

**Mid Swan Salvage Blowdown Environmental Assessment**  
**Table of Contents**

---

**TABLE OF CONTENTS**

**Chapter 1: Purpose and Need for Action**

Document Structure .....	1-1
Project Area .....	1-1
Historical Condition .....	1-2
Existing Condition .....	1-2
Desired Condition .....	1-4
Management Direction .....	1-4
Purpose and Need .....	1-4
Proposed Action .....	1-5
Project Scope .....	1-5
Decisions to be Made .....	1-6
Applicable Laws and Executive Orders.....	1-7
Information Sources.....	1-7

**Chapter 2: Alternatives Considered**

Introduction .....	2-1
Public Involvement and the Scoping Process .....	2-1
Issues .....	2-2
Range of Alternatives.....	2-4
Alternatives Not Considered in Detail .....	2-4
Alternatives Considered in Detail.....	2-5
Activities Common to the Action Alternatives.....	2-8
Design Criteria .....	2-8
Activities Specific to the Action Alternatives.....	2-8
Comparison of Alternatives.....	2-14
Comparison of Environmental Effects.....	2-15
Management Requirements and Design Criteria .....	2-18

**Chapter 3: The Affected Environment and Environmental Consequences**

Introduction .....	3-1
Project Area .....	3-1
Definitions .....	3-1
Affected Environment Analysis .....	3-2
Environmental Consequences .....	3-3
Forest Plan Management Direction .....	3-8

**Soils**

Introduction .....	3-9
Analysis Area Description.....	3-9
Data Sources, Methods, and Assumptions Used.....	3-9
Measurement Indicators .....	3-10
Affected Environment.....	3-12
Environmental Consequences .....	3-15
Regulatory Framework and Consistency .....	3-24

**Forest Vegetation**

Introduction .....	3-25
Analysis Area.....	3-25

# Mid Swan Salvage Blowdown Environmental Assessment

## Table of Contents

---

Data Sources, Methods, and Assumptions Used.....	3-26
Measurement Indicators .....	3-29
Affected Environment.....	3-30
Environmental Consequences .....	3-52
Regulatory Framework and Consistency .....	3-63

### **Invasive Plant Species Noxious Weeds**

Introduction .....	3-65
Analysis Area.....	3-65
Data Sources, Methods, and Assumptions Used.....	3-65
Measurement Indicators .....	3-66
Affected Environment.....	3-66
Environmental Consequences .....	3-72
Regulatory Framework and Consistency .....	3-79

### **Threatened and Sensitive Plant Species**

Introduction .....	3-81
Analysis Area.....	3-81
Data Sources, Methods, and Assumptions Used.....	3-82
Measurement Indicators .....	3-83
Affected Environment.....	3-83
Environmental Consequences .....	3-87
Regulatory Framework and Consistency .....	3-94

### **Fire and Fuels**

Introduction .....	3-97
Analysis Area.....	3-97
Data Sources, Methods, and Assumptions Used.....	3-97
Measurement Indicators .....	3-98
Affected Environment.....	3-98
Environmental Consequences .....	3-104
Regulatory Framework and Consistency .....	3-110

### **Air Quality**

Introduction .....	3-111
Analysis Area.....	3-112
Data Sources, Methods, and Assumptions Used.....	3-112
Measurement Indicators .....	3-113
Affected Environment.....	3-113
Environmental Consequences .....	3-115
Regulatory Framework and Consistency .....	3-119

### **Water Resources**

Introduction .....	3-121
Analysis Area.....	3-121
Data Sources, Methods, and Assumptions Used.....	3-122
Measurement Indicators .....	3-123
Affected Environment.....	3-124
Environmental Consequences .....	3-127
Regulatory Framework and Consistency .....	3-132

# Mid Swan Salvage Blowdown Environmental Assessment

## Table of Contents

---

### **Fisheries**

Analysis Area.....	3-135
Data Sources, Methods, and Assumptions Used.....	3-135
Measurement Indicators .....	3-137
Affected Environment.....	3-140
Environmental Consequences .....	3-149
Regulatory Framework and Consistency .....	3-163

### **Threatened and Endangered Wildlife Species**

Introduction .....	3-165
--------------------	-------

#### **Canada Lynx**

Analysis Area.....	3-165
Data Sources, Methods, and Assumptions Used .....	3-166
Measurement Indicators .....	3-166
Affected Environment .....	3-166
Environmental Consequences .....	3-167
Regulatory Framework and Consistency .....	3-171

#### **Gray Wolf**

Analysis Area.....	3-172
Data Sources, Methods, and Assumptions Used .....	3-172
Description of Measurement Indicators .....	3-172
Affected Environment .....	3-172
Environmental Consequences .....	3-173
Regulatory Framework and Consistency .....	3-177

#### **Grizzly Bear**

Analysis Area.....	3-178
Data Sources, Methods, and Assumptions Used .....	3-178
Measurement Indicators .....	3-178
Affected Environment .....	3-178
Environmental Consequences .....	3-180
Regulatory Framework and Consistency .....	3-190

### **Old Growth Associated Wildlife Species**

Introduction.....	3-191
Analysis Area.....	3-193
Data Sources, Methods, and Assumptions Used .....	3-194
Measurement Indicators .....	3-194
Affected Environment .....	3-194
Environmental Consequences .....	3-196
Regulatory Framework and Consistency .....	3-203

### **Wildlife Sensitive Species**

Introduction.....	3-205
Analysis Area.....	3-205

#### **Black-backed Woodpecker**

Data Sources, Methods, and Assumptions Used .....	3-206
Measurement Indicators .....	3-206
Affected Environment .....	3-206
Environmental Consequences .....	3-207
Determination .....	3-212

# Mid Swan Salvage Blowdown Environmental Assessment

## Table of Contents

---

### Fisher

Data Sources, Methods, and Assumptions Used.....	3-212
Measurement Indicators .....	3-212
Affected Environment.....	3-213
Environmental Consequences .....	3-214
Determination .....	3-219

### Flammulated Owl

Data Sources, Methods, and Assumptions Used.....	3-219
Measurement Indicators .....	3-220
Affected Environment.....	3-220
Environmental Consequences .....	3-225
Determination .....	3-224

### Western (Boreal) Toad

Data Sources, Methods, and Assumptions Used.....	3-224
Measurement Indicators .....	3-224
Affected Environment.....	3-224
Environmental Consequences .....	3-225
Determination .....	3-227

Regulatory Framework and Consistency .....	3-227
--	-------

## Wildlife Snag and Down Woody Dependent Species

Introduction .....	3-229
Analysis Area .....	3-230
Data Sources, Methods, and Assumptions Used.....	3-230
Measurement Indicators .....	3-230
Affected Environment.....	3-230
Environmental Consequences .....	3-231
Regulatory Framework and Consistency .....	3-236

## Commonly Hunted Big Game

Introduction .....	3-237
Analysis Area .....	3-237
Data Sources, Methods, and Assumptions Used.....	3-237
Measurement Indicators .....	3-238
Affected Environment.....	3-238
Environmental Consequences .....	3-239
Regulatory Framework and Consistency .....	3-245

## Migratory Birds

Introduction .....	3-247
Analysis Area .....	3-249
Data Sources, Methods, and Assumptions Used.....	3-249
Measurement Indicators .....	3-249
Affected Environment.....	3-249
Environmental Consequences .....	3-250
Regulatory Framework and Consistency .....	3-254

# Mid Swan Salvage Blowdown Environmental Assessment

## Table of Contents

---

### **Recreation, Wilderness, and Range**

Introduction .....	3-257
Analysis Area.....	3-257
Affected Environment.....	3-257
Environmental Consequences .....	3-258
Regulatory Framework and Consistency .....	3-260

### **Heritage Resources**

Introduction .....	3-261
Analysis Area.....	3-261
Data Sources, Methods, and Assumptions Used.....	3-261
Affected Environment.....	3-261
Environmental Consequences .....	3-263
Regulatory Framework and Consistency .....	3-264

### **Scenery Resource**

Introduction .....	3-265
Analysis Area.....	3-265
Data Sources, Methods, and Assumptions Used.....	3-265
Measurement Indicators .....	3-266
Affected Environment.....	3-267
Environmental Consequences .....	3-267
Regulatory Framework and Consistency .....	3-268

### **Lands**

Introduction .....	3-269
Analysis Area.....	3-269
Affected Environment.....	3-269
Environmental Consequences .....	3-272
Regulatory Framework and Consistency .....	3-273

### **Economics**

Introduction .....	3-275
Data Sources, Methods, and Assumptions Used.....	3-275
Analysis Area.....	3-277
Affected Environment.....	3-277
Environmental Consequences .....	3-278
Regulatory Framework and Consistency .....	3-282

### **Required Disclosures**

Potential Conflicts with Plans and Policies of Other Jurisdictions .....	3-283
Probable Environmental Effects that Cannot be Avoided .....	3-284
Relationship between Short-Term and Long-Term Productivity.....	3-284
Irreversible and Irretrievable Commitments of Resources .....	3-285
Specifically Required Disclosures .....	3-286

# Mid Swan Salvage Blowdown Environmental Assessment

## Table of Contents

---

## Appendices

- Appendix A – Monitoring Plan
- Appendix B – Best Management Practices
- Appendix C – Vegetation Treatments
- Appendix D – Bibliography, Glossary, and Acronyms
- Appendix E – List of Preparers

## List of Tables

2-1.	Treatment Summary by Alternative .....	.2-7
2-2.	Temporary/Historic Tempoate/Skid Trails Needed for Alternative B .....	.2-8
2-3.	Summary of Proposed Treatment Activities for Alternative B .....	.2-9
2-4.	Proposed Treatment Activities for Alternative B.....	.2-10
2-5.	Temporary/Historic Template/Skid Trails Needed for Alternative C .....	.2-11
2-6.	Summary of Proposed Treatment Activities for Alternative C .....	.2-11
2-7.	Proposed Treatment Activities for Alternative C .....	.2-12
2-8.	Temporary/Historic Template/Skid Trails Needed for Alternative D .....	.2-13
2-9.	Summary of Proposed Treatment Activities for Alternative D .....	.2-13
2-10	Proposed Treatment Activities for Alternative D .....	.2-14
2-11	Comparison of Alternatives – How They respond to the Purpose and Need.....	.2-15
2-12	Comparison of Alternatives – How They Respond to the Key Issues.....	.2-15
2-13	Comparison of Environmental Effects by Alternative .....	.2-15
2-14	Management Requirements and Design Criteria .....	.2-18
3-1.	Past Actions Considered In The Cumulative Effects Analysis .....	.3-4
3-2.	Present and Reasonably Foreseeable Actions Considered in the Cumulative Effects Analysis .....	.3-6
3-3.	Management Area Descriptions, Emphasis, and Management Area Acres for the Mid Swan Salvage Blowdown Project Area.....	.3-8
3-4.	Mapped Landtypes by Unit.....	.3-12
3-5	Special Soil Features by Unit .....	.3-13
3-6	Percent Dtrimental Soil Disturbance for Proposed Units .....	.3-14
3-7	Cumulative Effects Summary .....	.3-22
3-8	Detrimental Disturbance Summary by Alternative .....	.3-23
3-9	Landfire Fire Regime Groups .....	.3-32
3-10	Ponderosa Pine Diameter, Volume, and Density Comparison of 2,000 and 5,000 Board Feet Per Acre (Scribner Board Foot Volume) .....	.3-34
3-11	Historic Seral Stages within the Swan Subbasin .....	.3-35
3-12	Habitat Types Used to Define Potential Vegetation Groups .....	.3-38
3-13	1998 Distribution of Seral Stages within the Swan Subbasin .....	.3-39
3-14	Cover Type Summary (All Ownerships) .....	.3-40
3-15	Current Cover Type of the Mid Swan Project Area .....	.3-41
3-16	Cover Type Summary (All Ownerships) .....	.3-41
3-17	Forest Inventory Analysis Summary Estimates for the Swan River Watershed.....	.3-44
3-18	2005, 2006, 2007 Aerial Detection Survey Results .....	.3-46
3-19	Analysis Area Past Harvest.....	.3-49
3-20	Treatment Summary by Alternative .....	.3-52
3-21	2009 Bark Beetle Hazard Ratings .....	.3-54
3-22	Green et al (as amended) Western Montana Zone Old Growth Criteria.....	.3-55
3-23	Acres of Old Growth Salvaged by Alternative.....	.3-59
3-24	Volume Estimates and Acres Treated by Alternative on NFS Lands .....	.3-61
3-25	Volume Estimates and Acres Treated by Alternative on All Lands.....	.3-63
3-26	Noxious Weed Species of Concern Found within the Mid Swan Blowdown Salvage Project Area .....	.3-67
3-27	Acres Infested with Weed Species of Concern within the Mid Swan Blowdown Salvage Project Area ..	.3-69
3-28	Weed Species of Concern Found in the 2008 Mid Swan Blowdown Project Area Surveys.....	.3-69

## Mid Swan Salvage Blowdown Environmental Assessment Table of Contents

---

3-29	Weed Treatment Prioritization on the Flathead National Forest.....	3-71
3-30	Treatment Summary by Alternative .....	3-73
3-31	Water Howellia Occupied Ponds in Close Proximity to Units and Haul Routes within the Mid Swan Blowdown Salvage Project Area. ....	3-84
3-32	Existing Condition of 184 Known Occurrences in the Swan Valley (Interpreted from 1997 and 2005 Aerial Photos).....	3-86
3-33	Regional Forester's Sensitive Plants and Other Rare Plants in the Mid Swan Blowdown Salvage Project Area .....	3-87
3-34	Pond's Proximity to Roads .....	3-90
3-35	Fire Behavior Thresholds (June-October) .....	3-105
3-36	Fire Behavior Indicators .....	3-106
3-37	Fire Behavior Indicators for Alternative A .....	3-107
3-38	Fire Behavior Indicators for Alternatives B, C, and D .....	3-107
3-39	Slash Reduction Treatments by Alternative.....	3-108
3-40	Particulate Amounts (Tons Per Acre) Produced by Prescribed Fire Associated with All Activities .....	3-117
3-41	Standard Visual Range for the Bob Marshall Wilderness and Glacier National Park .....	3-119
3-42	Natural Water Quantities in the Mid Swan Blowdown Analysis Area.....	3-125
3-43	Existing Condition of Goal, Lion, and Piper Creek Watersheds .....	3-126
3-44	Channel Stability Rating .....	3-126
3-45	Water Quantities Resulting from Implementation of Alternative B .....	3-129
3-46	Equivalent Clearcut Areas with the Implementation of Alternative B .....	3-129
3-47	Available Data on Large Woody Debris in Lion Creek as Compared to INFISH Objectives and Reference Stream Conditions. ....	3-141
3-48	Available Data on Pool Habitat Condition and Comparison to INFISH Objectives and Reference Data .....	3-142
3-49	Threatened, Endangered, and Proposed Species Known of Suspected to Occur within the Influence Area of the Proposed Action .....	3-165
3-50	Grizzly Bears, Population, and Habitat Status .....	3-179
3-51	Cover Analysis .....	3-181
3-52	Proposed Temporary Roads in Alternative B .....	3-181
3-53	Restriction Roads – Mid Swan Blowdown Salvage Project.....	3-182
3-54	Proposed Temporary Roads in Alternative C .....	3-185
3-55	Restriction Roads – Mid Swan Blowdown Salvage Project – Alternative C.....	3-186
3-56	Proposed Temporary Roads in Alternative D.....	3-188
3-57	Restricted Roads – Mid Swan Blowdown Salvage project – Alternative D.....	3-189
3-58	Habitat Requirements of Old Growth Associated Wildlife Species .....	3-192
3-59	Levels of Mature and Old Forest at the Forest and Regional (West of the Continental Divide) Scales Relative to the Historic Rate of Variability.....	3-231
3-60	Northern Rockies “Birds of Conservation Concern” .....	3-247
3-61	Neotropical Migratory Birds with Declining Populations Trends Associated with Forest Habitats.....	3-248
3-62	Trails within the Mid Swan Project Area .....	3-258
3-63	Project Feasibility and Financial Efficiency Summary (2008 Dollars).....	3-280
3-64	Total Employment and Income (2008 Dollars) Over the Life of the Project .....	3-281

## List of Figures

3-1	Mid Swan Blowdown Biophysical Settings.....	3-33
3-2	Ayres (1898) Forest Conditions Reported within the Analysis Area .....	3-33
3-3	Composition of the Mid Swan Blowdown Project Area Circa 1930's Timber Inventory .....	3-34

## Mid Swan Salvage Blowdown Environmental Assessment Table of Contents

---

3-4	Distribution of Potential VegetationGroups within the Mid Swan Blowdown Analysis Area .....	3-39
3-5	Canopy Cover within the Mid Swan Blowdown Analysis Area Tree Dominated Areas .....	3-43
3-6	Results of McNeil Coring Sampling on Lion Creek in Comparison to All Nine Monitored Streams in the Swan Valley .....	3-143
3-7	Results of Annual Bull Trout Redd Counts in Lion creek in Comparison to the Total of All Other Inventoried Streams in the Swan Valley .....	3-147
3-8	Results of Bull Trout Redd Counts in Piper Creek, Goat Creek, and the Combined Goat and Squeezers Creek Drainage. ....	3-141
3-9	Cross-section Illustration of Lion Creek, Showing Geologic Terms and Probable Groundwater Movement .....	3-149
3-10	Example of Recent Blowdown over Lion Creek .....	3-152

### **List of Maps**

Map 1-1      Mid Swan Blowdown Salvage Vicinity Map

Map 2-1      Mid Swan Proposed Action (Alternative B)

Map 2-2      Mid Swan Alterantive C

Map 2-3      Mid Swan Alternative D

Map 3-1      Mid Swan Management Areas

Map 3-2      Mid Swan Lynx Habitat

Map 3-3      Mid Swan Grizzly Bear Subunits

Map 3-4      Mid Swan Vegetative Cover

Map 3-5      Mid Swan Old Growth