boating accidents.

Compared to Alternative 3, Alternative 5 would result in fewer days of hunting (20 versus 40) and therefore fewer occasions on which hunt-related activities might divert law enforcement resources from other missions or result in injuries that require medical attention. Because hunting under either Alternative could occur year-round, each hunting expedition under the two alternatives would have a similar potential to result in boating accidents or to occur during the busy summer season when law enforcement and medical services are more likely to be engaged elsewhere.

4.14.3.6 Alternative 6

Alternative 6 would include the same provisions as Alternative 3 except that hunting would also be allowed in the Strait of Juan de Fuca portion of the Makah U&A. Alternative 6 would be expected to result in the same number of hunting days year round as Alternative 3. The ability to

hunt in the Strait might result in effects in different locations than would occur under Alternative 3. As noted in Section 4.15.3, Public Safety, Evaluation of Alternatives, hunting whales in the Strait would not be expected to pose any additional risks of injury through boating accidents, compared to hunting in the coastal portion of the U&A. Similarly, hunting in the Strait would not be expected to result in any additional potential for law enforcement intervention, compared to Alternative 6 would probably not differ from the potential under Alternative 3 and would have the same effects compared to the No-action Alternative.

4.15 Public Safety

4.15.1 Introduction

This section addresses the potential for a whale hunt and hunt-related activities in the project area to affect public safety. Persons whose safety may be affected by whale hunt-related activities are divided into three groups: hunters and other participants (such as official observers, members of the media, and law enforcement personnel), protesters, and bystanders. Bystanders on the water may include recreational and other boaters; bystanders on land may include Makah tribal members at protests, tourists, or motorists. Individuals from any of these groups could be injured by weapons, boating accidents, or protests and related activities (such as civil disobedience or law enforcement actions). This section examines how the potential for those types of injuries might vary depending on the time of year and location of any hunt and on the frequency of any hunting.

4.15.2 Evaluation Criteria

Three criteria were used to determine the potential for effects on public safety under the alternatives, based on the ways in which injury may occur as a result of any proposed gray whale hunt. These include injuries from weapons (harpoon, rifle or explosive grenade), from boating accidents (including those associated with protest activities on the water), or from land-based protest activities.

With the exception of injuries related to adverse weather or sea conditions, the risk of injury would likely be equal for each hunt attempt. The risk of injury associated with any given alternative would, therefore, depend on the number of days of hunting and the time of year the hunts occur. Table 4-1 identifies the expected number of days of hunting under each alternative. Alternatives under which more hunts would occur would probably result in greater risk of injury to hunters, protesters, and bystanders. Alternatives that limit hunting to the winter and spring period would probably result in greater risk of injury than alternatives that allowed hunting year

round. The following sections discuss the risk of each type of injury for each of the groups that may be affected.

4.15.2.1 Injury from Weapons

Under current conditions, no whale hunting is authorized and no weapons are used in the project area to kill whales. Some level of hunting currently exists but the number of injuries associated with weapons accidents in hunting is unknown. Under any of the action alternatives, hunters and other participants would be at the greatest risk of injury from weapons because they would be handling weapons; protesters and bystanders would experience a lesser risk. The possibility of any persons being struck by a bullet or shoulder-fired explosive projectile would be minimized by proposed safety requirements that would include, among other things, the Coast Guard navigational restrictions (Section 3.1.1.3, Coast Guard Regulated Navigation Area), hunter training, visibility requirements, and a lookout to determine when the shooter would have a clear line of fire at a whale (Section 2.3.3.2.7, Other Environmental Protection Measures).

The risk of injury to any group of individuals from weapons would most likely depend on the number of whales that could be struck. Table 4-1 identifies the number of whales that may be struck under each Alternative. It would also depend on the season during which hunting occurs. Hunts that takes place during the winter and spring months may have the greater potential to result injury from weapons. This is because the limited hunting season would include periods of rougher weather and sea conditions, which might hamper the accuracy of hunters using harpoons, rifles, or explosive projectiles. Less accurate strikes might result in greater risk of injury to hunt participants, protesters, and bystanders.

Hunters and Other Participants

Hunters using a toggle-point harpoon could be cut by the harpoon tip or struck with the shaft. Hunters using either a harpoon or an explosive projectile as the primary weapon for striking the whale could become tangled in the line. Hunters using an explosive projectile either as the primary or secondary hunting weapon (launched either from a darting gun or shoulder gun) could be injured if the grenade exploded prematurely. There would be a greater risk with black powder grenades, where the fuse would be lit before the grenade was fired (Section 3.15.3.5.2, Weapons Associated with the Hunt). The fuse on penthrite grenades would not be lit until the projectile entered the whale, reducing the risk of hunter injury from premature detonation (Section 3.15.3.5.2, Weapons Associated with the Hunt). Hunters using a rifle as the secondary weapon for

killing a whale could potentially be injured from the rifle recoiling or misfiring; hunters could also be struck directly or by ricochet with a .50 caliber bullet.

Weapons also present the potential for injury to other participants, such as members of the media, hunt observers, and enforcement officials. Such individuals could be exposed to many of the same potential injuries from weapons as hunters, but they would be less likely to be injured by a harpoon, premature detonation of grenades, or rifle recoil. Such injuries are more likely to be associated with handling a weapon.

Protesters

Protesters would face a lower risk than hunters of being injured by weapons misfiring, because protesters would not likely be handling weapons. Records of the 1999 and 2000 protests do not show that protesters possessed weapons. Protesters who attempt to interfere with a hunt by positioning their vessels between whales and hunters could be struck by a harpoon, bullet, or explosive projectile. Protesters might also sustain injuries if their vessels were struck by a projectile.

Bystanders

Recreational boaters and other potential bystanders would probably not encounter hunting activities under the action alternatives because of the large size of the hunting area, its remoteness, the presence of the Coast Guard MEZ. Any recreational boaters who encountered hunting activities would likely avoid them. Because they would probably not be near the hunt, bystanders on the water would most likely not be injured by weapons. It is extremely unlikely that bystanders on land would be exposed to injury from weapons under the action alternatives, because any hunt would probably occur hundreds to thousands of yards from shore and the tribe would adhere to weapon discharge procedures (e.g., visibility and shot distances) expected to constrain the area of potential danger to the immediate vicinity of the whale being pursued (Beattie 2001; Graves et al. 2004; Makah Tribe 2005a).

4.15.2.2 Injury from Boating Accidents

Under current conditions, no whale hunts are authorized and no vessel activity associated with whale hunts occurs. There is a considerable amount of commercial and recreational vessel activity in the area, and likely some boating accidents occur, though the current rate is not known. Under any of the action alternatives, boating accidents might result from protest activities on the water, the actions of a wounded whale, or adverse weather and sea conditions. Any type of boating accident could result in traumatic injury, drowning, or hypothermia. The risk of

individuals being injured in a boating accident associated with protester activities would be reduced by the Coast Guard navigational restrictions (Section 3.1.1.3, Coast Guard Regulated Navigation Area); to the extent protesters obeyed those restrictions.

The risk of injury to any group of individuals from boating accidents would most likely depend on the number of days of hunting. Table 4-1 identifies the number of days of hunting expected to occur under each Alternative. It would also depend on the season during which hunting occurs. Hunts that takes place during the winter and spring months may have the greater potential to result injury from boating accidents. This is because the limited hunting season would include periods of rougher weather and sea conditions, which might increase the potential for boating accidents compared to hunts that occur during milder weather and calmer seas. Accidents caused by the behavior of protestors on the water, the behavior of a wounded whale, or as a result of attempting to tow a whale to shore, are considered as boating accidents.

Hunters and Other Participants

Protesters on small vessels, jet skis, and a small submarine accompanied the 1999 and 2000 hunts (Section 3.15.3.4, Behavior of People Associated with the Hunt). Some protesters attempted to interfere with the hunt by placing their vessels between whales and hunting vessels, charging hunting vessels, or harassing whales to make them move away from hunting vessels (Section 3.15.2.4, Behavior of People Associated with the Hunt). This type of vessel operation could cause boating accidents involving hunters or other participants. No hunters or other participants were injured due to actions of protest vessel operators during the 1999 and 2000 hunts.

An injured whale could also cause a boating accident. Once a whale was harpooned, the wounded whale might ram or otherwise strike boats. A harpooned whale might also swamp the canoe by swimming away or diving (Section 3.4.3.5.3, Whale Response to Being Struck). The risk of injury to hunters and other participants by a wounded whale would be reduced by the use of a secondary hunting weapon (either a .50 caliber rifle as proposed or an explosive projectile launched from a darting gun or shoulder gun). This secondary weapon would most likely kill a wounded whale within minutes of a harpoon strike.

A boating accident could also result if boats became unstable, swamped, capsized, or struck other boats, especially during rough weather or high seas conditions. A boat towing a whale to shore could also become unstable because of the size and weight of the whale. This type of risk would be reduced under alternatives in which the Makah could hunt year-round (Alternatives 3, 5, or 6).

Under that scenario, the Tribe would have a greater opportunity to choose hunting days depending on weather and sea conditions.

Protesters

Persons operating vessels engaged in protests would face an elevated risk of injury from boating accidents. As described under Hunters and Other Participants, above, protest vessel operators may place themselves at an elevated risk of injury. For example, in 2000 one jet ski operator entering the MEZ collided with a Coast Guard vessel and sustained a shoulder injury (Public Safety, Section 3.15.3.4, Behavior of People Associated with the Hunt).

An injured whale could also cause a boating accident, as could adverse weather and sea conditions, as described under Hunters and Other Participants. The risk of injury from a wounded whale would probably be lower for protesters than for hunters, as hunters would likely be closer to injured whales. As noted above, the risk of injury from a wounded whale would decline if a secondary hunting weapon were used. Similarly, the risk of boating accidents due to weather and sea conditions would be less under alternatives allowing the Makah to hunt year-round.

Bystanders

As described above in the discussion regarding bystanders and weapons injuries, bystanders on the water probably would not be close enough to the hunting area to be injured in a boating accident related to protest activities or a wounded whale. The potential for recreational boaters to sustain injury due to adverse weather or sea conditions would be independent of the presence or absence of hunt-related activities under any of the alternatives.

4.15.2.3 Injury from Land-based Protest Activities

Under current conditions, no whale hunts are authorized and no whale-hunting protests occur. There are presently no known incidents of other forms of organized civil disobedience in the area. Under the action alternatives, protesters might stage protests on the road leading to the Makah Reservation, on or near the reservation itself, or on the water around the hunt. Potential risks associated with water-based protests are addressed in Section 4.15.2.2, Injury from Boating Accidents. During the 1999 and 2000 hunts, demonstrators on the Makah Reservation exchanged insults with tribal members, including hunters (Section 3.15.3.4, Behavior of People Associated with the Hunt). The risk of individuals being injured as a result of protest activities on land would be minimized by implementation of an enforcement management plan similar to that applied during previous hunts.

The risk of injury to any group of individuals from protest activities would most likely depend on the number of days of hunting. Table 4-1 identifies the number of days of hunting expected to occur under each alternative.

Hunters and Other Participants

Protest activities on land might expose hunters and other participants (including law enforcement personnel) to increased risk of injury. No hunters or other participants were injured during the 1999 and 2000 hunts because of protests on land.

Protesters

Protesters might face an elevated risk of injury from the actions of law enforcement personnel, protesters, or counter-protesters. In one incident during the 1998 practice whale hunt exercise, a protester was pushed from a dock, but did not sustain injury. There was also an instance of Makah youth throwing rocks at protester vessels, causing no injury, but damaging a vessel windshield (Section 3.15.3.4, Behavior of People Associated with the Hunt). No protesters were seriously injured during the 1999 and 2000 hunts because of protests on land.

Bystanders

For this analysis, Makah tribal members and non-members who are not actively engaged as hunt participants are considered bystanders, along with persons who are not engaged in protests. During the 1999 and 2000 protests, some tribal members not involved in the hunt engaged protesters, and there were some altercations, although no one was seriously injured (Section 3.15.3.4, Behavior of People Associated with the Hunt). Bystanders might approach protest scenes as onlookers, or could be drawn into protests, with an attendant increase in the risk of personal injury.

4.15.3 Evaluation of Alternatives

The following sections consider the potential for the alternatives to affect the safety of hunters and other participants, protesters, and bystanders. For each alternative, the discussion addresses the anticipated change in the number of injuries resulting from weapons, boating accidents, or protest activities.

The lowest risk of adverse effects to public safety would occur under the No-action Alternative because no hunting would occur and there would be no associated protest activities. Alternatives 3 and 6), with the greatest number of whales harvested and greatest number of days of hunting, would result in the greatest risk to public safety from weapons, boating accidents, and protest activities, compared to the No-action Alternative. Alternatives 2 and 4 would allow the same

number of whales harvested as Alternatives 3 and 6, but would probably result in fewer days of hunting (20 days versus 40), and therefore less risk of injury from protest activities. Hunting under Alternatives 2 and 4 would be limited to periods of worse weather and rougher seas than Alternatives 3 and 6 and would therefore pose greater risks of injury from weapons and boating accidents. Conversely, the fewer days of hunting under Alternatives 2 and 4 would result in less risk of injury from boating accidents than under Alternatives 3 and 6. Alternative 5 would likely have the least potential for injury of all the action alternatives. Although Alternative 5 would include approximately the same number of days of hunting as Alternatives 2 and 4 (20 days versus 7 to 30), hunting could occur any time of year, creating greater opportunity for the Tribe to choose hunting days with safer weather and sea conditions.

4.15.3.1 Alternative 1

Currently no whale hunting occurs in the project area, so there are no accidents related to whale hunting. Recreational boaters, commercial and recreational fishers, and commercial vessels currently use the project area (Section 3.13.3.2, Marine Vessel Traffic) and there is likely currently some level of injury associated with boating, although the amount is unknown. Hunting also currently occurs in the project area (Table 3-29) and there is likely currently some level of injury from weapons associated with hunting, although the amount is unknown. Under the No-action Alternative, there would be no increased risk of injury to individuals beyond those levels that occur under current conditions.

4.15.3.2 Alternative 2

Under Alternative 2, whale hunting would be expected to occur on a total of 7 to 30 days, primarily during April and May. Up to seven whales could be struck annually under this alternative. Compared to the No-action Alternative (under which there would be no whale-hunt-related injuries), there would be an increased risk of injury from weapons, boating accidents and protest activities in the project area on each day that hunting occurred. Hunting during April and May would include periods of inclement weather and rough sea conditions, which could contribute to accidents involving weapons or boats.

4.15.3.3 Alternative 3

Under Alternative 3, there would be no seasonal restrictions on whale hunting activities and hunting would be expected to occur year round. Up to seven whales could be struck annually under this alternative. Compared to the No-action Alternative, weapon use, boating accidents and

protest activities could result in increased risk of injury to hunters and other participants, bystanders, and protesters.

Compared to Alternative 2 there would be more days of hunting under Alternative 3 (40 versus 7-30) and therefore greater risk of injury from boating accidents and protest activities. Alternative 3 would allow the same number of whales struck as Alternative 2 and therefore would result in the same risk of injury from weapons (although under Alternative 2 it is possible that the restrictions on hunting seasons and harvest of identified whales could make it more difficult to achieve the full harvest level). Conversely, the ability to hunt during better weather conditions under Alternative 3 might reduce the potential associated with each hunt for injury from weapons and boating accidents due to unfavorable weather and sea conditions.

4.15.3.4 Alternative 4

Alternative 4 would include the same limits on the number of whales harvested as Alternative 2, and include the same hunting season. The additional restrictions contained in Alternative 4 (no hunting within 200 yards of rocks and islands in the Washington Islands National Wildlife Refuges) would not be expected to affect the number of whales struck, the hunting season or the number of days of hunting. Therefore, the likely increase in risk of injury to individuals is likely to be the same under Alternative 4 as under Alternative 2, compared to the No-action Alternative.

4.15.3.5 Alternative 5

Under Alternative 5, hunting would likely occur year round, with a likely total of 20 days of hunting. The number of whales struck would be limited to three. Hunt activities would likely take place year round. Thus compared to the No-action Alternative, under Alternative 5 there is an increased risk of injury from weapons, boating accidents and protest activities associated with hunting over 20 days throughout the year and with striking of three whales.

Compared to Alternatives 2 and 4, Alternative 5 would probably result in about the same number of days of hunting (20 versus 7-30) and therefore the same potential for injuries from boating accidents and protest activities. Under Alternative 5, however, fewer whales could be struck than under Alternatives 2 and 4 (three whales versus seven), so there would be less potential for injury from weapons. Alternative 5 would also allow hunting year round, reducing the potential for injury from weapons and boating accidents that could be associated with the worse weather and sea conditions likely under Alternative 2.

Compared to Alternative 3, Alternative 5 would result in fewer days of hunting (20 versus 40) and therefore a lower potential for injuries from boating accidents and protest activities.

Alternative 5 would also result in less risk of injury than Alternative 3 because fewer whales could be struck under Alternative 5 (three whales versus seven). Both alternatives would allow year round hunting, so risks of injury from weapons and boating accidents would not be different based on weather and sea conditions.

4.15.3.6 Alternative 6

Alternative 6 would include the same provisions as Alternative 3 except that hunting would also be allowed in the Strait of Juan de Fuca portion of the Makah U&A. Alternative 6 would be expected to result in the same number of whales struck and the same number of hunting days year round as Alternative 3. The ability to hunt in the Strait, however, might result in effects in different locations than would occur under Alternative 3, compared to the No-action Alternative. Hunting whales in the Strait would not be expected to pose any additional risks of injury from boating accidents or protest activities, compared to hunting in the coastal portion of the U&A. under Alternative 3. Therefore, risks of injuries from these sources would likely be the same under Alternative 6 as under Alternative 3, compared to the No-action Alternative.

If tribal members chose to hunt in the Strait, with the highway running close to the coastline over a portion of this area, risks to bystanders on land from weapons injuries would increase slightly compared to Alternative 3, and thus compared to the No-action Alternative, because of the potential for a stray bullet or grenade. The increased risk would be slight because of the small number of bullets (28) or grenades (21) expected to be fired, the low traffic volumes on the highway, and the safety measures proposed.

4.16 Human Health

4.16.1 Introduction

This section addresses the potential for the alternatives to affect human health of the Makah Tribe in the project area. Three issues pertain to human health and whale hunt-related activities: (1) the potential nutritional benefits associated with consuming whale food products, (2) the potential for exposure to contaminants in food items from whale harvests, and (3) the potential for exposure to food-borne pathogens in food items from whale harvests. Based on the information available for this analysis, all of the alternatives would have a reasonably foreseeable potential to affect human health both positively and negatively. There are too many uncertainties, however, to quantify either type of effect or to predict whether any of the alternatives would result in a net positive or negative effect on human health. The following sections discuss these points in greater detail.

4.16.2 Evaluation Criteria

Three criteria were used to determine the potential for effects on human health. The first is the change in nutritional benefits the Makah Tribe could experience under any of the alternatives. The second is the amount of environmental contamination tribal members might be exposed to as a result of consuming gray whale products. The last is the extent Makah tribal members would be exposed to food borne pathogens as a result of processing and consuming whale products.

4.16.2.1 Nutritional Benefits

As described in Section 3.16.3.1, Nutritional and Health Benefits from Consuming Whale Food Products and Other Traditional Subsistence Foods, marine mammal tissues were an historically important nutritional component of the Makah diet (Renker 2002). Marine mammal tissues, including large whales, contain vitamins, essential elements, and both essential and beneficial polyunsaturated fatty acids (United States Department of Agriculture 2005). These items are present in other foods (e.g., fish, shellfish, nuts, and vegetable oils), but in some cases are present in higher concentrations in marine mammal food products (e.g., polyunsaturated fats). Documented benefits of consuming essential fatty acids present in whale and fish food products include prevention or alleviation of symptoms associated with diabetes, kidney disease, heart disease, hypertension, and other similar health problems (Budowski 1988; Simopoulos 1999; Simopoulos 2002; Holub and Holub 2004; Ebbesson 2005b, c; Reynolds et al 2006). In addition, whale products provide a good source of antioxidants (vitamin E) and selenium, which play a role in protecting against some contaminants (e.g., mercury) (Arnold and Middaugh 2004). Whale-derived food products are a source of minerals and vitamins that have well-documented nutritional benefits to populations consuming them.

There are no specific studies that compare the types and concentrations of nutrients in food products obtained from the drift whales occasionally consumed by the Makah with those found in the fresh gray whale food products that would be available to them under Alternatives 2 through 6. Whether consuming freshly harvested gray whale food products would affect the level of nutrition available to Makah tribal members would depend largely on the types and levels of nutrition present in an individual tribal member's existing diet relative to several factors: (1) what part(s) of the whale and how much of each would be consumed, (2) what currently consumed food items (and associated nutritional levels) would be replaced by gray whale food products, and (3) how each food item would be collected, stored, and prepared for consumption. None of this information is currently available.

4.16.2.2 Environmental Contaminants

As described in Section 3.16.3.2, Environmental Contaminants in Gray Whales, gray whale tissues contain chemical contaminants that Makah tribal members would be exposed to if they consumed fresh gray whale food products generated from a successful hunt. Similar contaminants are present in the foods that Makah tribal members typically consume, including fish and shellfish from the project area as well as store-purchased food products. There are no data to compare the amount of contaminants currently being consumed by the Makah Tribe from its normal food sources with the amount of contaminants found in fresh whale products, making it difficult to determine the net change in contaminants to which tribal members would be exposed. Furthermore, data do not exist to indicate the amount of fresh whale food products an individual Makah member may consume in lieu of other food sources normally consumed by the same individual. As a result of this lack of data, it is not possible to discern risk levels based upon the existing best available information addressing the rate of consumption and method of cooking fresh whale tissues by Makah tribal members.

There are no specific studies that compare the types and concentrations of contaminants in food products obtained from the drift whales occasionally consumed by the Makah with those found in the fresh gray whale food products that would be available to them under Alternatives 2 through 6. Whether consuming freshly harvested gray whale food products would affect contaminant exposure in Makah tribal members would depend largely on the types and levels of contaminants present in an individual tribal member's existing diet relative to several factors: (1) what part(s) of the whale and how much of each would be consumed, (2) what currently consumed food items (and associated contaminants) would be replaced by gray whale food products, (3) the age and sex of the whale, (4) possibly the time of year and body condition of the whale, and (5) how each food item would be collected, stored, and prepared for consumption. None of this information is currently available.

4.16.2.3 Exposure to Food-Borne Pathogens

As described in Section 3.16.3.3, Exposure to Food-Borne Pathogens, exposure to food-borne pathogens might result from improperly handled food items. While exposure to pathogens associated with the consumption of whale products has been documented, it is not unique to consumption of whale food products. Pathogenic organisms (e.g., bacteria, viruses, and parasites) are common in other subsistence and store-purchased foods such as seafood, poultry products, meat products, dairy products, and vegetables. Any of these products could cause illness if they were improperly butchered, stored, or prepared. Thus under current conditions, there is some

degree of risk to Makah tribal members of contracting food-related illness from exposure to pathogens. Changes in the quantity of freshly harvested whale consumed would probably not appreciably change the potential for food-borne illness to occur in Makah tribal members, assuming they followed the same general food storage and preparation practices for whale products as for other food products.

4.16.3 Evaluation of Alternatives

Three evaluation criteria were used to compare the alternatives relative to human health: (1) potential change in the level of exposure to contaminants, (2) potential change in the level of exposure to food-borne pathogens, and (3) potential change in the nutritional composition of the diet of Makah tribal members associated with consuming freshly harvested gray whale food products. The following sections contain discussions of these criteria for each alternative.

4.16.3.1 Alternative 1

Under the No-action Alternative, no Makah gray whale hunt would be permitted. Thus, Makah tribal members would not have access to or consume freshly harvested whale food products. Under this alternative, no change in the exposure to contaminants or food-borne pathogens or the nutritional composition of the diet from foods consumed by the Makah Tribe would be expected. The continued absence of freshly harvested gray whale food products in the diet of the Makah would continue to preclude them from realizing the added nutritional benefits (e.g., minerals and omega-3 fatty acids) associated with consuming them, but there are no data to suggest that current diets of individual Makah members sufficiently lack these nutritional benefits. For example, the omega-3 fatty acid benefits of whale products (e.g., prevention of heart disease and glucose intolerance) may be adequately realized by tribal members from other food sources. Overall, there is insufficient information to conclude that the lack of fresh whale products under the No-action Alternative would not be expected to alter dietary conditions for any tribal member.

4.16.3.2 Alternatives 2, 3, 4, 5, and 6

Unlike conditions under the No-action Alternative, Alternatives 2, 3, 4, 5, and 6 would allow the Makah Tribe to conduct gray whale hunts in the project area, and it is assumed that consumption of freshly harvested gray whale food products would occur. Based on Section 4.16.1, Introduction, it is impossible to predict the precise changes in exposure to contaminants or food-borne pathogens or the nutritional composition of the Makah diet if they have the opportunity to consume freshly harvested whale food products. In general, no substantial changes in the type of exposure to contaminants or food-borne pathogens by the Makah would be expected under any of

the action alternatives; the level of exposure to these contaminants would, however, be unknown. Consumption of freshly harvested gray whale food products may temporarily increase the overall nutritional value of the Makah diet by raising the proportion of certain minerals and omega-3 fatty acids if diets currently lack this benefit. Omega-3 fatty acids have been shown to positively affect glucose tolerance and insulin sensitivity in Alaska Natives (Ebbesson et al. 2005b; Ebbesson et al. 2005c). This relative nutritional increase would occur only as long as whale products were available for consumption and would be greatest under Alternatives 3 and 6 and lowest under Alternative 5.

4.17 National and International Regulatory Environment

4.17.1 Introduction

This section evaluates the potential for the six alternatives to influence the future decisions of parties other than the Makah to seek or not seek an MMPA waiver to take marine mammals and/or a WCA quota to take whales resulting in increased take of marine mammals. It also evaluates the potential for the alternatives to influence the future positions or actions of other countries in the IWC arena or their actions in managing whale hunting by their nationals. Finally, it evaluates the potential for the alternatives to influence the behavior of other countries towards indigenous people within their borders.

4.17.2 Evaluation Criteria

To examine the potential effects on marine mammals nationally, analyses in this section address the potential for changes in the number of requests for waivers under the MMPA and/or quota allocations under the WCA. Potential effects on whales worldwide are examined through an assessment of the potential for changes in whaling activities. Potential effects on indigenous people worldwide are examined through an assessment of increased or decreased opportunities to pursue ceremonial and subsistence practices. The following sections further discuss these evaluation criteria and the likelihood of changes in the regulatory environment under the six alternatives.

4.17.2.1 Marine Mammals Nationally

NMFS' waiver of the moratorium and issuance of regulations and permits for the Makah to hunt in compliance with the 9th Circuit decision in *Anderson v. Evans* (2004) under Alternatives 2 through 6 has the potential to lead to additional requests for MMPA waivers from non-Indians or Indian tribes, and ultimately to the federally-authorized take of additional marine mammals.

NMFS' actions under Alternatives 2 through 6 could also lead to additional requests for a quota under the WCA by those claiming aboriginal subsistence whaling rights.

4.17.2.1.1 Increased Take of Marine Mammals by Non-Indians

Section 101(a)(3)(A) of the MMPA directs the Secretary to determine whether and by what means it is compatible with the Act to waive the moratorium and allow taking of any marine mammal. In the history of implementation of the MMPA there have been few requests to the Secretary of the Interior or the Secretary of Commerce to waive the MMPA take moratorium. Section 3.17.3.1, *Waivers of the MMPA Take Moratorium*, details examples of past waiver requests. Given that history and the substantive requirements, the time and process involved, NMFS considers it unlikely that a successful request by the Makah Tribe would influence non-Indian parties in the United States to seek additional waivers. For example, Alaska's request for a waiver for 10 species resulted in a 1976 waiver for walrus. There is no evidence that the success of the walrus request resulted in additional requests from other states seeking management authority. For the same reasons, NMFS considers it unlikely that a decision under the No-action Alternative to deny the Makah's request would decrease the number of future requests by non-Indians for waivers of the MMPA take moratorium. If NMFS' authorization of a hunt under Alternatives 2 through 6 did lead to additional waiver requests, the outcome of any process to consider them would depend on a number of facts that are not presently known, making it speculative to conclude that the harvest of marine mammals nationally would increase as a result of implementing Alternatives 2 through 6.

4.17.2.1.2 Increased Take of Marine Mammals by Indian Tribes

NMFS recognizes that some Northwest Indian tribes traditionally harvested and used products from seals, sea otters and other marine mammals. Northwest Indian tribes have in the past expressed an interest in harvesting marine mammals (Schmitten 1994). Additionally some tribes may continue to believe and assert that their treaty rights to take marine mammals are not subject to the MMPA. A successful completion of the authorization process in response to the Makah in this waiver request may influence these other Indian tribes in the Northwest and nationally to seek waivers of the moratorium to take marine mammals. The outcomes of any future processes would depend on facts not presently known, but it is possible that implementation of Alternatives 2 through 6 could lead to increased federally authorized take by other Indian tribes. With respect to the No-action Alternative, it is uncertain whether a decision by NMFS to deny the Makah Tribe's request would result in less harvest of marine mammals by Indian tribes in the future.

4.17.2.1.3 Increasing Aboriginal Subsistence Whaling and Harvest of Whales

Aside from Indian tribes and Alaska Natives, NMFS is not aware of other entities in the United States that could claim aboriginal status to pursue whaling under the WCA. Alaska Natives have received WCA allocations for bowhead whales since 1978. The Makah Tribe formally expressed interest in resuming a gray whale hunt starting in 1995 (Makah tribal Council 1995a). NMFS first published a WCA quota for their use in 1998 (63 FR 16701, April 6, 1998). The 1998-2002 gray whale catch limit in the Schedule was revised to include Makah's aboriginal subsistence whaling (Section 1.2.4.1.3, IWC Aboriginal Subsistence Whaling). Although it has been over 29 years since the Alaska Natives first received a WCA allocation, and over nine years since the Makah received theirs, no other Indian tribe or Alaskan native has requested an allocation or inquired about receiving an allocation for whales under the WCA. This history suggests that beyond the Makah there is little need or interest by other native groups to seek take of gray whales. Accordingly, NMFS considers it unlikely that publishing a WCA gray whale quota for the Makah's use under Alternatives 2 through 6 would influence other Indian tribes to seek WCA quotas, eventually leading to the harvest of other whale species in other aboriginal subsistence whaling operations. In any event, any WCA quota issued would be subject to the IWC catch limit. And before NMFS could publish a WCA quota, it would also be required to present a needs statement to the IWC. The outcome of that process would depend on facts not currently known and the outcome is therefore uncertain.

With respect to No-action Alternative, it is unlikely that a decision by NMFS to deny the Makah Tribe's request would result in fewer requests for WCA allocations from Indian tribes in the future.

4.17.2.2 Worldwide Whaling

In addition its ruling regarding the MMPA, the court in *Anderson v. Evans* (2004) also ruled that NMFS should have prepared an EIS rather than an EA for its past Makah whale hunting proposal, finding that

the agencies' [sic] failure to consider the precedential impact of our government's support for the Makah Tribe's whaling in future IWC deliberations remains a troubling vacuum. We conclude that the possible impact on the heretofore narrow aboriginal subsistence exception supports our conclusion that an EIS is necessary.

Public comments also expressed concern that NMFS' approval of Makah whale hunting could lead to increased whaling by weakening United States leadership in whale conservation or strengthening the position or resolve of whaling proponents.

The United States' negotiating position before the IWC is not subject to NEPA review (although an opportunity for public review is available, as described in Section 1.2.4.1.4, United States' IWC Interagency Consultation). Once the IWC amends its Schedule, NMFS implements that decision domestically by publishing an aboriginal subsistence whaling quota and entering into a cooperative agreement with the Tribe (Section 1.2.4.2, National Whaling Governance under the WCA). Pursuant to the *Anderson v. Evans* decision, to authorize this gray whale hunt NMFS also must decide whether to waive the take moratorium under the MMPA, and issue necessary regulations and permits (Section 1.2.3, Marine Mammal Protection Act). These decisions by NMFS are subject to NEPA review, which is provided through this EIS. NMFS' decision under the WCA and MMPA in response to this request may have the potential to influence the positions or actions of the United States and others regarding whaling worldwide. This analysis addresses the potential for NMFS' authorization of Makah whale hunting pursuant to this request to increase whaling worldwide by weakening the United States' ability to oppose commercial and scientific whaling in the international arena, by emboldening other countries to pursue whaling, or by expanding the interpretation of what constitutes aboriginal subsistence whaling.

Since the early 1970s the United States has consistently supported the moratorium on commercial whaling and insisted on safeguards before any whaling can resume. The United States has also opposed lethal scientific whaling. To support its position the United States has cited management concerns, rather than a philosophy that all whaling of any kind should be banned. Throughout the period of time the United States has opposed commercial and scientific whaling, it has supported aboriginal subsistence whaling, for example by proposing and defending bowhead catch limits on behalf of Alaska Natives. For these reasons, it is unlikely that NMFS' actions to either deny the Makah request (Alternative 1- No-action) or grant the Makah some level of hunting (Alternatives 2 through 6) would change the United States' position on commercial and scientific whaling or its ability to actively pursue its position.

It is also unlikely that NMFS' actions on the Makah request would effectively be used by other countries to obtain bargaining leverage. Though Japan attempted to use the United States' bowhead request in 2002 as influential evidence in its pursuit of small type coastal whaling, there is no evidence that this move led to a fundamental change in United States position that in turn led to a change in whaling. There is also no evidence that whaling proponents such as Japan would use the United States' authorization of a Makah hunt as a bargaining tool. It is more likely that the outcome of Japan's requests for small-type coastal whaling, or the pro-whaling nations' efforts to remove the moratorium on commercial whaling, depends on the balance of power in the

IWC rather than on bargaining maneuvers like those that took place in 2002 over the bowhead catch limit. The fact that Japan and the other pro-whaling countries supported the ENP gray whale catch limit even as they were opposing the bowhead catch limit in 2002 undercuts the argument that pro-whaling countries would use the Makah hunt to obtain bargaining leverage (3.17.3.2.3 Aboriginal Subsistence Whaling). In 2007, bowhead and gray whale aboriginal subsistence catch limits were revised by consensus at the annual meeting of the IWC (Section 1.4.1.2.1, Relevant Overview of Requests for Bowhead Whales on Behalf of Alaska Eskimos, and Section 1.4.1.2.2, Overview of Requests for ENP Gray Whales on Behalf of the Makah).

There is a potential that NMFS' authorization of a Makah whale hunt under Alternatives 2 through 6 would embolden pro-whaling nations to authorize whaling by their nationals that they might not otherwise have authorized. Pro-whaling nations have argued that all whale-killing should be treated equally, limited only by principles of sound science and management. These nations could argue that the resumption of whale-killing by the Makah justifies an increase in other types of whaling. Moreover, the ability of aboriginal subsistence whalers to sell handicrafts made from inedible parts (which is included in Alternatives 2 through 6) has been used by pro-whaling nations to characterize aboriginal hunts as 'commercial' and to argue that there is no difference between this type of commerce and commerce in meat or blubber. However, this argument has been made even in the absence of a Makah hunt. NMFS considers it unlikely, however, that an authorization of a gray whale harvest by the Makah Tribe under Alternatives 2 through 6 would make an important difference in the probability of pro-whaling nations increasing their commercial or scientific whaling operations. The United States' ongoing support of the Alaska Native aboriginal subsistence hunt, and its support of other such hunts within the IWC, have placed it firmly in the company of nations supporting aboriginal subsistence whaling, even while having a history of opposing a resumption of commercial whaling and high levels of scientific whaling such as that carried out by Japan.

There is also a potential that NMFS' potential authorization of a Makah whale hunt under Alternatives 2 through 6 would be viewed as an expansion of the definition of aboriginal subsistence whaling, leading to increased requests at the IWC for aboriginal subsistence whaling and ultimately an increase in whaling within that category. One distinction between Makah whale hunting and other aboriginal subsistence hunts approved by the IWC is the Tribe's 70- to 80-year hiatus in whaling. There is the possibility that pro-whaling nations would use a perceived expansion of the definition to bolster their requests for whaling operations that have characteristics similar to aboriginal subsistence whaling, but differ in some way. Japan's argument that small-type coastal

whaling is similar to aboriginal subsistence whaling is an example of how an IWC party might use Makah whaling to support its desired whaling operations. However, this argument has been made even in the absence of a Makah hunt. While there is evidence that pro-whaling parties within the IWC will use the authorization of any whaling activities, including a Makah hunt for gray whales, to support their efforts to receive approval for their proposed whaling operations, there is no evidence that such a tactic would lead to the commercial moratorium being lifted, or to an increase in whaling worldwide. Language adopted by the IWC when the joint United States-Russian Federation request was first approved referred to “aborigines whose traditional aboriginal subsistence and cultural needs have been recognized,” suggesting the possibility that each IWC party was free to recognize the subsistence and cultural needs of its aborigines (IWC 1998).

NMFS examined the history of whaling within the IWC to aid its analysis of the potential for United States approval of the Makah request to lead to future increases in whaling. Figures 4-1 through 4-3 depict whale harvests since 1985, in total and by species, in commercial, scientific, and aboriginal subsistence whale hunts. Generally, the figures show a steep decline in commercial harvest following Japan’s withdrawal of its objection to commercial harvest (after the 1987/1988 season), a steady increase in scientific whaling following Japan’s withdrawal of its objection, and a drop in aboriginal subsistence harvest of minke and gray whales through the early 1990s, followed by an increase. NMFS calculated the trend for each type of whaling for the period before and after the first request that the United States made on behalf of the Makah at the IWC meeting in 1996 (1985-1996, and 1997-2005, respectively) to test whether there is a correlation between United States’ actions on behalf of the Makah and whaling worldwide. As shown in Figures 4-1 through 4-3, for each type of whaling there is a significant difference in the trend before and after 1996.

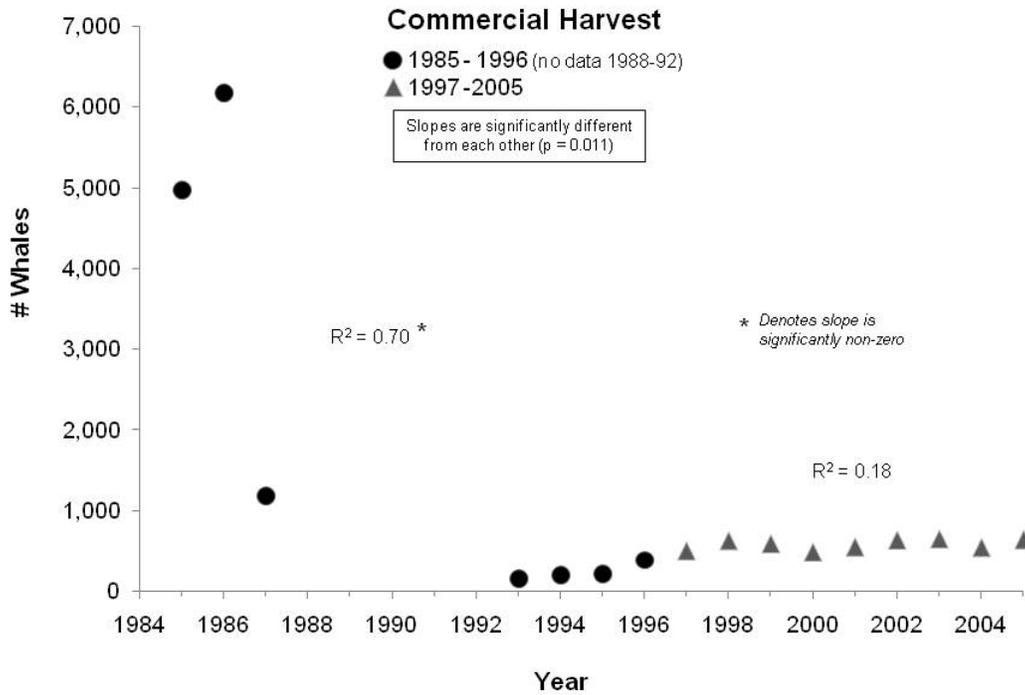


Figure 4-1. Trend Analysis for Commercial Harvest before and after 1996

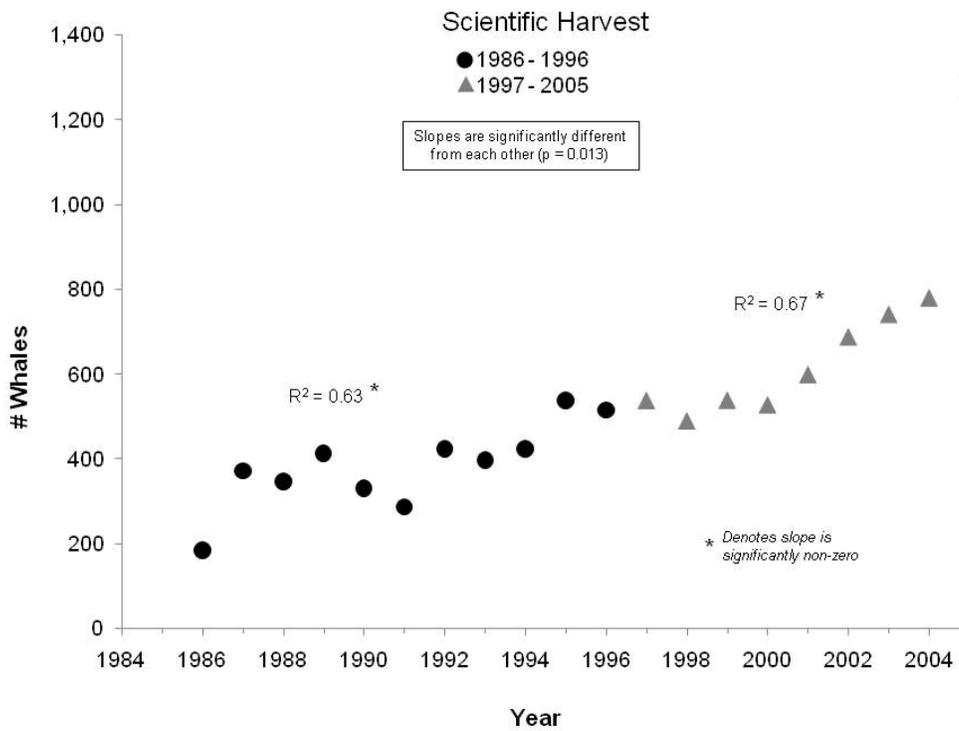


Figure 4-2. Trend Analysis for Scientific Whaling before and after 1996

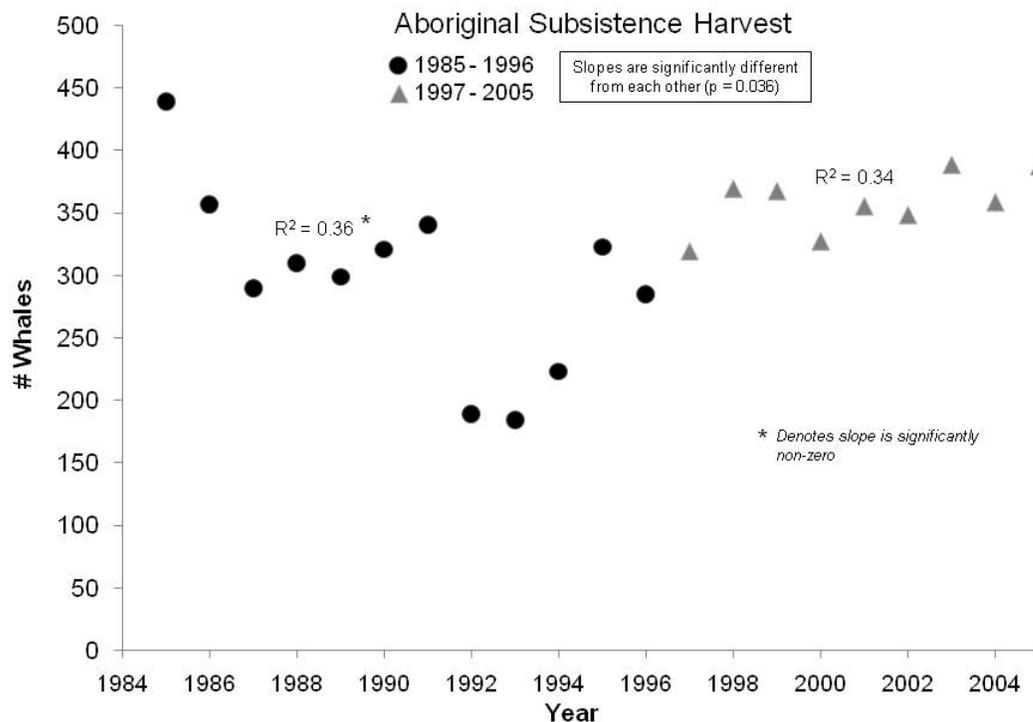


Figure 4-3. Trend Analysis for Aboriginal Subsistence Whaling before and after 1996

While a simple representation of these trends suggests there may be a correlation between the Makah request and increased whaling activity for every type of whaling, other information suggests this is not the best interpretation of the data. For each type of whaling, there was an increasing trend that began well before 1996. For scientific whaling, that increasing trend began in 1985; for commercial whaling it began in 1993; and for aboriginal subsistence whaling it began in 1992. As Tables 3-47 through 3-49 illustrate, the increases in commercial and scientific whaling reflect increased harvest of minke whales, while the increase in aboriginal subsistence whaling reflects increased harvest of minke and gray whales. The increased harvest of minke whales in Norway’s whaling, which began before 1996, likely reflects the view by Norway that harvest should be allowed of abundant stocks that can sustain harvest. The increased harvest of minke whales in Japan’s scientific whaling, which also began before 1996, reflects a change in its research program. This increase has occurred even in the absence of NMFS’ authorization of a Makah hunt.

NMFS’ decision to authorize or deny the Makah request may have a minor effect on some of the dynamics of the international debate regarding whaling. It is too speculative to conclude, however,

that those effects would lead to an increase in whaling worldwide, given the constantly shifting dynamics within the IWC, the legislative nature of IWC decision-making, and the numerous factors any country must consider when it authorizes hunting.

4.17.2.3 Indigenous People Worldwide

NMFS' denial of the Makah request under Alternative 1 (No-action Alternative) may have the potential to diminish the ability of indigenous people worldwide to pursue ceremonial and subsistence practices, by setting an example that would encourage other countries to prohibit or interfere with such practices. Conversely, if NMFS authorizes the Makah to hunt gray whales under Alternatives 2 through 6 it may encourage other governments to allow indigenous people worldwide to pursue ceremonial and subsistence practices, thereby increasing the ability of indigenous people to engage in such practices.

The United States considers its role regarding such rights to be one of leading by example, guaranteeing civil freedoms to all its citizens through legally prescribed processes. If NMFS provides a full consideration of the Makah request, with due process, and makes a decision that complies with the *Anderson v. Evans* court decision and other relevant law, that would be consistent with the United States' position in the international arena that indigenous people should be governed by domestic laws, and that those laws should include processes for protecting civil freedoms. Moreover, it is not clear that other countries would necessarily consider or look to the ultimate outcome of the United States' process in deciding whether to prohibit related or unrelated indigenous practices.

4.17.3 Evaluation of Alternatives

The following sections consider the potential for the alternatives, to influence the future positions or actions of other countries in the IWC arena or their actions in managing whale hunting by their nationals and to influence the behavior of other countries towards indigenous people within their borders.

Under Alternatives 2 through 6, NMFS would authorize the Makah whale hunting by waiving the take moratorium, promulgating regulations, and issuing permits under the MMPA, and publishing aboriginal subsistence whaling quotas for the Makah Tribe's use and entering into a cooperative agreement under the WCA. Under the No-action Alternative, NMFS would not authorize any whale hunt under either the MMPA or the WCA.

4.17.3.1 Alternative 1

Under the No-action Alternative, NMFS would not authorize a gray whale hunt by the Makah Tribe. It is unlikely this action would change the United States' negotiating position in the IWC regarding commercial, scientific or aboriginal subsistence whaling, or the ability of the United States to influence debates in the IWC. It is also unlikely this action would change the ability of indigenous people worldwide to pursue ceremonial and subsistence practices, so long as NMFS' process and decision are consistent with the *Anderson v. Evans* court decision and other applicable law and demonstrate the integrity of the process. The relationships between indigenous people and their governments are affected by numerous factual considerations. It is unlikely that NMFS' denial of the Makah Tribe's request to harvest up to five whales annually would influence the complicated decisions made by other governments regarding ceremonial and subsistence practices of indigenous people.

4.17.3.2 Alternatives 2 through 6

It is uncertain whether NMFS' action to authorize a gray whale hunt would increase whaling worldwide by emboldening pro-whaling countries. While such an outcome is possible, it is speculative given the variety of issues and dynamics that drive the decisions of the IWC or of countries party to the IWC.

Similar to the No-action Alternative, it is unlikely this action would change the ability of indigenous people worldwide to pursue ceremonial and subsistence practices, so long as NMFS' process and decision are consistent with the *Anderson v. Evans* court decision and other applicable law and demonstrate the integrity of the process. The relationships between indigenous people and their governments are affected by numerous factual considerations. It is unlikely that NMFS' authorization of a Makah gray whale hunt would influence the complicated decisions made by other governments regarding ceremonial and subsistence practices of indigenous people.