
Table of Contents

GLOSSARY.....	xxviii
1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION.....	1-1
1.1 Introduction	1-1
1.2 Summary of the Proposed Action.....	1-3
1.3 Purpose and Need for the Proposed Action.....	1-3
1.4 Background to Purpose and Need	1-4
1.5 ESA 4(d) Rule and Limit 6.....	1-9
1.6 Fisheries Affecting Puget Sound Chinook Salmon.....	1-12
1.7 Regulatory Jurisdictions Affecting Washington Fisheries.....	1-25
1.8 Environmental Review Process.....	1-26
1.8.1 Public Scoping.....	1-26
1.8.2 Issues and Concerns Raised During Scoping	1-27
1.9 Decisions to be Made.....	1-27
1.10 Relationship to Other Plans	1-28
1.10.1 Pacific Salmon Treaty Annexes	1-28
1.10.2 Pacific Coast Framework Management Plan	1-28
1.10.3 Puget Sound Salmon Management Plan	1-29
1.10.4 Puget Sound Recovery Planning	1-29
1.10.5 Wild Salmonid Policy.....	1-29
1.10.6 Gravel to Gravel	1-30
1.11 Roles and Responsibilities of the Federal Government, State and Tribes in Fisheries Management...	1-30
1.11.1 Federal Agencies	1-30
1.11.2 Tribes	1-31
1.11.3 State Agencies	1-31
1.12 Overview of the NEPA Environmental Impact Statement.....	1-32
2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION	2-1
2.1 Introduction	2-1
2.2 Alternatives Considered but Eliminated from Detailed Study.....	2-2
2.2.1 Tribal-Only Fisheries	2-2
2.2.2 No Hatchery Augmentation	2-3
2.2.3 Exploitation Rate Management	2-3

2.3	Alternatives Considered in Detail	2-3
2.3.1	Alternative 1 – Proposed Action/Status Quo	2-6
2.3.2	Alternative 2 – Escapement Goal Management.....	2-13
2.3.3	Alternative 3 – Escapement Goal Management at the Population Level with Terminal Fisheries Only	2-15
2.3.4	Alternative 4 – No Action/No Authorized Take	2-19
3.0	AFFECTED ENVIRONMENT	3-1
3.1	Introduction	3-1
3.2	Environmental Setting	3-2
3.2.1	Physical Description of the Action Area.....	3-5
3.2.2	Resident Population within the Action Area.....	3-8
3.2.3	Evolutionarily Significant Units within the Action Area.....	3-9
3.3	Fish	3-14
3.3.1	Threatened and Endangered Species.....	3-14
3.3.1.1	Puget Sound Chinook	3-15
3.3.1.2	Hood Canal and Strait of Juan de Fuca Chum Salmon (<i>Oncorhynchus keta</i>)	3-59
3.3.1.3	Listed Columbia River Chinook Salmon	3-65
3.3.1.4	Bull Trout (<i>Salvelinus confluentus</i>)	3-65
3.3.1.5	Listed Columbia River Chum Salmon.....	3-66
3.3.2	Unlisted Salmonids.....	3-66
3.3.2.1	Puget Sound and Olympic Peninsula Coho Salmon (<i>O. kisutch</i>)	3-66
3.3.2.2	Puget Sound Sockeye Salmon (<i>O. nerka</i>).....	3-71
3.3.2.3	Washington Coastal Chinook and Unlisted Columbia River Chinook.....	3-73
3.3.2.4	Puget Sound Chum Salmon (Unlisted).....	3-73
3.3.2.5	Puget Sound Steelhead (<i>O. mykiss</i>)	3-74
3.3.2.6	Puget Sound Pink Salmon (<i>O. gorbuscha</i>).....	3-76
3.3.3	Non-Salmonid Fishes (Groundfish)	3-77
3.3.4	Forage Species (Pacific Herring, Sandlance, Smelt)	3-79
3.3.5	Fish Habitat Affected by Salmon Fishing.....	3-79
3.3.6	Marine-Derived Nutrients from Salmon Spawners	3-81
3.3.7	Selectivity on Biological Characteristics of Salmon	3-86
3.3.8	Hatchery-Related Fishery Effects on Salmon.....	3-96
3.3.8.1	Effects of Hatchery-Origin Chinook on Natural-Spawning Chinook Salmon	3-96
3.3.8.2	Overfishing	3-102

3.4	Tribal Treaty Rights and Trust Responsibilities.....	3-103
3.4.1	Introduction.....	3-103
3.4.2	Federal Tribal Relations	3-103
3.4.3	The Trust Responsibility.....	3-104
3.4.4	Indian Treaty Rights in Puget Sound.....	3-104
3.4.5	Tribal Regulation and Usual and Accustomed Grounds and Stations.....	3-106
3.4.6	Limitations on the Exercise of Indian Treaty Rights	3-107
3.5	Treaty Indian Ceremonial and Subsistence Salmon Uses	3-109
3.5.1	Historic Fisheries.....	3-111
3.5.1.1	The Ethnographic Record	3-111
3.5.1.2	Tribal Areas, Reservation Locations, and the Importance of Salmon.....	3-113
3.5.1.3	Post Treaty Period Fishing	3-114
3.5.2	Contemporary Fisheries	3-116
3.5.2.1	Salmon Species, Availability, and Cultural Preferences	3-116
3.5.2.2	Fishing Areas	3-116
3.5.2.3	Gear	3-117
3.5.3	Salmon Uses and the Cultural Significance of Salmon	3-117
3.5.3.1	Use, Distribution and Sharing.....	3-117
3.5.3.2	Tribes and Relationship to Salmon: Responsibility and Stewardship.....	3-121
3.5.3.3	The Transmission of Fishing Culture.....	3-122
3.5.3.4	Other Activities That Underscore The Significance of Salmon in Contemporary Indian Culture	3-123
3.5.3.5	Summary	3-124
3.6	Economic Activity and Value.....	3-125
3.6.1	Commercial Salmon Harvesting and Processing	3-125
3.6.1.1	Salmon Harvesting	3-125
3.6.1.2	Processing of Commercial Salmon Catch	3-134
3.6.2	Sport Fishing Activity, Catch, and Value	3-135
3.6.3	Regional Economic Activity	3-141
3.6.3.1	Strait of Juan de Fuca/North Hood Canal Region	3-142
3.6.3.2	North Puget Sound	3-143
3.6.3.3	South Puget Sound/South Hood Canal	3-143
3.6.3.4	Three-Region Summary	3-151
3.7	Environmental Justice	3-153

3.7.1	Background	3-153
3.7.2	Methodology.....	3-153
3.7.2.1	Establish the Target Area.....	3-154
3.7.2.2	Identify the Population Areal Unit	3-154
3.7.2.3	Identify the Target Population.....	3-154
3.7.2.4	Identify the Reference Area.....	3-154
3.7.2.5	Define Disproportionate Effect.....	3-154
3.7.2.6	Identify Environmental Justice Area(s) of Concern	3-155
3.7.3	Public Outreach to Identify Significant Minority and/or Low-Income Groups.....	3-155
3.7.4	Low Income Populations	3-155
3.7.5	Racial Minorities	3-156
3.7.6	Indian Tribes.....	3-158
3.8	Wildlife.....	3-160
3.8.1	Marine Habitats	3-160
3.8.2	Marine Birds	3-166
3.8.2.1	Rhinoceros Auklet	3-166
3.8.2.2	Common Murre	3-167
3.8.2.3	Pigeon Guillemot.....	3-169
3.8.2.4	Gulls and Terns	3-170
3.8.2.5	Grebes, Loons, and Cormorants	3-171
3.8.2.6	Sea Ducks.....	3-172
3.8.3	Marine Mammals.....	3-173
3.8.3.1	Harbor Seal	3-174
3.8.3.2	California Sea Lion	3-175
3.8.3.3	Gray Whale	3-176
3.8.3.4	Killer Whale	3-177
3.8.3.5	Harbor Porpoise and Dall's Porpoise	3-177
3.8.3.6	Sea Otter.....	3-179
3.8.4	Benthic Invertebrates	3-179
3.8.5	Threatened and Endangered Species.....	3-180
3.8.5.1	Marbled Murrelet	3-180
3.8.5.2	California Brown Pelican	3-181
3.8.5.3	Bald Eagle.....	3-182
3.8.5.4	Steller Sea Lion	3-183

3.8.5.5	Humpback Whale/Fin Whale	3-184
3.8.5.6	Pacific Leatherback Turtle	3-184
3.9	Ownership and Land Use – Parks and Recreation	3-185
3.10	Water Quality	3-187
3.10.1	Turbidity and Sedimentation.....	3-188
3.10.2	Non-Point Source Pollution	3-188
4.0	ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES.....	4-1
4.1	Introduction	4-1
4.2	Basis for Comparison of Alternatives and Approach to Alternatives Analysis	4-3
4.2.1	No Action Alternative.....	4-3
4.2.2	Technical Approach to Impact Assessment	4-4
4.2.3	Scenarios for Alternatives	4-5
4.2.3.1	Abundance	4-5
4.2.3.2	Canadian and Alaskan Fisheries.....	4-6
4.3	Fish	4-9
4.3.1	Threatened and Endangered Fish Species	4-9
4.3.1.1	Alternative 1 – Proposed Action/Status Quo	4-16
4.3.1.2	Alternative 2 – Escapement Goal Management at the Management Unit Level	4-21
4.3.1.3	Alternative 3 – Escapement Goal Management at the Population Level.....	4-24
4.3.1.4	Alternative 4 – No Action/No Authorized Take	4-27
4.3.1.5	Summary Discussion of Alternatives	4-30
4.3.2	Unlisted Salmonid Species.....	4-53
4.3.2.1	Alternative 1 – Proposed Action/Status Quo	4-54
4.3.2.2	Alternative 2 – Escapement Goal Management at the Management Unit Level	4-56
4.3.2.3	Alternative 3 – Escapement Goal Management at the Population Level With Terminal Fisheries Only	4-59
4.3.2.4	Alternative 4 – No Action/No Authorized Take	4-63
4.3.3	Non-Salmonid Fish Species	4-66
4.3.4	Fish Habitat	4-67
4.3.5	Marine-Derived Nutrients from Spawning Salmon	4-69
4.3.5.1	Alternative 1 – Proposed Action/Status Quo	4-70
4.3.5.2	Alternative 2 – Escapement Goal Management at the Management Unit Level	4-72
4.3.5.3	Alternative 3 – Escapement Goal Management at the Population Level with Terminal Fisheries Only	4-73

4.3.5.4	Alternative 4 – No Action/No Authorized Take	4-74
4.3.6	Selectivity on Biological Characteristics of Salmon	4-76
4.3.6.1	Alternative 1 – Proposed Action/Status Quo	4-77
4.3.6.2	Alternative 2 – Escapement Goal Management at the Management Unit Level	4-81
4.3.6.3	Alternative 3 – Escapement Goal Management at the Population Level with Terminal Fisheries Only	4-82
4.3.6.4	Alternative 4 – No Action/No Authorized Take	4-82
4.3.7	Hatchery-Related Fishery Effects On Salmon: Straying and Overfishing.....	4-83
4.3.7.1	Straying of Hatchery Chinook.....	4-84
4.3.7.2	Straying of Coho and Chum Salmon.....	4-98
4.3.8	Indirect and Cumulative Effects.....	4-100
4.3.8.1	Indirect Effects.....	4-100
4.3.8.2	Cumulative Effects of the Proposed Action or Alternatives on Fish Species	4-103
4.4	Tribal Treaty Rights and Trust Responsibility.....	4-114
4.4.1	Alternative 1 – Proposed Action/Status Quo	4-114
4.4.2	Alternative 2 – Escapement Goal Management at the Management Unit Level	4-115
4.4.3	Alternative 3 – Escapement Goal Management at the Population Level with Terminal Fisheries Only	4-116
4.4.4	Alternative 4 – No Action/No Authorized Take	4-117
4.4.5	Indirect and Cumulative Effects.....	4-118
4.5	Treaty Indian Ceremonial and Subsistence Salmon Uses	4-119
4.5.1	Alternative 1 – Proposed Action/Status Quo	4-121
4.5.2	Alternative 2 – Escapement Goal Management at the Management Unit Level	4-122
4.5.3	Alternative 3 – Escapement Goal Management at the Population Level with Terminal Fisheries Only.	4-123
4.5.4	Alternative 4 – No Action/No Authorized Take	4-124
4.5.5	Indirect and Cumulative Impacts	4-125
4.5.5.1	Indirect Effects.....	4-125
4.5.5.2	Cumulative Impacts	4-127
4.6	Economic Activity and Value.....	4-129
4.6.1	Alternative 1 – Proposed Action/Status Quo	4-130
4.6.1.1	Summary of Scenario Differences.....	4-130
4.6.2	Alternative 2 – Escapement Goal Management at the Management Unit Level	4-130
4.6.2.1	Summary of Scenario Differences.....	4-130

4.6.2.2	Comparison of the Management Unit-Based Escapement Alternative (Alternative 2) to the Proposed Action.....	4-131
4.6.3	Alternative 3 – Escapement Goal Management at the Population Level with Terminal Fisheries Only	4-132
4.6.3.1	Summary of Scenario Differences.....	4-132
4.6.3.2	Comparison of the Population Unit-Based Escapement Alternative (Alternative 3) to the Proposed Action	4-133
4.6.4	Alternative 4 – No Action/No Authorized Take	4-134
4.6.4.1	Summary of Scenario Differences.....	4-134
4.6.4.2	Comparison of the No Action/No Authorized Take Alternative (Alternative 4) to the Proposed Action	4-134
4.6.5	Summary	4-136
4.6.6	Cumulative Effects	4-158
4.7	Environmental Justice	4-162
4.7.1.	Alternative 1 – Proposed Action/Status Quo	4-168
4.7.2	Alternative 2 – Escapement Goal Management at the Management Unit Level	4-170
4.7.3	Alternative 3 – Escapement Goal Management at the Population Level.....	4-173
4.7.4	Alternative 4 – No Action/No Authorized Take, Scenario B.....	4-174
4.7.5	Comparison of the Effects of Management Alternatives on the Tribes.....	4-176
4.7.6	Indirect and Cumulative Effects.....	4-178
4.7.6.1.	Indirect Effects.....	4-178
4.7.6.2	Cumulative Effects	4-178
4.8	Wildlife.....	4-182
4.8.1	Marine Birds	4-182
4.8.1.1	Alternative 1 – Proposed Action/Status Quo	4-186
4.8.1.2	Alternative 2 – Escapement Goal Management at the Management Unit Level	4-186
4.8.1.3	Alternative 3 – Escapement Goal Management at the Population Level with Terminal Fisheries Only	4-187
4.8.1.4	Alternative 4 – No Action/No Authorized Take	4-187
4.8.2	Marine Mammals.....	4-187
4.8.2.1	Alternative 1 – Proposed Action/Status Quo	4-189
4.8.2.2	Alternative 2 – Escapement Goal Management at the Management Unit Level	4-189
4.8.2.3	Alternative 3 – Escapement Goal Management at the Population Level with Terminal Fisheries Only	4-190
4.8.2.4	Alternative 4 – No Action/No Authorized Take	4-190
4.8.3	Marine Invertebrates	4-190

4.8.3.1	Alternative 1 – Proposed Action/Status Quo	4-191
4.8.3.2	Alternative 2 – Escapement Goal Management at the Management Unit Level	4-191
4.8.3.3	Alternative 3 – Escapement Goal Management at the Population Level with Terminal Fisheries Only	4-191
4.8.3.4	Alternative 4 – No Action/No Authorized Take	4-191
4.8.4	Threatened and Endangered Wildlife Species	4-192
4.8.4.1	Alternative 1 – Proposed Action/Status Quo	4-193
4.8.4.2	Alternative 2 – Escapement Goal Management at the Management Unit Level	4-193
4.8.4.3	Alternative 3 – Escapement Goal Management at the Population Level with Terminal Fisheries Only	4-194
4.8.4.4	Alternative 4 – No Action/No Authorized Take	4-194
4.8.5	Wildlife Indirect Effects	4-194
4.8.6	Cumulative Effects on Wildlife	4-196
4.9	Ownership and Land Use – Parks and Recreation	4-206
4.10	Water Quality	4-207
4.10.1	Sedimentation and Turbidity	4-207
4.10.2	Non-Point Source Pollution	4-207
5.0	IDENTIFICATION OF THE ENVIRONMENTALLY PREFERABLE AND AGENCY PREFERRED ALTERNATIVES	5-1
5.1	Impacts Summary	5-1
5.2	Identification of the Environmentally Preferable and Agency Preferred Alternatives.....	5-9
5.2.1	The Environmentally Preferable Alternative	5-9
5.2.2	The Agency Preferred Alternative	5-10
6.0	LIST OF PREPARERS AND CONTRIBUTORS	6-1
6.1	NEPA Evaluation Team	6-1
6.2	Contributors.....	6-4
7.0	LIST OF AGENCIES AND ORGANIZATIONS CONSULTED	7-1
8.0	REFERENCES	8-1
1.0	Purpose and Need for the Proposed Action	8-1
2.0	Alternatives Including the Proposed Action	8-2
3.0	Affected Environment	8-3
3.2	Environmental Setting	8-3
3.3	Fish	8-4
3.3.5	Marine-Derived Nutrients	8-10

3.3.6	Selectivity on Biological Characteristics of Salmon	8-14
3.3.7	Hatchery-Related Fishery Effects on Salmon.....	8-16
3.4	Tribal Treaty Rights and Trust Responsibilities	8-19
3.5	Treaty Indian Ceremonial and Subsistence Salmon Uses	8-20
3.6	Economic Activity and Value	8-22
3.7	Environmental Justice	8-23
3.8	Wildlife.....	8-24
3.9	Ownership and Land Use.....	8-34
3.10	Water Quality.....	8-35
4.0	Environmental Consequences	8-35
4.2	Basis for Comparison of Alternatives and Approach to Alternatives Analysis	8-35
4.3	Fish	8-36
4.3.5	Marine-Derived Nutrients from Spawning Salmon	8-37
4.3.6	Selectivity on Biological Characteristics of Salmon	8-37
4.3.8	Indirect and Cumulative Effects	8-37
4.4	Tribal Treaty Rights and Trust Responsibility.....	8-38
4.6	Economic Activity and Value	8-38
4.7	Environmental Justice	8-38
4.8	Wildlife.....	8-39
5.0	Identification of the Environmentally Preferable and Agency Preferred Alternative.....	8-42
Technical Appendix C Technical Methods, Derivation of Harvest Management Standards and Fishery Impacts.....		8-42
Technical Appendix D Technical Methods, Economics.....		8-44

APPENDICES

A	Puget Sound Chinook Harvest Resource Management Plan.....	A-1
B	Puget Sound Chinook Population Information	B-1
C	Technical Methods – Derivation of Chinook Management Objectives and Fishery Impact Modeling Methods.....	C-1
D	Technical Methods – Economics.....	D-1
E	Technical Methods – Environmental Justice	E-1
F	Applicable Laws, Treaties, Licenses and Permits	F-1
G	Plant and Animal Database Searches.....	G-1
H	Consultation and Coordination	H-1

List of Tables

Table 1.5-1.	The fourteen salmon and steelhead Evolutionarily Significant Units included in the ESA 4(d) rule and their listing information.....	1-11
Table 1.6-1.	Fraser River sockeye, pink and incidental chinook catch in Puget Sound, 1995–2001.....	1-22
Table 1.6-2.	Commercial net fishery harvest of pink salmon from the Nooksack, Skagit, and Snohomish river systems, 1991–2001.....	1-22
Table 1.6-3.	Landed coho salmon harvest: Puget Sound net fisheries. Regional totals include the freshwater catch.....	1-23
Table 2.3-1.	Comparison of alternatives considered for detailed analysis.....	2-5
Table 2.3-2.	Puget Sound chinook resource management plan harvest conservation objectives: Recovery exploitation rates, escapement goals, critical abundance thresholds, and minimum fishing rates under Alternative 1.....	2-8
Table 2.3-3.	Escapement goal objectives used to analyze Alternative 2 based on objectives provided by the co-managers.....	2-14
Table 2.3-4.	Escapement goal objectives used to analyze Alternative 3 based on objectives provided by the co-managers.....	2-18
Table 3.2-1.	Major river systems within the four regions of the Puget Sound Action Area.....	3-5
Table 3.2-2.	April 1, 2000 resident population of Puget Sound Action Area counties.....	3-8
Table 3.3-1.	Summary of key characteristics of Pacific salmon species.....	3-15
Table 3.3-2.	Critical escapement thresholds, viable escapement thresholds, and rebuilding exploitation rates determined by NMFS for Puget Sound chinook populations.....	3-19
Table 3.3-3.	Summary of status of Hood Canal and Strait of Juan de Fuca native summer chum salmon populations.....	3-63
Table 3.3-4.	Summary of environmental and harvest-related factors impacting Hood Canal and Strait of Juan de Fuca summer chum populations.....	3-63
Table 3.3-5.	Summary of assessments of population status of Puget Sound coho salmon.....	3-68
Table 3.3-6.	Summary of run size and escapement trends for Puget Sound wild coho population groups, 1981 through 2000.....	3-69
Table 3.3-7-1.	Average age composition of the Puget Sound chinook salmon catch by gear type.....	3-92
Table 3.6-1.	County, regional, and state industrial output by major industrial sector in 2000 (in millions of 2000 dollars).....	3-145
Table 3.6-2.	County, regional, and state industrial output by specific industrial sectors in 2000 (in millions of 2000 dollars).....	3-146
Table 3.6-3.	County, regional, and state employment by major industrial sector in 2000.....	3-147
Table 3.6-4.	County, regional, and state employment by specific industrial sectors in 2000.....	3-148
Table 3.6-5.	County, regional, and state personal income by major industrial sector in 2000 (in millions of 2000 dollars).....	3-149

Table 3.6-6.	County, regional, and state personal income by specific industrial sectors in 2000 (in millions of 2000 dollars)	3-150
Table 3.7-1.	Percentage of persons below the poverty level, by county, within the target area.....	3-156
Table 3.7-2.	Percentage of minority persons by county, by race, within the target area.....	3-157
Table 3.7-3.	Tribes considered in the environmental justice analysis.....	3-159
Table 3.8-1.	Presence and association of marine birds and mammals within the marine habitats of Puget Sound.....	3-162
Table 3.8-2.	Seasonal abundance of birds and marine mammals in Puget Sound.....	3-165
Table 3.9-1.	Freshwater and saltwater boat launches in the 12 counties within the Puget Sound action area.....	3-185
Table 4.2-1	Scenarios associated with estimated harvest levels within the Puget Sound Action Area.....	4-8
Table 4.3-1.	Rebuilding Exploitation Rates, and critical and viable escapement standards for listed Puget Sound chinook and Hood Canal summer chum, against which impacts of Alternatives were assessed.....	4-13
Table 4.3-2.	Predicted southern U.S. catch of Puget Sound chinook salmon populations under Alternatives 1-4 and Scenarios A-D.....	4-32
Table 4.3-3.	Performance of Alternatives 1 through 4 under Scenario B relative to rebuilding exploitation rate, critical escapement threshold, and viable escapement threshold standards.....	4-33
Table 4.3-4	Summary of impacts of Alternatives 2-4 relative to the Proposed Action under Scenario B	4-34
Table 4.3-5.	Performance of Alternatives 1 through 4 under Scenarios A-D relative to rebuilding exploitation rate, critical escapement threshold, and viable escapement threshold standards ..	4-35
Table 4.3-6	Summary of impacts of Alternatives 2-4 relative to the Proposed Action under Scenarios 1-4. .	4-36
Table 4.3-7a	Performance of Alternative 1 (Proposed Action) under Scenario A relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-37
Table 4.3-7b	Performance of Alternative 1 (Proposed Action) under Scenario B relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-38
Table 4.3-7c	Performance of Alternative 1 (Proposed Action) under Scenario C relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-39
Table 4.3-7d	Performance of Alternative 1 (Proposed Action) under Scenario D relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-40
Table 4.3-8a-1	Performance of Alternative 2 (Escapement Goal Management at Management Unit Level) under Scenario A relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-41
Table 4.3-8a-2	Performance of Alternative 2 (Escapement Goal Management at Management Unit Level) under Scenario A relative to Alternative 1 Scenario A (Proposed Action).....	4-41

Table 4.3-8b-1	Performance of Alternative 2 (Escapement Goal Management at Management Unit Level) under Scenario B relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-42
Table 4.3-8b-2	Performance of Alternative 2 (Escapement Goal Management at Management Unit Level) under Scenario B relative to Alternative 1 Scenario B (Proposed Action).	4-42
Table 4.3-8c-1	Performance of Alternative 2 (Escapement Goal Management at Management Unit Level) under Scenario C relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-43
Table 4.3-8c-2	Performance of Alternative 2 (Escapement Goal Management at Management Unit Level) under Scenario C relative to Alternative 1 Scenario C (Proposed Action).	4-43
Table 4.3-8d-1	Performance of Alternative 2 (Escapement Goal Management at Management Unit Level) under Scenario D relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-44
Table 4.3-8d-2	Performance of Alternative 2 (Escapement Goal Management at Management Unit Level) under Scenario D relative to Alternative 1 Scenario D (Proposed Action).	4-44
Table 4.3-9a-1	Performance of Alternative 3 (Escapement Goal Management at Population Level) under Scenario A relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-45
Table 4.3-9a-2	Performance of Alternative 3 (Escapement Goal Management at Population Level) under Scenario A relative to Alternative 1 Scenario A (Proposed Action).	4-45
Table 4.3-9b-1	Performance of Alternative 3 (Escapement Goal Management at Population Level) under Scenario B relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-46
Table 4.3-9b-2	Performance of Alternative 3 (Escapement Goal Management at Population Level) under Scenario B relative to Alternative 1 Scenario B (Proposed Action).	4-46
Table 4.3-9c-1	Performance of Alternative 3 (Escapement Goal Management at Population Level) under Scenario C relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-47
Table 4.3-9c-2	Performance of Alternative 3 (Escapement Goal Management at Population Level) under Scenario C relative to Alternative 1 Scenario C (Proposed Action).	4-47
Table 4.3-9d-1	Performance of Alternative 3 (Escapement Goal Management at Population Level) under Scenario D relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-48
Table 4.3-9d-2	Performance of Alternative 3 (Escapement Goal Management at Population Level) under Scenario D relative to Alternative 1 Scenario D (Proposed Action).	4-48

Table 4.3-10a-1 Performance of Alternative 4 (No Fishing) under Scenario A relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-49
Table 4.3-10a-2 Performance of Alternative 4 (No Fishing) under Scenario A relative to Alternative 1 Scenario A (Proposed Action).....	4-49
Table 4.3-10b-1 Performance of Alternative 4 (No Fishing) under Scenario B relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-50
Table 4.3-10b-2 Performance of Alternative 4 (No Fishing) under Scenario B relative to Alternative 1 Scenario B (Proposed Action).....	4-50
Table 4.3-10c-1 Performance of Alternative 4 (No Fishing) under Scenario C relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-51
Table 4.3-10c-2 Performance of Alternative 4 (No Fishing) under Scenario C relative to Alternative 1 Scenario C (Proposed Action).....	4-51
Table 4.3-10d-1 Performance of Alternative 4 (No Fishing) under Scenario D relative to NMFS recovery standards, viable salmonid population guidelines, and current condition escapement goals for listed Puget Sound chinook and Hood Canal-Strait of Juan de Fuca summer chum salmon.	4-52
Table 4.3-10d-2 Performance of Alternative 4 (No Fishing) under Scenario D relative to Alternative 1 Scenario D (Proposed Action).....	4-52
Table 4.3-11 Performance of Alternative 1 (Proposed Action) relative to exploitation rate objectives or escapement goals for coho, sockeye, pink, and fall-winter chum salmon.....	4-55
Table 4.3-12a Performance of Alternative 2 relative to exploitation rate objectives or escapement goals for coho, sockeye, pink, and fall-winter chum salmon.....	4-57
Table 4.3-12b Performance of Alternative 2 (Escapement goal management at the management unit level) relative to Alternative 1 for coho, sockeye, pink, and chum salmon.....	4-58
Table 4.3-13a Performance of Alternative 3 relative to exploitation rate objectives or escapement goals for coho, sockeye, pink, and fall-winter chum salmon.....	4-60
Table 4.3-13b Performance of Alternative 3 (Escapement goal management at the population level) relative to Alternative 1 for coho, sockeye, pink, and chum salmon.	4-62
Table 4.3-14a Performance of Alternative 4 relative to exploitation rate objectives or escapement goals for coho, sockeye, pink, and fall-winter chum salmon.....	4-64
Table 4.3-14b Performance of Alternative 4 (No Fishing) relative to Alternative 1 for coho, sockeye, pink, and chum salmon.....	4-65
Table 4.3.5-1 Biomass (pounds) of spawning salmon in the Skagit, Snohomish, and Green rivers, under Alternative 1.....	4-71
Table 4.3.5-2 Biomass (pounds) of spawning salmon in the Skagit, Snohomish, and Green rivers, under Alternative 2.....	4-73
Table 4.3.5-3 Biomass (pounds) of spawning salmon in the Skagit, Snohomish, and Green rivers, under Alternative 3.....	4-74

Table 4.3.5-4	Biomass (pounds) of spawning salmon in the Skagit, Snohomish, and Green rivers, under Alternative 4.....	4-75
Table 4.3.6.1-1.	Range of expected total exploitation rates by Puget Sound chinook management unit during the period 2004–2009. Exploitation rates greater than 0.4 are shaded.	4-80
Table 4.3.6.1-2.	Range of expected southern U.S. exploitation rates by Puget Sound chinook management unit during the period 2004–2009. Exploitation rates greater than 0.4 are shaded.....	4-80
Table 4.3.7-1.	Comparisons of hatchery- and naturally-spawning chinook salmon escapement with the Proposed Action or alternatives by scenario. Substantial differences (greater than 30%) in escapement from Alternative 1 are shaded.	4-85
Table 4.3.7-2.	Comparisons of hatchery- and naturally-spawning chinook salmon escapement with the Proposed Action or alternatives under Scenario A. Substantial differences (greater than 30%) in escapement from Alternative 1 are shaded.....	4-86
Table 4.3.7-3.	Comparisons of hatchery- and naturally-spawning chinook salmon escapement with the Proposed Action or alternatives under Scenario B. Substantial differences (greater than 30%) in escapement from Alternative 1 are shaded.....	4-87
Table 4.3.7-4.	Comparisons of hatchery- and naturally-spawning chinook salmon escapement with the Proposed Action or alternatives under Scenario C. Substantial differences (greater than 30%) in escapement from Alternative 1 are shaded.....	4-88
Table 4.3.7-5.	Comparisons of hatchery- and naturally-spawning chinook salmon escapement with the Proposed Action or alternatives under Scenario D. Substantial differences (greater than 30%) in escapement from Alternative 1 are shaded.....	4-89
Table 4.3.7-6.	Estimated 1996–2002 average number of hatchery-origin chinook salmon that spawn in the wild as a proportion of the hatchery-origin escapement for key Puget Sound chinook hatchery salmon populations under consideration (hatchery fish spawning in the wild/total hatchery fish returning).	4-91
Table 4.3.7-7.	Hatchery contribution to natural spawning escapement by scenario and alternative for five representative Puget Sound chinook populations.....	4-93
Table 4.3.7-8.	Comparisons of hatchery- and natural-spawning coho salmon escapement with the proposed action and alternatives. Substantial differences (greater than 30%) in escapement from Alternative 1 are shaded.....	4-99
Table 4.3.7-9.	Comparisons of hatchery- and natural-spawning chum salmon escapement with the proposed action and alternatives. Substantial differences (greater than 30%) in escapement from Alternative 1 are shaded.....	4-99
Table 4.3.8-1.	Federal, Tribal, Washington state, and local plans, policies, and programs that influence fish within the Puget Sound Action Area: 2004.....	4-105
Table 4.6-1.	Performance of economic indicators under alternatives 1-4 relative to conservation standards under scenarios 1-4.....	4-139
Table 4.6-2.	Impacts to commercial harvest, commercial harvest value, and processing value. Scenario A: 2003 abundance and 2003 Canadian/Alaskan Pacific Salmon Treaty fisheries.	4-140
Table 4.6-3.	Direct economic impacts to the commercial fishing and salmon processing industries. Scenario A: 2003 abundance and 2003 Canadian/Alaskan Pacific Salmon Treaty fisheries....	4-141

Table 4.6-4.	Impacts to sport fishing trips and expenditures by region. Scenario A: 2003 abundance and 2003 Canadian/Alaskan Pacific Salmon Treaty fisheries.....	4-142
Table 4.6-5.	Regional economic impacts of the alternatives. Scenario A: 2003 abundance and 2003 Canadian/Alaskan Pacific Salmon Treaty fisheries.....	4-143
Table 4.6-6.	Impacts to commercial harvest, commercial harvest value, and processing value. Scenario B: 2003 abundance with maximum Canadian/Alaskan Pacific Salmon Treaty fisheries.....	4-144
Table 4.6-7.	Direct economic impacts to the commercial fishing and salmon processing industries. Scenario B: 2003 abundance with maximum Canadian/Alaskan Pacific Salmon Treaty fisheries	4-145
Table 4.6-8.	Impacts to sport fishing trips and expenditures by region. Scenario B: 2003 abundance with maximum Canadian/Alaskan Pacific Salmon Treaty fisheries.	4-146
Table 4.6-9.	Regional economic impacts of the alternatives. Scenario B: 2003 abundance with maximum Canadian/Alaskan Pacific Salmon Treaty fisheries.....	4-147
Table 4.6-10.	Impacts to commercial harvest, commercial harvest value, and processing value. Scenario C: 30% reduction in abundance and 2003 Canadian/Alaskan Pacific Salmon Treaty fisheries.4-148	
Table 4.6-11.	Direct economic impacts to the commercial fishing and salmon processing industries. Scenario C: 30% reduction in abundance and 2003 Canadian/Alaskan Pacific Salmon Treaty fisheries.	4-149
Table 4.6-12.	Impacts to sport fishing trips and expenditures by region. Scenario C: 30% reduction in abundance and 2003 Canadian/Alaskan Pacific Salmon Treaty fisheries.	4-150
Table 4.6-13.	Regional economic impacts of the alternatives. Scenario C: 30% reduction in abundance and 2003 Canadian/Alaskan Pacific Salmon Treaty fisheries.....	4-151
Table 4.6-14.	Impacts to commercial harvest, commercial harvest value, and processing value. Scenario D: 30% reduction in abundance with maximum Canadian/Alaskan Pacific Salmon Treaty fisheries.	4-152
Table 4.6-15.	Direct economic impacts to the commercial fishing and salmon processing industries. Scenario D: 30% reduction in abundance with maximum Canadian/Alaskan Pacific Salmon Treaty fisheries.	4-153
Table 4.6-16.	Impacts to sport fishing trips and expenditures by region. Scenario D: 30% reduction in abundance with maximum Canadian/Alaskan Pacific Salmon Treaty fisheries.	4-154
Table 4.6-17.	Regional economic impacts of the alternatives. Scenario D: 30% reduction in abundance with maximum Canadian/Alaskan Pacific Salmon Treaty fisheries.....	4-155
Table 4.6-18.	Baseline and change in net economic values of commercial salmon fishing (in millions of 2002 dollars).	4-156
Table 4.6-19.	Baseline and changes in angler days and net economic value (NEV) of salmon sport fishing in the Puget Sound area.	4-157
Table 4.6-20.	Federal, Tribal, Washington State, and local plans, policies, and programs that influence economic condition within the Puget Sound Action Area (2004).....	4-160
Table 4.6-20.	Federal, Tribal, Washington State, and local plans, policies, and programs that influence economic condition within the Puget Sound Action Area (2004) continued	4-161

Table 4.7-1.	Tribal salmon fishing revenue for the action area – 17 fishing tribes (estimates in thousands of dollars).....	4-164
Table 4.7-2.	Selected data for potentially affected tribes.....	4-166
Table 4.7-3.	Relative mortality for tribal peoples compared to residents of Washington State.....	4-167
Table 4.7-4.	Estimated tribal salmon harvested annually under Alternative 1, Scenario B.....	4-169
Table 4.7-5.	Estimated annual tribal salmon revenue, by species – Alternative 1, Scenario B.....	4-169
Table 4.7-6.	Predicted tribal harvests of chinook salmon under Alternative 1, Scenarios A, C, or D.....	4-170
Table 4.7-7.	Number of tribal salmon caught annually under Alternative 2, Scenario B.....	4-171
Table 4.7-8.	Predicted tribal harvests of chinook salmon under Alternative 2, Scenarios A, C, or D.....	4-172
Table 4.7-9.	Estimated tribal salmon numbers harvested annually under Alternative 3, Scenario B.....	4-173
Table 4.7-10.	Predicted tribal harvests of chinook salmon under Alternative 3, Scenarios A, C, or D.....	4-174
Table 4.7-11.	Estimated tribal salmon numbers harvested annually under Alternative 4, Scenario B.....	4-175
Table 4.7-12.	Predicted tribal harvests of chinook salmon under Alternative 4, Scenarios A, C, or D.....	4-176
Table 4.7-13.	Summary of environmental justice indicators associated with potential impacts from alternative management plans under Scenario B.....	4-177
Table 4.7-14.	Federal, Tribal, Washington State, and local plans, policies, and programs predicted to have a cumulative impact on environmental justice communities within the Puget Sound Action Area (2004).....	4-181
Table 4.8.6-1	Cumulative effects on wildlife of the Proposed Action in combination with various plans, policies and laws.....	4-198
Table 5.1-1.	Abundance and Canadian/Alaskan fishery scenarios evaluated for each alternative.....	5-2
Table 5.1-2.	Comparison of predicted environmental effects among alternatives and a description of the Proposed Action for Scenario B in the order they appear in the EIS.....	5-4

List of Figures

Figure 1.1-1.	Washington commercial salmon management marine catch reporting areas.....	1-2
Figure 1.4-1.	Marine range of west coast chinook salmon.....	1-5
Figure 1.4-2.	Fisheries management forums.	1-6
Figure 1.4-3.	Locations of federally-recognized Puget Sound treaty tribes that are parties to the proposed action.	1-8
Figure 1.6-1.	Major fishing areas in Alaska, British Columbia and the southern United States where listed Puget Sound chinook salmon are caught.	1-14
Figure 1.6-2.	Commercial net and troll catch of chinook salmon in Puget Sound, 1980–2001.	1-19
Figure 1.6-3.	Puget Sound overview.	1-21
Figure 1.6-4.	Number of chinook salmon caught in Puget Sound marine fisheries.	1-24
Figure 1.6-5.	Number of chinook salmon caught in Puget Sound freshwater recreational fisheries.	1-24
Figure 3.2-1.	The Puget Sound Action Area and regions within the action area.	3-3
Figure 3.2-2.	Washington counties within the Puget Sound Action Area.	3-4
Figure 3.2-3.	The North Puget Sound region of the Puget Sound Action Area.	3-6
Figure 3.2-4.	Puget Sound Chinook Salmon Evolutionarily Significant Unit: Land ownership pattern.	3-10
Figure 3.2-5.	Proposed demographically-independent populations in the Puget Sound Salmon Evolutionarily Significant Unit.	3-12
Figure 3.2-6.	Hood Canal Summer-Run Chum Salmon Evolutionarily Significant Unit: Land ownership pattern.	3-13
Figure 3.3-1.	North Puget Sound Region.	3-22
Figure 3.3-2.	Spawning escapement, fishing exploitation rate, and geographic distribution of fishing mortality for Nooksack River spring chinook.	3-24
Figure 3.3-3.	Spawning escapement, fishing exploitation rate, and geographic distribution of fishing mortality for Skagit River summer-fall chinook.	3-27
Figure 3.3-4.	Spawning escapement, fishing exploitation rate, and geographic distribution of fishing mortality for Skagit River spring chinook.	3-29
Figure 3.3-5.	Spawning escapement, fishing exploitation rate, and geographic distribution of fishing mortality for Stillaguamish River summer-fall chinook.	3-32
Figure 3.3-6.	Spawning escapement, fishing exploitation rate, and geographic distribution of fishing mortality for Snohomish River summer-fall chinook.	3-33
Figure 3.3-7.	South Puget Sound Region.	3-37
Figure 3.3-8.	Spawning escapement, fishing exploitation rate, and geographic distribution of fishing mortality for Lake Washington summer-fall chinook.	3-39
Figure 3.3-9.	Spawning escapement, fishing exploitation rate, and geographic distribution of fishing mortality for Green-Duwamish River summer-fall chinook.	3-41

Figure 3.3-10.	Spawning escapement, fishing exploitation rate, and geographic distribution of fishing mortality for White River spring chinook.....	3-44
Figure 3.3-11.	Spawning escapement, fishing exploitation rate, and geographic distribution of fishing mortality for Puyallup River fall chinook.	3-47
Figure 3.3-12.	Spawning escapement, fishing exploitation rate and geographic distribution of fishing mortality for Nisqually River fall chinook.	3-49
Figure 3.3-13.	Spawning escapement, fishing exploitation rate, and geographic distribution of fishing mortality for Skokomish River fall chinook.	3-51
Figure 3.3-14.	Strait of Juan de Fuca Region.	3-54
Figure 3.3-15.	Spawning escapement, fishing exploitation rate, and geographic distribution of fishing mortality for Dungeness River spring chinook.....	3-56
Figure 3.3-16.	Spawning escapement, fishing exploitation rate, and geographic distribution of fishing mortality for Elwha River summer-fall chinook.	3-58
Figure 3.3-17.	Summer chum salmon spawning escapement to the Big Quilcene, other west Hood Canal streams, and east Hood Canal streams, 1968-2001.....	3-61
Figure 3.3-18.	Summer chum salmon spawning escapement to Strait of Juan de Fuca streams, 1971-2001... ..	3-62
Figure 3.3.7-1.	Age composition of Puget Sound chinook salmon catch: relatively stable since 1980.	3-92
Figure 3.3.7-2.	Age composition of Puget Sound chinook salmon escapement: stable since the 1970s.....	3-93
Figure 3.5-1.	Location of federally-recognized Puget Sound Indian tribes that are parties to the proposed action.	3-110
Figure 3.6-1.	Annual average ex-vessel value of commercial salmon landed at Puget Sound ports between 1991 and 1998, by county.....	3-126
Figure 3.6-2.	Annual average catch (tribal and non-tribal) and ex-vessel value of commercially-caught salmon in Puget Sound between 1991 and 2000.	3-127
Figure 3.6-3.	Percent of the annual average commercially-caught salmon in Puget Sound between 1991 and 2000, by marine catch area (in pounds landed).....	3-128
Figure 3.6-4.	Action and impact analysis area for the Puget Sound Chinook Harvest Resource Management Plan.....	3-130
Figure 3.6-5.	Percent of annual average commercially-caught (tribal and non-tribal) harvest of salmon in freshwater areas of Puget Sound.	3-131
Figure 3.6-6.	Annual average catch and ex-vessel value of salmon harvested by tribes in Puget Sound (1991-2000).	3-133
Figure 3.6-7.	Annual average sport catch (number of fish caught) of salmon in marine and freshwater areas of Puget Sound, by species (1991-2000).....	3-136
Figure 3.6-8.	Salmon ports and major launch areas in North Puget Sound region.	3-137
Figure 3.6-9.	Salmon ports and major launch areas in South Puget Sound/South Hood Canal region.	3-138
Figure 3.6-10.	Salmon ports and major launch areas in the Strait of Juan de Fuca/North Hood Canal region.	3-139