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Forest Service

Wildlife Report

Colville National Forest Plan Revision

Draft Environmental Impact Statement

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DRAFT

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Table of Contents

Affected Environment ... 1
Federally Listed Wildlife Species ... 1
Woodland Caribou ... 1
Grizzly Bear ... 2
Canada Lynx ... 2
Surrogate Wildlife Species ... 3
Other Species of Management Interest ... 5
Deer and Elk Population status and herds ... 5
Climate Change and Wildlife ... 7

Environmental Consequences of Alternatives–Wildlife ... 8
Methodology ... 8
Assumptions ... 8
Methods of Analysis ... 9
Spatial and Temporal Context for Effects Analysis ... 9
Key Indicators ... 10
Summary of Effects - Wildlife ... 11
Effects of No Action Alternative - Wildlife ... 13
Federally Listed Wildlife Species ... 13
Late-Successional and Old Forest Habitats (Federally Listed Wildlife Species) ... 17
Motorized Recreation and Road Access ... 21
Livestock Grazing ... 23
Habitat Connectivity ... 24
Riparian Habitats ... 27
Species of Management Interest ... 29
Effects of Proposed Action Alternative - Wildlife ... 30
Federally Listed Wildlife Species ... 30
Late-Successional and Old Forest Habitats (Federally Listed Wildlife Species) ... 35
Motorized Recreation and Road Access ... 39
Livestock Grazing ... 41
Snag Habitat ... 42
Habitat Connectivity ... 43
Riparian Habitats ... 45
Species of Management Interest ... 47
Effects of Alternative O - Wildlife ... 49
Federally Listed Wildlife Species ... 49
Late-Successional and Old Forest Habitats (Federally Listed Wildlife Species) ... 53
Motorized Recreation and Road Access ... 57
Livestock Grazing ... 59
Habitat Connectivity ... 60
Snag Habitat ... 62
Riparian Habitats ... 63
Species of Management Interest ... 65
Effects of Alternative B - Wildlife ... 67
Federally Listed Wildlife Species ... 67
Late-Successional and Old Forest Habitats (Federally Listed Wildlife Species) ... 71
Motorized Recreation and Road Access ... 76
Livestock Grazing ... 77

Habitat Connectivity 78
Snag Habitat 80
Riparian Habitats 81
Species of Management Interest 83
Effects of Alternative R - Wildlife 85
Federally Listed Wildlife Species 85
Late-Successional and Old Forest Habitats (Federally Listed Species) 89
Motorized Recreation and Road Access 93
Livestock Grazing 94
Habitat Connectivity 95
Snag Habitat 97
Riparian Habitats 99
Species of Management Interest 100
Effects of Alternative P - Wildlife 102
Federally Listed Wildlife Species 102
Late-Successional and Old Forest Habitats (Federally Listed Species) 106
Motorized Recreation and Road Access 111
Livestock Grazing 112
Habitat Connectivity 114
Snag Habitat 115
Riparian Habitats 117
Species of Management Interest 118

References 120

Appendix A – Description of Viability Outcomes for Surrogate Wildlife Species 128

Appendix B – Viability Outcomes for Surrogate Wildlife Species 130

Appendix C – Results of Wildlife Habitat Models 131

Appendix D – R6 Sensitive Species and R6 Surrogate Species 134

List of Tables

Table 1. Current percent of core areas within grizzly bear management units in the Selkirk recovery area 2
Table 2. Current and historical viability outcomes for surrogate wildlife species assessed on the Colville National Forest (see Appendix A for descriptions of Viability Outcomes) 4
Table 3. Influence of roads and trails on elk winter range habitat effectiveness 6
Table 4. Influence of roads and trails on deer winter range habitat effectiveness 6
Table 5. Climate change vulnerability ratings for wildlife species assessed in the Colville National Forest plan revision 7
Table 6. Viability outcomes for surrogate wildlife species assessed on the Colville National Forest in short (<20 years) and long (<50 years) time periods 130

List of Figures

Figure 1. Results of wildlife habitat models at 20, 50, and 100 years for selected surrogate wildlife species by alternative for the Colville National Forest plan revision 131

Affected Environment

The Colville National Forest provides a wide-array of habitats for a diversity of wildlife species. The species addressed in forest planning include federally listed species, surrogate species (including Management Indicator Species and R6 Sensitive Species), endemic species, and other species of management interest.

Federally Listed Wildlife Species

Since the completion of the current Forest Plan, new wildlife species have been listed (Canada lynx) and others delisted (peregrine falcon, bald eagle, gray wolf). And, new science is available concerning those species that were included in the current Forest Plan.

Woodland Caribou

The Woodland Caribou was federally listed as an endangered species in 1984. The population was estimated between 27 and 46 animals during annual counts occurring from 2002 to 2012 (WDFW 2012). The caribou recovery area is 1,477 square miles in size and comprised of lands managed by the Colville National Forest, Idaho Panhandle National Forest, Idaho Department of Lands, and British Columbia. About 47 percent of the recovery area is in the US and 53 percent in British Columbia. The caribou recovery area is divided into 17 Caribou Management Units, four of which occur on the Colville National Forest.

In the mid-1990s, an interagency effort was started to augment caribou populations in the Selkirk Mountains of Washington in order to advance recovery efforts (Almack 1998). A caribou management area identified in the existing Forest Plan (completed in 1988) has been used to guide management. However, new science has identified winter recreational activities as an important issue to address in relation to caribou recovery (Mitchell and Hamilton 2007); this was not addressed in the existing land management plan. In 2001, the USFWS issued a new Biological Opinion on the 1988 Forest Plan with terms and conditions that required a winter recreation strategy be completed that balanced the needs of secure winter habitat for caribou with access for winter recreation activities (USFWS 2001). Thus, a recreation strategy was developed in 2003 (USFS 2003). In 2012, the USFWS designated 30,000 acres of national forest lands at or above 5,000 feet as critical habitat for woodland caribou (USFWS 2012).

Early winter caribou habitat consists of low to mid elevation, cedar / hemlock forest stands and stands on the ecotone with subalpine fir / spruce habitats (Rominger and Oldemeyer 1989). Mature and old stand conditions and good canopy closure (70 percent+) are important habitat components (Rominger 1995). There is less risk of caribou being disturbed by winter recreation activities on early-winter range. On the Sullivan Lake Ranger District, most off-road travel in these areas is precluded by the heavily wooded nature of the preferred forest stand types. The potential for disturbance to caribou exists mainly where roads bisect these stands.

Subalpine and alpine ridges provide late winter habitat for woodland caribou (Rominger et al. 1996). Snowmobile riders are attracted to these areas for the challenging slopes and the views that they often provide. Simpson and Terry (2000) characterized snowmobile riding as posing moderate to high risks to caribou in the South Selkirk Mountains Ecosystem. A primary concern related to this activity is animals being displaced from preferred late-winter habitat (Mitchell and Hamilton 2007).

Grizzly Bear

The Selkirk Grizzly Bear Recovery Area is located in northeastern Washington and includes parts of Washington, Idaho, and British Columbia. The Selkirk recovery area was included in the original overall grizzly bear recovery plan for the US. One of the key aspects of grizzly bear recovery is human access management. Access management remains one of the most influential tools used to contribute towards the recovery of grizzly bear populations (IGBC 1998). Measures of the degree of human influence on grizzly bear habitat are based on methods developed by the Interagency Grizzly Bear Committee Access Management Task Force (IGBC 1998). Based on this approach, areas with relatively limited human access are referred to as core areas and are tracked in Grizzly Bear Management Units (GBMUs) that have been identified throughout the recovery area. Table 1 shows the current amount of core area in the GBMUs within the Forest Plan Revision area.

The Selkirk recovery area has been stratified into management situation 1, 2, and 3 areas that are used to determine where management direction is applied. Areas outside of the recovery area but still on the Colville National Forest are managed as management situation 5.

Table 1. Current percent of core areas within grizzly bear management units in the Selkirk recovery area

Grizzly Bear Management Unit (GBMU)	Current Core Percent
Le Clerc	>27%
Salmo-Priest	>64%
Sullivan-Hughes	>61%

Canada Lynx

Lynx are considered a species of greatest conservation need in the state of Washington. Lynx occurrence, currently and historically, has been documented in the northeastern corner of the state (McKelvey et al. 2000). Stinson (2001) stated that the highest lynx harvest in Washington was from Ferry County (Kettle-Wedge Core Area) at 35 percent. Lynx were present and reproducing in the Kettle Mountains through the 1970s (Stinson 2001), but subsequently were likely over-trapped. Currently only occasional tracks are observed with no evidence of reproduction in northeastern Washington (Koehler et al. 2008, WDFW and USFS 2011, report on file with Colville National Forest).

The Canada lynx is associated with moderate and high elevation forests composed mostly of subalpine-fir forest associations (Ruediger et al. 2000, Stinson 2001, ILBT 2013).

In 2000, the Canada lynx was listed as a Threatened species, and in 2005 core, secondary, and periphery areas were identified to emphasize their importance for the recovery of lynx (USFWS 2005). To date, no recovery plan for Canada lynx has been completed. Current management direction is provided through the Canada Lynx Interagency Agreement that relies on the science summarized in the Canada Lynx Conservation Assessment and Strategy (ILBT 2013). This agreement was intended to remain until it is replaced by management direction given in revised Forest Plans. There is a need to revise the Forest Plan to incorporate the emphasis areas identified by US Fish and Wildlife Service (USFWS 2005) and to replace the interim policy given in the Interagency Agreement. On the Colville National Forest, the Kettle-Wedge area is identified as a Core Area for lynx, the Selkirk Mountains as Secondary Area, and the Okanogan Highlands (west

of the Kettle Mountains) as Peripheral Area (USFWS 2005, ILBT 2013). No critical habitat was identified for Canada lynx on the Colville National Forest (USFWS 2009).

Surrogate Wildlife Species

Considerable new science has developed since the current forest plan concerning the viability of a wide-array of wildlife species that are present within the planning area (Lehmkuhl et al. 1997, Wisdom et al. 2000, Raphael et al. 2001). In addition, methods for assessing species viability have evolved (Soule 1987, Marcot et al. 2001, Beissinger and McCullough 2002, Suring et al. 2011), and choosing which species to assess that best represent other species has changed considerably. We used the surrogate species approach to evaluate species and ecosystem viability following direction and guidance provided by Region 6 Planning (USFS 2006). Surrogate species are intended to represent ecological conditions that generate sustainable ecosystems, and it is not expected that the population dynamics of a surrogate species would necessarily represent the population dynamics of another species (Lambeck 1997). The concept of surrogate species differs from management indicator species (MIS) described in the regulations written to implement the National Forest Management Act (NFMA) (36 CFR 219.19). The use of management indicator species (MIS) was considered a means of evaluating the effects of management actions on a suite of species whose population trends were assumed to reflect changes in habitat amount and quality due to the effects of the management actions (Suring et al. 2011). This assumption and the MIS concept have been called into question in the past two decades since its inception (Landres et al. 1988, Andelman et al. 2001). As a result, the MIS concept evolved to the more robust concept of surrogate species, including surrogate species, in the late 1990s (Lambeck 1997). Surrogate species are now considered a more appropriate approach in addressing species and ecosystem viability (Wiens et al. 2008, Suring et al. 2011).

The approach used to evaluate the ecological conditions capable of sustaining viable populations of wildlife species within the Forest planning area is described in detail in Suring et al. (2011) and Gaines et al. (2015). In summary, an eight-step process was used to assess the ecological conditions capable of sustaining viable populations of terrestrial wildlife species. The process included: (1) identification of species of conservation concern, (2) description of source habitats, and other important ecological factors, (3) organizing species into groups, (4) selection of surrogate species for each group, (5) development of surrogate species assessment models, (6) application of the surrogate species assessment models to evaluate current and historical conditions (7) development of conservation strategies, and (8) designing monitoring and adaptive management. Following the application of species screening criteria, 209 species were identified as species of conservation concern within the planning area. The 209 species of conservation concern were aggregated into 10 families (these are not phylogenetic families) and 28 groups based primarily on their habitat associations. Next, 26 surrogate species (77 percent birds, 15 percent mammals, 8 percent amphibians) were selected for use on the Colville National Forest, based on risk factors and ecological characteristics (Gaines et al. 2015, Suring et al. 2011).

Evaluation of the current conditions within the assessment area documented reductions in the viability outcomes (see Appendix A for a description of the Viability Outcomes) for all surrogate species compared to historical conditions (Gaines et al. 2015). The species for which current viability outcomes are most similar to historical viability outcomes include the golden eagle, Harlequin duck, northern goshawk, peregrine falcon, and Wilson’s snipe (table 2). Species for which current viability outcomes have departed the most from historical viability outcomes and are of greatest conservation concern included the eared grebe, fox sparrow, western bluebird, and white-headed woodpecker (table 2). Some of these species occur on only a small portion of the

forest or within watersheds with only a minor amount of national forest land. Because our process was based on an all-lands approach, the viability of these species was assessed. However, conservation measures identified to improve their viability outcomes were not applicable to the forest planning process.

Table 2. Current and historical viability outcomes for surrogate wildlife species assessed on the Colville National Forest (see Appendix A for descriptions of Viability Outcomes)

Surrogate Wildlife Species	Current Viability Outcome	Historical Viability Outcome
American Marten	B/C	A/B
Bald Eagle	C	A
Bighorn Sheep	B/C	A/B
Black-backed Woodpecker	C	A
Canada Lynx	B	A
Cassin's Finch	D	A
Columbia Spotted Frog	C	A
Eared Grebe[1]	E	C/D
Fox Sparrow	E	A
Golden Eagle	A/B	A
Harlequin Duck	A/B	A
Lark Sparrow[1]	C/D	A
Lewis's Woodpecker	C/D	A
MacGillivray's Warbler	C	A
Marsh Wren	C	A/B
Northern Goshawk	A/B	A
Northern Harrier[1]	C	A
Peregrine Falcon[1]	A/B	A
Pileated Woodpecker	C	A
Sage Thrasher[1]	D/E	A
Tiger Salamander[1]	C	A
Western Bluebird	D	A
White-headed Woodpecker	D/E	A
Wilson's Snipe[1]	B	A/B
Wolverine	B	A
Wood Duck[1]	C	A

1/Surrogate species whose source habitats either do not occur or <25% occur on the Colville National Forest.

There is a need to address the viability concerns for surrogate species identified in the assessment of the current conditions (Gaines et al. 2015). By addressing the habitat needs and risk factors identified for surrogate species through the assessment, ecological conditions capable of supporting viable populations of all native and non-native desirable wildlife species, including R6 Sensitive Species, would be enhanced. Some key findings of the assessment that should be addressed in the revised Forest Plan include:

- Riparian habitats are important for a wide-variety of the surrogate species assessed. A strategy that protects and restores riparian habitat, including addressing the negative effects of roads, is needed.
- Late-successional and old forest habitats are generally below their historical range of variability. In some forest types, such as the dry and mesic forests, active restoration of old-forest habitat is needed to restore important habitat structures (e.g., large trees) and to reduce risk of habitat loss due to uncharacteristically severe wildfires.
- One of the primary reasons for species viability outcomes being reduced is the widespread influence of roads. Restoring habitat effectiveness, by reducing the negative effects of roads, is important for several surrogate wildlife species.
- Restoring the connectivity of wildlife habitats is an important strategy for addressing the effects of climate change on wildlife populations. Restoring habitat connectivity, especially within riparian habitats, is important and needs to address the negative effects of roads and allowing wildlife access to crossing structures that may be installed along highways.
- The availability of large and old trees and large snag habitat is generally lacking in many forest types because of past management practices and altered disturbance regimes. Restoration of these key habitat components is important for several surrogate wildlife species.

Other Species of Management Interest

Deer and Elk Population status and herds

The Selkirk Elk Herd occurs on the Colville National Forest and adjacent areas. This herd contributes significantly to local economies through wildlife viewing and recreational hunting opportunities. The Selkirk herd is currently about 1,200 animals (WDFW 2001). The Selkirk herd plan identified the desired condition for the herd as follows: increase the Pend Oreille subherd from 800 to 1000 animals; stabilize and maintain the Hangman subherd; and reduce vehicle collisions.

Both white-tailed deer and mule deer occur on the Colville National Forest. The white-tailed deer management plan (WDFW 2010) identified two management units that include portions of the Forest: Okanogan Highlands and Selkirk. The Okanogan Highlands is 31 percent public land, 19 percent private, and 50 percent Colville tribal lands. The management objective for white-tailed deer in this area is to maintain the current population level. The Selkirk management unit is 37 percent public land, 6 percent Colville tribal lands, and 57 percent private lands. The objective in the unit is to reduce the effects of the antlerless harvest and increase the population. Currently the mule deer population in northeastern Washington is below historical levels (WDFW 2008). A mule deer management plan for this area has not been completed.

Since the 1988 forest plan was completed, considerable research has been conducted on habitat relationships and the effects of human activities on deer and elk. For example, research has indicated that the availability of quality forage during non-winter periods is very important to the winter survival and productivity of elk herds (Cook 2002, Cook et al. 2004), more important than thermal cover (Cook 1998, Lenz 1997). Existing forest plans emphasized the availability of thermal cover on winter ranges, and in some cases, at levels difficult to ecologically sustain in dry

forest environments. Additional science has underscored the importance of the effects of roads and other linear recreation routes on the effectiveness of habitat for deer and elk (Rowland et al. 2005, Wisdom et al. 2005). The current forest plan relies on the use of road density as an index of habitat effectiveness for deer and elk; however, recent research suggests that using the zone of influence is a better indicator (Gaines et al. 2003, Rowland et al. 2005). Forest Plan management direction for deer and elk needs to be revised to reflect the best available science.

Currently, the level of human influence on elk winter ranges is moderate (table 3). On deer winter ranges, 38 percent have a high level of human influence, 38 percent have a moderate level of human influence, and 24 percent have a low level of human influence (table 4).

Table 3. Influence of roads and trails on elk winter range habitat effectiveness

Elk Herd	Acres of Winter Range outside of ZOI	Total Acres of Winter Range	Habitat Effectiveness Index	Current Level of Human Influence
Kettle	46227	70852	0.65	Moderate
Selkirk	31300	55459	0.56	Moderate

Table 4. Influence of roads and trails on deer winter range habitat effectiveness

Ranger District/watershed (HUC10)	Acres of winter range outside of Zone of Influence (ZOI)	Total acres of winter range	Habitat effectiveness index	Current level of human influence
NEWPORT				
Le Clerc Creek-Pend Oreille River	2300	3434	0.67	Mod
Tacoma Creek-Pend Oreille River	5227	10990	0.48	High
Upper Little Spokane River	273	273	1.00	Low
REPUBLIC				
Rock Creek-Kettle River	966	966	1.00	Low
Curlew Creek	2262	4400	0.51	Mod
Toroda Creek	704	704	1.00	Low
Upper Sanpoil River	11683	16616	0.70	Low
Vulcan Mountain-Kettle River	9294	15466	0.60	Mod
West Fork Sanpoil River	3313	3791	0.87	Low
SULLIVAN LAKE				
Le Clerc Creek-Pend Oreille River	6168	10020	0.62	Mod
Sullivan Creek-Pend Oreille River	4889	9969	0.49	High
THREE RIVERS				
Boulder Creek-Kettle River	8975	16011	0.56	Mod
Chewelah Creek-Colville River	6482	10780	0.60	Mod
Deep Creek	1925	4073	0.47	High
Mill Creek	1072	2229	0.48	High

Ranger District/watershed (HUC10)	Acres of winter range outside of Zone of Influence (ZOI)	Total acres of winter range	Habitat effectiveness index	Current level of human influence
Onion Creek-Roosevelt Lake	2522	3264	0.77	Low

Climate Change and Wildlife

The anticipated climatic changes to eastern Washington environments are likely to result in a variety of effects to wildlife populations and their habitats (Gaines et al. 2012, Lawler et al. 2014). A striking conclusion reached from several climate change studies is the degree of change to wildlife habitats and populations that has already occurred (Lawler and Mathias 2007, Root et al. 2003). There are a variety of responses of wildlife to changing climatic conditions that have occurred or are anticipated to occur including: changes in species distributions, changes in the timing of breeding and other activities, changes in pathogens and invasive species distributions, changes in survival and extinction risks, and changes in the interactions among species. To aid in the assessment of the effects of climate change and forest management activities on surrogate wildlife species the Climate Change Sensitivity Database (CCSD 2013) was used to determine the vulnerability of each species and the particular effects that climate change might have given their life history. Of the species that were assessed in the database, nine (36 percent) have a high rating, six (24 percent) have a medium rating, 5 (20 percent) have a low vulnerability rating, and five (20 percent) were not rated (table 5).

Table 5. Climate change vulnerability ratings for wildlife species assessed in the Colville National Forest plan revision

Wildlife Species	Vulnerability Rating	Specific Climate Impacts
THREATENED AND ENDANGERED SPECIES		
Woodland Caribou	High	Climate change will alter the distribution and abundance of caribou habitat, and may change predator/prey dynamics. Population is small and highly vulnerable.
Grizzly bear	Low	Changes in snowpack will change hibernation exposing bears to humans for longer time.
Canada lynx	High	Changes to the distribution of key habitats and prey species
SURROGATE WILDLIFE SPECIES		
Northern Goshawk	High	Changes to food supply and suitable habitat
Pileated Woodpecker	Medium	Loss of habitat due to altered disturbance regimes
American Marten	High	Changes to habitat distribution and amount
White-headed Woodpecker	Medium	Changes to habitat from altered disturbance regimes
Black-backed Woodpecker	Medium	Changes to habitat from altered

Wildlife Species	Vulnerability Rating	Specific Climate Impacts
		disturbance regimes
Lewis's Woodpecker	Medium	Changes to habitat from altered disturbance regimes
Wolverine	High	Changes in persistence of spring snow used for denning
MacGillivray's Warbler	Not Available	
Golden Eagle	Medium	Changes to prey and habitat from altered disturbance regimes
Bald Eagle	Low	Changes to fish populations
Columbia Spotted Frog	High	Changes to wetland and riparian habitats
Marsh Wren	Not Available	
Wilson's Snipe	Not Available	
Western Bluebird	High	Changes to habitat from altered disturbance regimes. Changes from competition with other cavity nesters
Peregrine Falcon	Low	Generalist with high mobility
Cassin's Finch	High	Changes to extreme temperatures and dry air
Fox Sparrow	Not Available	
Water Vole	Not Available	
SPECIES OF MANAGEMENT INTEREST		
Deer	Low	Habitat generalist with high mobility
Elk	Low	Habitat generalist with high mobility

Environmental Consequences of Alternatives–Wildlife

Methodology

Assumptions

In addition to the common assumptions listed in the Environmental Analysis and Overall Assumptions, the Wildlife analyses included the following.

- The use of the Surrogate Species approach (Lambeck 1997) is a credible and scientifically rigorous method to assess ecosystem conditions that contribute to the viability of surrogate wildlife species. The baseline conditions for Surrogate Wildlife Species in the Colville National Forest planning area are presented in Gaines et al. (2015) and give reasonable approximations of conditions at the scale of a watershed (10th Code HUC) that are influencing surrogate species habitats and populations.

- A key assumption of the landscape restoration approach that is represented in two of the alternatives (Proposed Action, P) is that by strategically locating restoration treatments, landscape fire movement can be altered, and the risk to adjacent late-successional and old forest habitat is reduced. A considerable and growing body of science is available to support this assumption (Finney 2001, Finney et al. 2006, Kennedy et al. 2008, Lehmkuhl et al. 2007).
- Modeling future habitat trends for a select group of surrogate wildlife species required several assumptions, most importantly, that habitat associations for each species were adequately represented by the identified model states, and that the effects of forest management treatments were adequately reflected in effects on habitat conditions.

Methods of Analysis

Federally Listed Wildlife Species

For wildlife species that are federally protected by the Endangered Species Act, recovery plans and critical habitat designations (for those species that it has been designated) were used to identify factors (table 6) that threaten species recovery. These factors were used to assess how well the No Action Alternative and each of the action alternatives addressed the threats and contributed to the recovery of the species.

Surrogate Wildlife Species

The Region 6 surrogate species assessment process (USFS 2006) was used to evaluate the No Action and Action alternatives. This approach is described in detail in Suring et al. (2011) and Gaines et al. (2015). The surrogate species assessment process was completed for the planning area in order to determine the baseline conditions for each of the surrogate species (see Affected Environment) and to identify risk factors that influence the viability of surrogate wildlife species (table 6). These risk factors were addressed to varying degrees in each of the alternatives and used to evaluate how well each alternative contributes to the viability of surrogate wildlife species.

Spatial and Temporal Context for Effects Analysis

The spatial context for the analyses of the effects of management alternatives varied according to the species or group of species being assessed. For the woodland caribou and grizzly bear, the portion of the respective recovery areas located on the CNF was used to address direct and indirect effects, while the entire recovery area was used to evaluate cumulative effects. For Canada lynx, the direct and indirect effects were evaluated for the core and secondary areas identified in the recovery outline (USFWS 2005). Cumulative effects for Canada lynx were evaluated by considering the adjacent areas where lynx would most likely disperse from which included the Okanogan-Wenatchee National Forest and Washington Department of Natural Resources lands to the west and the Idaho-Panhandle National Forest to the east. The respective management plans were reviewed to consider the cumulative effects.

For wildlife species selected as Surrogate species, broad-scale viability assessments were done across the species' range that occurred in Northeast Washington assessment area (Suring et al. 2011, Gaines et al. 2015). This process included two spatial scales of assessment. Direct, indirect and cumulative effects were assessed for each individual species using the watershed (10th Code HUC) as an evaluation unit, considering all land ownerships within the watershed. Individual watershed results were then used to determine the current and historical (prior to European

settlement) viability outcomes that were evaluated at the individual planning unit (in this case the CNF) level.

Future habitat trends were modeled for the following surrogate species: American marten, white-headed woodpecker, northern goshawk, pileated woodpecker, black-backed woodpecker, and Lewis's woodpecker (Appendix C). These trends were modeled to assess habitat conditions at 20, 50 and 100 years in order to estimate how different management alternatives would contribute to the viability of surrogate species. Other risk factors that influence the viability of surrogate species were assessed in the short term (≤20 years) using the Objectives and the long term (≤50 years) using the Desired Conditions to estimate how alternatives might contribute to the viability of surrogate wildlife species.

For species of management interest, which included deer and elk, direct and indirect effects were considered within the portions of the herd ranges that occurred on the CNF, while cumulative effects were considered across the entire herd range. Herd ranges were identified by the Washington Department of Fish and Wildlife in herd management plans (WDFW 2001, 2010).

Key Indicators

The following indicators were used to evaluate the contribution of each alternative to the recovery of federally listed wildlife species, the viability of surrogate wildlife species, and the sustainability of species of management interest.

Table 6–Evaluation criteria and key indicators for Wildlife

Issue	Evaluation Criteria	Key Indicator
The recovery and viability of wildlife species associated with late and old forest structures.	Wildlife species associated with late and old forest structures o Moist Forests o Listed species – woodland caribou o Surrogate species – northern goshawk, pileated woodpecker, American marten o Dry and Mesic Forests o Surrogate species – pileated woodpecker, northern goshawk, white-headed woodpecker	*The amount, location and spatial configuration of old-forest habitats* *The influence of roads and trails on old-forest habitat effectiveness*
The influence of motorized access on the recovery and viability of wildlife species sensitive to human disturbances	Wildlife species that are sensitive to human disturbances that result from motorized access o Non-Winter o Listed species – grizzly bear o Surrogate species –	*The influence of linear recreation routes and roads on wildlife species will be evaluated using road density as an indicator of habitat effectiveness for wolverine, Canada lynx; and the zone of influence as an indicator of habitat effectiveness for grizzly bear, deer, and elk (Gaines et al. 2003)*

Issue	Evaluation Criteria	Key Indicator
	wolverine o Winter o Listed species – Canada lynx, woodland caribou o Surrogate species – wolverine o Other species – deer, elk	
The influence of livestock grazing of the viability or sustainability of wildlife species	Surrogate wildlife species and species of management interest affected by grazing o Surrogate species – MacGillivray's warbler, golden eagle, Western bluebird, Cassin's finch o Other species – deer and elk	*Effects of grazing on the viability and habitat of surrogate and other wildlife species* o The location and intensity of cattle grazing on allotments o Degree of overlap between grazing allotments and source habitats for surrogate wildlife species and winter and summer ranges for deer and elk
The influence of forest management activities on habitat connectivity for surrogate wildlife species	Surrogate wildlife species used to evaluate habitat connectivity o Surrogate species – American marten, Canada lynx, wolverine	*Wildlife habitat connectivity* o The dispersal habitat suitability (Singleton et al. 2002) for surrogate species based on anticipated changes to habitat, road density, and linear recreation routes
The influence of forest management activities on the viability of surrogate wildlife species dependent on snag habitats	Surrogate wildlife species dependent on snag habitats o Surrogate species – pileated woodpecker, white-headed woodpecker, black-backed woodpecker, Lewis's woodpecker, Western bluebird	*Availability of snag habitat* o The proposed vegetation management activities within source habitats for each surrogate species o The road density within source habitats for each surrogate species
The influence of forest management on the viability of surrogate wildlife species associated with riparian habitats	Surrogate wildlife species associated with riparian habitats Surrogate species – water vole, bald eagle, MacGillivray's warbler, Columbia spotted frog, Wilson's snipe, eared grebe, marsh wren	*Widths of riparian management areas* *Vegetation management within riparian management areas* *Road density and Zone of Influence on riparian habitat effectiveness*

Summary of Effects - Wildlife

Several factors were considered in the evaluation of how alternatives influenced the evaluation criteria and indicators, and how well each alternative contributes to the recovery of federally listed wildlife species, the viability of surrogate wildlife species, or the sustainability of species of

management interest. These factors included: 1) How well the alternative addresses new science, especially the interactions between disturbance processes, habitat sustainability, and wildlife populations. 2) How well the alternative addresses new recovery plans, critical habitat, conservation strategies, or management plans (e.g., ILBT 2013, USFWS 2009). 3) How the alternative addresses the impacts of roads on wildlife habitats (e.g., Gaines et al. 2003, Wisdom et al. 2000). 4) How the alternative addresses the effects of domestic grazing on wildlife habitats. 5) How the alternative address anticipated effects of climate change, and specifically, does the alternative restore landscape resistance and resiliency (Gaines et al. 2012, Lawler et al. 2014).

In general, the alternatives that emphasize restoration of disturbance regimes and habitats, including reducing road effects, contributed the most to the recovery, viability, and sustainability of wildlife habitats and populations (table 7). These alternatives include the Proposed Action and Alternative P. Alternative R, which includes a substantial reserve-system, would generate moderate-high contribution to wildlife habitats and populations, especially for wildlife species associated with late-successional and old forest habitat structures. The alternatives that emphasize single resource management (e.g., timber production) and do not address road effects tended to give the lowest contributions to wildlife habitats and populations.

Table 7–Summary of the relative contribution of each alternative to the recovery of federally listed wildlife species, viability of surrogate wildlife species, or sustainability of species of management interest

Issue/ Species	Forest Plan Alternatives					
	NA	PA	R	P	B	O
Old Forest						
Contribution to recovery (Caribou)	Low[1/]	High[2/]	High[3/]	High	Moderate	Moderate
Contribution to viability	Low	Moderate	High	High	Low	Low
Motorized Recreation and Road Access						
Contribution to viability	Low	Moderate	High	High	Low	Low
Livestock Grazing						
Contribution to viability	Low	Moderate	High	High	Low	Moderate
Habitat Connectivity						
Contribution to viability	Low	Moderate	Moderate	High	Low	Low
Snag Habitat						
Contribution to viability	Low	Moderate	High	High	Low	Low
	Riparian and Aquatic					
Contribution to viability	Low	Moderate	High	High	Low	Low
Other Listed Species (Lynx)						
Contribution to recovery	Low	High	Moderate	High	Low	Low
Species of Management Interest						
Contribution to sustainability	Low	Moderate	Moderate	High	Low	Low

1/ Low = a low contribution by the alternative to the recovery/viability/sustainability of the species or group of species.
2/ Moderate = a moderate contribution by the alternative to the recovery/viability/sustainability of the species or group of species.
3/ High = a high contribution by the alternative to the recovery/viability/sustainability of the species or group of species.

Effects of No Action Alternative - Wildlife

Federally Listed Wildlife Species

Grizzly Bear

Direct and Indirect Effects

Forest activities that influence the recovery of the grizzly bear include: human access that can displace bears from important seasonal habitats or increase the risk of bear-human interactions, disposal of livestock carcasses within range allotments to avoid attracting bears to a potential food source, and the storage of food and garbage at recreation sites to reduce the potential for bears to associate humans with food resources.

Management of grizzly bears does not vary between alternatives. Existing management direction provides standards for human access, disposal of livestock carcasses, and food and garbage storage within the Selkirk Grizzly Bear Recovery Area (IGBC 1998, USDA 1988, USFWS 1993, USDI 2001). Existing standards have largely been met and would continue to be followed.

Climate Change

Grizzly bears have been identified as having a low sensitivity to climate change because they are opportunistic, eat a diverse array of food resources, and are highly adaptable (Servheen and Cross 2010, CCSD 2013). Anticipated impacts may include changes in the timing of denning due to longer snow-free periods and reduced snowpack (Lawler et al. 2014) and changes in the availability of food sources (Servheen and Cross 2010). These changes may put bears at risk of negative human interactions for a longer period of time each year (Servheen and Cross 2010). This would make education, proper food and garbage storage, carcass disposal measures, and human access management that much more important.

Cumulative Effects

The primary reason for the low population of grizzly bears in the recovery zone is past persecution and human-caused mortality of bears. Legal protections are now in place to protect grizzly bears. Information/education programs, sanitation measures, and access management have and would continue to be used to aid in the recovery of grizzly bears in the Selkirk Recovery Area.

Past, present, and reasonably foreseeable future actions that could affect grizzly bears include timber harvest and associated road construction, recreational activities that can cause disturbance to bears and create potential for human-bear conflicts, and human development that fragment grizzly bear habitat. Cumulative effects are evaluated across the Recovery Area by tracking activities within Grizzly Bear Management Units (GBMUs). Other land managers have adopted and are following similar management direction (IPNF 2015) and overall recovery is coordinated by the Selkirk Grizzly Bear Management Subcommittee. GBMUs that occur on the Colville National Forest include the LeClerc, Salmo-Priest, and Sullivan-Hughes. The contribution made

on federal lands to grizzly bear recovery would help to mitigate potential cumulative effects from off-forest activities.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance (e.g., core areas) to become more important to wildlife such as grizzly bears.

Black bear hunting on both sides of the international border within the Selkirk Recovery Area has the potential to add cumulatively to the mortality of grizzly bears. Hunters that encounter grizzly bears may mistakenly identify the bear, kill the bear in self-defense, or opportunistically poach the bear. Human access management within the recovery area is key to reducing the risk of mortality to grizzly bears from black bear hunting.

On private lands, the presence of garbage, pet food, fruit trees, or other attractants may lure bears into conflict situations. Bears that become habituated or a nuisance may lead to the bear being killed.

Conclusion

This alternative would make a high contribution to the recovery of grizzly bears in the Selkirk Recovery Area and would result in a May Affect, Not Likely to Adversely Affect determination. This is based on the existing management direction, followed in all alternatives, that addresses:

1. Human access management,
2. Disposal of carcasses in range allotments that occur in the recovery area, and
3. Proper storage of food, garbage and other attractants that may lead to human-bear interactions.

Canada Lynx

Direct and Indirect Effects of No Action Alternative on Canada lynx

Forest management activities that influence the recovery and conservation of Canada lynx include: vegetation management that affect lynx habitat components, winter recreation that influences habitat connectivity and lynx habitat use, forest roads that can become sources of lynx mortality at high traffic volumes and speeds, and grazing effects to riparian areas that provide habitat for snowshoe hares, a primary food resource for lynx (ILBT 2013). The Interagency Lynx Biology Team (ILBT 2013) developed conservation measures for core and secondary areas (USFWS 2005) to address each of these forest management activities, and for planners to consult when revising forest plans. These were used to evaluate the potential contribution of forest management alternatives to the recovery of Canada lynx.

When the USFWS reviewed existing regulatory mechanisms to determine if listing Canada lynx as a federally protected species was warranted, they determined that existing forest plans gave inadequate protections (USFWS 2003). Several national forests within the range of the Canada lynx subsequently amended their forest plans using the original Lynx Conservation Assessment and Strategy (Ruediger et al. 2000) as a basis for current science. However, forest plans in Region 6 were not amended, thus existing management plans do not address recent science and conservation recommendations (ILBT 2013), recovery objectives (USFWS 2005), or critical habitat (USFWS 2009). No critical habitat for the Canada lynx was designated on the Colville National Forest (USFWS 2009), however, both core and secondary area were identified (USFWS 2005, ILBT 2013).

Vegetation management activities affect the distribution of lynx habitat components, can fragment habitats, and create sources of disturbance (ILBT 2013). As a result, risk factors were identified and conservation measure developed to address the risk factors (ILBT 2013). The conservation measures for vegetation management apply to lynx core areas and include use of the natural range of variability to mimic pattern and scale of natural disturbances and connectivity across the landscape, while considering the future climate change (ILBT 2013). A conservation measure focused on the restoration of disturbance regimes in dry forests that occur in close proximity to lynx habitat to reduce the risk of uncharacteristically severe and frequent fires reaching lynx habitat. No management direction occurs in the existing forest plan that addresses these conservation measures.

Winter recreation can influence how lynx use habitats (ILBT). To minimize the potential of negative effects from winter recreation, the ILBT (2013) developed conservation measures to reduce effects. Conservation measures for winter recreation in lynx core areas included reducing effects on habitat connectivity and discouraging expansion of over-the-snow routes that may influence lynx habitat use (ILBT 2013). Existing management plans do not address effects of over-the-snow recreation on lynx habitat.

The conservation measures for forest roads in lynx core areas include avoiding road reconstruction or upgrades that occur in lynx habitat and would result in increased traffic speeds or volumes (ILBT 2013). These measure were developed to reduce the potential for mortality to lynx from vehicles. There is no management direction in existing plans to address this conservation measure.

The conservation measures for grazing in lynx core areas include management of riparian areas to assure adequate habitat for snowshoe hares, the primary prey species for Canada lynx (ILBT 2013). The existing forest management plan includes management direction for grazing in riparian areas to mitigate effects to habitat for listed fish species, but does not include anything specific to Canada lynx or snowshoe hares.

The No Action Alternative would provide limited management direction to address the direct and indirect effects of forest management activities on the recovery of Canada lynx. The No Action Alternative would give less protection for Canada lynx than the R and P alternatives, and protection that is similar to the B and O alternatives.

Climate Change

The potential effects of climate change on Canada lynx identified by the Interagency Lynx Biology Team (2013) included: 1) an upward shift in elevation or latitudinal distribution of lynx and prey, 2) a decrease in the amount of habitat and population size from reduced snow

persistence and increased disturbance events (e.g., fires), 3) changes in demographic rates, such as survival and reproduction, and 4) changes in predator-prey relationships.

Climate change adaptations to address these effects include restoration of landscape-scale disturbance regimes to better mimic natural patterns and processes (Spies et al. 2010, Gaines et al. 2012, Lawler et al. 2014), and maintaining or restoring habitat connectivity to allow Canada lynx to adjust their ranges to changing conditions (Heller and Zavaleta 2009, ILBT 2013, Squires et al. 2013). There is limited management direction in the existing management plans to address these climate change adaptations.

Cumulative Effects of No Action Alternative on Canada lynx

Past, present, and reasonably foreseeable actions that affect lynx habitat include timber harvest and fuels reduction, recreation, human development, and grazing on private and public lands. In addition, legal trapping of lynx, timber harvest, oil and gas development, mining and human access in British Columbia have and would continue to affect Canada lynx habitat.

Past vegetation management and large scale fires on the Forest within lynx habitat has resulted in a distribution and amount of successional stages (early, mid, late) that are outside the HRV. This alternative does not emphasize landscape restoration that would restore lynx habitats towards the HRV, providing conditions more similar to those under which lynx evolved. Thus, activities on the Forest would not mitigate for off-forest vegetation management as would occur with the action alternatives.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Grazing has occurred and would continue to take place on off-forest lands potentially impacting deciduous or riparian habitats for lynx prey species.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

All federal lands adjacent to the Forest within Canada lynx core and secondary areas would use the Lynx Conservation Assessment and Strategy (LCAS) (ILBT 2013) as current science to guide project level consultation and land management planning. The North Cascades National Park Complex recently revised their management plan to include the LCAS (NPS 2012). The Idaho Panhandle National Forest land management plan was recently revised to address the conservation measures identified in the LCAS (IPNF 2015). The conservation of lynx on WDNR lands is guided by the Department of Natural Resources Lynx Habitat Management Plan (WDNR 1996, updated in 2002). The management plan for the Pend Oreille National Wildlife Refuge provides conservation measures to contribute to the recovery and viability of Canada lynx (USFWS 2000). Colletively, these management plans have addressed many of the conservation measures identified for Canada lynx (ILBT 2013) and would help mitigate potential cumulative

effects that may occur from off-forest activities. In addition, no critical habitat was identified on the Colville National Forest or on adjacent lands (USFWS 2009).

In Canada, timber harvesting, oil and gas development, coal mining, and the proliferation of human access associated with these industries, have and would continue to affect lynx habitat. Legal trapping occurs north of the Forest in Canada and could reduce the potential for lynx to disperse into the lynx habitat on the Forest. Trapping is not legal in Idaho, Montana, or Washington.

Conclusion

The No Action Alternative would make a low contribution to the recovery of the Canada lynx in the short (≤20 years) and long (≤50 years) term, and result in a May Effect, Likely to Adversely Affect determination. This is because of the following:

1) Existing management plans do not address the best available science and conservation measures identified in the recent version of the Lynx Conservation Assessment and Strategy (ILBT 2013), and the USFWS Recovery Outline (USFWS 2005);

2) Existing management plans do not address recommended climate change adaptations, and

3) Existing management plans were found to give inadequate regulatory mechanisms to prevent listing lynx as a federally threatened species (USFWS 2003).

Late-Successional and Old Forest Habitats (Federally Listed Wildlife Species)

Woodland Caribou

Direct and Indirect Effects

The forest management activities that can influence the recovery and viability of woodland caribou include: 1) Vegetation management and natural disturbances affect the amount and connectivity of old growth forests of Engelmann spruce/subalpine fir and western redcedar/western hemlock. 2) Human access that can increase the potential for poaching and cause disturbance to caribou during the critical winter period. These effects were used to evaluate the potential contribution of each alternative to the recovery of woodland caribou.

This alternative would not implement new science, recommendations from the Biological Opinion issued in 2001 (USFWS 2001) on the 1988 Forest Plan (USFS 1988), or address the critical habitat designation (USFWS 2012). Vegetation management is currently guided by the management direction given in the land management allocation for caribou. The existing Forest Plan attempted to strike a balance between retaining old growth and providing for timber production. Timber harvest has been cited as one of the primary factors that has reduced and fragmented old growth habitats for woodland caribou (USFWS 1994, USFWS 2012).

A term and condition of the 2001 Biological Opinion was that the Forest develop a winter recreation strategy that protects important winter habitats for caribou while providing some level of winter recreation access. This strategy was developed (USFS 2003) but would not be formally adopted until the forest plan is revised. This alternative does not emphasize reducing the negative effects of forest roads on wildlife habitat (such as the Proposed Action, R and P alternatives).

Climate Change

Climate change would likely alter the distribution and abundance of suitable caribou habitat, and would change snow depths and persistence, which affect seasonal movements of mountain caribou (WDFW 2012). The potential effects of climate change depend on the interaction of seasonal temperatures and snowfall patterns, and occurrence of wildfires, outbreaks of forest insects, and diseases (Mountain Caribou Science Team 2005). Management adaptations to address the effects of climate change include a focus on forest restoration and reducing non-climatic factors that affect wildlife populations (e.g., restoring habitat effectiveness). This alternative would not implement these adaptations.

Cumulative Effects

The caribou recovery area is 1,477 square miles in size and includes the Colville National Forest, Idaho Panhandle National Forest, Idaho Department of Lands, and British Columbia. About 47 percent of the recovery area is in the US and 53 percent in British Columbia. The Idaho Panhandle National Forest recently revised their Forest Plan to address habitat and risk factors identified in the caribou recovery plan and critical habitat (USFS 2015). The caribou recovery team works cooperatively to address cumulative effects on woodland caribou.

Past activities on the Forest have impacted caribou habitat. Over-the-snow motorized use may have caused disturbance to caribou.

Past vegetation management and disturbances on the Forest have resulted in the distribution and arrangement of successional stages (early, mid, late) within caribou habitat that are outside the HRV. Presently, more of the landscape is in med-successional and less in late-successional habitats compared to HRV. This alternative would not manage habitats towards HRV, and would not be as effective at mitigating for the cumulative effects of off-forest timber harvest.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife such as caribou.

Big game hunting continues on both sides of the U.S./Canada border. Encounters with hunters may result in caribou mortality as a result of mistaken identification. Legal harvest of caribou by Treaty Indians does occur, but with few statistics on the number of animals taken it is difficult to evaluate the influence of this on the caribou population. Fatal collisions with vehicles occur on open roads in caribou habitat and are likely to continue. Predation by mountain lions, wolves and other predators would continue, with the affect on the caribou population dependent on big game populations, predator populations and a variety of other factors.

One important factor is how the Canadian officials decide to manage this herd. In the British Columbia portion of the recovery area, human activities that would continue to impact caribou

habitat include gas, powerline, and international border corridors, recreation activities, timber harvest, and highways.

Conclusion

The implementation of this alternative would have a May Affect, Likely to Adversely Affect determination for woodland caribou. It would make a low contribution to the recovery of woodland caribou. The reasons for this determination are:

1) This alternative would not address new science and risk factors identified in the recovery plan and critical habitat.

2) This alternative would not formally adopt the winter recreation strategy for caribou habitat that was a Term and Condition of the 2001 Biological Opinion.

3) This alternative does not focus on the protection and restoration of habitat, that would better address expected climate change effects, cumulative effects, and enhance landscape resiliency.

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the viability of late-successional and old forest (LSOF) dependent surrogate species include: the loss of LSOF habitat from fire (Healy et al. 2008, Davis et al. 2011), vegetation treatments (e.g. timber harvest, thinning, prescribed fire) that affect forest structure (e.g., canopy closure, snags, downed wood)(Healy et al. 2008, Wisdom et al. 2008, Davis et al. 2011), management of roads that influence habitat effectiveness (Gaines et al. 2003), and protection of riparian areas which are an important element of LSOF habitats for some species (e.g., bald eagles).

The existing management direction for LSOF species is based on a system of small management areas that retains LSOF habitat for specific Management Indicator Species (e.g., American marten, barred owl, pileated woodpecker). These areas range in size from 75 to 300 acres, are relatively equally distributed, but have no way to provide for habitat connectivity between or among the small islands of habitat. These small islands of habitat are also highly susceptible to disturbances such as fire, insects, and tree diseases, with no redundancy or replacement habitat in the event they are lost. This system was based on minimizing the effects of protection of LSOF habitat on the timber harvest level. This system was deemed inadequate to provide for the viability of LSOF species and thus Forest Plans were amended with the east-side screen (USFS 1995). The intent was for the east-side screens to provide interim direction until the Forest Plan was revised.

The area in-between the small islands of LSOF habitat is managed primarily through even-aged timber production, with some protections for elements of LSOF habitat, such as snags and downed wood. However, the combination of roads and timber harvest generally results in these areas having snag habitat below levels that would maintain viable populations of snag dependent wildlife species. Again, the management direction in the original Forest Plan was deemed inadequate, thus additional direction was adopted through the east-side screens (USFS 1995), with the intent that this would serve as interim direction until Forest Plan was revised. The east-side screens restrict the cutting of trees $\geq$21 inches in diameter.

This alternative would not provide management direction that would reduce the negative effects of roads on wildlife habitats. Currently, there are about 4,000 miles of road, resulting in an overall road density on the roaded portion of the Forest of about 3 miles/square mile, which is considered a low level of habitat effectiveness for many surrogate species (Wisdom et al. 2000, Gaines et al. 2003).

Overall, the No Action Alternative would provide management direction for LSOF habitat that is similar to the B and O Alternatives, but would provide less habitat than the R and P Alternatives. This alternative would not improve the viability outcomes in the short (≤20 years) or long (≤50 years) time periods (Appendix B) for surrogate wildlife species that are dependent on LSOF habitats.

Climate Change

The sensitivity of LSOF associated surrogate wildlife species to the effects of climate change were identified as medium for pileated woodpecker, and high for northern goshawk and American marten (CCSD 2013). The primary effect of climate change is the loss of LSOF habitats due to altered disturbance regimes (CCSD 2013).

Since the mid-1980s, the size and intensity of large wildfires in the western United States have increased markedly (Westerling et al. 2006), due, in part, to a reduction in fuel moisture driven by increased temperature and lower snowpack. Increases in fire risk and severity have been also been driven, in part, by increased fuel loads because of fire suppression practices used over the last century (McKenzie et al. 2004). Predicted increases in spring and summer temperature identified in many climate change models would exacerbate the frequency and intensity of disturbances such as fire (McKenzie et al. 2004, Wotton and Flannigan 1993) and defoliation caused by forest insects (Littell et al. 2009). In the interior Columbia Basin, Littell et al. (2009) predicted that the area burned is likely to double or even triple by 2050. Climate-driven changes in fire regimes would likely be the dominant driver of changes to forests and LSOF habitats in the western United States over the next century (McKenzie et al. 2004).

A landscape restoration approach is not emphasized in this alternative. Landscape-scale restoration has been identified as an adaptive strategy to create landscapes more resilient to climate change (Spies et al. 2010, Gaines et al. 2012) and to maintain late-successional and old forest habitat structure (Lawler et al. 2014). The emphasis on restoration of resiliency would result in landscapes, including disturbance regimes, which are more resilient to climate change through the application of strategically located restoration treatments in priority locations (Noss et al. 2006, Spies et al. 2006, Gaines et al. 2010, Franklin and Johnson 2012). By strategically locating restoration treatments, landscape-scale fire behavior may be altered to be more similar to native disturbance regimes and the risk of loss of LSOF habitat to uncharacteristically severe fires may be reduced (Finney 2001, Finney et al. 2006, Ager et al. 2007, Lehmkuhl et al. 2007).

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats, and protect and restore LSOF habitats (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, and LSOF habitat

protections in the original Forest Plan were found to be inadequate and were amended by the eastside screens (USFS 1995).

Past vegetation management and disturbances on the Forest have resulted in the distribution and arrangement of successional stages (early, mid, late) that are outside the HRV. Presently, more of the landscape is in mid-successional and less in late-successional, especially late-open, habitats compared to HRV. This alternative would manage habitats towards HRV resulting in a distribution and amount of successional stages that better mimic conditions under which surrogate wildlife species evolved, and better mitigate for the cumulative effects of off-forest timber harvest.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusion

The implementation of this alternative would make a relatively low contribution to the viability of LSOF dependent surrogate wildlife species. This determination is based on the following:

1) The LSOF habitat provided by this alternative may not maintain viable populations of LSOF surrogate wildlife species

2) This alternative does not emphasize restoration of landscape resiliency to reduce the loss of LSOF habitats to uncharacteristically severe wildfires

3) The protection and conservation of key elements of LSOF habitat such as old trees, snags, and riparian areas is less than other alternatives and dated

4) The alternative would not result in the restoration of habitat effectiveness by reducing the negative effects of roads on LSOF habitats

Motorized Recreation and Road Access

Surrogate Wildlife Species

Direct and Indirect Effects

Motorized recreation and the use of forest roads influence the viability of surrogate wildlife species. These potential effects include displacement from key habitats, disturbance during critical periods, and the risk of mortality caused by collisions with vehicles (see Wisdom et al. 2000 and Gaines et al. 2003 for a complete list of road and trail associated factors that influence wildlife). The effects of motorized recreation and roads can occur during the non-winter period or during the winter period when snowmobiling or ski-trail grooming occurs.

Implementation of this alternative would have limited opportunity to reduce the negative effects of roads on surrogate species habitats. The current management direction for roads is limited, scattered through numerous document and amendments, and was largely intended to address big-game species (e.g., road density is limited to 0.4 to <1.5 miles of open road/square mile on winter ranges).

This alternative would not change the current level of winter or summer motorized trail use, thus would not change the impacts to surrogate species habitat effectiveness. Overall, this alternative would provide a level of habitat effectiveness for surrogate wildlife that is similar to Alternative O, and less than the Proposed Action, B, R, and P alternatives. The viability outcomes for surrogate wildlife species would not be improved and would remain below the historical capability.

Climate Change

The sensitivity of surrogate wildlife species used to assess the effects of roads and motorized recreation is rated as moderate for bighorn sheep, and high for Harlequin duck, Canada lynx, and wolverine (CCSD 2013). An important climate change adaptation that has been recommended for wildlife is to reduce the negative effects of roads and motorized recreation on habitat (Gaines et al. 2012, Lawler et al. 2014). By reducing the negative effects of roads and motorized recreation, habitats (especially riparian and wetland habitats) can become more resilient to the effects of climate change, and habitat connectivity can be restored allowing wildlife to adjust their ranges as conditions change. The management direction for roads provided in the No Action Alternative would make very limited improvement to habitat effectiveness for surrogate wildlife species.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and restore habitat effectiveness (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, mostly focused on big-game species.

The limited management direction in the existing Forest Plan to reduce the negative effects of roads on wildlife and continued development of private lands (located mostly in north-south valley bottoms that bisect the CNF) means that management of roads and motorized trails on federal lands is even more important to the viability of surrogate wildlife species.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusion

The implementation of this alternative would make a relatively low contribution to the viability of surrogate wildlife species whose habitats are influenced by motorized access. This would occur because:

1) The alternative includes limited management direction to reduce the effects of roads on habitat effectiveness for surrogate wildlife species,

2) This alternative does not alter the current effects that summer and winter motorized trails have on habitat effectiveness for surrogate wildlife species,

3) This alternative does little to address the cumulative effects of human access and development on wildlife habitats.

Livestock Grazing

Surrogate Wildlife Species

Direct and Indirect Effects

Grazing can influence habitats of surrogate wildlife species by removing key habitat elements (e.g., dense shrubs for MacGillivray's warbler and fox sparrow), especially in riparian habitats, altering disturbance regimes that maintain habitat structure (e.g., frequent fires in dry forests and grasslands keep open canopy for western bluebird), and influence the availability of important prey items (e.g., squirrels for golden eagles). To address the potential effects on surrogate wildlife species, the management direction regarding grazing in riparian habitat and upland habitats for each alternative was assessed.

This alternative would continue with the existing interim direction (INFISH) for riparian habitats. Presently, some riparian habitats are in poor condition due to the effects of past and current grazing. The plan direction for this alternative would have little effect on altering the distribution of livestock that would allow riparian habitats to recover.

This alternative does not include ecologically based Desired Conditions for upland non-forest habitats (e.g., rangeland and alpine habitats) or Standards to protect unique habitats. This alternative would not alter the number of livestock, the intensity of grazing, or the amount of area grazed. Presently, 73 percent of the Forest is in a livestock allotment and animal unit months (AUMs) average about 25,000 per year. The viability outcomes for surrogate wildlife species would not be improved and would remain below the historical capability.

Climate Change

Habitats that are particularly sensitive to the effects of climate change include riparian areas (including wetlands) and alpine areas (Lawler et al. 2014). A management adaptation to make these habitats more resilient to climate change is to reduce the effects of non-climatic stressors (e.g., roads, intense grazing, etc.)(Lawler et al. 2014). This alternative has limited management direction that would restore the resiliency of habitats that are sensitive to climate change.

Cumulative Effects

Grazing occurs on nearby private, state, tribal, and federal lands. Where grazing is allowed on the adjacent Okanogan-Wenatchee National Forest and Idaho Pan Handle National Forest, it is managed to accommodate other public land uses, such as contributing to the viability of surrogate wildlife species. On the adjacent Little Pend Oreille Wildlife Refuge, livestock grazing was reduced over time to allow restoration of riparian habitats and is currently only used to achieve specific wildlife habitat objectives (USFWS 2000). Grazing on non-federal lands increases the need to provide for wildlife habitats on federal lands that contribute to the viability of surrogate wildlife species.

This alternative does not include management direction for some key habitats that would better account for the cumulative effects of grazing on wildlife habitats.

Conclusion

The implementation of this alternative would make a relatively low contribution to viability for surrogate wildlife species that are influenced by domestic grazing. This determination is based on:

1) This alternative has limited management direction for riparian habitat to reduce the negative effects of grazing and improve riparian habitat condition, and

2) This alternative would not change the number, grazing intensity or distribution of livestock.

Habitat Connectivity

Surrogate Wildlife Species

Direct and Indirect Effects

A number of forest management activities influence habitat connectivity for surrogate wildlife species. These include: the amount, patch sizes, and arrangement of suitable habitats; location and density of motorized travel routes, especially in relation to riparian and LSOF habitats; and the ability of surrogate wildlife species to access wildlife crossing structures where national forest lands occur adjacent to highways and freeways. These are addressed in the evaluation of how forest management alternatives would affect habitat connectivity for surrogate wildlife species.

Current management direction focuses on providing habitat connectivity for LSOF species through the identification of connectivity corridors during project planning (as per eastside screens, USFS 1995). Additional provisions for low to moderate mobility LSOF species are provided in Riparian Management Zones. No management direction addresses habitat connectivity for wildlife species that are not associated with LSOF habitats (e.g., wide-ranging carnivores, Singleton et al. 2002).

The implementation of this alternative would have limited opportunity to reduce the negative effects of roads on habitat connectivity for surrogate wildlife species because current management direction for roads is limited, scattered through numerous documents and amendments, and was largely intended to address big-game species only. This alternative would not change the current level of winter or summer motorized trail use, thus would not change the effects to surrogate species habitat effectiveness. The viability outcomes for surrogate wildlife species would not be improved and would remain below the historical capability.

Climate Change

Maintaining and restoring ecological connectivity is the most oft-cited climate adaptation strategy for biodiversity conservation (Heller and Zavaleta 2009, Opham and Wascher 2004, Parmesan 2006, Spies et al. 2010) and has been identified as an important adaptation strategy for wildlife in northeast Washington (Gaines et al. 2012). This is because species' range shifts have been the primary biological response to past episodes of climatic change, yet widespread anthropogenic barriers to movement would now challenge species' ability to respond (Price 2002, Thomas and Lennon 1999, Wormworth and Mallon 2006).

Current management plans provide direction to address habitat connectivity for some highly mobile LSOF wildlife species. However, there is no management direction that addresses habitat connectivity for wildlife species not associated with LSOF habitats (e.g. wide-ranging carnivores), nor do existing management plans address the effects of forest roads on habitat connectivity. Much has been learned about the effects of climate change on wildlife since the 1988 forest plan was developed and amended, and the existing plan does not adequately address recommended climate adaptations to maintain or restore habitat connectivity for a wide-array of wildlife species.

Cumulative Effects

Past, present and reasonably foreseeable human developments and transportation infrastructure, along with land ownership patterns, create cumulative impacts that limit options to conserve or restore regional habitat connectivity. Regional habitat connectivity has been evaluated for a variety of wildlife species, including the surrogate wildlife species used to evaluate connectivity in this planning area (Singleton et al. 2002, WWHCWG 2010, Proctor et al. 2015). These assessments have shown the importance of the Colville National Forest in providing stepping-stone habitats between the Cascade Range and Selkirk Mountains (Singleton et al. 2002, WWHCWG 2010). Connectivity from the Cascade Range to the Kettle Range and the Selkirk Mountains is interrupted by transportation corridors and human developments that are associated with the Okanogan, Upper Columbia, and Pend Oreille river valleys (Singleton et al. 2002, WWHCWG 2010). Planning efforts are currently underway to determine the feasibility of constructing a wildlife-crossing structure near Riverside (in the Highway 97 corridor) for connectivity between the Cascade and Kettle Ranges. Additionally, connectivity planning in southern British Columbia identified linkage areas that could greatly enhance wildlife movements between the Selkirk Mountains and Purcell Mountains (Apps et al. 2007, Proctor et al. 2015).

Reducing the direct and indirect effects of roads on wildlife habitats would contribute to the maintenance and restoration of habitat connectivity, including cumulative effects, but is not well addressed in the current management plan. Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusions

The existing management plans have limited direction that addresses habitat connectivity, and most is relevant to wildlife species associated with LSOF habitats. Thus, the implementation of the No Action Alternative would provide a relatively low contribution to the viability of surrogate

wildlife species used to assess habitat connectivity. The primary reasons for this conclusion include:

1) No management direction to address wildlife species that are not associated with LSOF habitats (e.g., wide-ranging carnivores)

2) Limited management direction that addresses the effects of roads and road network on habitat connectivity, despite this being a primary factor that influences wildlife movements

Snag Habitat

Surrogate Wildlife Species

Direct and Indirect Effects

Some forest activities directly influence the availability of habitat for snag-dependent surrogate species. These include firewood cutting (Bate et al. 2007, Hollenbeck et al. 2013), hazard tree reduction that causes the loss of snag habitat along roads and at recreation sites (Bate et al. 2007, Hollenbeck et al. 2013, Wisdom et al. 2008), and removal of snags during timber harvest for safety reasons (Wisdom et al. 2008).

The existing Forest Plan management direction for snag habitat to address the potential loss of habitat in timber sale operations was based on snag densities that more recent science has shown would not provide for viable populations of snag dependent species. Thus, interim policy was adopted to revise these numbers (east side screens, USFS 1995). This alternative does not include a diameter limit on the size of snags cut for firewood as in other alternatives.

Existing management plans provide limited opportunity to reduce the negative effects of roads on surrogate species habitats, such as the loss of snag habitat, because current management direction for roads is limited, scattered through numerous documents and amendments (e.g., Roadless Rule, USFS 2000), and was largely intended to address big-game species only.

Overall, this alternative would provide habitat protections for snag dependent wildlife that are similar to Alternatives B and O, but less than the Proposed Action, R and P alternatives. The viability outcomes for snag-dependent surrogate wildlife species would not be improved and remain below the historical capability.

Climate Change

Surrogate wildlife species associated with snag habitats include the pileated woodpecker, white-headed woodpecker, black-backed woodpecker, and Lewis's woodpecker. These species have a medium sensitivity rating to climate change, and the western bluebird as high sensitivity (CCSD 2013). The primary effect anticipated from climate change is the loss of habitat due to altered disturbance regimes. Because this alternative does not focus on landscape scale restoration, the restoration of disturbances regimes would not be emphasized. Thus, habitat for snag dependent surrogate wildlife is likely to be lost at an accelerated rate due to increased disturbances associated with climate change, loss of snag habitat from relatively intense timber harvest, and loss associated with roads as snags are cut for firewood and to reduce hazard trees. The increase in fire associated with climate change could create a short-term gain in snag habitat followed by a long-term reduction (80-100 years, Harrod et al. 1998) as snags attrition occurs.

Cumulative Effects

Past and current management on public and private lands have generally resulted in a reduction in large (>20 inches DBH) snag habitat below HRV (Hessburg et al. 1999). The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and more rigorous snag requirements to contribute to the viability of snag dependent wildlife (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan. The current plan provides limited management direction to reduce the effects of roads on wildlife habitats and current required snag densities make limited contribution to the viability of surrogate wildlife species. The limited management direction for snag habitat on non-federal lands adjacent to the planning area places additional emphasis on providing for viability populations of snag-dependent wildlife species on federal lands. Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done is such a way that they restore wildlife habitat that has been affected by fire exclusion, but treatments can lead to the loss of snag habitat for safety reasons.

Conclusion

The implementation of this alternative would make a relatively low contribution to the viability of snag dependent surrogate wildlife species. This determination is based on:

1) The negative effects of roads on the loss of snag habitat would not be addressed

2) The snag densities that are required to be left following timber harvest do not address recent science showing these number to be too low to maintain viable populations of snag-dependent species

3) There is no diameter limit on the size of snags that are cut for firewood

Riparian Habitats

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the quality and availability of habitat for riparian dependent surrogate species include management of roads, recreation sites, and vegetation treatments that occur within riparian habitats.

In the No Action alternative, management direction for watersheds and riparian habitats is not consolidated into one consistent set of plan components (e.g., direction is in both the existing forest plan and in the INFISH amendment). Standards and guidelines would limit management activities allowed to occur within riparian habitats. This alternative includes smaller (compared to other alternatives except B) riparian management area widths along intermittent streams, lakes, and ponds in the areas covered by the INFISH forest plan amendment (USFS 1995).

The implementation of this alternative would not reduce the effects of roads on riparian habitats. Overall, this alternative would provide habitat protection for riparian associated wildlife that is similar to the alternative B, but less than the Proposed Action, O, R and P alternatives.

Conditions that contribute to viability of surrogate species would be maintained at levels below the historical capability and viability outcomes would not be considerably improved.

Climate Change

Some of the riparian associated surrogate species are rated as high sensitivity to climate change (CCSD 2013) and riparian habitats are considered vulnerable to the anticipated effects of climate change (Lawler et al. 2014). The primary effect anticipated from climate change is the loss of habitat and reduced connectivity of riparian habitats due to altered hydrologic regimes and disturbances (fire) regimes (Lawler et al. 2014).

The emphasis of this alternative is on timber management. Because this alternative does not focus on landscape scale restoration, the restoration of disturbances regimes would not be emphasized. Thus, habitat for riparian dependent surrogate wildlife is likely to be lost at an accelerated rate due to increased disturbances associated with climate change and some loss of riparian habitat from timber harvest. In addition, an important adaptation for climate change for riparian habitats is to restore their resiliency by reducing the negative effects of roads (Lawler et al. 2014). However, this alternative has limited management direction to reduce road effects on riparian habitats and does not emphasize watershed restoration.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. Management plans for the Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge reduce the negative effects of roads on wildlife habitats, and protect and restore riparian habitats (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, and riparian habitat protections in the original Forest Plan were found to be inadequate and were amended (INFISH, PACFISH-USFS 1995; ACS-USFS 1994).

On private lands, Washington State Forestry Practices Act provides some limited protections for riparian habitats. Management of priority watersheds emphasizes using an “all lands” approach to enhance coordination across landowners and may enhance conditions for riparian associated wildlife species. However, habitat protections for riparian habitats on federal lands would help to mitigate for the limited protections and cumulative that occur on private lands.

Conclusion

The implementation of this alternative would make a relatively low contribution to the viability of riparian dependent surrogate wildlife species. This determination is based on the following:

1) This alternative lacks effective and clear management direction to reduce the negative effects of roads on riparian habitat for surrogate wildlife species

2) More rigorous riparian management direction, including Standards, included in other alternatives (e.g., R), which better protects riparian habitats and would better address potential effects of climate change and cumulative effects

3) The viability outcomes for surrogate wildlife species dependent on riparian habitats would not be improved

Species of Management Interest

Deer and Elk

Direct and Indirect Effects

Forest management activities can influence deer and elk populations and habitat use. Vegetation management activities may affect the distribution and abundance of cover and forage. Adequate forage is particularly important during the summer and fall before the following birthing season when this can have a positive effect on the condition of pregnant females (Lenz 1997, Cook 1998, Cook 2002, Cook et al. 2004, Cook et al. 2005). The management of forest roads and trails can influence how deer and elk use habitats, and influence the interactions between deer and elk (Rowland et al. 2005, Wisdom et al. 2005a,b). Additionally, deer and elk can compete with domestic livestock for both food resources (Findholt et al. 2005) and space (Coe et al. 2001, Coe et al. 2005). Thus, the potential effects that vegetation management, road and trail management, and grazing management can have on deer and elk habitats and population are evaluated for each of the alternatives.

Under the No Action Alternative, cover and forage for deer and elk on winter ranges emphasizes the retention of winter thermal cover. Considerable research has shown that the management of deer and elk winter habitat should be less focused on the retention of thermal cover and more focused on the availability of forage on summer and fall habitats (see Cook et al. 2005 for a review). This alternative, like alternatives B and O, would not incorporate the current science about the role of winter thermal cover and summer forage in contributing to the sustainability of deer and elk populations.

This alternative would not alter the current habitat effectiveness for deer and winter ranges through road management. The Selkirk Elk Herd has a moderate level of habitat effectiveness (moderate level of human influence) on their winter ranges (see Gaines et al. 2003 for calculation of habitat effectiveness). Currently, in 38 percent of the watersheds, winter habitat for deer has a high habitat effectiveness index (low level of human influence), 38 percent of the winter habitat has a moderate level of habitat effectiveness (moderate level of human influence), and 24 percent has a low level of habitat effectiveness (high level of human influence). Current management direct for winter ranges is based on road density standards. Rowland et al. (2005) found road density to be a poor indicator of habitat use by deer and elk and recommended the use of the zone of influence instead. This is incorporated into the Proposed Action and alternatives R and P.

Under this alternative, no changes would occur to current grazing practices on national forest allotments. Degraded range conditions would be maintained or slowly be improved, likely having negative effects to deer and elk habitat use and populations (Coe et al. 2001, 2005; Findholt et al. 2005). More robust range management direction (e.g., ecologically based Desired Conditions in the other alternatives) would not be adopted.

Climate Change

Deer and elk have a low level of sensitivity to the effects of climate change due to their ability to tolerate a relatively wide range of climatic conditions, their high mobility, and as habitat generalists (CCSD 2013). However, alternatives that restore landscape pattern and functions while reducing the effects of roads on deer and elk summer and winter habitats would provide more resilience deer and elk populations. This alternative does not emphasize landscape-scale restoration and nor does it provide consistent and effective management direction for roads that would restore habitat effectiveness for deer and elk.

Cumulative Effects

The historical cattle and sheep grazing that occurred on portions of the Forest degraded range conditions (Wissmar et al. 1994, Bunting et al. 2002). These conditions, combined with current domestic (cattle) and wild ungulate grazing (primarily elk and deer), have resulted in the maintenance or slow recovery of poor range conditions in some areas (Wissmar et al. 1994, Bunting et al. 2002). In turn, these poor range conditions have had negative effects on some important unique habitats such as riparian areas and meadows. This alternative would not result in more rigorous grazing management direction that would help to address this situation.

Winter ranges for the deer and elk occur on Federal lands, adjacent Wildlife Management Areas managed by the State, and private lands. Elk herd management plans (WDFW 2001) provide guidance for elk management on state lands and make recommendations for elk management on Forestlands. Management plans for deer include the White-tailed Deer Management Plan that provides direction to manage hunting to maintain deer populations (WDFW 2010). A statewide general management plan for mule deer has been developed but does not provide herd-specific management objectives (WDFW 2008). Mule deer are widely distributed across the Forest. A considerable amount of historical winter range for deer and elk is now in private land ownership or under the waters of Lake Roosevelt (created by the Grand Coulee dam). The cumulative effects of the existing management plans (state and federal lands) would provide for the conditions that contribute to sustainable populations of deer and elk, while considering the effects of private land development.

Conclusion

The implementation of the No Action Alternative would make a relatively low contribution to the conditions that support sustainable populations of deer and elk. This is based on the following:

1) This alternative would not address new science that recommends de-emphasizing the importance of winter thermal cover and increasing the emphasis on summer and fall forage quality and quantity.

2) This alternative does not provide consistent and effective direction on the management of roads to restore habitat effectiveness on deer and elk summer and winter ranges.

3) This alternative would not include more rigorous management direction to improve the conditions of key habitats, such as riparian areas and meadows that are in poor condition due to the cumulative effects of past grazing practices, and current domestic and wild ungulate grazing.

Effects of Proposed Action Alternative - Wildlife

Federally Listed Wildlife Species

Grizzly Bear

Direct and Indirect Effects

Forest activities that influence the recovery of the grizzly bear include: human access that can displace bears from important seasonal habitats or increase the risk of bear-human interactions, disposal of livestock carcasses within range allotments to avoid attracting bears to a potential

food source, and the storage of food and garbage at recreation sites to reduce the potential for bears to associate humans with food sources.

Management of grizzly bears does not vary between alternatives. Existing management direction provides standards for human access, disposal of livestock carcasses, and food and garbage storage within the Selkirk Grizzly Bear Recovery Area (IGBC 1998, USDA 1988, USFWS 1993, USDI 2001). Existing standards have largely been met and would continue to be followed.

Climate Change

Grizzly bears have been identified as having a low sensitivity to climate change because they are opportunistic, eat a diverse array of food resources, and are highly adaptable (Servheen and Cross 2010, CCSD 2013). Anticipated impacts may include changes in the timing of denning due to longer snow-free periods and reduced snowpack (Lawler et al. 2014) and changes in the availability of food sources (Servheen and Cross 2010). These changes may put bears at risk of negative human interactions for a longer period of time each year (Servheen and Cross 2010). This would make education, proper food and garbage storage, carcass disposal measures, and human access management that much more important.

Cumulative Effects

The primary reason for the low population of grizzly bears in the recovery zone is past persecution and human-cause mortality of bears. Legal protections are now in place to protect grizzly bears. Information/education programs, sanitation measures, and access management have and would continue to be used to aid in the recovery of grizzly bears in the Selkirk Recovery Area.

Past, present and reasonably foreseeable future actions that could affect grizzly bears include timber harvest and associated road construction, recreational activities that can cause disturbance to bears and create potential for human-bear conflicts, and human development that fragment grizzly bear habitat. Cumulative effects are evaluated across the Recovery Area by tracking activities within Grizzly Bear Management Units (GBMUs). Other land managers have adopted and are following similar management direction (IPNF 2015) and overall recovery is coordinated by the Selkirk Grizzly Bear Management Subcommittee. GBMUs that occur on the Colville National Forest include the LeClerc, Salmo-Priest, and Sullivan-Hughes. The contribution made on federal lands to grizzly bear recovery would help to mitigate potential cumulative effects from off-forest activities.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance (e.g., core areas) becoming more important to wildlife such as grizzly bears.

Black bear hunting on both sides of the international border within the Selkirk Recovery Area has the potential to add cumulatively to the mortality of grizzly bears. Hunters that encounter grizzly

bears may mistakenly identify the bear, kill the bear in self-defense, or opportunistically poach the bear. Human access management within the recovery area is key to reducing the risk of mortality to grizzly bears from black bear hunting.

On private lands, the presence of garbage, pet food, fruit trees, or other attractants may lure bears into conflict situations. Bears that become habituated or a nuisance may lead to the bear being killed.

Conclusion

This alternative would make a relatively high contribution to the recovery of grizzly bears in the Selkirk Recovery Area and would result in a May Affect, Not Likely to Adversely Affect determination. This is based on the existing management direction, followed in all alternatives, that addresses:

1. Human access management,
2. Disposal of carcasses in range allotments that occur in the recovery area, and
3. Proper storage of food, garbage and other attractants that may lead to human-bear interactions.

Canada Lynx

Direct and Indirect Effects

The forest management activities that influence the recovery and conservation of Canada lynx include: vegetation management that affects lynx habitat components, winter recreation that influences habitat connectivity and lynx habitat use, forest roads that can become sources of lynx mortality at high traffic volumes and speeds, and grazing effects to riparian areas that provide habitat for snowshoe hares, a primary food resource for lynx (ILBT 2013). The Interagency Lynx Biology Team (ILBT 2013) developed conservation measures for core and secondary areas (USFWS 2005) to address each of these forest management activities, and for planners to consult when revising forest plans. These were used to evaluate the potential contribution of forest management alternatives to the recovery of Canada lynx.

Vegetation management activities affect the distribution of lynx habitat components, can fragment habitats, and create sources of disturbance (ILBT 2013). As a result, risk factors were identified and conservation measure developed to address the risk factors (ILBT 2013). The conservation measures for vegetation management apply to lynx core areas and include the use of the natural range of variation to mimic the pattern and scale of natural disturbances and connectivity across the landscape, while considering future climate change (ILBT 2013). A conservation measure focused on the restoration of disturbance regimes in dry forests that occur in close proximity to lynx habitat to reduce the risk of uncharacteristically severe and frequent fires reaching lynx habitat. Finally, conservation measures also limit the amount of vegetation management and the rate of habitat change (e.g., acres treated/decade) within lynx analysis units. The implementation of this alternative includes management direction to manage habitat for Canada lynx toward desired conditions that are based on the natural range of variability. This means that habitats would be managed so that the amount of habitat, patch sizes, and spatial arrangement would mimic conditions under which lynx evolved (Hessburg et al. 1999, Agee 2000).

Winter recreation can influence how lynx use habitats (ILBT 2013). To minimize the potential of negative effects from winter recreation, the ILBT (2013) developed conservation measures to reduce effects. Conservation measures for winter recreation in lynx core areas included reducing

effects on habitat connectivity and discouraging expansion of over-the-snow routes that may influence lynx habitat use (ILBT 2013). Management direction in this alternative is for no expansion of over-the-snow winter recreational activities in lynx habitat.

The conservation measures for forest roads in lynx core areas include avoiding road reconstruction or upgrades that occur in lynx habitat and would result in increased traffic speeds or volumes (ILBT 2013). These measures would reduce the potential for vehicular traffic to result in a source of mortality to lynx. This alternative includes management direction to limit road reconstruction and upgrades in lynx habitat that would increase traffic volume or speed.

The conservation measures for grazing in lynx core areas include management of riparian areas to assure adequate habitat for snowshoe hares, the primary prey species for Canada lynx (ILBT 2013).

The Proposed Action would provide management direction to address the direct and indirect effects of forest management activities on the recovery of Canada lynx. The Proposed Action alternative would provide more protections for Canada lynx than the No Action, B, and O alternatives, and similar to the R and P alternatives.

Climate Change

The potential effects of climate change on Canada lynx identified by the Interagency Lynx Biology Team (2013) included: 1). An upward shift in elevation or latitudinal distribution of lynx and prey, 2) A decrease in the amount of habitat and population size from reduced snow persistence and increased disturbance events (e.g., fires), 3). Changes in demographic rates, such as survival and reproduction, and 4). Changes in predator-prey relationships.

Climate change adaptations to address these effects include restoration of landscape-scale disturbance regimes to better mimic natural patterns and processes (Spies et al. 2010, Gaines et al. 2012, Lawler et al. 2014), and maintaining or restoring habitat connectivity to allow Canada lynx to adjust their ranges to changing conditions (Heller and Zavaleta 2009, ILBT 2013, Squires et al. 2013). There is management direction in this alternative to implement climate change adaptations through the focus on whole-landscape restoration, and the restoration of conditions that would enhance connectivity of habitats (see Habitat Connectivity sections).

Cumulative Effects

Past, present, and reasonably foreseeable actions that affect lynx habitat include timber harvest and fuels reduction, recreation, human development, and grazing on private and public lands. In addition, legal trapping of lynx, timber harvest, oil and gas development, mining and human access in British Columbia have and would continue to affect Canada lynx habitat.

Past vegetation management and large scale fires on the Forest within lynx habitat has resulted in a distribution and amount of successional stages (early, mid, late) that are outside the HRV. This alternative would result in vegetation management activities that would restore lynx habitats towards the HRV, providing conditions more similar to those under which lynx evolved.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Grazing has occurred and would continue to take place on off-forest lands potentially impacting deciduous or riparian habitats for lynx prey species.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

All federal lands within Canada lynx core and secondary areas would use the Lynx Conservation Assessment and Strategy (LCAS) (ILBT 2013) as current science to guide project level consultation and land management planning. The North Cascades National Park Complex recently revised their management plan to include the LCAS (NPS 2012). The Idaho Panhandle National Forest land management plan was recently revised to address the conservation measures identified in the LCAS (USFS 2015). The conservation of lynx on WDNR lands is guided by the Department of Natural Resources Lynx Habitat Management Plan (WDNR 1996, updated in 2002). The management plan for the Pend Oreille National Wildlife Refuge provides conservation measures to contribute to the recovery and viability of Canada lynx (USFWS 2000). Colletively, these management plans have addressed many of the conservation measures identified for Canada lynx (ILBT 2013) and would help mitigate potential cumulative effects that may occur from off-forest activities. In addition, no critical habitat was identified on the Colville National Forest or on adjacent lands (USFWS 2009).

In Canada, timber harvesting, oil and gas development, coal mining, and the proliferation of human access associated with these industries, have and would continue to affect lynx habitat. Legal trapping occurs north of the Forest in Canada and could reduce the potential for lynx to disperse into the lynx habitat on the Forest. Trapping is not legal in Idaho, Montana, or Washington.

Conclusion

The Proposed Action Alternative would make a relatively high contribution to the recovery of the Canada lynx in both the short (≤20 years) and long (≤50 years) term, and result in a May Effect, Not Likely to Adversely Affect determination. This is because of the following:

1) This alternative incorporates the best available science and conservation measures identified in the recent version of the Lynx Conservation Assessment and Strategy (ILBT 2013), and USFWS Recovery Outline (USFWS 2005)..

2) This alternative would implement recommended climate change adaptations by focusing on the restoration of forest disturbance regimes and resiliency, and reducing the impacts of roads on habitat connectivity.

3) This alternative addresses previous findings that existing management plans provided inadequate regulatory mechanisms to prevent the listing of lynx as a federally Threatened species (USFWS 2003).

Late-Successional and Old Forest Habitats (Federally Listed Wildlife Species)

Woodland Caribou

Direct and Indirect Effects

The forest management activities that can influence the recovery and viability of woodland caribou include: 1) Vegetation management and natural disturbances affect the amount and connectivity of old growth forests of Engelmann spruce/subalpine fir and western redcedar/western hemlock. 2) Human access that can increase the potential for poaching and cause disturbance to caribou during the critical winter period. These effects were used to evaluate the potential contribution of each alternative to the recovery of woodland caribou.

This alternative would implement new science, recommendations from the Biological Opinion issued in 2001 (USFWS 2001) on the 1988 Forest Plan (USFS 1988), and address the critical habitat designation (USFWS 2012). Vegetation management would be focused on the restoration late-successional and old forest habitats based the natural and future range of variability. The Desired Conditions would be for the amount, spatial arrangement, and connectivity of caribou habitat to mimic natural patterns and processes.

A term and condition of the 2001 Biological Opinion was that the Forest develop a winter recreation strategy that protects important winter habitats for caribou while providing some level of winter recreation access. This strategy was developed (USFS 2003) and would be fully integrated into this alternative. The strategy includes information and education about the effects of winter recreation on wildlife, monitoring and enforcement of areas closed to over-the-snow activities, and limitations on permitted over-the-snow activities. Collectively, these actions have reduced the impacts of winter recreation to caribou habitat while providing recreation opportunities in areas and at the time of the winter season when effects to caribou are minimal. In addition to winter recreation, this alternative emphasizes reducing the negative effects of forest roads on wildlife habitat (though not to the degree in the R and P alternatives).

Climate Change

Climate change would likely alter the distribution and abundance of suitable caribou habitat, and would change snow depths and persistence, which affect seasonal movements of mountain caribou (WDFW 2012). The potential effects of climate change depend on the interaction of seasonal temperatures and snowfall patterns and occurrence of wildfires, outbreaks of forest insects, and diseases (Mountain Caribou Science Team 2005). Management adaptations to address the effects of climate change include a focus on forest restoration and reducing non-climatic factors that affect wildlife populations (e.g., reducing the negative impacts of roads and winter recreation). This alternative would implement these adaptations.

Cumulative Effects

The caribou recovery area is 1,477 square miles in size and includes the Colville National Forest, Idaho Panhandle National Forest, Idaho Department of Lands, and British Columbia. About 47 percent of the recovery area is in the US and 53 percent in British Columbia. The Idaho Panhandle National Forest recently revised the forest plan to address habitat and risk factors identified in the caribou recovery plan and critical habitat (USFS 2015). The caribou recovery team works cooperatively to address cumulative effects on woodland caribou.

Past activities on the Forest have impacted caribou habitat. Over-the-snow motorized use, prior to the implementation of the Winter Recreation Strategy (USFS 2003), may have caused disturbance to caribou. The alternative would continue with implementation of the Winter Recreation Strategy, limiting the cumulative effects on caribou.

Past vegetation management and disturbances on the Forest have resulted in the distribution and arrangement of successional stages (early, mid, late) that are outside the HRV. Presently, more of the landscape is in med-successional and less in late-successional habitats compared to HRV. This alternative would manage habitats towards HRV resulting in a distribution and amount of successional stages that better mimic conditions under which caribou evolved, and better mitigate for the cumulative effects of off-forest timber harvest.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These projects can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife such as caribou.

Big game hunting continues on both sides of the U.S./Canada border. Encounters with hunters may result in caribou mortality as a result of mistaken identification. Legal harvest of caribou by Treaty Indians does occur, but with few statistics on the number of animals taken it is difficult to evaluate the influence of this on the caribou population. Fatal collisions with vehicles occur on open roads in caribou habitat and are likely to continue. Predation by mountain lions, wolves and other predators would continue, with the effect on the caribou population dependent on big game populations, predator populations and a variety of other factors.

One important factor is how the Canadian officials decide to manage this herd. In the British Columbia portion of the recovery area, human activities that would continue to impact caribou habitat include gas, powerline, and international border corridors, recreation activities, timber harvest, and highways.

Conclusion

Implementation of this alternative would have a “May Affect, not Likely to Adversely Affect” determination for woodland caribou. It would make a relatively high contribution to the recovery of woodland caribou. The reasons for this determination are:

1) This alternative would address new science and risk factors identified in the recovery plan and critical habitat.

2) This alternative would formally adopt the winter recreation strategy for caribou habitat that was a Term and Condition of the 2001 Biological Opinion.

3) This alternative emphasizes the protection and restoration of caribou habitat, better addressing expected climate change effects and enhancing habitat resiliency.

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the viability of late-successional and old forest (LSOF) dependent surrogate species include: the loss of LSOF habitat from fire (Healy et al. 2008, Davis et al. 2011), vegetation treatments (e.g. timber harvest, thinning, prescribed fire) that affect forest structure (e.g., canopy closure, snags, downed wood)(Healy et al. 2008, Wisdom et al. 2008, Davis et al. 2011), management of roads that influence habitat effectiveness (Gaines et al. 2003), and protection of riparian areas which are an important element of LSOF habitats for some species (e.g., bald eagles).

The dynamic landscape restoration approach that is emphasized in this alternative would result in landscapes, including disturbance regimes, that are more resilient to climate change through the application of strategically located restoration treatments in priority locations (Noss et al. 2006, Spies et al. 2006, Gaines et al. 2010a, Franklin and Johnson 2012). By strategically locating restoration treatments, landscape-scale fire behavior can be altered to be more similar to native disturbance regimes and the risk of loss of LSOF habitat to uncharacteristically severe fires can be reduced (Finney 2001, Finney et al. 2006, Ager et al. 2007, Lehmkuhl et al. 2007). In addition, implementation of this alternative would include greater use of managed fire to achieve desired conditions for restoration and resiliency (Noss et al. 2006, Franklin and Johnson 2012).

For some LSOF surrogate species, such as the white-headed woodpecker, conservation assessments have recommended the use of stand-level treatments to restore habitat because current habitat levels are well below historic levels (Mellen-McLean et al. 2013, Gaines et al. 2015). The effects of restoration treatments on birds has been studied and shown that treatments that retain large trees and promote within-stand spatial variability can have positive effects on surrogate bird species, including the white-headed woodpecker (Gaines et al. 2007, Gaines et al. 2010b). The implementation of this alternative would result in approximately 5,000 acres/year of restorative treatments within dry and mesic forests, creating potentially favorable conditions for white-headed woodpeckers.

The implementation of this alternative includes plan components for several key elements of LSOF habitat. For instance, desired conditions for snag habitat address the potential loss of snags in vegetation management treatments. This alternative would also require that firewood cutting occur in designated areas only, and not allow removal of downed wood and snags $\geq$20 inches DBH. In addition, this alternative provides for the retention of large trees, which are currently below historical levels in most forested landscapes (Hessburg et al. 1999).

The implementation of this alternative would reduce the negative effects of roads on LSOF habitats within 10 watersheds in the short-term (<20 years based on Objectives) because roads would be closed (to meet other management objectives). In the longer-term (<50 years based on Desired Conditions), this alternative would result in road densities of equal to or less than 2 miles/square mile on 23 percent of the Forest, and equal to or less than 3 miles/square mile on 48 percent of the Forest.

Overall, this alternative would provide greater protection for LSOF habitats than the No Action, B and O alternatives, similar to alternative P and less than alternative R. The viability outcome for surrogate wildlife species associated with LSOF habitats would be improved in both the short ($\leq$20 years) and long ($\leq$50 years) time periods as Desired Conditions are achieved.

Climate Change

The sensitivity of LSOF associated surrogate wildlife species to the effects of climate change were identified as medium for pileated woodpecker, and high for northern goshawk and American marten (CCSD 2013). The primary effect of climate change is the loss of LSOF habitats due to altered disturbance regimes (CCSD 2013).

Since the mid-1980s, the size and intensity of large wildfires in the western United States have increased markedly (Westerling et al. 2006), due, in part, to a reduction in fuel moisture driven by increased temperature and lower snowpack. Increases in fire risk and severity have been also been driven, in part, by increased fuel loads because of fire suppression practices used over the last century (McKenzie et al. 2004). Predicted increases in spring and summer temperature identified in many climate change models would exacerbate the frequency and intensity of disturbances such as fire (McKenzie et al. 2004, Wotton and Flannigan 1993) and defoliation caused by forest insects (Littell et al. 2009). In the interior Columbia Basin, Littell et al. (2009) predicted that the area burned is likely to double or even triple by 2050. Climate-driven changes in fire regimes would likely be the dominant driver of changes to forests and LSOF habitats in the western United States over the next century (McKenzie et al. 2004).

The dynamic landscape restoration approach that is emphasized in this alternative represents the implementation of an adaptive strategy to create landscapes more resilient to climate change (Spies et al. 2010, Gaines et al. 2012). Landscape-scale restoration has been identified as an adaptive strategy to maintain late-successional and old forest habitat structure (Lawler et al. 2014). The emphasis on restoration of resiliency would result in landscapes, including disturbance regimes, which are more resilient to climate change through the application of restoration treatments in priority locations (Noss et al. 2006, Spies et al. 2006, Gaines et al. 2010, Franklin and Johnson 2012). By strategically locating restoration treatments, landscape-scale fire behavior can be altered to be more similar to native disturbance regimes and the risk of loss of LSOF habitat to uncharacteristically severe fires can be reduced (Finney 2001, Finney et al. 2006, Ager et al. 2007, Lehmkuhl et al. 2007). In addition, implementation of this alternative would include greater use of managed fire to achieve desired conditions for restoration and resiliency (Noss et al. 2006, Franklin and Johnson 2012).

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and to protect and restore LSOF habitats (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, and LSOF habitat protections in the original Forest Plan were found to be inadequate and were amended by the eastside screens (USFS 1995).

Past vegetation management and disturbances on the Forest have resulted in the distribution and arrangement of successional stages (early, mid, late) that are outside the HRV. Presently, more of the landscape is in mid-successional and less in late-successional, especially late-open, habitats compared to HRV. This alternative would manage habitats towards HRV resulting in a distribution and amount of successional stages that better mimic conditions under which surrogate wildlife species evolved, and better mitigate for the cumulative effects of off-forest timber harvest.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusion

The implementation of this alternative would make a moderate contribution to the viability of LSOF dependent surrogate wildlife species. The contribution would be due to the following components of this alternative:

1) Emphasis on the dynamic landscape restoration to restore landscape resiliency and reduce the loss of LSOF habitats to uncharacteristically severe wildfires.

2) The protection and conservation of key elements of LSOF habitat such as large trees, large snags, and riparian habitats,

3) Emphasis on restoring habitat effectiveness by reducing the negative effects of roads on LSOF habitats (though not to the same degree as R and P).

Motorized Recreation and Road Access

Surrogate Wildlife Species

Direct and Indirect Effects

Motorized recreation and the use of forest roads influence the viability of surrogate wildlife species (Wisdom et al. 2000, Gaines et al. 2003). These potential effects include displacement from key habitats, disturbance during critical periods, and the risk of mortality caused by collisions with vehicles (see Wisdom et al. 2000 and Gaines et al. 2003 for a complete list of road and trail associated factors that influence wildlife). The effects of motorized recreation and roads can occur during the non-winter period or during the winter period when snowmobiling or ski-trail grooming occurs.

The implementation of this alternative would reduce the effects of roads on surrogate species habitat effectiveness within 10 watersheds in the short-term (<20 years based on Objectives). In the longer-term (<50 years based on Desired Conditions) this alternative would result in road densities of equal to or less than 2 miles/square mile on 23 percent of the Forest, and equal to or less than 3 miles/square mile on 48 percent of the Forest. Habitat effectiveness for surrogate wildlife species would be improved from a low level of habitat effectiveness to a moderate level of habitat effectiveness in portions of 15 watersheds as Desired Conditions for road access are achieved.

This alternative would not change the current level of winter or summer motorized trail use, thus would not change the effects to surrogate species habitat effectiveness. Overall, this alternative would provide greater habitat effectiveness for surrogate wildlife species than the No Action, B

and O alternatives, and less than the R and P alternatives. The implementation of this alternative would result in some improvement in the viability outcomes for surrogate wildlife species used to assess the effects of roads and trails on wildlife habitats.

Climate Change

The sensitivity of surrogate wildlife species used to assess the effects of roads and motorized recreation is rated as moderate for bighorn sheep, and high for Canada lynx and wolverine (CCSD 2013). An important climate change adaptation that has been recommended for wildlife is to reduce the negative effects of roads (and trails) on habitat (Gaines et al. 2012, Lawler et al. 2014). By reducing the negative effects of roads, habitats (especially riparian and wetland habitats) can become more resilient to the effects of climate change, and habitat connectivity can be restored allowing wildlife to adjust their ranges as conditions change. The implementation of this alternative includes management direction to make modest improvement to habitat effectiveness for surrogate wildlife by reducing road impacts and densities.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and restore habitat effectiveness (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, mostly focused on big-game species.

The limited management direction in the existing Forest Plan to reduce the negative effects of roads on wildlife and continued development of private lands (located mostly in north-south valley bottoms that bisect the CNF) means that management of roads and motorized trails on federal lands is even more important to the viability of surrogate wildlife species.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusion

The implementation of this alternative would make a moderate contribution to the viability of surrogate wildlife species whose habitats are influenced by motorized access. This would occur because:

1) The alternative includes management direction to moderately reduce the effects of roads on habitat effectiveness for surrogate wildlife species, and

2) This alternative does not alter the current effects that summer and winter motorized trails have of habitat effectiveness for surrogate wildlife species.

Livestock Grazing

Surrogate Wildlife Species

Direct and Indirect Effects

Grazing can influence habitats of surrogate wildlife species by removing key habitat elements (e.g., dense shrubs for MacGillivray's warbler and fox sparrow), especially in riparian habitats; altering disturbance regimes that maintain habitat structure (e.g., frequent fires in dry forests and grasslands keep open canopy for western bluebird), and influence the availability of important prey species (e.g., squirrels for golden eagles). To address the potential effects on surrogate wildlife species, the management direction regarding grazing in riparian habitat and upland habitats for each alternative was assessed.

This alternative would include management direction for riparian habitats relying mostly on Guidelines (not Standards as in R and P alternatives). Presently, many riparian habitats are in poor condition due to the effects of past and current grazing. The plan direction for this alternative would make a modest improvement on altering the distribution of livestock that would allow riparian habitats to recover.

This alternative includes ecologically based Desired Conditions for upland non-forest habitats (e.g., rangeland and alpine habitats) and Guidelines to protect unique habitats. This alternative would not alter the number of livestock, the intensity of grazing, or the amount of area grazed. Presently, 73 percent of the Forest is in a livestock allotment and animal unit months (AUMs) average about 25,000 per year. However, management direction could result in some adjustments to the distribution of cattle and the intensity of grazing within specific habitats, such as unique habitats. This alternative would make modest improvements in the viability outcomes for surrogate wildlife species that were used to assess grazing effects.

Climate Change

Habitats that are particularly sensitive to the effects of climate change include riparian areas (including wetlands) and alpine areas (Lawler et al. 2014). A management adaptation to make these habitats more resilient to climate change is to reduce the effects of non-climatic stressors (e.g., roads, intense grazing, etc.)(Lawler et al. 2014). This alternative includes management direction (ARCS) that would help to restore the resiliency of habitats that are sensitive to climate change.

Cumulative Effects

Grazing occurs on nearby private, state, tribal, and federal lands. Where grazing is allowed on the adjacent Okanogan-Wenatchee National Forest and Idaho Pan Handle National Forest, it is managed to accommodate other public land uses, such as contributing to the viability of surrogate wildlife species. On the adjacent Pend Oreille Wildlife Refuge, grazing was reduced over time to allow restoration of riparian habitats and is currently only used to achieve specific wildlife habitat objectives (USFWS 2000). Grazing on non-federal lands increases the need to provide for wildlife habitats on federal lands that contribute to the viability of surrogate wildlife species. This alternative includes management direction for some key habitats that would better account for the cumulative effects of grazing on wildlife habitats.

Conclusion

The implementation of this alternative would make a moderate contribution to viability for surrogate wildlife species that are influenced by domestic grazing. This determination is based on:

1) This alternative does include management direction (generally Guidelines and not Standards as in R and P alternatives) for riparian habitat that would reduce the negative effects of grazing and improve riparian habitat condition.

2) This alternative would not change the number of AUMs or grazing intensity, but may alter the distribution of livestock to protect some unique habitats.

3) This alternative would include management direction that could make habitats that are sensitive to the effects of climate change more resilient.

Snag Habitat

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the availability of habitat for snag dependent surrogate species include firewood cutting (Bate et al. 2007, Hollenbeck et al. 2013), the loss of snag habitat along roads and at recreation sites from hazard tree removal (Bate et al. 2007, Hollenbeck et al. 2013, Wisdom et al. 2008), and removal of snags during timber harvest for safety reasons (Wisdom et al. 2008). The implementation of this alternative includes management direction for snag habitat to address the potential loss of habitat in timber sale operations, would require that firewood cutting occur in designated areas only, and not allow removal of snags ≥20 inches DBH.

The implementation of this alternative would decrease the loss of snag habitat due to hazard tree removal and firewood cutting along roads within 10 watersheds in the short-term (<20 years based on Objectives) because roads would be closed (to meet other management objectives). In the longer-term (<50 years based on Desired Conditions) this alternative would result in road densities of equal to or less than 2 miles/square mile on 23 percent of the Forest, and equal to or less than 3 miles/square mile on 48 percent of the Forest.

Overall, this alternative would provide greater protection of snag habitat than the No Action, B and O alternatives, and less than the P and R alternatives. This alternative would enhance the viability outcomes for surrogate wildlife species that are dependent on snag habitats.

Climate Change

Surrogate species associated with snag habitats include the pileated woodpecker, white-headed woodpecker, black-backed woodpecker, and Lewis's woodpecker and these species have a medium sensitivity rating to climate change, and the western bluebird as high sensitivity (CCSD 2013). The primary effect that is anticipated from climate change is the loss of habitat due to altered disturbance regimes. The whole landscape restoration approach that is emphasized in this alternative would result in landscapes, including disturbance regimes, that are more resilient to climate change through the application of strategically located restoration treatments in priority locations, and greater use of managed fire to achieve Desired Conditions for landscape restoration and resiliency. Because forest disturbances such as fire, insects, and diseases directly influence the availability of snag habitat over time, restoration of disturbance regimes to mimic natural

processes would aid in restoring snag habitat. In addition, this alternative would reduce non-climatic stressors by limiting the loss of large snags and reducing the impacts of roads.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and more rigorous snag requirements to contribute to the viability of snag dependent wildlife (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan. The current plan provides limited management direction to reduce the effects of roads on wildlife habitats, and current required snag densities make limited contribution to the viability of surrogate wildlife species. The limited management direction for snag habitat on non-Federal lands adjacent to the planning area, places additional emphasis on providing for viability populations of snag dependent wildlife species on Federal lands. Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion, but treatments can lead to the loss of snag habitat for safety reasons.

Conclusion

The implementation of this alternative would make a moderate contribution to the viability of snag dependent surrogate wildlife species. This determination is based on the following:

1) This alternative would focus on restoring disturbance regimes that influence the availability and condition of snag habitat.

2) This alternative would make modest reductions in the negative effects of roads on snag habitat.

3) This alternative provides management direction to protect snag habitat during vegetation management activities and from being cut for firewood.

Habitat Connectivity

Surrogate Wildlife Species

Direct and Indirect Effects

A number of forest management activities influence habitat connectivity for surrogate wildlife species. These include: the amount, patch sizes, and spatial arrangement of suitable habitats; and the location and density of motorized travel routes, especially in relation to riparian and LSOF habitats.. These are addressed in the evaluation of how forest management alternatives would affect habitat connectivity for surrogate wildlife species.

The implementation of this alternative includes management direction to manage wildlife habitats for surrogate wildlife species toward desired conditions that are based on the natural and future range of variability. This means that habitats for a wide-range of species would be managed so that the amount of habitat, patch sizes, and spatial arrangement would mimic conditions under which those species evolved (Hessburg et al. 1999).

In this alternative, management direction for riparian habitats is consolidated into one consistent set of plan components that applies to the Colville National Forest. Guidelines would limit management activities that are allowed to occur within riparian habitats and influence habitat connectivity. This alternative includes greater riparian management area widths along intermittent streams, lakes, and ponds than in the areas previously covered by the INFISH forest plan amendment (USFS 1995).

The implementation of this alternative would reduce the negative effects of roads on habitat connectivity for surrogate wildlife species within 10 watersheds in the short-term (<20 years based on Objectives) because roads would be closed (to meet other management objectives). In the longer-term (<50 years based on Desired Conditions), this alternative would result in road densities of equal to or less than 2 miles/square mile on 23 percent of the Forest, and equal to or less than 3 miles/square mile on 48 percent of the Forest.

Climate Change

Maintaining and restoring ecological connectivity is the most oft-cited climate adaptation strategy for biodiversity conservation (Heller and Zavaleta 2009, Opham and Wascher 2004, Parmesan 2006, Spies et al. 2010) and has been identified as an important adaptation strategy for wildlife in northeast Washington (Gaines et al. 2012). This is because species' range shifts have been the primary biological response to past episodes of climatic change, yet widespread anthropogenic barriers to movement would now challenge species' ability to respond (Price 2002, Thomas and Lennon 1999, Wormworth and Mallon 2006). The implementation of this alternative addresses climate change adaptations that are recommended to maintain or restore habitat connectivity for surrogate wildlife species.

Cumulative Effects

Past, present, and reasonably foreseeable human developments and transportation infrastructure, along with land ownership patterns create cumulative impacts that limit options to conserve and restore regional connectivity. Regional habitat connectivity has been evaluated for a variety of wildlife species, including the surrogate wildlife species used to evaluate connectivity in this planning area (Singleton et al. 2002, WWHCWG 2010, Proctor et al. 2015). These assessments have shown the importance of the Colville National Forest in providing stepping-stone habitats between the Cascades and Selkirk Mountains (Singleton et al. 2002, WWHCWG 2010). Connectivity from the Cascade Range to the Kettle Range and Selkirk Mountains is interrupted by transportation corridors and human developments associated with the Okanogan, Upper Columbia, and Pend Oreille river valleys (Singleton et al. 2002, WWHCWG 2010). Planning efforts are currently underway to determine the feasibility of constructing of a wildlife-crossing structure near Riverside (in the Highway 97 corridor) for connectivity between the Cascade and Kettle Ranges. Additionally, connectivity planning in southern British Columbia identified linkage areas that could greatly enhance wildlife movements between the Selkirk Mountains and Purcell Mountains (Apps et al. 2007, Proctor et al. 2015).

Reducing the direct and indirect effects of roads on wildlife habitats would contribute to the maintenance and restoration of habitat connectivity, including cumulative effects. Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusion

The implementation of this alternative would make a moderate contribution to providing habitat connectivity that is important for the viability of surrogate wildlife species. This conclusion is based on the following:

1) Habitat amounts, patch sizes, and connectivity would be managed towards desired conditions based on the natural range of variability, providing condition similar to those under which surrogate wildlife species evolved.

2) The negative effects of roads on habitat connectivity, including riparian and LSOF habitat would be moderately reduced.

Riparian Habitats

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the quality and availability of habitat for riparian dependent surrogate species include management of roads, recreation sites, grazing, and vegetation treatments that occur within riparian habitats.

In this alternative, management direction for watersheds and riparian habitats is consolidated into one consistent set of plan components that applies to the entire Colville National Forest. Guidelines would limit management activities that are allowed to occur within riparian habitats. This alternative includes greater riparian management area widths along intermittent streams, lakes, and ponds than in the areas previously covered by the INFISH forest plan amendment (USFS 1995).

The implementation of this alternative would reduce the effects of roads on riparian habitats within 10 watersheds in the short-term (<20 years based on Objectives) because roads would be closed (to meet other management objectives). In the longer-term (<50 years based on Desired Conditions) this alternative would result in road densities of equal to or less than 2 miles/square mile on 23 percent of the Forest, and equal to or less than 3 miles/square mile on 48 percent of the Forest.

This alternative would include management direction for riparian habitats relying mostly on Guidelines (not Standards as in R and P alternatives). Presently, many riparian habitats are in poor condition due to the effects of past and current grazing. The plan direction for this alternative would make a modest improvement on altering the distribution of livestock that would allow riparian habitats to recover.

Overall, this alternative would provide greater protection for riparian habitats than the No Action and Alternative B, similar to alternative O, and less than the P and R alternatives. The viability outcome for surrogate wildlife species that are dependent upon riparian habitats would be improved.

Climate Change

Some of the riparian associated surrogate species are rated as high sensitivity to climate change (CCSD 2013) and riparian habitats are considered vulnerable to the anticipated effects of climate change (Lawler et al. 2014). The primary effect that is anticipated from climate change is the loss of habitat and reduced connectivity of riparian habitats due to altered hydrologic and disturbance (fire) regimes (Lawler et al. 2014).

The whole landscape restoration approach that is emphasized in this alternative would result in landscapes, including disturbance regimes, that are more resilient to climate change through the application of strategically located restoration treatments in priority locations. In addition, emphasis of this alternative in reducing the negative effects of roads (though not to the same degree as the R or P alternatives) on aquatic habitats would help to make them more resilient to disturbances.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and to protect and restore riparian habitats (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, and riparian habitat protections in the original Forest Plan were found to be inadequate and were amended (INFISH, PACFISH-USFS 1995, ACS-USFS 1994).

On private lands, Washington State Forestry Practices Act provides some limited protections for riparian habitats. Management of priority watersheds emphasizes using an “all lands” approach to enhance coordination across landowners and may enhance conditions for riparian associated wildlife species. However, habitat protections for riparian habitats on federal lands would help to mitigate for the limited protections and cumulative effects that occur on private lands.

Conclusion

The implementation of this alternative would make a moderate contribution to the viability of riparian dependent surrogate wildlife species. This determination is based on the following:

1) This alternative would make modest reductions in the negative effects that roads have on riparian habitats.

2) This alternative would consolidate and make more consistent management direction for riparian habitats using Guidelines and providing larger management zones that existing direction.

3) The landscape restoration emphasis of this alternative would restore disturbance regimes, reducing the effects of uncharacteristically severe fires on riparian habitats.

Species of Management Interest

Deer and Elk

Direct and Indirect Effects

Forest management activities can influence deer and elk populations and habitat use. Vegetation management activities may affect the distribution and abundance of cover and forage. Adequate forage is particularly important during the summer and fall before the following birthing season when this can have a positive effect on the condition pregnant females (Lenz 1997, Cook 1998, Cook 2002, Cook et al. 2004, Cook et al. 2005). The management of forest roads and trails can influence how deer and elk use habitats, and influence the interactions between deer and elk (Rowland et al. 2005, Wisdom et al. 2005a, and b). Additionally, deer and elk can compete with domestic livestock for both food resources (Findholt et al. 2005) and space (Coe et al. 2001, Coe et al. 2005). Thus, the potential effects that vegetation management, road and trail management, and grazing management can have on deer and elk habitats and populations are evaluated for each of the alternatives.

Under the Proposed Action, cover and forage for deer and elk on winter and summer ranges would be managed commensurate with the natural range of variability. This would result in a sustainable level of cover and more emphasis on enhancement of forage conditions. Considerable research has shown that the management of deer and elk winter habitat should be less focused on the retention of thermal cover, and more focused on the availability of forage on summer and fall habitats (see Cook et al. 2005 for a review).

This alternative would improve habitat effectiveness for deer and elk on summer and winter ranges by reducing the impacts of roads. The Selkirk Elk Herd has a moderate level of habitat effectiveness (low level of human influence) on their winter ranges. Overall, habitat effectiveness would be restored on approximately 24,000 acres of habitat on elk range under this alternative. The desired conditions for elk winter ranges would be to have a low level of human influence (<30 percent of the winter range in the zone of influence of an open road, motorized route, or designated ski trail).

For deer, this alternative would result in a high level of habitat effectiveness (low level of human influence) on 31 percent of the winter ranges, a moderate level of habitat effectiveness on 62 percent of the winter ranges, and a low level of habitat effectiveness on 6 percent. The desired conditions for deer winter ranges would be to have a high level of habitat effectiveness (low level of human influence, <30 percent of the winter range in the zone of influence of an open road, motorized route, or designated ski trail).

Current management direction for winter ranges is based on road density standards and would be changed to use of the zone of influence (Rowland et al. 2005). This alternative includes more robust range management direction to aid in the recovery of range conditions that are currently in poor condition and have been slow to recover from past grazing practices.

Climate Change

Deer and elk have a low level of sensitivity to the effects of climate change due to their ability to tolerate a relatively wide range of climatic conditions, their high mobility, and as habitat generalists (CCSD 2013). However, alternatives that restore landscape pattern and functions while reducing the effects of roads on deer and elk summer and winter habitats would provide

more resilience deer and elk populations. This alternative emphasizes landscape-scale restoration and provides consistent management direction for roads that would make modest contributions to restore habitat effectiveness for deer and elk.

Cumulative Effects

The historical cattle and sheep grazing that occurred on portions of the Forest degraded range conditions (Wissmar et al. 1994, Bunting et al. 2002). These conditions, combined with current domestic (cattle) and wild ungulate grazing (primarily elk and deer), have resulted in the maintenance or slow recovery of poor range conditions in some areas (Bunting et al. 2002). In turn, these poor range conditions have had negative effects on some important unique habitats such as riparian areas and meadows. This alternative would result in more rigorous grazing management direction that would help to address this situation.

Winter ranges for the deer and elk occur on Federal lands, adjacent Wildlife Management Areas managed by the State, and private lands. Elk herd management plans (WDFW 2001) provide guidance for elk management on state lands and make recommendations for elk management on Forestland. Management plans for deer include the White-tailed Deer Management Plan that covers the two management units on the Colville National Forest and provides direction to manage hunting to either maintain or increase white-tailed deer populations (WDFW 2010). A statewide general management plan for mule deer has been developed but does not provide herd-specific management objectives (WDFW 2008). Mule deer are widely distributed across the Forest. A considerable amount of historical winter range for deer and elk is now in private land ownership or under the waters of Lake Roosevelt (created by the Grand Coulee dam). The cumulative effects of the existing management plans (state and federal lands) would provide for the conditions that contribute to sustainable populations of deer and elk, while considering the impacts of private land development.

Conclusion

The implementation of the Proposed Action would make a moderate contribution to the conditions that support sustainable populations of deer and elk. This is based on the following:

1) This alternative would address new science that recommends de-emphasizing the importance of winter thermal cover and increasing the emphasis on summer and fall forage quality and quantity.

2) This alternative provides consistent and effective direction on the management of roads and trails to restore habitat effectiveness on deer and elk summer and winter ranges.

3) This alternative would include more rigorous management direction to improve the conditions of key habitats, such as riparian areas and meadows, which are in poor condition due to the cumulative effects of past grazing practices, and current domestic and wild ungulate grazing.

Effects of Alternative O - Wildlife

Federally Listed Wildlife Species

Grizzly Bear

Direct and Indirect Effects

Forest activities that influence the recovery of the grizzly bear include: human access that can displace bears from important seasonal habitats or increase the risk of bear-human interactions, disposal of livestock carcasses within range allotments to avoid attracting bears to a potential food source, and the storage of food and garbage at recreation sites to reduce the potential for bears to associate humans with food sources.

Management of grizzly bears does not vary between alternatives. Existing management direction provides standards for human access, disposal of livestock carcasses, and food and garbage storage within the Selkirk Grizzly Bear Recovery Area (IGBC 1998, USDA 1988, USFWS 1993, USDI 2001). Existing standards have largely been met and would continue to be followed.

Climate Change

Grizzly bears have been identified as having a low sensitivity to climate change because they are opportunistic, eat a diverse array of food resources, and are highly adaptable (Servheen and Cross 2010, CCSD 2013). Anticipated impacts may include changes in the timing of denning due to longer snow-free periods and reduced snowpack (Lawler et al. 2014) and changes in the availability of food sources (Servheen and Cross 2010). These changes may put bears at risk of negative human interactions for a longer period of time each year (Servheen and Cross 2010). This would make education, proper food and garbage storage, carcass disposal measures, and human access management that much more important.

Cumulative Effects

The primary reason for the low population of grizzly bears in the recovery zone is past persecution and human-caused mortality of bears. Legal protections are now in place to protect grizzly bears. Information and education programs, sanitation measures, and access management have and would continue to be used to aid in the recovery of grizzly bears in the Selkirk Recovery Area.

Past, present and reasonable foreseeable future actions that could affect grizzly bears include timber harvest and associated road construction, recreational activities that can cause disturbance to bear and create potential for human-bear conflicts, and human development that fragment grizzly bear habitat. Cumulative effects are evaluated across the Recovery Area by tracking activities within Grizzly Bear Management Units (GBMUs). Other land managers have adopted and are following similar management direction (IPNF 2015) and overall recovery is coordinated by the Selkirk Grizzly Bear Management Subcommittee. GBMUs that occur on the Colville National Forest include the LeClerc, Salmo-Priest, and Sullivan-Hughes. The contribution made on federal lands to grizzly bear recovery would help to mitigate potential cumulative effects from off-forest activities. However, because this alternative does not address reducing the negative impacts of roads on wildlife habitats like in the proposed action and Alternatives R and P, it does less to mitigate cumulative effects.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance (e.g., core areas) to become more important to wildlife such as grizzly bears.

Black bear hunting on both sides of the international border within the Selkirk Recovery Area has the potential to add cumulatively to the mortality of grizzly bears. Hunters that encounter grizzly bears may mistakenly identify the bear, kill the bear in self-defense, or opportunistically poach the bear. Human access management within the recovery area is key to reducing the risk of mortality to grizzly bears from black bear hunting.

On private lands, the presence of garbage, pet food, fruit trees, or other attractants may lure bears into conflict situations. Bears that become habituated or a nuisance may lead to the bear being killed.

Conclusion

This alternative would make a relatively high contribution to the recovery of grizzly bears in the Selkirk Recovery Area and would result in a May Affect, Not Likely to Adversely Affect determination. This is based on the existing management direction, followed in all alternatives, that addresses:

1. Human access management,
2. Disposal of carcasses in range allotments that occur in the recovery area, and
3. Proper storage of food, garbage and other attractants that may lead to human-bear interactions.

Canada Lynx

Direct and Indirect Effects

The forest management activities that influence the recovery and conservation of Canada lynx include: vegetation management that affects lynx habitat components, access to highway crossing structures installed to facilitate wildlife movement, winter recreation that influences habitat connectivity and lynx habitat use, forest roads that can become sources of lynx mortality at high traffic volumes and speeds, and grazing effects to riparian areas that provide habitat for snowshoe hares, a primary food resource for lynx (ILBT 2013). The Interagency Lynx Biology Team (ILBT 2013) developed conservation measures for core and secondary areas (USFWS 2005) to address each of these forest management activities, and for planners to consult when revising forest plans. These were used to evaluate the potential contribution of forest management alternatives to the recovery of Canada lynx.

When the USFWS reviewed existing regulatory mechanisms to determine if listing Canada lynx as a federally protected species was warranted, they determined that existing forest plans provided inadequate protections (USFWS 2003). Several national forests within the range of the

Canada lynx subsequently amended their forest plans using the original Lynx Conservation Assessment and Strategy (LCAS)(Ruediger et al. 2000) as a basis for current science. However, forest plans in Region 6 were not amended, thus existing management plans do not address recent science and conservation recommendations (ILBT 2013), recovery objectives (USFWS 2005), or critical habitat (USFWS 2009). This alternative does not include management direction for Canada lynx.

Vegetation management activities affect the distribution of lynx habitat components, can fragment habitats, and create sources of disturbance (ILBT 2013). The LCAS recommended conservation measures for vegetation management apply to lynx core and secondary areas and include use of the natural range of variability to mimic pattern and scale of natural disturbances and connectivity across the landscape while considering the future climate change (ILBT 2013). A conservation measure focused on the restoration of disturbance regimes in dry forests that occur in close proximity to lynx habitat to reduce the risk of uncharacteristically severe and frequent fires reaching lynx habitat. A final recommended in the LCAS is a conservation measure to limit the amount of vegetation management and the rate of habitat change (e.g., acres treated/decade) within lynx analysis units. There is no management direction in this alternative that addresses these conservation measures.

Conservation measures were identified to address the effects that highways have on habitat connectivity for lynx in core areas (ILBT 2013). The Kettle-Wedge is a Core Area on the Colville National Forest. There is no management direction in this alternative that would assure that national forest lands adjacent to future highway wildlife crossing structures would be managed to allow lynx access to the crossing structures.

Winter recreation can influence how lynx use habitats (ILBT 2013). To minimize the potential negative effects from winter recreation, the ILBT (2013) developed conservation measures for lynx core areas that include reducing effects on habitat connectivity and discouraging expansion of over-the-snow routes that may influence lynx habitat use (ILBT 2013). This alternative does not address effects of over-the-snow recreation on lynx habitat.

The conservation measures for forest roads in lynx core areas include avoiding road reconstruction or upgrades that occur in lynx habitat and would result in increased traffic speeds or volumes (ILBT 2013). These measures would reduce the potential for vehicular traffic to result in a source of mortality to lynx. There is no management direction in this alternative to address this conservation measure.

The conservation measures for grazing in lynx core areas include management of riparian areas to assure adequate habitat for snowshoe hares, the primary prey species for Canada lynx (ILBT 2013). This alternative includes management direction for grazing in riparian areas to provide for habitat for listed fish species, but does not include anything specific to Canada lynx or snowshoe hares.

Alternative O would provide limited management direction to address the direct and indirect effects of forest management activities on the recovery of Canada lynx. Alternative O would make limited contributions to the recovery of Canada lynx, less than the Proposed Action, R and P alternatives, and similar to the No Action and Alternative B.

Climate Change

The potential effects of climate change on Canada lynx identified by the Interagency Lynx Biology Team (2013) included: 1). An upward shift in elevation or latitudinal distribution of lynx

and prey, 2). A decrease in the amount of habitat and population size from reduced snow persistence and increased disturbance events (e.g., fires), 3). Changes in demographic rates, such as survival and reproduction, and 3). Changes in predator-prey relationships.

Climate change adaptations to address these effects include restoration of landscape-scale disturbance regimes to better mimic natural patterns and processes (Spies et al. 2010, Gaines et al. 2012, Lawler et al. 2014), and maintaining or restoring habitat connectivity to allow Canada lynx to adjust their ranges to changing conditions (Heller and Zavaleta 2009, ILBT 2013, Squires et al. 2013). There is limited management direction in this alternative to address these climate change adaptations.

Cumulative Effects

Past, present, and reasonably foreseeable actions that affect lynx habitat include timber harvest and fuels reduction, recreation, human development, and grazing on private and public lands. In addition, legal trapping of lynx, timber harvest, oil and gas development, mining and human access in British Columbia have and would continue to affect Canada lynx habitat.

Past vegetation management and large scale fires on the Forest within lynx habitat has resulted in a distribution and amount of successional stages (early, mid, late) that are outside the HRV. This alternative would not emphasize vegetation management activities to restore lynx habitats towards the HRV.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Grazing has occurred and would continue to take place on off-forest lands potentially impacting deciduous or riparian habitats for lynx prey species.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

All federal lands within Canada lynx core and secondary areas would use the Lynx Conservation Assessment and Strategy (LCAS) (ILBT 2013) as current science to guide project level consultation and land management planning. The North Cascades National Park Complex recently revised their management plan to include the LCAS (NPS 2012). The Idaho Panhandle National Forest land management plan was recently revised to address the conservation measures identified in the LCAS (USFS 2015). The conservation of lynx on WDNR lands is guided by the Department of Natural Resources Lynx Habitat Management Plan (WDNR 1996, updated in 2002). The management plan for the Pend Oreille National Wildlife Refuge provides conservation measures to contribute to the recovery and viability of Canada lynx (USFWS 2000). Colletively, these management plans have addressed many of the conservation measures identified for Canada lynx (ILBT 2013) and would help mitigate potential cumulative effects that may occur from off-forest activities. In addition, no critical habitat was identified on the Colville National Forest or on adjacent lands (USFWS 2009).

In Canada, timber harvesting, oil and gas development, coal mining, and the proliferation of human access associated with these industries, have and would continue to affect lynx habitat. Legal trapping occurs north of the Forest in Canada and could reduce the potential for lynx to disperse into the lynx habitat on the Forest. Trapping is not legal in Idaho, Montana, or Washington.

Conclusion

Alternative O would make a relatively low contribution to the recovery of the Canada lynx in both the short (≤20 years) and long (≤50 years) term, and result in a May Effect, Likely to Adversely Affect determination. This is because of the following:

1) This alternative does not address the best available science and conservation measures identified in the recent version of the Lynx Conservation Assessment and Strategy (ILBT 2013), or USFWS Recovery Outline (USFWS 2005);

2) This alternative does not address recommended climate change adaptations, and

3) Existing regulatory mechanisms (management plans) were found to be inadequate to address the threats to Canada lynx (USFWS 2003).

Late-Successional and Old Forest Habitats (Federally Listed Wildlife Species)

Woodland Caribou

Direct and Indirect Effects

The forest management activities that can influence the recovery and viability of woodland caribou include: 1) Vegetation management and natural disturbances that affect the amount and connectivity of late-successional and old forest habitats of Engelmann spruce/subalpine fir and western redcedar/western hemlock. 2) Human access can increase the potential for poaching and cause disturbance to caribou during the critical winter period. These effects were used to evaluate the potential contribution of each alternative to the recovery of woodland caribou.

This alternative would implement new science, recommendations from the Biological Opinion issued in 2001 (USFWS 2001) on the 1988 Forest Plan (USFS 1988), and address the critical habitat designation (USFWS 2012). Vegetation management attempts to balance providing forest conditions for suitable caribou habitat while providing for timber production. Timber harvest has been cited as one of the primary factors that has reduced and fragmented old growth habitats for woodland caribou (USFWS 1994, USFWS 2012).

A term and condition of the 2001 Biological Opinion was that the Forest develop a winter recreation strategy that protects important winter habitats for caribou while providing some level of winter recreation access. The strategy includes information and education about the effects of winter recreation on wildlife, monitoring and enforcement of areas closed to over-the-snow activities, and limitations on permitted over-the-snow activities. Collectively, these actions have reduced the impacts of winter recreation on caribou habitat while providing recreational opportunities in areas and at the time of the winter season when effects to caribou are minimal. This strategy was developed (USFS 2002) and would be fully integrated into this alternative. However, this alternative would not emphasize reducing the negative effects of forest roads on wildlife habitat.

Climate Change

Climate change would likely alter the distribution and abundance of suitable caribou habitat, and would change snow depths and persistence, which affect seasonal movements of mountain caribou (WDFW 2012). The potential effects of climate change depend on the interaction of seasonal temperatures and snowfall patterns and occurrence of wildfires, outbreaks of forest insects, and diseases (Mountain Caribou Science Team 2005). Management adaptations to address the effects of climate change include a focus on forest restoration and reducing non-climatic factors that affect wildlife populations (e.g., restoring habitat effectiveness impacted by roads). This alternative would not implement these adaptations.

Cumulative Effects

The caribou recovery area is 1,477 square miles in size and includes the Colville National Forest, Idaho Panhandle National Forest, Idaho Department of Lands, and British Columbia. About 47 percent of the recovery area is in the US and 53 percent in British Columbia. The Idaho Panhandle National Forest recently revised the forest plan to address habitat and risk factors identified in the caribou recovery plan and critical habitat (USFS 2015). The caribou recovery team works cooperatively to address cumulative effects on woodland caribou.

Past activities on the Forest have impacted caribou habitat. Over-the-snow motorized use, prior to the implementation of the Winter Recreation Strategy (USFS 2003), may have caused disturbance to caribou. The alternative would continue with implementation of the Winter Recreation Strategy, limiting the cumulative effects on caribou.

Past vegetation management and disturbances on the Forest have resulted in the distribution and arrangement of successional stages (early, mid, late) that are outside the HRV. Presently, more of the landscape is in med-successional and less in late-successional habitats compared to HRV. This alternative would not manage habitats towards HRV, and would not be as effective as the Proposed Action and Alternative P at mitigating for the cumulative effects of off-forest timber harvest.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife such as caribou. However, because this alternative does not address the negative impacts of roads on wildlife habitat, it provides less opportunity to mitigate the cumulative effects of recreation.

Big game hunting continues on both sides of the U.S./Canada border. Encounters with hunters may result in caribou mortality as a result of mistaken identification. Legal harvest of caribou by Treaty Indians does occur, but with few statistics on the number of animals taken it is difficult to evaluate the influence of this on the caribou population. Fatal collisions with vehicles occur on open roads in caribou habitat and are likely to continue. Predation by mountain lions, wolves and

other predators would continue, with the affect on the caribou population dependent on big game populations, predator populations and a variety of other factors.

One important factor is how the Canadian officials decide to manage this herd. In the British Columbia portion of the recovery area, human activities that would continue to impact caribou habitat include gas, powerline, and international border corridors, recreation activities, timber harvest, and highways.

Conclusion

The implementation of this alternative would have a May Affect, Likely to Adversely Affect determination for woodland caribou. It would make a moderate contribution to the recovery of woodland caribou. The reasons for this determination are:

1) This alternative would address new science and risk factors identified in the recovery plan and critical habitat, but does not emphasize forest restoration as in the Proposed Action and alternative P.

2) This alternative would formally adopt the winter recreation strategy for caribou habitat that was a Term and Condition of the 2001 Biological Opinion.

3) This alternative attempts to balance the protection of caribou habitat with timber production, but does not address expected climate change effects that would enhance forest resiliency to the degree that other alternatives do.

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the viability of late-successional and old forest (LSOF) dependent surrogate species include: the loss of LSOF habitat from fire (Healy et al. 2008, Davis et al. 2011), vegetation treatments (e.g. timber harvest, thinning, prescribed fire) that affect forest structure (e.g., canopy closure, snags, downed wood)(Healy et al. 2008, Wisdom et al. 2008, Davis et al. 2011), management of roads that influence habitat effectiveness (Gaines et al. 2003), and protection of riparian areas which are an important element of LSOF habitats for some species (e.g., Bald eagles).

The management direction for LSOF species is similar to the No Action, and is based on a system of small management areas that retains LSOF habitat for specific Management Indicator Species (e.g., American marten, barred owl, pileated woodpecker). These areas range in size from 75 to 300 acres, are relatively equally distributed, but have no way to provide for habitat connectivity between or among the small islands of habitat. These small islands of habitat are also highly susceptible to disturbances such as fire, insects, and tree diseases, with no redundancy or replacement habitat in the event they are lost. This system was based on minimizing the effects of protection of LSOF habitat on the timber harvest level. This system was deemed inadequate to provide for the viability of LSOF species and thus Forest Plans were amended with the east-side screen (USFS 1995). The intent was for the east-side screens to provide interim direction until the Forest Plan was revised.

The area in-between the small islands of LSOF habitat is managed primarily through even-aged timber production, with some protections for elements of LSOF habitat, such as snags and downed wood. However, the combination of roads and timber harvest generally results in these

areas having snag habitat below levels that would maintain viable populations of snag dependent wildlife species. Again, the management direction in the original Forest Plan, and used in this alternative, was deemed inadequate, thus additional direction was adopted through the east-side screens (USFS 1995). The intent of the east-side screens was to serve as interim direction until the Forest Plan was revised. The east-side screens restrict the cutting of trees ≥21 inches in diameter.

This alternative would not provide management direction that would reduce the negative effects of roads on wildlife habitats. Currently, there are about 4,000 miles of road, resulting in an overall road density on the roaded portion of the Forest of about 3 miles/square mile, which is considered a low level of habitat effectiveness for many surrogate species (Wisdom et al. 2000, Gaines et al. 2003).

Overall, alternative O would provide management direction for LSOF habitat that is similar to the No Action and alternative B, but would provide less habitat than the R and P alternatives. This alternative would not improve the viability outcomes for surrogate wildlife species that are dependent on LSOF habitats in the short (≤20 years) and long (≤50 years) time periods.

Climate Change

The sensitivity of LSOF associated surrogate wildlife species to the effects of climate change were identified as medium for pileated woodpecker, and high for northern goshawk and American marten (CCSD 2013). The primary effect of climate change is the loss of LSOF habitats due to altered disturbance regimes (CCSD 2013).

Since the mid-1980s, the size and intensity of large wildfires in the western United States have increased markedly (Westerling et al. 2006), due, in part, to a reduction in fuel moisture driven by increased temperature and lower snowpack. Increases in fire risk and severity have been also been driven, in part, by increased fuel loads because of fire suppression practices used over the last century (McKenzie et al. 2004). Predicted increases in spring and summer temperature identified in many climate change models would exacerbate the frequency and intensity of disturbances such as fire (McKenzie et al. 2004, Wotton and Flannigan 1993) and defoliation caused by forest insects (Littell et al. 2009). In the interior Columbia Basin, Littell et al. (2009) predicted that the area burned is likely to double or even triple by 2050. Climate-driven changes in fire regimes would likely be the dominant driver of changes to forests and LSOF habitats in the western United States over the next century (McKenzie et al. 2004).

A landscape restoration approach is not emphasized in this alternative. Landscape-scale restoration has been identified as an adaptive strategy to create landscapes more resilient to climate change (Spies et al. 2010, Gaines et al. 2012) and to maintain late-successional and old forest habitat structures (Lawler et al. 2014). The emphasis on restoration of resiliency would result in landscapes, including disturbance regimes that are more resilient to climate change through the application of strategically located restoration treatments in priority locations (Noss et al. 2006, Spies et al. 2006, Gaines et al. 2010, Franklin and Johnson 2012). By strategically locating restoration treatments, landscape scale fire behavior may be altered to be more similar to native disturbance regimes and the risk of loss of LSOF habitat to uncharacteristically severe fires may be reduced (Finney 2001, Finney et al. 2006, Ager et al. 2007, Lehmkuhl et al. 2007).

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to

the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and to protect and restore LSOF habitats (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, and LSOF habitat protections in the original Forest Plan were found to be inadequate and were amended by the eastside screens USFS 1995).

Past vegetation management and disturbances on the Forest have resulted in the distribution and arrangement of successional stages (early, mid, late) that are outside the HRV. Presently, more of the landscape is in med-successional and less in late-successional habitats compared to HRV. This alternative would not manage habitats towards HRV, and would not be as effective as the Proposed Action and Alternative P at mitigating for the cumulative effects of off-forest timber harvest.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusion

The implementation of this alternative would make a relatively low contribution to the viability of LSOF dependent surrogate wildlife species. This determination is based on the following:

1) The LSOF habitat provided by this alternative would not maintain viable populations of LSOF surrogate wildlife species.

2) This alternative does not emphasize restoration of landscape resiliency to reduce the loss of LSOF habitats to uncharacteristically severe wildfires.

3) The protection and conservation of key elements of LSOF habitat such as large trees and snags, and riparian areas is minimal.

4) The alternative would not result in the restoration of habitat effectiveness by reducing the negative effects of roads on LSOF habitats.

Motorized Recreation and Road Access

Surrogate Wildlife Species

Direct and Indirect Effects

Motorized recreation and the use of forest roads influence the viability of surrogate wildlife species. These potential effects include displacement from key habitats, disturbance during critical periods, and the risk of mortality caused by collisions with vehicles (see Wisdom et al. 2000 and Gaines et al. 2003 for a complete list of road and trail associated factors that influence

wildlife). The effects of motorized recreation and roads can occur during the non-winter period or during the winter period when snowmobiling or ski-trail grooming occurs.

The implementation of this alternative would have limited opportunity to reduce the negative effects of roads on surrogate species habitats because management direction for roads would be for no net loss of road miles (approximately 4000 miles) and only address big-game species. Currently, the average road density (not counting the wilderness and Recommended Wilderness) is about 3.0 miles/square mile, which is a low level of habitat effectiveness (Wisdom et al. 2000) for surrogate wildlife species.

This alternative would not reduce the impacts of winter or summer-motorized trail use on surrogate species habitat effectiveness. Overall, this alternative would provide a level of habitat effectiveness for surrogate wildlife that is similar to the No Action and Alternative B, and less than the Proposed Action, R, and P alternatives. This alternative would not improve the viability outcome for surrogate species used to assess the effects of road and motorized trails.

Climate Change

The sensitivity of surrogate wildlife species used to assess the effects of roads and motorized recreation is rated as moderate for bighorn sheep, and high for Harlequin duck, Canada lynx, and wolverine (CCSD 2013). An important climate change adaptation that has been recommended for wildlife is to reduce the negative effects of roads (and trails) on habitat (Gaines et al. 2012, Lawler et al. 2014). By reducing the negative effects of roads, habitats (especially riparian and wetland habitats) can become more resilient to the effects of climate change, and habitat connectivity can be restored allowing wildlife to adjust their ranges as conditions change. The implementation of this alternative includes management direction to make very limited improvement to habitat effectiveness for surrogate wildlife by reducing road impacts and densities.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and restore habitat effectiveness (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, mostly focused on big-game species.

The limited emphasis of this alternative on reducing the negative effects of roads on wildlife and continued development of private lands (located mostly in east-west valley bottoms that bisect the OWNF) means that management of roads and motorized trails on federal lands is even more important to the viability of surrogate wildlife species.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusion

The implementation of this alternative would make a relatively low contribution to the viability of surrogate wildlife species whose habitats are influenced by motorized access. This would occur because:

1) The alternative includes limited management direction to reduce the impact of roads on habitat effectiveness for surrogate wildlife species.

2) This alternative does not reduce the impacts summer or winter-motorized trails have of habitat effectiveness for surrogate wildlife species in two watersheds.

3) This alternative does little to address the cumulative effects for human access and development on wildlife habitats.

Livestock Grazing

Surrogate Wildlife Species

Direct and Indirect Effects

Grazing can influence habitats of surrogate wildlife species by removing key habitat elements (e.g., dense shrubs for MacGillivray's warbler and fox sparrow), especially in riparian habitats. It can also alter disturbance regimes that maintain habitat structure (e.g., frequent fires in dry forests and grasslands keep open canopy for western bluebird), and influence the availability of important prey items (e.g., squirrels for golden eagles). To address the potential effects on surrogate wildlife species, the management direction regarding grazing in riparian habitat and upland habitats for each alternative was assessed.

This alternative would include management direction for riparian habitats relying mostly on Guidelines (not Standards as in R and P alternatives). Presently, some riparian habitats are in poor condition due to the effects of past and current grazing. The plan direction for this alternative would make a modest improvement on altering the distribution of livestock that would allow riparian habitats to recover.

This alternative includes ecologically based Desired Conditions for upland non-forest habitats (e.g., rangeland and alpine habitats) and Guidelines to protect unique habitats. This alternative would not alter the number of livestock, the intensity of grazing, or the amount of area grazed. Presently, 73 percent of the Forest is in a livestock allotment and animal unit months (AUMs) average about 25,000 per year. However, management direction could result in some adjustments to the distribution of cattle and the intensity of grazing within specific habitats, such as unique habitats. This alternative would make modest improvement to the viability outcomes for surrogate wildlife species used to assess the effects of grazing.

Climate Change

Habitats that are particularly sensitive to the effects of climate change include riparian areas (including wetlands) and alpine areas (Lawler et al. 2014). A management adaptation to make these habitats more resilient to climate change is to reduce the effects of non-climatic stressors (e.g., roads, intense grazing, etc.) (Lawler et al. 2014). This alternative includes management direction that would help to restore the resiliency of habitats that are sensitive to climate change.

Cumulative Effects

Grazing occurs on nearby private, state, tribal, and federal lands. Where grazing is allowed on the adjacent Okanogan-Wenatchee National Forest and Idaho Pan Handle National Forest, it is managed to accommodate other public land uses, such as contributing to the viability of surrogate wildlife species. On the adjacent Little Pend Oreille Wildlife Refuge, livestock grazing was reduced over time to allow restoration of riparian habitats and is currently only used to achieve specific wildlife habitat objectives (USFWS 2000). Grazing on non-federal lands increases the need to provide for wildlife habitats on federal lands that contribute to the viability of surrogate wildlife species. This alternative includes management direction for some key habitats that would better account for the cumulative effects of grazing on wildlife habitats.

Conclusion

The implementation of this alternative would make a moderate contribution to viability for surrogate wildlife species that are influenced by domestic grazing. This determination is based on:

1) This alternative does include management direction for riparian habitat that would reduce the negative effects of grazing and improve riparian habitat condition.

2) This alternative would not change the number or grazing intensity, but may alter the distribution of livestock to protect some unique habitats.

3) This alternative would include management direction that could make habitats that are sensitive to the effects of climate change more resilient.

Habitat Connectivity

Surrogate Wildlife Species

Direct and Indirect Effects

A number of forest management activities influence habitat connectivity for surrogate wildlife species. These include the amount, patch sizes, and spatial arrangement of suitable habitats; location and density of motorized travel routes, especially in relation to riparian and LSOF habitats. These are addressed in the evaluation of how forest management alternatives would affect habitat connectivity for surrogate wildlife species.

This alternative emphasizes providing habitat connectivity for LSOF species through the identification of connectivity corridors during project planning (as per eastside screens, USFS 1995). Additional provisions for low to moderate mobility LSOF species are provided through Riparian Management Zones. No management direction addresses habitat connectivity for wildlife species that are not associated with LSOF habitats (e.g., wide-ranging carnivores, Singleton et al. 2002).

The implementation of this alternative would have limited opportunity to reduce the negative effects of roads on surrogate species habitats because management direction for roads would be for no net loss of road miles (approximately 4000 miles) and emphasizes mostly big-game species. Currently, the average road density (not counting the wilderness and Recommended Wilderness) is about 3.0 miles/square mile, which is a low level of habitat effectiveness for surrogate wildlife species (Wisdom et al. 2000).

This alternative would not provide direction for the management of areas adjacent to highway crossing structures that may be installed in the future to facilitate wildlife movement and habitat connectivity across highways. Currently, this has been an issue where wildlife-crossing structures are being installed along the Interstate 90 corridor near Snoqualmie Pass (WDOT and USDOT FHA 2008). Additional crossing structures are being planned along Highway 97 in the near term.

Climate Change

Maintaining and restoring ecological connectivity is the most oft-cited climate adaptation strategy for biodiversity conservation (Heller and Zavaleta 2009, Opham and Wascher 2004, Parmesan 2006, Spies et al. 2010) and has been identified as an important adaptation strategy for wildlife in northeast Washington (Gaines et al. 2012). This is because species' range shifts have been the primary biological response to past episodes of climatic change, yet widespread anthropogenic barriers to movement would now challenge species' ability to respond (Price 2002, Thomas and Lennon 1999, Wormworth and Mallon 2006).

This alternative does provide direction to address habitat connectivity for some highly mobile LSOF wildlife species. However, there is no management direction that addresses habitat connectivity for wildlife species not associated with LSOF habitats (e.g. wide-ranging carnivores), nor does this alternative address the effects of forest roads and management of areas adjacent to wildlife crossing structures on habitat connectivity.

Cumulative Effects

Past, present, and reasonably foreseeable human developments and transportation infrastructure, along with land ownership patterns create cumulative impacts that limit options to conserve and restore regional connectivity. Regional habitat connectivity has been evaluated for a variety of wildlife species, including the surrogate wildlife species used to evaluate connectivity in this planning area (Singleton et al. 2002, WWHCWG 2010, Proctor et al. 2015). These assessments have shown the importance of the Colville National Forest in providing stepping-stone habitats between the Cascades and Selkirk Mountains (Singleton et al. 2002, WWHCWG 2010). Connectivity from the Cascades to the Kettle Range to the Selkirk Mountains is interrupted by transportation corridors and human developments associated with the Okanogan, Upper Columbia, and Pend Oreille river valleys (Singleton et al. 2002, WWHCWG 2010). Planning efforts are currently underway to determine the feasibility of constructing a wildlife-crossing structure near Riverside in the Highway 97 corridor for connectivity between the Cascade Mountains and Kettle Range. Additionally, connectivity planning in southern British Columbia identified linkage areas that could greatly enhance wildlife movements between the Selkirk Mountains and Purcell Mountains (Apps et al. 2007, Proctor et al. 2015).

Reducing the direct and indirect effects of roads on wildlife habitats would contribute to the maintenance and restoration of habitat connectivity, including cumulative effects, but is not well addressed in this alternative. Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusions

The O Alternative would provide limited direction that addresses habitat connectivity, and most is relevant to wildlife species associated with LSOF habitats. Thus, the implementation of the O Alternative would provide a low contribution to the viability of surrogate wildlife species used to assess habitat connectivity. The primary reasons for this conclusion include:

1) No management direction to address wildlife species that are not associated with LSOF habitats (e.g., wide-ranging carnivores),

2) Limited management direction that addresses the effects of roads and road networks on habitat connectivity, despite this being a primary factor that influences wildlife movements,

3) No management direction that addresses forest management activities that occur in areas adjacent of wildlife crossing structures that are or would be installed in highways to assure that wildlife have access to the crossing structures.

Snag Habitat

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the availability of habitat for snag dependent surrogate species include firewood cutting (Bate et al. 2007, Hollenbeck et al. 2013), the loss of snag habitat along roads and at recreation sites from hazard tree reduction (Bate et al. 2007, Hollenbeck et al. 2013, Wisdom et al. 2008), and removal of snags during timber harvest for safety reasons (Wisdom et al. 2008). The Forest Plans includes management direction for snag habitat to address the potential loss of habitat in timber sale operations. However, this alternative includes a 21-inch diameter limit on the size of snags that can be cut for firewood.

This alternative includes 39 percent of the Forest that would be managed for even-aged timber harvest, resulting in the potential loss of snag habitat for safety reasons. An additional 33 percent of the forest would be actively managed for restoration.

The implementation of this alternative would have limited opportunity to reduce the negative effects of roads on surrogate species habitats because management direction for roads would be for no net loss of road miles (approximately 4000 miles). Currently, the average road density (not counting the wilderness and Recommended Wilderness) is about 3.0 miles/square mile, which would result in a considerable loss of snag habitat for safety and hazard tree reduction (Bate et al. 2007, Hollenbeck et al. 2013, Wisdom et al. 2008).

Overall, this alternative would provide habitat protections for snag dependent wildlife that are similar to the No Action and Alternative B but less than the Proposed Action, R and P alternatives. This alternative would not improve the viability outcomes for snag dependent surrogate wildlife species.

Climate Change

Surrogate wildlife species associated with snag habitats include the pileated woodpecker, white-headed woodpecker, black-backed woodpecker, and Lewis's woodpecker and these species are rated as medium sensitivity to climate change, and the western bluebird as high sensitivity (CCSD 2013). The primary effect that is anticipated from climate change is the loss of habitat due

to altered disturbance regimes. Because this alternative does not focus on landscape scale restoration, the restoration of disturbances regimes would not be emphasized. Thus, habitat for snag dependent surrogate wildlife is likely to be lost at an accelerated rate due to increased disturbances associated with climate change and loss of snag habitat in the Responsible Management area from relatively intense timber harvest. The increase in fire associated with climate change could create a short-term gain in snag habitat followed by a long-term (80-100 years, Harrod et al. 1998) reduction as snags attrition occurs.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and more rigorous snag requirements to contribute to the viability of snag dependent wildlife (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitats and current required snag densities make limited contribution to the viability of surrogate wildlife species. The limited management direction for snag habitat on non-Federal lands adjacent to the planning area, places additional emphasis on providing for viable populations of snag dependent wildlife species on Federal lands. Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be designed in such a way that they restore wildlife habitat that has been affected by fire exclusion, but treatments can lead to the loss of snag habitat for safety reasons.

Conclusion

The implementation of this alternative would make a relatively low contribution to the viability of snag dependent surrogate wildlife species. This determination is based on:

1) This alternative would not emphasize landscape restoration of habitats and disturbance regimes that directly influence the availability and condition of snag habitat.

2) This alternative would make no reductions in the negative effects of roads on snag habitat.

3) Snag habitat would be reduced due to extensive timber harvest and active management, and an extensive road network would further reduce snag habitat for safety reasons.

Riparian Habitats

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the quality and availability of habitat for riparian dependent surrogate species include management of roads, recreation sites, and vegetation treatments that occur within riparian habitats.

In this alternative, management direction for watersheds and riparian habitats is not consolidated into one consistent set of plan components (e.g., direction is in both the existing forest plan and in the INFISH amendment). Standards and guidelines would limit management activities that are allowed to occur within riparian habitats. This alternative includes smaller riparian management

area widths along intermittent streams, lakes, and ponds in the areas covered by the INFISH forest plan amendment (USFS 1995).

The implementation of this alternative would provide limited management direction to reduce the effects of roads on riparian habitats. Overall, this alternative would provide habitat protection for riparian associated wildlife that is more than the No Action and Alternative B, similar to the Proposed Action, and much less than the R and P alternatives. This alternative would result in modest improvement to the viability outcomes for riparian dependent surrogate species.

Climate Change

Some of the riparian associated surrogate species are rated as high sensitivity to climate change (CCSD 2013) and riparian habitats are considered vulnerable to the anticipated effects of climate change (Lawler et al. 2014). The primary effect that is anticipated from climate change is the loss of habitat and reduced connectivity of riparian habitats due to altered hydrologic and disturbance (fire) regimes (Lawler et al. 2014).

The emphasis of this alternative is on relatively intensive timber management. Because this alternative does not focus on landscape scale restoration, the restoration of disturbances regimes would not be emphasized... Thus, habitat for riparian dependent surrogate wildlife is likely to be lost at an accelerated rate due to increased disturbances associated with climate change and some loss of riparian habitat from relatively intense timber harvest. In addition, a climate change adaptation for riparian habitats is to restore their resiliency by reducing the negative effects of roads (Lawler et al. 2014). However, this alternative has limited opportunity for managers to reduce road effects on riparian habitats.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and to protect and restore riparian habitats (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, and riparian habitat protections in the original Forest Plan were found to be inadequate and were amended (INFISH, PACFISH-USFS 1995; ACS-USFS 1994).

On private lands, Washington State Forestry Practices Act provides some limited protections for riparian habitats. Management of priority watersheds emphasizes using an “all lands” approach to enhance coordination across landowners and may enhance conditions for riparian associated wildlife species. However, habitat protections for riparian habitats on federal lands would help to mitigate for the limited protections that occur on private lands.

Conclusion

The implementation of this alternative would make a relatively low contribution to the viability of riparian dependent surrogate wildlife species. This determination is based on the following:

1) This alternative would not address the negative effects that roads have on riparian habitats.

2) This alternative would not consolidate and make more consistent management direction for riparian habitats using Standards (as in Alternatives R and P) and would have smaller riparian management areas.

3) This alternative would not emphasize landscape restoration that would reduce the potential effects of uncharacteristically severe fires on riparian habitats.

Species of Management Interest

Deer and Elk

Direct and Indirect Effects

Forest management activities can influence deer and elk populations and habitat use. Vegetation management activities may affect the distribution and abundance of cover and forage. Adequate forage is particularly important during the summer and fall before the following birthing season when this can have a positive effect on the condition pregnant females (Lenz 1997, Cook 1998, Cook 2002, Cook et al. 2004, Cook et al. 2005). The management of forest roads and trails can influence how deer and elk use habitats, and influence the interactions between deer and elk (Rowland et al. 2005, Wisdom et al. 2005a, and b). Additionally, deer and elk can compete with domestic livestock for both food resources (Findholt et al. 2005) and space (Coe et al. 2001, Coe et al. 2005). Thus, the potential effects that vegetation management, road and trail management, and grazing management can have on deer and elk habitats and population are evaluated for each of the alternatives.

Under this alternative, cover and forage for deer and elk on winter ranges emphasizes the retention of winter thermal cover. Considerable research has shown that the management of deer and elk winter habitat should be less focused on the retention of thermal cover, and more focused on the availability of forage on summer and fall habitats (see Cook et al. 2005 for a review). This alternative would not incorporate the current science about the role of winter thermal cover in providing for deer and elk populations.

This alternative would not alter the current habitat effectiveness for deer and elk on summer and winter ranges through road management. The Selkirk Elk Herd has a moderate level of habitat effectiveness (moderate level of human influence) on their winter ranges. Currently, in 38 percent of the watersheds, winter habitat for deer has a high habitat effectiveness index (low level of human influence), 38 percent habitat a moderate level of habitat effectiveness (moderate level of human influence), and 24 percent habitat a low level of habitat effectiveness (high level of human influence). Current management direct for winter ranges is based on road density standards. Rowland et al. (2005) found road density to be a poor indicator of habitat use by deer and elk and recommended the use of the zone of influence instead. This is incorporated into the Proposed Action, R and P alternatives but not Alternative O.

Under this alternative, there would be not changes to current grazing practices that occur on national forest allotments. Degraded range conditions would be maintained or slowly be improved, likely having effects on deer and elk habitat use and populations (Coe et al. 2001, 2005; Findholt et al. 2005). Somewhat more robust range management direction would be adopted.

Climate Change

Deer and elk have a low level of sensitivity to the effects of climate change due to their ability to tolerate a relatively wide range of climatic conditions, their high mobility, and as habitat generalists (CCSD 2013). However, alternatives that restore landscape pattern and functions while reducing the effects of roads on deer and elk summer and winter habitats would provide more resilient deer and elk populations. This alternative does not emphasize landscape-scale restoration and nor does it provide consistent and effective management direction for roads that would restore habitat effectiveness for deer and elk.

Cumulative Effects

The historical cattle and sheep grazing that occurred on portions of the Forest degraded range conditions (Wissmar et al. 1994, Bunting et al. 2002). These conditions, combined with current domestic (cattle) and wild ungulate grazing (primarily elk and deer), have resulted maintenance or slow recovery of poor range conditions in some areas (Wissmar et al. 1994, Bunting et al. 2002). These poor range conditions can have had negative effects on some important unique habitats such as riparian areas and meadows. This alternative would result in more rigorous grazing management direction that would help to address this situation.

Winter ranges for the deer and elk occur on Federal lands, adjacent Wildlife Management Areas managed by the State, and private lands. Elk herd management plans (WDFW 2001) provide guidance for elk management on state lands and make recommendations for elk management on Forestlands. Management plans for deer include the White-tailed Deer Management Plan that provides direction to manage hunting to either maintain deer populations (WDFW 2010) and a general plan for mule deer (WDFW 2008), which are widely distributed across the Forest. A considerable amount of historical winter range for deer and elk is now in private land ownership or under the waters of Lake Roosevelt (created by the Grand Coulee dam). The cumulative effects of the existing management plans (state and federal lands) would provide for the conditions that contribute to sustainable populations of deer and elk, while considering the effects of private land development.

Conclusion

The implementation of alternative O would make a relatively low contribution to the conditions that support sustainable populations of deer and elk. This is based on the following:

1) This alternative would not address new science that recommends de-emphasizing the importance of winter thermal cover and increasing the emphasis on summer and fall forage quality and quantity.

2) This alternative does not provide consistent and effective direction on the management of roads and trails to restore habitat effectiveness on deer and elk summer and winter ranges.

3) This alternative would include somewhat more rigorous management direction to improve the conditions of key habitats, such as riparian areas and meadows that are in poor condition due to the cumulative effects of past grazing practices, and current domestic and wild ungulate grazing.

Effects of Alternative B - Wildlife

Federally Listed Wildlife Species

Grizzly Bear

Direct and Indirect Effects

Forest activities that influence the recovery of the grizzly bear include: human access that can displace bears from important seasonal habitats or increase the risk of bear-human interactions, disposal of livestock carcasses within range allotments to avoid attracting bears to a potential food source, and the storage of food and garbage at recreation sites to reduce the potential for bears to associate humans with food sources.

Management of grizzly bears does not vary between alternatives. Existing management direction provides standards for human access, disposal of livestock carcasses, and food and garbage storage within the Selkirk Grizzly Bear Recovery Area (IGBC 1998, USDA 1988, USFWS 1993, USDI 2001). Existing standards have largely been met and would continue to be followed.

Climate Change

Grizzly bears have been identified as having a low sensitivity to climate change because they are opportunistic, eat a diverse array of food resources, and are highly adaptable (Servheen and Cross 2010, CCSD 2013). Anticipated impacts may include changes in the timing of denning due to longer snow-free periods and reduced snowpack (Lawler et al. 2014) and changes in the availability of food sources (Servheen and Cross 2010). These changes may put bears at risk of negative human interactions for a longer period of time each year (Servheen and Cross 2010). This would make education, proper food and garbage storage, carcass disposal measures, and human access management that much more important.

Cumulative Effects

The primary reason for the low population of grizzly bears in the recovery zone is past persecution and human-caused mortality of bears. Legal protections are now in place to protect grizzly bears. Information/education programs, sanitation measures, and access management have and would continue to be used to aid in the recovery of grizzly bears in the Selkirk Recovery Area.

Past, present and reasonable foreseeable future actions that could affect grizzly bears include timber harvest and associated road construction, recreational activities that can cause disturbance to bear and create potential for human-bear conflicts, and human development that fragment grizzly bear habitat. Cumulative effects are evaluated across the Recovery Area by tracking activities within Grizzly Bear Management Units (GBMUs). Other land managers have adopted and are following similar management direction (IPNF 2015) and overall recovery is coordinated by the Selkirk Grizzly Bear Management Subcommittee. GBMUs that occur on the Colville National Forest include the LeClerc, Salmo-Priest, and Sullivan-Hughes. The contribution made on federal lands to grizzly bear recovery would help to mitigate potential cumulative effects from off-forest activities. However, because this alternative does not address reducing the negative impacts of roads on wildlife habitats like in the proposed action and Alternatives R and P, it does less to mitigate cumulative effects.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance (e.g., core areas) to become more important to wildlife such as grizzly bears.

Black bear hunting on both sides of the international border within the Selkirk Recovery Area has the potential to add cumulatively to the mortality of grizzly bears. Hunters that encounter grizzly bears may mistakenly identify the bear, kill the bear in self-defense, or opportunistically poach the bear. Human access management within the recovery area is key to reducing the risk of mortality to grizzly bears from black bear hunting.

On private lands, the presence of garbage, pet food, fruit trees, or other attractants may lure bears into conflict situations. Bears that become habituated or a nuisance may lead to the bear being killed.

Conclusion

This alternative would make a relatively high contribution to the recovery of grizzly bears in the Selkirk Recovery Area and would result in a May Affect, Not Likely to Adversely Affect determination. This is based on the existing management direction, followed in all alternatives, that addresses:

1. Human access management,
2. Disposal of carcasses in range allotments that occur in the recovery area, and
3. Proper storage of food, garbage and other attractants that may lead to human-bear interactions.

Canada Lynx

Direct and Indirect Effects

The forest management activities that influence the recovery and conservation of Canada lynx include: vegetation management that affect lynx habitat components, winter recreation that influences habitat connectivity and lynx habitat use, forest roads that can become sources of lynx mortality at high traffic volumes and speeds, and grazing effects to riparian areas that provide habitat for snowshoe hares, a primary food resource for lynx (ILBT 2013). The Interagency Lynx Biology Team (ILBT 2013) developed conservation measures for core and secondary areas (USFWS 2005) to address each of these forest management activities, and for planners to consult when revising forest plans. These were used to evaluate the potential contribution of forest management alternatives to the recovery of Canada lynx.

When the USFWS reviewed existing regulatory mechanisms to determine if listing Canada lynx as a federally protected species was warranted, they determined that existing forest plans provided inadequate protections (USFWS 2003). Several national forests within the range of the Canada lynx subsequently amended their forest plans using the original Lynx Conservation

Assessment and Strategy (Ruediger et al. 2000) as a basis for current science. However, forest plans in Region 6 were not amended, thus existing management plans do not address recent science and conservation recommendations (ILBT 2013), recovery objectives (USFWS 2005), or critical habitat (USFWS 2009). This alternative does not include updated management direction for Canada lynx.

Vegetation management activities affect the distribution of lynx habitat components, can fragment habitats, and create sources of disturbance (ILBT 2013). As a result, risk factors associated with vegetation management activities were identified and conservation measures were developed to address the risk factors (ILBT 2013). The conservation measures for vegetation management apply to lynx core areas and include use of the natural range of variability to mimic pattern and scale of natural disturbances and connectivity across the landscape while considering the future climate change (ILBT 2013). A conservation measure focused on the restoration of disturbance regimes in dry forests that occur in close proximity to lynx habitat to reduce the risk of uncharacteristically severe and frequent fires reaching lynx habitat. Finally, conservation measures were recommended to address the amount of vegetation management and the rate of habitat change (e.g., acres treated per decade) within lynx analysis units. There is no management direction in this alternative that would address these conservation measures.

Conservation measures were identified to address the effects that highways have on habitat connectivity for lynx in core areas (ILBT 2013). The Kettle-Wedge is a Core Area on the Colville National Forest. There is no management direction in this alternative that would assure that national forest lands adjacent to future wildlife crossing structures would be managed to allow lynx access to the crossing structures.

Winter recreation can influence how lynx use habitats (ILBT 2013). To minimize the potential of negative effects from winter recreation, the ILBT (2013) developed conservation measures to reduce effects. Conservation measures for winter recreation in lynx core areas included reducing effects on habitat connectivity and to discourage expansion of over-the-snow routes that may influence lynx habitat use (ILBT 2013). This alternative does not address effects of over-the-snow recreation on lynx habitat.

The conservation measures for forest roads in lynx core areas include avoiding road reconstruction or upgrades that occur in lynx habitat and would result in increased traffic speeds or volumes (ILBT 2013). These measures would reduce the potential for vehicular traffic to result in a source of mortality to lynx. There is no management direction in this alternative to address this conservation measure.

The conservation measures for grazing in lynx core areas include management of riparian areas to assure adequate habitat for snowshoe hares, the primary prey species for Canada lynx (ILBT 2013). This alternative includes management direction for grazing in riparian areas to mitigate effects to habitat for listed fish species, but does not include anything specific to Canada lynx or snowshoe hares.

Alternative B would provide limited management direction to address the direct and indirect effects of forest management activities on the recovery of Canada lynx. Alternative B would provide less protection for Canada lynx than the Proposed Action, R and P alternatives, and protection similar to the No Action and Alternative O.

Climate Change

The potential effects of climate change on Canada lynx identified by the Interagency Lynx Biology Team (2013) included: 1) an upward shift in elevation or latitudinal distribution of lynx and prey, 2) a decrease in the amount of habitat and population size from reduced snow persistence and increased disturbance events (e.g., fires), 3) changes in demographic rates, such as survival and reproduction, and 4) changes in predator-prey relationships.

Climate change adaptations to address these effects include restoration of landscape-scale disturbance regimes to better mimic natural patterns and processes (Spies et al. 2010, Gaines et al. 2012, Lawler et al. 2014), and maintaining or restoring habitat connectivity to allow Canada lynx to adjust their ranges to changing conditions (Heller and Zavaleta 2009, ILBT 2013, Squires et al. 2013). There is limited management direction in the existing management plans to address these climate change adaptations.

Cumulative Effects

Past, present, and reasonably foreseeable actions that affect lynx habitat include timber harvest and fuels reduction, recreation, human development, and grazing on private and public lands. In addition, legal trapping of lynx, timber harvest, oil and gas development, mining and human access in British Columbia have and would continue to affect Canada lynx habitat.

Past vegetation management and large scale fires on the Forest within lynx habitat has resulted in a distribution and amount of successional stages (early, mid, late) that are outside the HRV. This alternative would not emphasize vegetation management activities to restore lynx habitats towards the HRV.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Grazing has occurred and would continue to take place on off-forest lands potentially impacting deciduous or riparian habitats for lynx prey species.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

All federal lands within Canada lynx core and secondary areas would use the Lynx Conservation Assessment and Strategy (LCAS) (ILBT 2013) as current science to guide project level consultation and land management planning. The North Cascades National Park Complex recently revised their management plan to include the LCAS (NPS 2012). The Idaho Panhandle National Forest land management plan was recently revised to address the conservation measures identified in the LCAS (USFS 2015). The conservation of lynx on WDNR lands is guided by the Department of Natural Resources Lynx Habitat Management Plan (WDNR 1996, updated in 2002). The management plan for the Pend Oreille National Wildlife Refuge provides conservation measures to contribute to the recovery and viability of Canada lynx (USFWS 2000). Colletively, these management plans have addressed many of the conservation measures identified for Canada

lynx (ILBT 2013) and would help mitigate potential cumulative effects that may occur from off-forest activities. In addition, no critical habitat was identified on the Colville National Forest or on adjacent lands (USFWS 2009).

In Canada, timber harvesting, oil and gas development, coal mining, and the proliferation of human access associated with these industries, have and would continue to affect lynx habitat. Legal trapping occurs north of the Forest in Canada and could reduce the potential for lynx to disperse into the lynx habitat on the Forest. Trapping is not legal in Idaho, Montana, or Washington.

Conclusion

Alternative B would make a relatively low contribution to the recovery of the Canada lynx in both the short (≤20 years) and long (≤50 years) term, and result in a May Effect, Likely to Adversely Affect determination. This is because of the following:

1) This alternative does not address the best available science and conservation measures identified in the recent version of the Lynx Conservation Assessment and Strategy (ILBT 2013), and USFWS Recovery Outline (USFWS 2005);

2) This alternative does not address recommended climate change adaptations, and

3) This alternative relies on direction in existing management plans, which were found to provide inadequate regulatory mechanisms to address threats to the Canada lynx (USFWS 2003).

Late-Successional and Old Forest Habitats (Federally Listed Wildlife Species)

Woodland Caribou

Direct and Indirect Effects

The forest management activities that can influence the recovery and viability of woodland caribou include: 1) Vegetation management and natural disturbances affect the amount and connectivity of old growth forests of Engelmann spruce/subalpine fir and western redcedar/western hemlock. 2) Human access that can increase the potential for poaching and cause disturbance to caribou during the critical winter period. These effects were used to evaluate the potential contribution of each alternative to the recovery of woodland caribou.

This alternative would implement new science, recommendations from the Biological Opinion issued in 2001 (USFWS 2001) on the 1988 Forest Plan (USFS 1988), and address the critical habitat designation (USFWS 2012). Vegetation management attempts to balance providing forest conditions for suitable caribou habitat while providing for timber production. Timber harvest has been cited as one of the primary factors that has reduced and fragmented old growth habitats for woodland caribou (USFWS 1994, USFWS 2012).

A term and condition of the 2001 Biological Opinion was that the Forest develop a winter recreation strategy that protects important winter habitats for caribou while providing some level of winter recreation access. This strategy was developed (USFS 2003) and would be fully integrated into this alternative. The strategy includes information and education about the effects of witner recreation on wildlife, monitoring and enforcement of areas closed to over-the-snow activities, and limitations on permitted over-the-snow activities. Collectively, these actions have

reduced the impacts of winter recreation to caribou habitat while providing recreation opportunities in areas and at the time of the winter season when effects to caribou are minimal. However, this alternative would not emphasize reducing the negative effects of forest roads on wildlife habitat.

Climate Change

Climate change would likely alter the distribution and abundance of suitable caribou habitat, and would also change snow depths and persistence, which affect seasonal movements of mountain caribou (WDFW 2012). The potential effects of climate change depend on the interaction, not only of seasonal temperatures and snowfall patterns, but also occurrence of wildfires, outbreaks of forest insects, and diseases (Mountain Caribou Science Team 2005). Management adaptations to address the effects of climate change include a focus on forest restoration and reducing non-climatic factors that affect wildlife populations (e.g., reducing impacts of winter recreation on habitat effectiveness for caribou). This alternative would not implement these adaptations.

Cumulative Effects

The caribou recovery area is 1,477 square miles in size and includes the Colville National Forest, Idaho Panhandle National Forest, Idaho Department of Lands, and British Columbia. About 47 percent of the recovery area is in the US and 53 percent in British Columbia. The Idaho Panhandle National Forest recently revised the forest plan to address habitat and risk factors identified in the caribou recovery plan and critical habitat (USFS 2015). The caribou recovery team works cooperatively to address cumulative effects on woodland caribou.

Past activities on the Forest have impacted caribou habitat. Over-the-snow motorized use, prior to the implementation of the Winter Recreation Strategy (USFS 2003), may have caused disturbance to caribou. The alternative would continue with implementation of the Winter Recreation Strategy, limiting the cumulative effects on caribou.

Past vegetation management and disturbances on the Forest have resulted in the distribution and arrangement of successional stages (early, mid, late) that are outside the HRV. Presently, more of the landscape is in med-successional and less in late-successional habitats compared to HRV. This alternative would not manage habitats towards HRV, and would not be as effective as the Proposed Action and Alternative P at mitigating for the cumulative effects of off-forest timber harvest.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife such as caribou. However, because this alternative does not address the negative impacts of roads on wildlife habitat, it provides less opportunity to mitigate the cumulative effects of recreation.

Big game hunting continues on both sides of the U.S./Canada border. Encounters with hunters may result in caribou mortality as a result of mistaken identification. Legal harvest of caribou by Treaty Indians does occur, but with few statistics on the number of animals taken it is difficult to evaluate the influence of this on the caribou population. Fatal collisions with vehicles occur on open roads in caribou habitat and are likely to continue. Predation by mountain lions, wolves and other predators would continue, with the affect on the caribou population dependent on big game populations, predator populations and a variety of other factors.

One important factor is how the Canadian officials decide to manage this herd. In the British Columbia portion of the recovery area, human activities that would continue to impact caribou habitat include gas, powerline, and international border corridors, recreation activities, timber harvest, and highways.

Conclusion

The implementation of this alternative would have a May Affect, Not Likely to Adversely Affect determination for woodland caribou. It would make a moderate contribution to the recovery of woodland caribou. The reasons for this determination are:

1) This alternative would address new science and risk factors identified in the recovery plan and critical habitat, but does not emphasize forest restoration as in the Proposed Action and alternative P.

2). This alternative would formally adopt the winter recreation strategy for caribou habitat that was a Term and Condition of the 2001 Biological Opinion.

3) This alternative attempts to balance the protection of caribou habitat with timber production, but does not address climate change adaptations that would enhance forest resiliency to the degree that other alternatives do.

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the viability of late-successional and old forest (LSOF) dependent surrogate species include: the loss of LSOF habitat from fire (Healy et al. 2008, Davis et al. 2011), vegetation treatments (e.g. timber harvest, thinning, prescribed fire) that affect forest structure (e.g., canopy closure, snags, downed wood)(Healy et al. 2008, Wisdom et al. 2008, Davis et al. 2011), management of roads that influence habitat effectiveness (Gaines et al. 2003), and protection of riparian areas which are an important element of LSOF habitats for some species (e.g., Bald eagles).

This alternative retains existing management direction for LSOF species that is based on a system of small management areas that retains LSOF habitat for specific Management Indicator Species (e.g., American marten, barred owl, pileated woodpecker). These areas range in size from 75 to 300 acres, are relatively equally distributed, but have no way to provide for habitat connectivity between or among the small islands of habitat. These small islands of habitat are also highly susceptible to disturbances such as fire, insects, and tree diseases, with no redundancy or replacement habitat in the event they are lost. This system was based on minimizing the effects of protection of LSOF habitat on the timber harvest level. This system was deemed inadequate to provide for the viability of LSOF species and thus Forest Plans were amended with the east-side

screen (USFS 1995). The intent was for the east-side screens to provide interim direction until the Forest Plan was revised.

The area in-between the small islands of LSOF habitat is managed primarily through even-aged timber production, with some protections for elements of LSOF habitat, such as snags and downed wood. However, the combination of roads and timber harvest generally results in these areas having snag habitat below levels that would maintain viable populations of snag dependent wildlife species. Again, the management direction in the original Forest Plan was deemed inadequate, thus additional direction was adopted through the east-side screens (USFS 1995), with the intent that this would serve as interim direction until Forest Plan was revised. The east-side screens restrict the cutting of trees ≥21 inches in diameter.

This alternative would not provide management direction that would reduce the negative effects of roads on wildlife habitats. Currently, there are about 4,000 miles of road, resulting in an overall road density on the roaded portion of the Forest of about 3 miles/square mile, which is considered a low level of habitat effectiveness for many surrogate species (Wisdom et al. 2000, Gaines et al. 2003).

Overall, Alternative B would provide management direction for LSOF habitat that is similar to the No Action and Alternative O, but would provide less LSOF habitat than the R and P alternatives. This alternative would not improve the viability outcomes for surrogate wildlife species that are dependent on LSOF habitats in the short (≤20 years) or long (≤50 years) time periods.

Climate Change

The sensitivity of LSOF associated surrogate wildlife species to the effects of climate change were identified as medium for pileated woodpecker, and high for northern goshawk and American marten (CCSD 2013). The primary effect of climate change is the loss of LSOF habitats due to altered disturbance regimes (CCSD 2013).

Since the mid-1980s, the size and intensity of large wildfires in the western United States have increased markedly (Westerling et al. 2006), due, in part, to a reduction in fuel moisture driven by increased temperature and lower snowpack. Increases in fire risk and severity have been also been driven, in part, by increased fuel loads because of fire suppression practices used over the last century (McKenzie et al. 2004). Predicted increases in spring and summer temperature identified in many climate change models would exacerbate the frequency and intensity of disturbances such as fire (McKenzie et al. 2004, Wotton and Flannigan 1993) and defoliation caused by forest insects (Littell et al. 2009). In the interior Columbia Basin, Littell et al. (2009) predicted that the area burned is likely to double or even triple by 2050. Climate-driven changes in fire regimes would likely be the dominant driver of changes to forests and LSOF habitats in the western United States over the next century (McKenzie et al. 2004).

A landscape restoration approach is not emphasized in this alternative. Landscape-scale restoration has been identified as an adaptive strategy to create landscapes more resilient to climate change (Spies et al. 2010, Gaines et al. 2012) and to maintain late-successional and old forest habitats (Lawler et al. 2014). The emphasis on restoration of resiliency would result in landscapes, including disturbance regimes that are more resilient to climate change through the application of strategically located restoration treatments in priority locations (Noss et al. 2006, Spies et al. 2006, Gaines et al. 2010, Franklin and Johnson 2012). By strategically locating restoration treatments, landscape scale fire behavior may be altered to be more similar to native

disturbance regimes and the risk of loss of LSOF habitat to uncharacteristically severe fires may be reduced (Finney 2001, Finney et al. 2006, Ager et al. 2007, Lehmkuhl et al. 2007).

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and to protect and restore LSOF habitats (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, and LSOF habitat protections in the original Forest Plan were found to be inadequate and were amended by the eastside screens USFS 1995).

Past vegetation management and disturbances on the Forest have resulted in the distribution and arrangement of successional stages (early, mid, late) that are outside the HRV. Presently, more of the landscape is in med-successional and less in late-successional habitats compared to HRV. This alternative would not manage habitats towards HRV, and would not be as effective as the Proposed Action and Alternative P at mitigating for the cumulative effects of off-forest timber harvest.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusion

The implementation of this alternative would make a relatively low contribution to the viability of LSOF dependent surrogate wildlife species. This determination is based on the following:

1) The LSOF habitat provided by this alternative would provide minimal contribution to the viability of LSOF surrogate wildlife species.

2) This alternative does not emphasize restoration of landscape resiliency to reduce the loss of LSOF habitats to uncharacteristically severe wildfires.

3) The protection and conservation of key elements of LSOF habitat such as large trees and snags, and riparian areas is limited.

4) The alternative would not result in the restoration of habitat effectiveness by reducing the negative effects of roads on LSOF habitats.

Motorized Recreation and Road Access

Surrogate Wildlife Species

Direct and Indirect Effects

Motorized recreation and the use of forest roads influence the viability of surrogate wildlife species. These potential effects include displacement from key habitats, disturbance during critical time periods, and the risk of mortality caused by collisions with vehicles (see Wisdom et al. 2000 and Gaines et al. 2003 for a complete list of road and trail associated factors that influence wildlife). The effects of motorized recreation and roads can occur during the non-winter period or during the winter period when snowmobiling or ski-trail grooming occurs.

The implementation of this alternative would have limited opportunity to reduce the negative effects of roads on surrogate species habitats because management direction for roads would be for no net loss of road miles (approximately 4000 miles) and emphasize big-game species. Currently, the average road density (not counting the wilderness and Recommended Wilderness) is about 3.0 miles/square mile, which is a low level of habitat effectiveness for surrogate wildlife species (Wisdom et al. 2000).

This alternative would reduce summer-motorized trail use by 30 miles within two watersheds, thus improving habitat effectiveness for surrogate species... Overall, this alternative would provide a level of habitat effectiveness for surrogate wildlife that is similar to the No Action and Alternative O, and less than the Proposed Action, R, and P alternatives.

Climate Change

The sensitivity of surrogate wildlife species used to assess the effects of roads and motorized recreation is rated as moderate for bighorn sheep, and high for Harlequin duck, Canada lynx, and wolverine (CCSD 2013). An important climate change adaptation that has been recommended for wildlife is to reduce the negative effects of roads (and trails) on habitat (Gaines et al. 2012, Lawler et al. 2014). By reducing the negative effects of roads, habitats (especially riparian and wetland habitats) can become more resilient to the effects of climate change, and habitat connectivity can be restored allowing wildlife to adjust their ranges as conditions change. The implementation of this alternative includes management direction to make very limited improvement to habitat effectiveness for surrogate wildlife by reducing road impacts and densities.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative impacts of roads on wildlife habitats and restore habitat effectiveness (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest plan provides limited management direction to reduce the effects of roads on wildlife habitat, mostly focused on big-game species.

The limited management direction in the existing Forest Plan to reduce the negative effects of roads on wildlife and continued development of private lands (located mostly in north-south valley bottoms that bisect the CNF) means that management of roads and motorized trails on federal lands is even more important to the viability of surrogate wildlife species.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusion

The implementation of this alternative would make a relatively low contribution to the viability of surrogate wildlife species whose habitats are influenced by motorized access. This would occur because:

1) The alternative includes limited management direction to reduce the impact of roads on habitat effectiveness for surrogate wildlife species,

2) This alternative does reduce the impacts summer-motorized trails have of habitat effectiveness for surrogate wildlife species in two watersheds, and

3) This alternative does little to address the cumulative effects for human access and development on wildlife habitats.

Livestock Grazing

Surrogate Wildlife Species

Direct and Indirect Effects

Grazing can influence habitats of surrogate wildlife species by removing key habitat elements (e.g., dense shrubs for MacGillivray's warbler and fox sparrow), especially in riparian habitats; alter disturbance regimes that maintain habitat structure (e.g., frequent fires in dry forests and grasslands keep open canopy for western bluebird); and influence the availability of important prey items (e.g., squirrels for golden eagles). To address the potential effects on surrogate wildlife species, the management direction regarding grazing in riparian habitat and upland habitats for each alternative was assessed.

This alternative would continue with the existing direction for riparian habitats found in the existing forest plan and amendment (PACFISH, USFS 1995). Presently, many riparian habitats are in poor condition due to the effects of past and current grazing. The plan direction for this alternative would have little effect on altering the distribution of livestock that would allow riparian habitats to recover.

This alternative does not include ecologically based Desired Conditions for upland non-forest habitats (e.g., rangeland and alpine habitats) or Standards to protect unique habitats. This alternative would not alter the number of livestock, the intensity of grazing, or the amount of area grazed. Presently, 73 percent of the Forest is in a livestock allotment and animal unit months (AUMs) average about 25,000 per year. This alternative would make a limited contribution to the viability of surrogate wildlife species that were used to assess the effects of grazing on wildlife habitats.

Climate Change

Habitats that are particularly sensitive to the effects of climate change include riparian areas (including wetlands) and alpine areas (Lawler et al. 2014). A management adaptation to make these habitats more resilient to climate change is to reduce the effects of non-climatic stressors (e.g., roads, intense grazing, etc.) (Lawler et al. 2014). This alternative would not include management direction that would restore the resiliency of habitats that are sensitive to climate change.

Cumulative Effects

Grazing occurs on nearby private, state, tribal, and federal lands. Where grazing is allowed on the adjacent Okanogan-Wenatchee National Forest and Idaho Pan Handle National Forest, it is managed to accommodate other public land uses, such as contributing to the viability of surrogate wildlife species. On the adjacent Little Pend Oreille Wildlife Refuge, livestock grazing was reduced over time to allow restoration of riparian habitats and is currently only used to achieve specific wildlife habitat objectives (USFWS 2000). Grazing on non-federal lands increases the need to provide for wildlife habitats on federal lands that contribute to the viability of surrogate wildlife species.

This alternative does not include management direction for some key habitats that would better account for the cumulative effects of grazing on wildlife habitats.

Conclusion

The implementation of this alternative would make a relatively low contribution to viability for surrogate wildlife species that are influenced by domestic grazing. This determination is based on:

1) This alternative does not include management direction for key habitats that would reduce the negative effects of grazing and improve riparian habitat condition, and

2) This alternative would not change the number, grazing intensity or distribution of livestock.

Habitat Connectivity

Surrogate Wildlife Species

Direct and Indirect Effects

There are a number of forest management activities that influence habitat connectivity for surrogate wildlife species. These include: the amount, patch sizes, and spatial arrangement of suitable habitats; location and density of motorized travel routes, especially in relation to riparian and LSOF habitats; and the ability of surrogate wildlife species to access wildlife crossing structures where national forest lands occur adjacent to highways and freeways. These are addressed in the evaluation of how forest management alternatives would affect habitat connectivity for surrogate wildlife species.

Current management direction is used in this alternative and is focused on providing habitat connectivity for LSOF species through the identification of connectivity corridors during project planning (as per eastside screens, USFS 1995). Additional provisions for low to moderate mobility LSOF species are provided through Riparian Management Zones. There is no management direction that addresses habitat connectivity for wildlife species that are not associated with LSOF habitats (e.g., wide-ranging carnivores, Singleton et al. 2002).

The implementation of this alternative would have limited opportunity to reduce the negative effects of roads on surrogate species habitats because management direction for roads would be for no net loss of road miles (approximately 4000 miles) and only address big-game species. Currently, the average road density (not counting the wilderness and Recommended Wilderness) is about 3.0 miles/square mile, which is a low level of habitat effectiveness for surrogate wildlife species.

This alternative would reduce summer-motorized trail use by 30 miles within two watersheds, thus reducing impacts to surrogate species habitat effectiveness.

Climate Change

Maintaining and restoring ecological connectivity is the most oft-cited climate adaptation strategy for biodiversity conservation (Heller and Zavaleta 2009, Opham and Wascher 2004, Parmesan 2006, Spies et al. 2010) and has been identified as an important adaptation strategy for wildlife in northeast Washington (Gaines et al. 2012). This is because species' range shifts have been the primary biological response to past episodes of climatic change, yet widespread anthropogenic barriers to movement would now challenge species' ability to respond (Price 2002, Thomas and Lennon 1999, Wormworth and Mallon 2006).

This alternative does provide direction to address habitat connectivity for some highly mobile LSOF wildlife species. However, there is no management direction that addresses habitat connectivity for wildlife species not associated with LSOF habitats (e.g. wide-ranging carnivores), nor does this alternative address the effects of forest roads and management of areas adjacent to wildlife crossing structures on habitat connectivity. Much has been learned about the effects of climate change on wildlife since the Forest plans were developed and amended, and this alternative does not adequately address recommended climate adaptations to maintain or restore habitat connectivity for a wide-array of wildlife species.

Cumulative Effects

Past, present, and reasonably foreseeable human developments and transportation infrastructure, along with land ownership patterns create cumulative impacts that limit options to conserve and restore regional connectivity. Regional habitat connectivity has been evaluated for a variety of wildlife species, including the surrogate wildlife species used to evaluate connectivity in this planning area (Singleton et al. 2002, WWHCWG 2010). These assessments have shown the importance of the Colville National Forest in providing stepping-stone habitats between the Cascades and Selkirk Mountains (Singleton et al. 2002, WWHCWG 2010, Proctor et al. 2015). Connectivity from the Cascades to the Kettle Range to the Selkirk Mountains is interrupted by transportation corridors and human developments associated with the Okanogan, Upper Columbia, and Pend Oreille river valleys (Singleton et al. 2002, WWHCWG 2010). Planning efforts are currently underway to determine the feasibility of constructing a wildlife-crossing structure near Riverside in the Highway 97 corridor for connectivity between the Cascade Mountains and Kettle Range. Additionally, connectivity planning in southern British Columbia identified linkage areas that could greatly enhance wildlife movements between the Selkirk Mountains and the Purcell Mountains (Apps et al. 2007, Proctor et al. 2015).

Reducing the direct and indirect effects of roads on wildlife habitats would contribute to the maintenance and restoration of habitat connectivity, including cumulative effects, but is not emphasized in this alternative. Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors

could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusions

Alternative B would provide limited direction that addresses habitat connectivity, and most is relevant to wildlife species associated with LSOF habitats. Thus, the implementation of alternative B would provide a relatively low contribution to the viability of surrogate wildlife species used to assess habitat connectivity. The primary reasons for this conclusion include:

1) No management direction to address wildlife species that are not associated with LSOF habitats (e.g., wide-ranging carnivores),

2) Limited management direction that addresses the effects of roads and road networks on habitat connectivity, despite this being a primary factor that influences wildlife movements, and

Snag Habitat

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the availability of habitat for snag dependent surrogate species include firewood cutting (Bate et al. 2007, Hollenbeck et al. 2013), the loss of snag habitat along roads and at recreation sites from hazard tree reduction (Bate et al. 2007, Hollenbeck et al. 2013, Wisdom et al. 2008), and removal of snags during timber harvest for safety reasons (Wisdom et al. 2008). The Forest Plans includes management direction for snag habitat to address the potential loss of habitat in timber sale operations. However, this alternative includes a 21-inch diameter limit on the size of snags that can be cut for firewood.

This alternative includes 43 percent of the Forest that emphasizes even-aged timber harvest, resulting in the potential loss of snag habitat for safety reasons. An additional 31 percent of the forest would be actively managed for restoration.

The implementation of this alternative would have limited opportunity to reduce the negative effects of roads on surrogate species habitats because management direction for roads would be for no net loss of road miles (approximately 4000 miles). Currently, the average road density (not counting the wilderness and Recommended Wilderness) is about 3.0 miles/square mile, which would result in a considerable loss of snag habitat for safety and hazard tree reduction (Bate et al. 2007, Hollenbeck et al. 2013, Wisdom et al. 2008).

Overall, this alternative would provide habitat protections for snag dependent wildlife that are similar to the No Action and Alternative O but less than the Proposed Action, R and P alternatives. The viability outcomes for surrogate wildlife species dependent on snag habitat would not be improved and would remain below the historical capability.

Climate Change

Surrogate wildlife species associated with snag habitats include the pileated woodpecker, white-headed woodpecker, black-backed woodpecker, and Lewis's woodpecker, which are rated as medium sensitivity to climate change, and the western bluebird as high sensitivity (CCSD 2013). The primary effect that is anticipated from climate change is the loss of habitat due to altered

disturbance regimes. Because this alternative does not focus on landscape scale restoration, the restoration of disturbances regimes would not be emphasized. Thus, habitat for snag dependent surrogate wildlife is likely to be lost at an accelerated rate due to increased disturbances associated with climate change, loss of snag habitat from relatively intense timber harvest, and loss of snag habitat associated with hazard tree removal along roads. The increase in fire associated with climate change could create a short-term gain in snag habitat followed by a long-term (80-100 years, Harrod et al. 1998) reduction as snags attrition occurs.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and more rigorous snag requirements to contribute to the viability of snag dependent wildlife (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitats and current required snag densities make limited contribution to the viability of surrogate wildlife species. The limited management direction for snag habitat on non-Federal lands adjacent to the planning area, places additional emphasis on providing for viability populations of snag dependent wildlife species on Federal lands. Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion, but treatments can lead to the loss of snag habitat for safety reasons.

Conclusion

The implementation of this alternative would make a relatively low contribution to the viability of snag dependent surrogate wildlife species. This determination is based on:

1) This alternative would not focus on landscape restoration of habitats and disturbance regimes that influence the availability and condition of snag habitat.

2) This alternative would make limited reductions in the negative effects of roads on snag habitat.

3) Snag habitat would be reduced due to timber harvest and active management, and an extensive road network would further reduce snag habitat for safety reasons.

Riparian Habitats

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the quality and availability of habitat for riparian dependent surrogate species include management of roads, recreation sites, grazing, and vegetation treatments that occur within riparian habitats.

In this alternative, management direction for watersheds and riparian habitats is not consolidated into one consistent set of plan components (e.g., direction is in both the existing forest plan and in the INFISH amendment). Standards and guidelines would limit management activities that are allowed to occur within riparian habitats. This alternative includes smaller riparian management

area widths (compared to other alternatives expect the No Action) along intermittent streams, lakes, and ponds in the areas covered by the INFISH forest plan amendment (USFS 1995).

The implementation of this alternative would provide limited management direction to reduce the effects of roads on riparian habitats. Overall, this alternative would provide habitat protection for riparian associated wildlife that is similar to the No Action Alternative, less than the Proposed Action and Alternative O, and much less than the R and P alternatives. The viability outcome for surrogate wildlife species would not be improved and would remain below the historical capability.

Climate Change

Some of the riparian associated surrogate species are rated as high sensitivity to climate change (CCSD 2013) and riparian habitats are considered vulnerable to the anticipated effects of climate change (Lawler et al. 2014). The primary effect that is anticipated from climate change is the loss of habitat and reduced connectivity of riparian habitats due to altered hydrologic and disturbance (fire) regimes (Lawler et al. 2014).

The emphasis of this alternative is on timber management. Because this alternative does not focus on landscape scale restoration, the restoration of disturbances regimes would not be emphasized. Thus, habitat for riparian dependent surrogate wildlife is likely to be lost at an accelerated rate due to increased disturbances associated with climate change and some loss of riparian habitat from timber harvest. In addition, an important adaptation for climate change for riparian habitats is to restore their resiliency by reducing the negative effects of roads (Lawler et al. 2014). However, this alternative has limited opportunity for managers to use to reduce road effects on riparian habitats and does not emphasize watershed restoration.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and to protect and restore riparian habitats (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, and riparian habitat protections in the original Forest Plan were found to be inadequate and were amended (INFISH, PACFISH-USFS 1995, ACS-USFS 1994).

On private lands, Washington State Forestry Practices Act provides some limited protections for riparian habitats. Management of priority watersheds emphasizes using an “all lands” approach to enhance coordination across landowners and may enhance conditions for riparian associated wildlife species. However, habitat protections for riparian habitats on federal lands would help to mitigate for the limited protections and cumulative effects that occur on private lands.

Conclusion

The implementation of this alternative would make a relatively low contribution to the viability of riparian dependent surrogate wildlife species. This determination is based on the following:

1) This alternative would not address the negative effects that roads have on riparian habitats.

2) This alternative would not consolidate and make more consistent management direction for riparian habitats using Standards and would have smaller riparian management areas.

3) This alternative would not emphasize landscape restoration that would reduce the potential effects of uncharacteristically severe fires on riparian habitats.

Species of Management Interest

Deer and Elk

Direct and Indirect Effects

Forest management activities can influence deer and elk populations and habitat use. Vegetation management activities may affect the distribution and abundance of cover and forage. Adequate forage is particularly important during the summer and fall before the following birthing season when this can have a positive effect on the condition pregnant females (Lenz 1997, Cook 1998, Cook 2002, Cook et al. 2004, Cook et al. 2005). The management of forest roads and trails can influence how deer and elk use habitats, and influence the interactions between deer and elk (Rowland et al. 2005, Wisdom et al. 2005a, b). Additionally, deer and elk can compete with domestic livestock for both food resources (Findholt et al. 2005) and space (Coe et al. 2001, Coe et al. 2005). Thus, the potential effects that vegetation management, road and trail management, and grazing management can have on deer and elk habitats and population are evaluated for each of the alternatives.

Under this alternative, cover and forage for deer and elk on winter ranges emphasizes the retention of winter thermal cover. Considerable research has shown that the management of deer and elk winter habitat should be less focused on the retention of thermal cover, and more focused on the availability of forage on summer and fall habitats (see Cook et al. 2005 for a review). This alternative would not incorporate the current science about the role of providing adequate forage quality and quantity in providing for deer and elk populations.

This alternative would not alter the current habitat effectiveness for deer and winter ranges through road management. The Selkirk Elk Herd has a moderate level of habitat effectiveness (moderate level of human influence) on their winter ranges. Currently, in 38 percent of the watersheds, winter habitat for deer has a high habitat effectiveness index (low level of human influence), 38 percent habitat a moderate level of habitat effectiveness (moderate level of human influence), and 24 percent habitat a low level of habitat effectiveness (high level of human influence). Management direction for winter ranges is based on road density standards. Rowland et al. (2005) found road density to be a poor indicator of habitat use by deer and elk and recommended the use of the zone of influence instead. This is incorporated into the Proposed Action and alternative R and P.

Under this alternative, there would be no changes to current grazing practices that occur on national forest allotments. Degraded range conditions would be maintained or slowly be improved, likely having effects to deer and elk habitat use and populations (Coe et al. 2001, 2005; Findholt et al. 2005). More robust range management direction (as in the other alternatives) would not be adopted.

Climate Change

Deer and elk have a low level of sensitivity to the effects of climate change due to their ability to tolerate a relatively wide range of climatic conditions, their high mobility, and as habitat

generalists (CCSD 2013). However, alternatives that restore landscape pattern and functions while reducing the effects of roads on deer and elk summer and winter habitats would provide more resilience deer and elk populations. This alternative does not emphasize landscape-scale restoration and nor does it provide consistent and effective management direction for roads that would restore habitat effectiveness for deer and elk.

Cumulative Effects

The historical cattle and sheep grazing that occurred on portions of the Forest severely degraded range conditions (Wissmar et al. 1994, Bunting et al. 2002). These conditions, combined with current domestic (cattle) and wild ungulate grazing (primarily elk and deer), have resulted maintenance or slow recovery of poor range conditions in some areas (Wissmar et al. 1994, Bunting et al. 2002). In turn, these poor range conditions have had negative effects on some important unique habitats such as riparian areas and meadows (Beebe et al. 2002, Evans 2006, Lehmkuhl et al. 2013). This alternative would not result in more rigorous grazing management direction that would help to address this situation.

Winter ranges for the deer and elk occur on Federal lands, adjacent Wildlife Management Areas managed by the State, and private lands. Elk herd management plans (WDFW 2001) provide guidance for elk management on state lands and make recommendations for elk management on Forestlands. Management plans for deer include the White-tailed Deer Management Plan that provides direction to manage hunting to either maintain deer populations (WDFW 2010) and a general plan for mule deer (WDFW 2008), which are widely distributed across the Forest. A considerable amount of historical winter range for deer and elk is now in private land ownership or under the waters of Lake Roosevelt (created by the Grand Coulee dam). The cumulative effects of existing management plans (state and federal lands) would provide for the conditions that contribute to sustainable populations of deer and elk, while considering the effects of private land development.

Conclusion

The implementation of Alternative B would make a relatively low contribution to the conditions that support sustainable populations of deer and elk. This is based on the following:

1) This alternative would not address new science that recommends de-emphasizing the importance of winter thermal cover and increasing the emphasis on summer and fall forage quality and quantity.

2) This alternative does not provide consistent and effective direction on the management of roads and trails to restore habitat effectiveness on deer and elk summer and winter ranges.

3) This alternative would not include more rigorous management direction to improve the conditions of key habitats, such as riparian areas and meadows that are in poor condition due to the cumulative effects of past grazing practices, and current domestic and wild ungulate grazing.

Effects of Alternative R - Wildlife

Federally Listed Wildlife Species

Grizzly Bear

Direct and Indirect Effects

Forest activities that influence the recovery of the grizzly bear include: human access that can displace bears from important seasonal habitats or increase the risk of bear-human interactions, disposal of livestock carcasses within range allotments to avoid attracting bears to a potential food source, and the storage of food and garbage at recreation sites to reduce the potential for bears to associate humans with food sources.

Management of grizzly bears does not vary between alternatives. Existing management direction provides standards for human access, disposal of livestock carcasses, and food and garbage storage within the Selkirk Grizzly Bear Recovery Area (IGBC 1998, USDA 1988, USFWS 1993, USDI 2001). Existing standards have largely been met and would continue to be followed.

Climate Change

Grizzly bears have been identified as having a low sensitivity to climate change because they are opportunistic, eat a diverse array of food resources, and are highly adaptable (Servheen and Cross 2010, CCSD 2013). Anticipated impacts may include changes in the timing of denning due to longer snow-free periods and reduced snowpack (Lawler et al. 2014) and changes in the availability of food sources (Servheen and Cross 2010). These changes may put bears at risk of negative human interactions for a longer period of time each year (Servheen and Cross 2010). This would make education, proper food and garbage storage, carcass disposal measures, and human access management that much more important.

Cumulative Effects

The primary reason for the low population of grizzly bears in the recovery zone is past persecution and human-caused mortality of bears. Legal protections are now in place to protect grizzly bears. Information/education programs, sanitation measures, and access management have and would continue to be used to aid in the recovery of grizzly bears in the Selkirk Recovery Area.

Past, present and reasonable foreseeable future actions that could affect grizzly bears include timber harvest and associated road construction, recreational activities that can cause disturbance to bear and create potential for human-bear conflicts, and human development that fragment grizzly bear habitat. Cumulative effects are evaluated across the Recovery Area by tracking activities within Grizzly Bear Management Units (GBMUs). Other land managers have adopted and are following similar management direction (IPNF 2015) and overall recovery is coordinated by the Selkirk Grizzly Bear Management Subcommittee. GBMUs that occur on the Colville National Forest include the LeClerc, Salmo-Priest, and Sullivan-Hughes. The contribution made on federal lands to grizzly bear recovery would help to mitigate potential cumulative effects from off-forest activities. However, because this alternative does not address reducing the negative impacts of roads on wildlife habitats like in the proposed action and Alternatives R and P, it does less to mitigate cumulative effects.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance (e.g., core areas) to become more important to wildlife such as grizzly bears.

Black bear hunting on both sides of the international border within the Selkirk Recovery Area has the potential to add cumulatively to the mortality of grizzly bears. Hunters that encounter grizzly bears may mistakenly identify the bear, kill the bear in self-defense, or opportunistically poach the bear. Human access management within the recovery area is key to reducing the risk of mortality to grizzly bears from black bear hunting.

On private lands, the presence of garbage, pet food, fruit trees, or other attractants may lure bears into conflict situations. Bears that become habituated or a nuisance may lead to the bear being killed.

Conclusion

This alternative would make a relatively high contribution to the recovery of grizzly bears in the Selkirk Recovery Area and would result in a May Affect, Not Likely to Adversely Affect. This is based on the existing management direction, followed in all alternatives, that addresses:

1. Human access management,
2. Disposal of carcasses in range allotments that occur in the recovery area, and
3. Proper storage of food, garbage and other attractants that may lead to human-bear interactions.

Canada Lynx

Direct and Indirect Effects

The forest management activities that influence the recovery and conservation of Canada lynx include: vegetation management that affect lynx habitat components, winter recreation that influences habitat connectivity and lynx habitat use, forest roads that can become sources of lynx mortality at high traffic volumes and speeds, and grazing effects to riparian areas that provide habitat for snowshoe hares, a primary food resource for lynx (ILBT 2013). The Interagency Lynx Biology Team (ILBT 2013) developed conservation measures for core and secondary areas (USFWS 2005) to address each of these forest management activities, and for planners to consult when revising forest plans. These were used to evaluate the potential contribution of forest management alternatives to the recovery of Canada lynx.

Vegetation management activities affect the distribution of lynx habitat components, can fragment habitats, and create sources of disturbance (ILBT 2013). As a result, risk factors associated with vegetation management have been identified and conservation measures recommended to address the risk factors (ILBT 2013). The conservation measures for vegetation management apply to

lynx core areas and include mimicking the pattern and scale of natural disturbances and connectivity across the landscape while considering the future range of variability (ILBT 2013). A The ILBT (2013) also recommended a conservation measure focused on the restoration of disturbance regimes in dry forests that occur in close proximity to lynx habitat to reduce the risk of uncharacteristically severe and frequent fires reaching lynx habitat. Finally, there are conservation measures that limit the amount of vegetation management and the rate of habitat change (e.g., acres treated/decade) within lynx analysis units. Alternative R emphasizes an LSOF Reserve network covering about 48 percent of the Forest. The remaining Matrix, covering about 25 percent of the Forest, would be managed primarily for timber production. No management direction in this alternative guides land management to mimic the pattern and scale of natural disturbances as recommended for the vegetation conservation measures.

Conservation measures were identified to address the effects that highways have on habitat connectivity for lynx in core areas (ILBT 2013). Management direction under this alternative would assure that national forest lands adjacent to wildlife crossing structures would be managed to allow lynx access to the crossing structures.

Conservation measures for winter recreation in lynx core areas included reducing effects on habitat connectivity and to discourage expansion of over-the-snow routes that may influence lynx habitat use (ILBT 2013). The implementation of this alternative would include management direction that addresses effects of over-the-snow recreation on lynx habitat.

The conservation measures for forest roads in lynx core areas include avoiding road reconstruction or upgrades that occur in lynx habitat and would result in increased traffic speeds or volumes (ILBT 2013). These measures would reduce the potential for vehicular traffic to result in a source of mortality to lynx. There is management direction in this alternative to address this conservation measure.

The conservation measures for grazing in lynx core areas include management of riparian areas to assure adequate habitat for snowshoe hares, the primary prey species for Canada lynx (ILBT 2013). Alternative R would include management direction for grazing in riparian areas to provide for habitat for listed fish species, and direction specific to Canada lynx or snowshoe hares.

Alternative R would provide management direction to address most, but not all (see discussion above) of the direct and indirect effects of forest management activities on the recovery of Canada lynx. Alternative R would provide protection for Canada lynx that is greater than the No Action, B and O alternatives but less than the Proposed Action and Alternative P.

Climate Change

The potential effects of climate change on Canada lynx identified by the Interagency Lynx Biology Team (2013) included: 1) an upward shift in elevation or latitudinal distribution of lynx and prey, 2) a decrease in the amount of habitat and population size from reduced snow persistence and increased disturbance events (e.g., fires), 3) changes in demographic rates, such as survival and reproduction, and 4) changes in predator-prey relationships.

Climate change adaptations to address these effects include restoration of landscape-scale disturbance regimes to better mimic natural patterns and processes (Spies et al. 2010, Gaines et al. 2012, Lawler et al. 2014), and maintaining or restoring habitat connectivity to allow Canada lynx to adjust their ranges to changing conditions (Heller and Zavaleta 2009, ILBT 2013, Squires et al. 2013). There is limited management direction in alternative R to address these climate change adaptations.

Cumulative Effects

Past, present, and reasonably foreseeable actions that affect lynx habitat include timber harvest and fuels reduction, recreation, human development, and grazing on private and public lands. In addition, legal trapping of lynx, timber harvest, oil and gas development, mining and human access in British Columbia have and would continue to affect Canada lynx habitat.

Past vegetation management and large-scale fires on the Forest within lynx habitat has resulted in a distribution and amount of successional stages (early, mid, late) that are outside the HRV. This alternative would not emphasize vegetation management activities to restore lynx habitats towards the HRV.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Grazing has occurred and would continue to take place on off-forest lands potentially impacting deciduous or riparian habitats for lynx prey species.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

All federal lands within Canada lynx core and secondary areas would use the Lynx Conservation Assessment and Strategy (LCAS) (ILBT 2013) as current science to guide project level consultation and land management planning. The North Cascades National Park Complex recently revised their management plan to include the LCAS (NPS 2012). The Idaho Panhandle National Forest land management plan was recently revised to address the conservation measures identified in the LCAS (USFS 2015). The conservation of lynx on WDNR lands is guided by the Department of Natural Resources Lynx Habitat Management Plan (WDNR 1996, updated in 2002). The management plan for the Pend Oreille National Wildlife Refuge provides conservation measures to contribute to the recovery and viability of Canada lynx (USFWS 2000). Colletively, these management plans have addressed many of the conservation measures identified for Canada lynx (ILBT 2013) and would help mitigate potential cumulative effects that may occur from off-forest activities. In addition, no critical habitat was identified on the Colville National Forest or on adjacent lands (USFWS 2009).

In Canada, timber harvesting, oil and gas development, coal mining, and the proliferation of human access associated with these industries, have and would continue to affect lynx habitat. Legal trapping occurs north of the Forest in Canada and could reduce the potential for lynx to disperse into the lynx habitat on the Forest. Trapping is not legal in Idaho, Montana, or Washington.

Conclusion

Alternative R would make a moderate contribution to the recovery of the Canada lynx in both the short ($\leq$20 years) and long ($\leq$50 years) term, and result in a May Effect, Likely to Adversely Affect determination. This is because of the following:

1) This alternative does not address the vegetation management conservation measures identified in the recent version of the Lynx Conservation Assessment and Strategy (ILBT 2013) to mimic natural vegetation pattern and processes.

2) This alternative does address the conservation measures for roads, over-the-snow activities, and grazing, and

3) This alternative would address some of the climate change adaptations but would not emphasize landscape-scale restoration of landscape resiliency.

Late-Successional and Old Forest Habitats (Federally Listed Species)

Woodland Caribou

Direct and Indirect Effects

The forest management activities that can influence the recovery and viability of woodland caribou include: 1) Vegetation management and natural disturbances affect the amount and connectivity of old growth forests of Engelmann spruce/subalpine fir and western redcedar/western hemlock. 2) Human access that can increase the potential for poaching and cause disturbance to caribou during the critical winter period. These effects were used to evaluate the potential contribution of each alternative to the recovery of woodland caribou.

This alternative would implement new science, recommendations from the Biological Opinion issued in 2001 (USFWS 2001) on the 1988 Forest Plan (USFS 1988), and address the critical habitat designation (USFWS 2012). Vegetation management would be focused on the protection of late-successional and old growth habitats based on a network of reserves. The Desired Conditions address the amount, spatial arrangement, and connectivity of caribou habitat to mimic natural patterns and processes.

A term and condition of the 2001 Biological Opinion was that the Forest develop a winter recreation strategy that protects important winter habitats for caribou while providing some level of winter recreation access. This strategy was developed (USFS 2003) and would be fully integrated into this alternative. The strategy includes information and education about the effects of winter recreation on wildlife, monitoring and enforcement of areas closed to over-the-snow activities, and limitations on permitted over-the-snow activities. Collectively, these actions have reduced the impacts of winter recreation to caribou habitat while providing recreation opportunities in areas and at the time of the winter season when effects to caribou are minimal. In addition to winter recreation, this alternative emphasizes substantially reducing the negative effects of forest roads on wildlife habitat.

Climate Change

Climate change would likely alter the distribution and abundance of suitable caribou habitat, and would also change snow depths and persistence, which affect seasonal movements of mountain caribou (WDFW 2012). The potential effects of climate change depend on the interaction, not only of seasonal temperatures and snowfall patterns, but also occurrence of wildfires, outbreaks of forest insects, and diseases (Mountain Caribou Science Team 2005). Management adaptations to address the effects of climate change include a focus on forest restoration and reducing non-climatic factors that affect wildlife populations (e.g., restoring habitat effectiveness). This alternative would implement these adaptations.

Cumulative Effects

The caribou recovery area is 1,477 square miles in size and includes the Colville National Forest, Idaho Panhandle National Forest, Idaho Department of Lands, and British Columbia. About 47 percent of the recovery area is in the US and 53 percent in British Columbia. The Idaho Panhandle National Forest recently revised the forest plan to address habitat and risk factors identified in the caribou recovery plan and critical habitat (USFS 2015). The caribou recovery team works cooperatively to address cumulative effects on woodland caribou.

Past activities on the Forest have impacted caribou habitat. Over-the-snow motorized use, prior to the implementation of the Winter Recreation Strategy (USFS 2003), may have caused disturbance to caribou. The alternative would continue with implementation of the Winter Recreation Strategy, limiting the cumulative effects on caribou.

Past vegetation management and disturbances on the Forest have resulted in the distribution and arrangement of successional stages (early, mid, late) that are outside the HRV. Presently, more of the landscape is in med-successional and less in late-successional habitats compared to HRV. This alternative would emphasize the protection and restoration of LSOF habitat within the caribou recovery area, helping to mitigate for the cumulative effects of off-forest timber harvest.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife such as caribou. However, because this alternative does not address the negative impacts of roads on wildlife habitat, it provides less opportunity to mitigate the cumulative effects of recreation.

Big game hunting continues on both sides of the U.S./Canada border. Encounters with hunters may result in caribou mortality as a result of mistaken identification. Legal harvest of caribou by Treaty Indians does occur, but with few statistics on the number of animals taken it is difficult to evaluate the influence of this on the caribou population. Fatal collisions with vehicles occur on open roads in caribou habitat and are likely to continue. Predation by mountain lions, wolves and other predators would continue, with the affect on the caribou population dependent on big game populations, predator populations and a variety of other factors.

One important factor is how the Canadian officials decide to manage this herd. In the British Columbia portion of the recovery area, human activities that would continue to impact caribou habitat include gas, powerline, and international border corridors, recreation activities, timber harvest, and highways.

Conclusion

The implementation of this alternative would have a "May Affect, not Likely to Adversely Affect" determination for woodland caribou. It would make a relatively high contribution to the recovery of woodland caribou. The reasons for this determination are:

1) This alternative would address new science and risk factors identified in the recovery plan and critical habitat.

2). This alternative would formally adopt the winter recreation strategy for caribou habitat that was a Term and Condition of the 2001 Biological Opinion.

3) This alternative emphasizes the protection and restoration of caribou habitat, better addressing expected climate change effects and enhancing resiliency.

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the viability of late-successional and old forest (LSOF) dependent surrogate species include: the loss of LSOF habitat from fire (Healy et al. 2008, Davis et al. 2011), vegetation treatments (e.g. timber harvest, thinning, prescribed fire) that affect forest structure (e.g., canopy closure, snags, downed wood)(Healy et al. 2008, Wisdom et al. 2008, Davis et al. 2011), management of roads that influence habitat effectiveness (Gaines et al. 2003), and protection of riparian areas which are an important element of LSOF habitats for some species (e.g., bald eagles).

This alternative provides for the viability of LSOF species through a system of LSOF emphasis areas that encompass about 44 percent of the Forest. This alternative attempts to better accommodate habitat loss from fires and other disturbances by creating a larger network of LSOF habitats with increasing redundancy. This emphasizes short-term habitat protection for LSOF species instead of landscape scale restoration (as in the Proposed Action and Alternative P).

The implementation of this alternative includes plan components for several key elements of LSOF habitat. For instance, desired conditions for snag habitat address the potential loss of habitat in vegetation management treatments. This alternative would allow no firewood cutting in LSOF emphasis areas and no removal of snags >20 inches DBH (except for safety reasons). This alternative includes a 21-inch diameter limit on the removal of trees.

The implementation of this alternative would substantially decrease the negative effects of roads on LSOF habitat within 10 watersheds in the short-term (<20 years based on Objectives) because roads would be closed to meet other management objectives. In the longer-term (<50 years based on Desired Conditions) this alternative would result in road densities of equal to or less than 1 miles/square mile on 44 percent of the Forest, and equal to or less than 2 miles/square mile on 25 percent of the Forest, further reducing road associated effects to LSOF habitats and surrogate species.

Overall, this alternative would provide greater protection for LSOF habitats than the No Action, Proposed Action, and B and O alternatives, and similar to alternative P. This alternative would improve the viability outcomes for surrogate wildlife species that are dependent on LSOF habitats in both the short (≤20 years) and long (≤50 years) time periods as Desired Conditions are achieved.

Climate Change

The sensitivity of LSOF associated surrogate wildlife species to the effects of climate change were identified as medium for pileated woodpecker, and high for northern goshawk and American

marten (CCSD 2013). The primary effect of climate change is the loss of LSOF habitats due to altered disturbance regimes (CCSD 2013, Lawler et al. 2014).

Since the mid-1980s, the size and intensity of large wildfires in the western United States have increased markedly (Westerling et al. 2006), due, in part, to a reduction in fuel moisture driven by increased temperature and lower snowpack. Increases in fire risk and severity have been also been driven, in part, by increased fuel loads because of fire suppression practices used over the last century (McKenzie et al. 2004). Predicted increases in spring and summer temperature identified in many climate change models would exacerbate the frequency and intensity of disturbances such as fire (McKenzie et al. 2004, Wotton and Flannigan 1993) and defoliation caused by forest insects (Littell et al. 2009). In the interior Columbia Basin, Littell et al. (2009) predicted that the area burned is likely to double or even triple by 2050. Climate-driven changes in fire regimes would likely be the dominant driver of changes to forests and LSOF habitats in the western United States over the next century (McKenzie et al. 2004).

The effectiveness of a system of reserves may be compromised under climate change as species' habitat shifts to nonreserved areas (Araujo et al. 2004, Carroll et al. 2009). The LSOF habitat network proposed in this alternative would add additional area (compared to the No Action, B, and O Alternatives) to increase redundancy in the LSOF network. However, this alternative does not focus on landscape-scale forest restoration that has been identified as an important climate change adaptation to maintain LSOF habitats (Lawler et al. 2014).

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and to protect and restore LSOF habitats (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, and LSOF habitat protections in the original Forest Plan were found to be inadequate and were amended by the eastside screens (USFS 1995).

Past vegetation management and disturbances on the Forest have resulted in the distribution and arrangement of successional stages (early, mid, late) that are outside the HRV. Presently, more of the landscape is in med-successional and less in late-successional habitats compared to HRV. This alternative would emphasize the protection and restoration of LSOF habitat within management areas that cover about 44% of the Forest under this alternative, helping to mitigate for the cumulative effects of off-forest timber harvest.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Conclusion

Implementation of this alternative would make a relatively high contribution to the viability of LSOF dependent surrogate wildlife species. The contribution would be due to the following components of this alternative:

1) Emphasis on the protection of LSOF habitats.

2) The protection and conservation of key elements of LSOF habitat such as large trees, large snags, and riparian areas, and

3) The emphasis on restoring habitat effectiveness by substantially reducing the negative effects of roads on LSOF habitats.

Motorized Recreation and Road Access

Surrogate Wildlife Species

Direct and Indirect Effects

Motorized recreation and the use of forest roads influence the viability of surrogate wildlife species. These potential effects include displacement from key habitats, disturbance during critical periods, and the risk of mortality caused by collisions with vehicles (see Wisdom et al. 2000 and Gaines et al. 2003 for a complete list of road and trail associated factors that influence wildlife). The effects of motorized recreation and roads can occur during the non-winter period or during the winter period when snowmobiling or ski-trail grooming occurs.

Implementation of this alternative would reduce the negative effects of roads on surrogate species habitats in 10 watersheds in the short-term (<20 years based on Objectives). In the longer-term (<50 years based on Desired Conditions) this alternative would result in road densities of equal to or less than 1 mile/square mile on 44 percent of the Forest, and equal to or less than 2 miles/square mile on 25 percent of the Forest. Habitat effectiveness (as affected by roads) for surrogate wildlife species would be improved from a current low level of habitat effectiveness in 32 watersheds to a moderate level of habitat effectiveness in 16 watersheds and a high level of habitat effectiveness in 16 watersheds as Desired Conditions for road access are achieved.

Implementation of this alternative would also reduce the impacts of summer-motorized trails on habitat effectiveness for surrogate wildlife species. Approximately 30 miles of summer-motorized trails would be reduced or converted to non-motorized use within two watersheds. The implementation of this alternative would result in the highest habitat effectiveness for surrogate wildlife species as a result of reducing the impacts of roads and motorized trails.

Climate Change

The sensitivity of surrogate wildlife species used to assess the effects of roads and motorized recreation is rated as moderate for bighorn sheep, and high for Canada lynx and wolverine (CCSD 2013). An important climate change adaptation that has been recommended for wildlife is to reduce the negative effects of roads (and trails) on habitat (Gaines et al. 2012, Lawler et al. 2014). By reducing the negative effects of roads, habitats (especially riparian and wetland habitats) can become more resilient to the effects of climate change, and habitat connectivity can be restored allowing wildlife to adjust their ranges as conditions change. The implementation of this alternative includes management direction to make substantial improvement to habitat effectiveness for surrogate wildlife by reducing road and motorized trail impacts and densities.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative impacts of roads on wildlife habitats and restore habitat effectiveness (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, mostly focused on big-game species.

The limited management direction in the existing Forest Plan to reduce the negative effects of roads on wildlife and continued development of private lands (located mostly in north-south valley bottoms that bisect the CNF) means that management of roads and motorized trails on federal lands is even more important to the viability of surrogate wildlife species.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusion

The implementation of this alternative would make a relatively high contribution to the viability of surrogate wildlife species. This would occur because:

1) the alternative includes management direction to substantially reduce the impact of roads on habitat effectiveness for surrogate wildlife species, and

2) this alternative reduces the effects that summer motorized trails have of habitat effectiveness for surrogate wildlife species.

Livestock Grazing

Surrogate Wildlife Species

Direct and Indirect Effects

Grazing can influence habitats of surrogate wildlife species by removing key habitat elements (e.g., dense shrubs for MacGillivray's warbler and fox sparrow), especially in riparian habitats; alter disturbance regimes that maintain habitat structure (e.g., frequent fires in dry forests and grasslands keep open canopy for western bluebird); and influence the availability of important prey items (e.g., squirrels for golden eagles). To address the potential effects on surrogate wildlife species, the management direction regarding grazing in riparian habitat and upland habitats for each alternative was assessed.

This alternative would include management direction for riparian habitats that includes additional Standards (compared to the No Action, Proposed Action, B and O alternatives). Presently, many riparian habitats are in poor condition due to the effects of past and current grazing. The plan direction for this alternative would make a considerable improvement on altering the distribution of livestock that would all riparian habitats to recover.

This alternative includes ecologically based Desired Conditions for upland non-forest habitats (e.g., rangeland and alpine habitats) and Standards to protect unique habitats. This alternative would not alter the number of livestock, the intensity of grazing, or the amount of area grazed. Presently, 73 percent of the Forest is in a livestock allotment and animal unit months (AUMs) average about 25,000 per year. However, management direction would result in adjustments to the distribution of cattle and the intensity of grazing within specific habitats, such as unique habitats. This alternative, along with alternative P, has the greatest potential to improve viability outcomes for surrogate wildlife species that are influenced by grazing.

Climate Change

Habitats that are particularly sensitive to the effects of climate change include riparian areas (including wetlands) and alpine areas (Lawler et al. 2014). A management adaptation to make these habitats more resilient to climate change is to reduce the effects of non-climatic stressors (e.g., roads, intense grazing, etc.) (Lawler et al. 2014). This alternative includes management direction that would help to restore the resiliency of habitats that are sensitive to climate change.

Cumulative Effects

Grazing occurs on nearby private, state, tribal, and federal lands. Where grazing is allowed on the adjacent Okanogan-Wenatchee National Forest and Idaho Pan Handle National Forest, it is managed to accommodate other public land uses, such as contributing to the viability of surrogate wildlife species. On the adjacent Little Pend Oreille Wildlife Refuge, livestock grazing was reduced over time to allow restoration of riparian habitats and is currently only used to achieve specific wildlife habitat objectives (USFWS 2000). Grazing on non-federal lands increases the need to provide for wildlife habitats on federal lands that contribute to the viability of surrogate wildlife species.

This alternative includes management direction for some key habitats that would better account for the cumulative effects of grazing on wildlife habitats.

Conclusion

The implementation of this alternative would make a relatively high contribution to viability for surrogate wildlife species that are influenced by domestic grazing. This determination is based on:

1) This alternative includes management direction (including standards) for riparian habitat that would reduce the negative effects of grazing and improve riparian habitat condition.

2) This alternative would not change the number or grazing intensity, but would alter the distribution of livestock to protect some unique habitats.

3) This alternative would include management direction that could make habitats that are sensitive to the effects of climate change more resilient.

Habitat Connectivity

Surrogate Wildlife Species

Direct and Indirect Effects

A number of forest management activities influence habitat connectivity for surrogate wildlife species. These include: the amount, patch sizes, and spatial arrangement of suitable habitats;

location and density of motorized travel routes, especially in relation to riparian and LSOF habitats; and the ability of surrogate wildlife species to access wildlife crossing structures where national forest lands occur adjacent to highways and freeways. These are addressed in the evaluation of how forest management alternatives would affect habitat connectivity for surrogate wildlife species.

This alternative is focused on providing habitat connectivity for LSOF species through a network of LSOF emphasis areas that encompass a considerably larger area than any other alternative. The LSOF emphasis areas are positioned at distances from each other to allow highly mobile species to move among them. Additional provisions for low to moderate mobility LSOF species are provided through management direction for Riparian Management Areas. There is limited direction for habitat connectivity for species not associated with LSOF habitats (e.g. wide-ranging carnivores, Singleton et al. 2002).

In this alternative, management direction for riparian habitats is consolidated into one consistent set of plan components that applies to the entire Colville National Forest. Standards and guidelines would limit management activities that are allowed to occur within riparian habitats and influence habitat connectivity. This alternative includes greater riparian management area widths along intermittent streams, lakes, and ponds than in the areas previously covered by the INFISH forest plan amendment (USFS 1995).

The implementation of this alternative would decrease the negative effects of roads on habitat connectivity for surrogate wildlife species within 10 watersheds in the short-term (<20 years based on Objectives) because roads would be closed to meet other management objectives. In the longer-term (<50 years based on Desired Conditions) this alternative would result in road densities of equal to or less than 1 miles/square mile on 44 percent of the Forest, and equal to or less than 2 miles/square mile on 25 percent of the Forest, further reducing road associated effects to habitat connectivity.

The implementation of this alternative would also reduce the effects of summer-motorized trails on habitat connectivity for surrogate wildlife species. Approximately 30 miles of summer-motorized trails would be reduced or converted to non-motorized use within two watersheds.

The implementation of this alternative includes management direction for national forest lands that occur adjacent to wildlife crossing structures that may be installed in highways. The management direction is to assure that forest management activities are compatible with wildlife having access to the crossing structures.

Climate Change

Maintaining and restoring ecological connectivity is the most oft-cited climate adaptation strategy for biodiversity conservation (Heller and Zavaleta 2009, Opham and Wascher 2004, Parmesan 2006, Spies et al. 2010) and has been identified as an important adaptation strategy for wildlife in northeast Washington (Gaines et al. 2012). This is because species' range shifts have been the primary biological response to past episodes of climatic change, yet widespread anthropogenic barriers to movement would now challenge species' ability to respond (Price 2002, Thomas and Lennon 1999, Wormworth and Mallon 2006). The implementation of this alternative addresses the climate change adaptations that are recommended to maintain or restore habitat connectivity, but emphasizes LSOF species. Other alternatives (e.g., Proposed Action and P) maintain or restore habitat connectivity for a wider array of wildlife species.

Cumulative Effects

Past, present, and reasonably foreseeable human developments and transportation infrastructure, along with land ownership patterns, create cumulative impacts that limit options to conserve and restore regional connectivity. Regional habitat connectivity has been evaluated for a variety of wildlife species, including the surrogate wildlife species used to evaluate connectivity in this planning area (Singleton et al. 2002, WWHCWG 2010, Proctor et al. 2015). These assessments have shown the importance of the Colville National Forest in providing stepping-stone habitats between the Cascades and Selkirk Mountains (Singleton et al. 2002, WWHCWG 2010). Connectivity from the Cascades to the Kettle Range to the Selkirk Mountains is interrupted by transportation corridors and human developments associated with the Okanogan, Upper Columbia, and Pend Oreille river valleys (Singleton et al. 2002, WWHCWG 2010). Planning efforts are currently underway to determine the feasibility of constructing of a wildlife-crossing structure near Riverside in the Highway 97 corridor for connectivity between the Cascade Mountains and Kettle Range. Additionally, connectivity planning in southern British Columbia identified linkage areas that could greatly enhance wildlife movements between the Selkirk Mountains and Purcell Mountains (Apps et al. 2007, Proctor et al. 2015).

This alternative emphasizes reducing the direct and indirect effects of roads on wildlife habitats, contributing to the maintenance and restoration of habitat connectivity, and reducing cumulative effects. Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusion

The implementation of this alternative would make a moderate contribution to providing habitat connectivity that is important for the viability of surrogate wildlife species. This conclusion is based on the following:

1) An extended network (compared to the existing network) of LSOF habitat areas would provide additional habitat connectivity for LSOF species but limited management direction for wildlife species not associated with LSOF habitats,

2) The negative effects of roads on habitat connectivity, including riparian and LSOF habitat would be considerably reduced.

3) Management direction would assure that management activities that occur adjacent to wildlife crossing structures would be compatible with wildlife gaining access to the crossing structures.

Snag Habitat

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the availability of habitat for snag dependent surrogate species include firewood cutting (Bate et al. 2007, Hollenbeck et al. 2013), the loss of snag habitat along roads and at recreation sites from hazard tree removal (Bate et al. 2007, Hollenbeck et al. 2013, Wisdom et al. 2008), and removal of snags during timber harvest for safety reasons

(Wisdom et al. 2008). The implementation of this alternative includes management direction for snag habitat to address the potential loss of habitat in timber sale operations, would not allow firewood cutting in reserves (reserves in this alternative include considerably more land area than any other alternative), and would not allow removal of snags ≥20 inches DBH.

Implementation of this alternative would reduce the loss of snag habitat due to hazard tree removal along roads in 10 watersheds in the short-term (<20 years based on Objectives). In the longer-term (<50 years based on Desired Conditions) this alternative would result in road densities of equal to or less than 1 miles/square mile on 44 percent of the Forest, and equal to or less than 2 miles/square mile on 25 percent of the Forest.

Overall, this alternative would provide greater habitat for snag dependent surrogate wildlife species than any other alternative, and would improve the viability outcomes for snag dependent surrogate wildlife species.

Climate Change

Surrogate wildlife species associated with snag habitats include the pileated woodpecker, white-headed woodpecker, black-backed woodpecker, and Lewis's woodpecker, which are rated as medium sensitivity to climate change, and the western bluebird as high sensitivity (CCSD 2013). The primary effect that is anticipated from climate change is the loss of habitat due to altered disturbance regimes. The emphasis of this alternative is on short-term habitat protection within an extended reserve system and relatively intensive timber management within the matrix, outside of the reserves. Because this alternative does not focus on landscape scale restoration, the restoration of disturbances regimes would not be emphasized. Thus, habitat for snag dependent surrogate wildlife is likely to be lost at an accelerated rate due to increased disturbances associated with climate change and loss of snag habitat in the matrix from relatively intense timber harvest. The increase in fire associated with climate change could create a short-term gain in snag habitat followed by a long-term (80-100 years, Harrod et al. 1998) reduction as snags attrition occurs.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and more rigorous snag requirements to contribute to the viability of snag dependent wildlife (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitats and current required snag densities make limited contribution to the viability of surrogate wildlife species. The limited management direction for snag habitat on non-Federal lands adjacent to the planning area, places additional emphasis on providing for viability populations of snag dependent wildlife species on Federal lands. Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion, but treatments can lead to the loss of snag habitat for safety reasons.

Conclusion

The implementation of this alternative would make a relatively high contribution to the viability of snag dependent surrogate wildlife species. This determination is based on:

1) This alternative would focus on providing protections for snag habitat.

2) This alternative would make substantial reductions in the negative effects of roads on snag habitat.

3). This alternative provides management direction to protect snag habitat during vegetation management activities and snags from being cut for firewood outside designated areas.

Riparian Habitats

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the quality and availability of habitat for riparian dependent surrogate species include management of roads, recreation sites, grazing, and vegetation treatments that occur within riparian habitats.

In this alternative, management direction for watersheds and riparian habitats is consolidated into one consistent set of plan components that applies to the entire Colville National Forest. Standards and Guidelines would limit management activities that are allowed to occur within riparian habitats. This alternative includes greater riparian management area widths along intermittent streams, lakes, and ponds than in the areas previously covered by the INFISH forest plan amendment (USFS 1995).

The implementation of this alternative would reduce the effects of roads on riparian habitat within 10 watersheds in the short-term (<20 years based on Objectives). In the longer-term (<50 years based on Desired Conditions) this alternative would result in road densities of equal to or less than 1 miles/square mile on 44 percent of the Forest, and equal to or less than 2 miles/square mile on 25 percent of the Forest.

Overall, this alternative would provide greater habitat protection for riparian dependent surrogate wildlife species than the No Action, Proposed Action, O and B alternatives, and similar to alternative P. The viability outcomes for riparian dependent surrogate wildlife species would be improved.

Climate Change

Some of the riparian associated surrogate species are rated as high sensitivity to climate change (CCSD 2013) and riparian habitats are considered vulnerable to the anticipated effects of climate change (Lawler et al. 2014). The primary effect that is anticipated from climate change is the loss of habitat and reduced connectivity of riparian habitats due to altered hydrologic and disturbance (fire) regimes (Lawler et al. 2014).

The emphasis of this alternative is on short-term habitat protection within a reserve system and relatively intensive timber management within the matrix, outside of the reserves. Because this alternative does not focus on landscape scale restoration, the restoration of disturbances regimes would not be emphasized. Thus, habitat for riparian dependent surrogate wildlife is likely to be lost at an accelerated rate due to increased disturbances associated with climate change and loss of habitat in the matrix from relatively intense timber harvest.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to

the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and to protect and restore riparian habitats (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, and riparian habitat protections in the original Forest Plan were found to be inadequate and were amended (PACFISH, INFISH-USFS 1995, ACS-USFS 1994).

On private lands, Washington State Forestry Practices Act provides some limited protections for riparian habitats. Management of priority watersheds emphasizes using an “all lands” approach to enhance coordination across landowners and may enhance conditions for riparian associated wildlife species. However, habitat protections for riparian habitats on federal lands would help to mitigate for the limited protections and cumulative effects that occur on private lands.

Conclusion

The implementation of this alternative would make a relatively high contribution to the viability of riparian dependent surrogate wildlife species. This determination is based on the following:

1) This alternative would make substantial reductions in the negative effects that road have on riparian habitats.

2) This alternative would consolidate and make more consistent management direction for riparian habitats using Standards and providing larger management zones that existing direction.

Species of Management Interest

Deer and Elk

Direct and Indirect Effects

Forest management activities can influence deer and elk populations and habitat use. Vegetation management activities may affect the distribution and abundance of cover and forage. Adequate forage is particularly important during the summer and fall before the following birthing season when this can have a positive effect on the condition pregnant females (Lenz 1997, Cook 1998, Cook 2002, Cook et al. 2004, Cook et al. 2005). The management of forest roads and trails can influence how deer and elk use habitats, and influence the interactions between deer and elk (Rowland et al. 2005, Wisdom et al. 2005a, and b). Additionally, deer and elk can compete with domestic livestock for both food resources (Findholt et al. 2005) and space (Coe et al. 2001, Coe et al. 2005). Thus, the potential effects that vegetation management, road and trail management, and grazing management can have on deer and elk habitats and population are evaluated for each of the alternatives.

Under Alternative R, cover and forage for deer and elk on winter ranges emphasizes the retention of winter thermal cover. Considerable research has shown that the management of deer and elk winter habitat should be less focused on the retention of thermal cover, and more focused on the availability of forage on summer and fall habitats (see Cook et al. 2005 for a review). This alternative would not incorporate the current science about the role of winter thermal cover in providing for deer and elk populations.

Much of the summer range for deer and elk under this alternative is managed either within a wilderness reserve or within a LSOF habitat reserve network. This limits the opportunities to restore forage conditions that contribute to elk productivity.

This alternative would improve habitat effectiveness for deer and elk on summer and winter ranges. The Selkirk Elk Herd has a moderate level of habitat effectiveness (low level of human influence) on their winter ranges. Under this alternative, habitat effectiveness would be improved to high (a low level of human influence). Overall, habitat effectiveness would be restored on approximately 48,000 acres of habitat on elk range under this alternative. The desired conditions for elk winter ranges would be to have a low level of human influence (<30 percent of the winter range in the zone of influence of an open road, motorized route, or designated ski trail).

For deer, this alternative would result in a high level of habitat effectiveness (low level of human influence) on 81 percent of the deer winter ranges, a moderate level of habitat effectiveness on 13 percent, and a low level of habitat effectiveness on 6 percent... The desired conditions for deer winter ranges would be to have a low level of human influence (<30 percent of the winter range in the zone of influence of an open road, motorized route, or designated ski trail).

Current management direction for winter ranges is based on road density standards and would be changed to use of the zone of influence (Rowland et al. 2005). This alternative includes more robust range management direction to aid in the recovery of range conditions that are poor and slow to recover from past grazing practices.

Climate Change

Deer and elk have a low level of sensitivity to the effects of climate change due to their ability to tolerate a relatively wide range of climatic conditions, their high mobility, and as habitat generalists (CCSD 2013). However, alternatives that restore landscape pattern and functions while reducing the effects of roads on deer and elk summer and winter habitats would provide more resilience deer and elk populations. This alternative provides consistent management direction for roads that would make considerable contributions to restore habitat effectiveness for deer and elk. However, this alternative does not emphasize landscape-scale forest restoration, considered an important climate change adaptation to restore landscape resiliency to disturbances and create more sustainable habitat conditions (Lawler et al. 2014).

Cumulative Effects

The historical cattle and sheep grazing that occurred on portions of the Forest severely degraded range conditions (Wissmar et al. 1994, Bunting et al. 2002). These conditions, combined with current domestic (cattle) and wild ungulate grazing (primarily elk and deer), have resulted maintenance or slow recovery of poor range conditions in some areas (Wissmar et al. 1994, Bunting et al. 2002). In turn, these poor range conditions have had negative effects on some important unique habitats such as riparian areas and meadows. This alternative would result in more rigorous grazing management direction that would help to address this situation.

Winter ranges for the deer and elk occur on Federal lands, adjacent Wildlife Management Areas managed by the State, and private lands. Elk herd management plans (WDFW 2001) provide guidance for elk management on state lands and make recommendations for elk management on Forestland. Management plans for deer include the White-tailed Deer Management Plan that covers the two management units on the Colville National Forest and provides direction to manage hunting to either maintain or increase white-tailed deer populations (WDFW 2010). A considerable amount of historical winter range for deer and elk is now in private land ownership

or under the waters of Lake Roosevelt (created by the Grand Coulee dam). The cumulative effects of the existing management plans (state and federal lands) would provide for the conditions that contribute to sustainable populations of deer and elk, while considering the effects of private land development.

Conclusion

The implementation of Alternative R would make a moderate contribution to the conditions that support sustainable populations of deer and elk. This is based on the following:

1) This alternative would not address new science that recommends de-emphasizing the importance of winter thermal cover and increasing the emphasis on summer and fall forage quality and quantity. It would also limit management activities that increase forage productivity.

2) This alternative does provide consistent and effective direction on the management of roads and trails to restore habitat effectiveness on deer and elk summer and winter ranges.

3) This alternative would include more rigorous management direction to improve the conditions of key habitats, such as riparian areas and meadows that are in poor condition due to the cumulative effects of past grazing practices, and current domestic and wild ungulate grazing.

Effects of Alternative P - Wildlife

Federally Listed Wildlife Species

Grizzly Bear

Direct and Indirect Effects

Forest activities that influence the recovery of the grizzly bear include: human access that can displace bears from important seasonal habitats or increase the risk of bear-human interactions, disposal of livestock carcasses within range allotments to avoid attracting bears to a potential food source, and the storage of food and garbage at recreation sites to reduce the potential for bears to associate humans with food sources.

Management of grizzly bears does not vary between alternatives. Existing management direction provides standards for human access, disposal of livestock carcasses, and food and garbage storage within the Selkirk Grizzly Bear Recovery Area (IGBC 1998, USDA 1988, USFWS 1993, USDI 2001). Existing standards have largely been met and would continue to be followed.

Climate Change

Grizzly bears have been identified as having a low sensitivity to climate change because they are opportunistic, eat a diverse array of food resources, and are highly adaptable (Servheen and Cross 2010, CCSD 2013). Anticipated impacts may include changes in the timing of denning due to longer snow-free periods and reduced snowpack (Lawler et al. 2014) and changes in the availability of food sources (Servheen and Cross 2010). These changes may put bears at risk of negative human interactions for a longer period of time each year (Servheen and Cross 2010). This would make education, proper food and garbage storage, carcass disposal measures, and human access management that much more important.

Cumulative Effects

The primary reason for the low population of grizzly bears in the recovery zone is past persecution and human-caused mortality of bears. Legal protections are now in place to protect grizzly bears. Information/education programs, sanitation measures, and access management have and would continue to be used to aid in the recovery of grizzly bears in the Selkirk Recovery Area.

Past, present and reasonable foreseeable future actions that could affect grizzly bears include timber harvest and associated road construction, recreational activities that can cause disturbance to bear and create potential for human-bear conflicts, and human development that fragment grizzly bear habitat. Cumulative effects are evaluated across the Recovery Area by tracking activities within Grizzly Bear Management Units (GBMUs). Other land managers have adopted and are following similar management direction (IPNF 2015) and overall recovery is coordinated by the Selkirk Grizzly Bear Management Subcommittee. GBMUs that occur on the Colville National Forest include the LeClerc, Salmo-Priest, and Sullivan-Hughes. The contribution made on federal lands to grizzly bear recovery would help to mitigate potential cumulative effects from off-forest activities. However, because this alternative does not address reducing the negative impacts of roads on wildlife habitats like in the proposed action and Alternatives R and P, it does less to mitigate cumulative effects.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance (e.g., core areas) to become more important to wildlife such as grizzly bears.

Black bear hunting on both sides of the international border within the Selkirk Recovery Area has the potential to add cumulatively to the mortality of grizzly bears. Hunters that encounter grizzly bears may mistakenly identify the bear, kill the bear in self-defense, or opportunistically poach the bear. Human access management within the recovery area is key to reducing the risk of mortality to grizzly bears from black bear hunting.

On private lands, the presence of garbage, pet food, fruit trees, or other attractants may lure bears into conflict situations. Bears that become habituated or a nuisance may lead to the bear being killed.

Conclusion

This alternative would make a relatively high contribution to the recovery of grizzly bears in the Selkirk Recovery Area and would result in a May Affect, Not Likely to Adversely Affect determination. This is based on the existing management direction, followed in all alternatives, that addresses:

1. Human access management,
2. Disposal of carcasses in range allotments that occur in the recovery area, and

3. Proper storage of food, garbage and other attractants that may lead to human-bear interactions.

Canada Lynx

Direct and Indirect Effects

The forest management activities that influence the recovery and conservation of Canada lynx include: vegetation management that affect lynx habitat components, winter recreation that influences habitat connectivity and lynx habitat use, forest roads that can become sources of lynx mortality at high traffic volumes and speeds, and grazing effects to riparian areas that provide habitat for snowshoe hares, a primary food resource for lynx (ILBT 2013). The Interagency Lynx Biology Team (ILBT 2013) developed conservation measures for core and secondary areas (USFWS 2005) to address each of these forest management activities, and for planners to consult when revising forest plans. These were used to evaluate the potential contribution of forest management alternatives to the recovery of Canada lynx.

Vegetation management activities (e.g., timber harvest, prescribed fire) affect the distribution of lynx habitat components, can fragment habitats, and create sources of disturbance (ILBT 2013). As a result, the ILBT (2013) identified risk factors associated with vegetation management and developed conservation measures to address the risk factors. The conservation measures for vegetation management apply to lynx core areas and include using the historic range of variability to mimic the pattern and scale of natural disturbances and connectivity across the landscape, while considering the future range climate change (ILBT 2013). A conservation measure focused on the restoration of disturbance regimes in dry forests that occur in close proximity to lynx habitat to reduce the risk of uncharacteristically severe and frequent fires reaching lynx habitat. Finally, conservation measures were recommended that limit the amount of vegetation management and the rate of habitat change (e.g., acres treated/decade) within lynx analysis units. The implementation of this alternative includes management direction to manage habitat for Canada lynx toward desired conditions that are based on the historic range of variability (HRV). This means that habitats would be managed so that the amount of habitat, patch sizes, and spatial arrangement would mimic conditions under which Canada lynx evolved (Agee 2000).

Winter recreation can influence how lynx use habitats (ILBT 2013). To minimize the potential of negative effects from winter recreation, the ILBT (2013) developed conservation measures to reduce effects. Conservation measures for winter recreation in lynx core areas included reducing effects on habitat connectivity and discouraging expansion of over-the-snow routes that may influence lynx habitat use (ILBT 2013). There is management direction in this alternative that limits over-the-snow winter recreational activities in lynx habitat.

The conservation measures for forest roads in lynx core areas include avoiding road reconstruction or upgrades that occur in lynx habitat and would result in increased traffic speeds or volumes (ILBT 2013). These measures would reduce the potential for vehicular traffic to result in a source of mortality to lynx. This alternative includes management direction to limit road reconstruction and upgrades in lynx habitat that would increase traffic volume or speed.

The conservation measures for grazing in lynx core areas include management of riparian areas to assure adequate habitat for snowshoe hares, the primary prey species for Canada lynx (ILBT 2013). This alternative includes management direction for grazing in riparian management areas specific to providing habitat for snowshoe hares.

Alternative P would provide management direction to address the direct and indirect effects of forest management activities on the recovery of Canada lynx. Alternative P would provide more protections for Canada lynx than any of the other alternatives, and would make a substantial contribution to the recovery of Canada lynx.

Climate Change

The potential effects of climate change on Canada lynx identified by the Interagency Lynx Biology Team (2013) included: 1) an upward shift in elevation or latitudinal distribution of lynx and prey, 2) a decrease in the amount of habitat and population size from reduced snow persistence and increased disturbance events (e.g., fires), 3) changes in demographic rates, such as survival and reproduction, and 4) changes in predator-prey relationships.

Climate change adaptations to address these effects include restoration of landscape-scale disturbance regimes to better mimic natural patterns and processes (Spies et al. 2010, Gaines et al. 2012), and maintaining or restoring habitat connectivity to allow Canada lynx to adjust their ranges to changing conditions (Heller and Zavaleta 2009, ILBT 2013, Squires et al. 2013). There is management direction in this alternative to implement these climate change adaptations through the emphasis on dynamic-landscape restoration, and the restoration of conditions that would enhance connectivity of habitats (see Habitat Connectivity sections).

Cumulative Effects

Past, present, and reasonably foreseeable actions that affect lynx habitat include timber harvest and fuels reduction, recreation, human development, and grazing on private and public lands. In addition, legal trapping of lynx, timber harvest, oil and gas development, mining and human access in British Columbia have and would continue to affect Canada lynx habitat.

Past vegetation management and large-scale fires on the Forest within lynx habitat has resulted in a distribution and amount of successional stages (early, mid, late) that are outside the HRV. This alternative would result in vegetation management activities that would restore lynx habitats towards the HRV, providing conditions more similar to those under which lynx evolved.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Grazing has occurred and would continue to take place on off-forest lands potentially impacting deciduous or riparian habitats for lynx prey species.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

All federal lands within Canada lynx core and secondary areas would use the Lynx Conservation Assessment and Strategy (LCAS) (ILBT 2013) as current science to guide project level consultation and land management planning. The North Cascades National Park Complex recently revised their management plan to include the LCAS (NPS 2012). The Idaho Panhandle

National Forest land management plan was recently revised to address the conservation measures identified in the LCAS (USFS 2015). The conservation of lynx on WDNR lands is guided by the Department of Natural Resources Lynx Habitat Management Plan (WDNR 1996, updated in 2002). The management plan for the Pend Oreille National Wildlife Refuge provides conservation measures to contribute to the recovery and viability of Canada lynx (USFWS 2000). Colletively, these management plans have addressed many of the conservation measures identified for Canada lynx (ILBT 2013) and would help mitigate potential cumulative effects that may occur from off-forest activities. In addition, no critical habitat was identified on the Colville National Forest or on adjacent lands (USFWS 2009).

In Canada, timber harvesting, oil and gas development, coal mining, and the proliferation of human access associated with these industries, have and would continue to affect lynx habitat. Legal trapping occurs north of the Forest in Canada and could reduce the potential for lynx to disperse into the lynx habitat on the Forest. Trapping is not legal in Idaho, Montana, or Washington.

Conclusion

Alternative P would make a relatively high contribution to the recovery of the Canada lynx in both the short (≤20 years) and long (≤50 years) term, and result in a May Effect, Not Likely to Adversely Affect determination. This is because of the following:

1) This alternative incorporates the best available science and conservation measures identified in the recent version of the Lynx Conservation Assessment and Strategy (ILBT 2013), and the USFWS Recovery Outline (USFWS 2005);

2) This alternative would implement recommended climate change adaptations by focusing on the restoration of forest disturbance regimes and resiliency, and reducing the impacts of roads on habitat connectivity, and

3) This alternative addresses previous findings that existing management plans provided inadequate regulatory mechanisms to prevent the listing of lynx as a federally Threatened species (USFWS 2003).

Late-Successional and Old Forest Habitats (Federally Listed Species)

Woodland Caribou

Direct and Indirect Effects

The forest management activities that can influence the recovery and viability of woodland caribou include: 1) Vegetation management and natural disturbances affect the amount and connectivity of old growth forests of Engelmann spruce/subalpine fir and western redcedar/western hemlock. 2) Human access that can increase the potential for poaching and cause disturbance to caribou during the critical winter period. These effects were used to evaluate the potential contribution of each alternative to the recovery of woodland caribou.

This alternative would implement new science, recommendations from the Biological Opinion issued in 2001 (USFWS 2001) on the 1988 Forest Plan (USFS 1988), and address the critical habitat designation (USFWS 2012). Vegetation management would be focused on restoring late successional and old forest habitats based the historic range of variability. The Desired Conditions

would be for the amount, spatial arrangement, and connectivity of caribou habitat to mimic natural patterns and processes.

A term and condition of the 2001 Biological Opinion was that the Forest develop a winter recreation strategy that protects important winter habitats for caribou while providing some level of winter recreation access. This strategy was developed (USFS 2003) and is fully integrated into this alternative. This strategy includes information and education about the effects of winter recreation on wildlife, monitoring and enforcement of areas closed to over-the-snow activities, and limitations on permitted over-the-snow activities. Collectively, these actions have reduced the impacts of winter recreation to caribou habitat while providing recreation opportunities in areas and at the time of the winter season when effects to caribou are minimal. In addition to winter recreation, this alternative emphasizes substantially reducing the negative effects of forest roads on wildlife habitat.

Climate Change

Climate change would likely alter the distribution and abundance of suitable caribou habitat, and would also change snow depths and persistence, which affect seasonal movements of mountain caribou (WDFW 2012). The potential effects of climate change depend on the interaction, not only of seasonal temperatures and snowfall patterns, but also occurrence of wildfires, outbreaks of forest insects, and diseases (Mountain Caribou Science Team 2005). Management adaptations to address the effects of climate change include a focus on forest restoration and reducing non-climatic factors that affect wildlife populations (e.g., restoring habitat effectiveness). This alternative would implement these adaptations.

Cumulative Effects

The caribou recovery area is 1,477 square miles in size and includes the Colville National Forest, Idaho Panhandle National Forest, Idaho Department of Lands, and British Columbia. About 47 percent of the recovery area is in the US and 53 percent in British Columbia. The Idaho Panhandle National Forest recently revised the forest plan to address habitat and risk factors identified in the caribou recovery plan and critical habitat (USFS 2015). The caribou recovery team works cooperatively to address cumulative effects on woodland caribou.

Past activities on the Forest have impacted caribou habitat. Over-the-snow motorized use, prior to the implementation of the Winter Recreation Strategy (USFS 2003), may have caused disturbance to caribou. The alternative would continue with implementation of the Winter Recreation Strategy, limiting the cumulative effects on caribou.

Past vegetation management and disturbances on the Forest have resulted in the distribution and arrangement of successional stages (early, mid, late) that are outside the HRV. Presently, more of the landscape is in med-successional and less in late-successional habitats compared to HRV. This alternative would manage habitats towards HRV resulting in a distribution and amount of successional stages that better mimic conditions under which caribou evolved, and better mitigate for the cumulative effects of off-forest timber harvest.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife such as caribou.

Big game hunting continues on both sides of the U.S./Canada border. Encounters with hunters may result in caribou mortality as a result of mistaken identification. Legal harvest of caribou by Treaty Indians does occur, but with few statistics on the number of animals taken it is difficult to evaluate the influence of this on the caribou population. Fatal collisions with vehicles occur on open roads in caribou habitat and are likely to continue. Predation by mountain lions, wolves and other predators would continue, with the affect on the caribou population dependent on big game populations, predator populations and a variety of other factors.

One important factor is how the Canadian officials decide to manage this herd. In the British Columbia portion of the recovery area, human activities that would continue to impact caribou habitat include gas, powerline, and international border corridors, recreation activities, timber harvest, and highways.

Conclusion

Implementation of this alternative would have a May Affect, "not Likely to Adversely Affect" determination for woodland caribou. It would make a relatively high contribution to the recovery of woodland caribou. The reasons for this determination are:

1) This alternative would address new science and risk factors identified in the recovery plan and critical habitat.

2) This alternative would formally adopt the winter recreation strategy for caribou habitat that was a Term and Condition of the 2001 Biological Opinion.

3) This alternative emphasizes the protection and restoration of caribou habitat, better addressing expected climate change effects and enhancing resiliency.

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the viability of late-successional and old forest (LSOF) dependent surrogate species include: the loss of LSOF habitat from fire (Healy et al. 2008, Davis et al. 2011), vegetation treatments (e.g. timber harvest, thinning, prescribed fire) that affect forest structure (e.g., canopy closure, snags, downed wood)(Healy et al. 2008, Wisdom et al. 2008, Davis et al. 2011), management of roads that influence habitat effectiveness (Gaines et al. 2003), and protection of riparian areas which are an important element of LSOF habitats for some species.

The dynamic-landscape restoration approach emphasized in this alternative would result in landscapes, including disturbance regimes, that are more resilient to climate change through the application of strategically located restoration treatments in priority locations (Noss et al. 2006, Spies et al. 2006, Gaines et al. 2010, Franklin and Johnson 2012). By strategically locating restoration treatments, landscape scale fire behavior may be altered to be more similar to native

disturbance regimes and the risk of loss of LSOF habitat to uncharacteristically severe fires may be reduced (Finney 2001, Finney et al. 2006, Ager et al. 2007, Lehmkuhl et al. 2007). Landscape restoration through the implementation of this alternative would include a network of dense, multi-layered habitat patches tailored to specific conditions and surrogate species (Gaines et al. 2010, Franklin and Johnson 2012). The amount, patch size, and spatial arrangement of dense, multi-layered habitat would be managed within or towards the historic range of variation for each landscape (e.g., watershed) (Hessburg et al. 2013). In addition, implementation of this alternative would include greater use of managed fire to achieve desired conditions for restoration and resiliency (Noss et al. 2006, Franklin and Johnson 2012).

For some LSOF surrogate species, such as the white-headed woodpecker, conservation assessments have recommended the use of stand-level treatments to restore habitat because current habitat levels are well below historic levels (Mellen-McLean et al. 2013, Gaines et al. 2015). The effects of restoration treatments on birds has been studied and shown that treatments that retain large trees and promote spatial variability can have positive effects on surrogate bird species, including the white-headed woodpecker (Gaines et al. 2007, Gaines et al. 2010b). The implementation of this alternative would result in approximately 5000 acres/year of restorative treatments within dry and mesic forests, creating favorable conditions for white-headed woodpeckers.

The implementation of this alternative includes plan components for several key elements of LSOF habitat. For instance, desired conditions for snag habitat address the potential loss of snags in vegetation management treatments. This alternative would also require that firewood cutting occur in designated areas only, and not allow removal of snags ≥20 inches DBH outside of designated areas. In addition, this alternative provides for the retention and restoration of late-successional forest structure, which is currently lacking in most forested landscapes (Hessburg et al. 1999).

The implementation of this alternative would reduce the negative effects of roads on LSOF habitats within 10 watersheds in the short-term (<20 years based on Objectives) because roads would be closed (to meet other management objectives). In the longer-term (<50 years based on Desired Conditions) this alternative would result in road densities of equal to or less than 1 miles/square mile on 23 percent of the Forest, and equal to or less than 2 miles/square mile on 48 percent of the Forest, considerably reducing the negative effects of roads on LSOF habitats.

Overall, this alternative would provide greater protection for LSOF habitats than the No Action, Proposed Action, B, O, and R alternatives. This alternative would improve the viability outcomes for surrogate species that are dependent on LSOF habitats in both the short (≤20 years) and long (≤50 years) time periods as Desired Conditions are achieved.

Climate Change

The sensitivity of LSOF associated surrogate wildlife species to the effects of climate change were identified as medium for pileated woodpecker, and high for northern goshawk and American marten (CCSD 2013). The primary effect of climate change is the loss of LSOF habitats due to altered disturbance regimes (CCSD 2013, Lawler et al. 2014).

Since the mid-1980s, the size and intensity of large wildfires in the western United States have increased markedly (Westerling et al. 2006), due, in part, to a reduction in fuel moisture driven by increased temperature and lower snowpack. Increases in fire risk and severity have been also been driven, in part, by increased fuel loads because of fire suppression practices used over the

last century (McKenzie et al. 2004). Predicted increases in spring and summer temperature identified in many climate change models would exacerbate the frequency and intensity of disturbances such as fire (McKenzie et al. 2004, Wotton and Flannigan 1993) and defoliation caused by forest insects (Littell et al. 2009). In the interior Columbia Basin, Littell et al. (2009) predicted that the area burned is likely to double or even triple by 2050. Climate-driven changes in fire regimes would likely be the dominant driver of changes to forests and LSOF habitats in the western United States over the next century (McKenzie et al. 2004).

The dynamic-landscape restoration approach that is emphasized in this alternative represents the implementation of an adaptive strategy to create landscapes more resilient to climate change (Spies et al. 2010, Gaines et al. 2012) and to maintain LSOF habitats (Lawler et al. 2014). The emphasis on restoration of resiliency would result in landscapes, including disturbance regimes that are more resilient to climate change through the application of strategically located restoration treatments in priority locations (Noss et al. 2006, Spies et al. 2006, Gaines et al. 2010, Franklin and Johnson 2012). By strategically locating restoration treatments, landscape scale fire behavior can be altered to be more similar to native disturbance regimes and the risk of loss of LSOF habitat to uncharacteristically severe fires can be reduced (Finney 2001, Finney et al. 2006, Ager et al. 2007, Lehmkuhl et al. 2007). In addition, implementation of this alternative would include greater use of managed fire to achieve desired conditions for restoration and resiliency (Noss et al. 2006, Franklin and Johnson 2012).

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and to protect and restore LSOF habitats (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and the current plan provides limited management direction to reduce the effects of roads on wildlife habitat, and LSOF habitat protections in the original Forest Plan were found to be inadequate and were amended by the eastside screens (USFS 1995).

Past vegetation management and disturbances on the Forest have resulted in the distribution and arrangement of successional stages (early, mid, late) that are outside the HRV. Presently, more of the landscape is in mid-successional and less in late-successional habitats compared to HRV. This alternative would manage habitats towards HRV resulting in a distribution and amount of successional stages that better mimic conditions under which caribou evolved, and better mitigate for the cumulative effects of off-forest timber harvest.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities.

Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done in such a way that they restore wildlife habitat that has been affected by fire exclusion.

Conclusion

The implementation of this alternative would make a relatively high contribution to the viability of LSOF dependent surrogate wildlife species. The high contribution would be due to the following components of this alternative:

1) Emphasis on landscape restoration to enhance landscape resiliency,

2) The conservation of LSOF habitat across whole landscape (not just in reserves),

3) The protection and restoration of key elements of LSOF habitat such late-successional structure, and riparian areas, and

4) The emphasis on restoring habitat effectiveness by substantially reducing the negative effects of roads on LSOF habitats.

Motorized Recreation and Road Access

Surrogate Wildlife Species

Direct and Indirect Effects

Motorized recreation and the use of forest roads influence the viability of surrogate wildlife species. These potential effects include displacement from key habitats, disturbance during critical time periods, and the risk of mortality caused by collisions with vehicles (see Wisdom et al. 2000 and Gaines et al. 2003 for a complete list of road and trail associated factors that influence wildlife). The effects of motorized recreation and roads can occur during the non-winter period or during the winter period when snowmobiling or ski-trail grooming occurs.

The implementation of this alternative would reduce the negative effects of roads on surrogate species habitats in 10 watersheds in the short-term (<20 years based on Objectives). In the longer-term (<50 years based on Desired Conditions) this alternative would result in road densities of equal to or less than 1 miles/square mile on 23 percent of the Forest, and equal to or less than 2 miles/square mile on 48 percent of the Forest. The remainder of the Forest would remain unroaded. Habitat effectiveness (as affected by roads) for surrogate wildlife species would be improved from a current low to moderate level of habitat effectiveness in 26 watersheds to a moderate level of habitat effectiveness in 17 watersheds and a high level of habitat effectiveness in 9 watersheds as Desired Conditions for road access are achieved.

Overall, this alternative would provide greater habitat effectiveness for surrogate wildlife species than the No Action, Proposed Action, B and O alternatives, and somewhat less than Alternative R. This alternative would improve the viability outcomes for surrogate wildlife species whose habitats are influenced by roads and motorized trails.

Climate Change

The sensitivity of surrogate wildlife species used to assess the effects of roads and motorized recreation is rated as high for Canada lynx and wolverine (CCSD 2013). An important climate change adaptation that has been recommended for wildlife is to reduce the negative effects of non-climate related stressors such as the effects of roads (and trails) on habitat (Gaines et al. 2012, Lawler et al. 2014). By reducing the negative effects of roads, habitats (especially riparian and wetland habitats) can become more resilient to the effects of climate change, and habitat connectivity can be restored allowing wildlife to adjust their ranges as conditions change. The

implementation of this alternative includes management direction to make substantial improvement to habitat effectiveness for surrogate wildlife by reducing road impacts and densities.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative impacts of roads on wildlife habitats and restore habitat effectiveness (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and the current plan provides limited management direction to reduce the effects of roads on wildlife habitat, mostly focused on big-game species.

The limited management direction in current Forest Plans to reduce the negative effects of roads on wildlife and continued development of private lands (located mostly in north-south valley bottoms that bisect the CNF) means that management of roads and motorized trails on federal lands is even more important to the viability of surrogate wildlife species.

Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusion

The implementation of this alternative would make a relatively high contribution to the viability of surrogate wildlife species whose habitats are influenced by motorized access. This would occur because:

1) This alternative includes management direction to substantially reduce the impact of roads on habitat effectiveness for surrogate wildlife species, and

2) This alternative does not alter the current impacts that summer and winter motorized trails have on habitat effectiveness for surrogate wildlife species.

Livestock Grazing

Surrogate Wildlife Species

Direct and Indirect Effects

Grazing can influence habitats of surrogate wildlife species by removing key habitat elements (e.g., dense shrubs for MacGillivray's warbler and fox sparrow), especially in riparian habitats; alter disturbance regimes that maintain habitat structure (e.g., frequent fires in dry forests and grasslands keep open canopy for western bluebird); and influence the availability of important prey items (e.g., squirrels for golden eagles). To address the potential effects on surrogate wildlife species, the management direction regarding grazing in riparian habitat and upland habitats for each alternative was assessed.

This alternative would include Standards as management direction for riparian habitats. Presently, many riparian habitats are in poor condition due to the effects of past and current grazing. The plan direction for this alternative would make a considerable improvement to the grazing impacts of livestock and allow riparian habitats to recover.

This alternative includes ecologically based Desired Conditions for upland non-forest habitats (e.g., rangeland and alpine habitats) and Standards to protect unique habitats. This alternative would not alter the number of livestock, the intensity of grazing, or the amount of area grazed. Presently, 73 percent of the Forest is in a livestock allotment and animal unit months (AUMs) average about 25,000 per year. However, management direction would result in adjustments to the distribution of cattle and the intensity of grazing within specific habitats, such as unique habitats. This alternative has a high potential to improve the viability outcomes for surrogate species that are influenced by grazing.

Climate Change

Habitats that are particularly sensitive to the effects of climate change include riparian areas (including wetlands) and alpine areas (Lawler et al. 2014). A management adaptation to make these habitats more resilient to climate change is to reduce the effects of non-climatic stressors (e.g., roads, intense grazing, etc.) (Lawler et al. 2014). This alternative includes management direction that would help to restore the resiliency of habitats that are sensitive to climate change.

Cumulative Effects

Grazing occurs on nearby private, state, tribal, and federal lands. Where grazing is allowed on the adjacent Okanogan-Wenatchee National Forest and Idaho Pan Handle National Forest, it is managed to accommodate other public land uses, such as contributing to the viability of surrogate wildlife species. On the adjacent Little Pend Oreille Wildlife Refuge, livestock grazing was reduced over time to allow restoration of riparian habitats and is currently only used to achieve specific wildlife habitat objectives (USFWS 2000). Grazing on non-federal lands increases the need to provide for wildlife habitats on federal lands that contribute to the viability of surrogate wildlife species. This alternative includes management direction for some key habitats that would better account for the cumulative effects of grazing on wildlife habitats.

Conclusion

The implementation of this alternative would make a relatively high contribution to viability for surrogate wildlife species that are influenced by domestic grazing. This determination is based on:

1) This alternative includes management direction (including Standards) for riparian habitat that would reduce the negative effects of grazing and improve riparian habitat condition.

2) This alternative would not change the number or grazing intensity, but would alter the distribution of livestock to protect some unique habitats.

3) This alternative would include management direction that could make habitats that are sensitive to the effects of climate change more resilient.

Habitat Connectivity

Surrogate Wildlife Species

Direct and Indirect Effects

There are a number of forest management activities that influence habitat connectivity for surrogate wildlife species. These include: the amount, patch sizes, and spatial arrangement of suitable habitats; location and density of motorized travel routes, especially in relation to riparian and LSOF habitats; and the ability of surrogate wildlife species to access wildlife crossing structures where national forest lands occur adjacent to highways and freeways. These are addressed in the evaluation of how forest management alternatives would affect habitat connectivity for surrogate wildlife species.

The implementation of this alternative includes management direction to manage wildlife habitats for surrogate wildlife species toward desired conditions that are based on the historic range of variability. This means that habitats for a wide-range of species would be managed so that the amount of habitat, patch sizes, and spatial arrangement would mimic conditions under which those species evolved (Hessburg et al. 1999, Hessburg et al. 2013).

In this alternative, management direction for riparian habitats is consolidated into one consistent set of plan components that applies to the entire Colville National Forest, and would be consistent with other National Forests in Region 6. Standards and Guidelines would limit management activities that are allowed to occur within riparian habitats and influence habitat connectivity. This alternative includes greater riparian management area widths along intermittent streams, lakes, and ponds than in the areas previously covered by the INFISH forest plan amendment (USFS 1995).

The implementation of this alternative would reduce the negative effects of roads on habitat connectivity for surrogate wildlife species within 10 watersheds in the short-term (<20 years based on Objectives) because roads would be closed (to meet other management objectives). In the longer-term (<50 years based on Desired Conditions) this alternative would result in road densities of equal to or less than 1 miles/square mile on 23 percent of the Forest, and equal to or less than 2 miles/square mile on 48 percent of the Forest, considerably reducing the negative effects of roads on habitat connectivity.

Climate Change

Maintaining and restoring ecological connectivity is the most oft-cited climate adaptation strategy for biodiversity conservation (Heller and Zavaleta 2009, Opham and Wascher 2004, Parmesan 2006, Spies et al. 2010) and has been identified as an important adaptation strategy for wildlife in northeast Washington (Gaines et al. 2012). This is because species' range shifts have been the primary biological response to past episodes of climatic change, yet widespread anthropogenic barriers to movement would now challenge species' ability to respond (Price 2002, Thomas and Lennon 1999, Wormworth and Mallon 2006). The implementation of this alternative addresses climate change adaptations that are recommended to maintain or restore habitat connectivity for surrogate wildlife species.

Cumulative Effects

Past, present, and reasonably foreseeable human developments and transportation infrastructure, along with land ownership patterns, create cumulative impacts that limit options to conserve and

restore regional connectivity. Regional habitat connectivity has been evaluated for a variety of wildlife species, including the surrogate wildlife species used to evaluate connectivity in this planning area (Singleton et al. 2002, WWHCWG 2010). These assessments have shown the importance of the Colville National Forest in providing stepping-stone habitats between the Cascades and Selkirk Mountains (Singleton et al. 2002, WWHCWG 2010, Proctor et al. 2015). Connectivity from the Cascades to the Kettle Range to the Selkirk Mountains is interrupted by transportation corridors and human developments associated with the Okanogan, Upper Columbia, and Pend Oreille river valleys (Singleton et al. 2002, WWHCWG 2010). Planning efforts are currently underway to determine the feasibility of constructing a wildlife-crossing structure near Riverside in the Highway 97 corridor for connectivity between the Cascade Mountains and Kettle Range. Additionally, connectivity planning in southern British Columbia identified linkage area that could greatly enhance wildlife movements between the Selkirk Mountains and the Purcell Mountains (Apps et al. 2007, Proctor et al. 2015).

Reducing the direct and indirect effects of roads on wildlife habitats would contribute to the maintenance and restoration of habitat connectivity, including cumulative effects. Border Patrol activities on the Forest have the potential to cause disturbance through use of roads or trails that are normally closed to motorized use. The exact extent or amount of the impact over the life of the plan is difficult to predict because many factors could influence Border Patrol activities. Recreation is likely to increase on all land ownerships due to increasing demands. This would increase human disturbance and result in NFS lands that have relatively low human disturbance to become more important to wildlife.

Conclusion

The implementation of this alternative would make a relatively high contribution to providing habitat connectivity that is important for the viability of surrogate wildlife species. This conclusion is based on the following:

1) Habitat amount, patch sizes, and spatial arrangement would be managed towards desired conditions based on the historic range of variability, providing conditions similar to those under which surrogate wildlife species evolved.

2) The negative effects of roads on habitat connectivity, including riparian and LSOF habitats, would be considerably reduced.

Snag Habitat

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the availability of habitat for snag dependent surrogate species include firewood cutting (Bate et al. 2007, Hollenbeck et al. 2013), the loss of snag habitat along roads and at recreation sites from hazard tree reduction (Bate et al. 2007, Hollenbeck et al. 2013, Wisdom et al. 2008), and removal of snags during timber harvest for safety reasons (Wisdom et al. 2008).

The implementation of this alternative includes management direction for snag habitat to address the potential loss of habitat in timber sale operations, would require that firewood cutting occur in designated areas only, and would not allow removal of snags $\geq$20 inches DBH outside of designated areas.

The implementation of this alternative would decrease snag habitat loss due to hazard tree removal along roads in 10 watersheds in the short-term (<20 years based on Objectives) due to reduced road densities. In the longer-term (<50 years based on Desired Conditions) this alternative would result in road densities of equal to or less than 1 miles/square mile on 23 percent of the Forest, and equal to or less than 2 miles/square mile on 48 percent of the Forest. Overall, this alternative would provide greater habitat for snag dependent surrogate wildlife than the No Action, Proposed Action, B and O alternatives, and somewhat less than alternative R.

Climate Change

Surrogate wildlife species associated with snag habitat included the pileated woodpecker, white-headed woodpecker, black-backed woodpecker, and Lewis's woodpecker, which are rated as medium sensitivity to climate change, and the western bluebird as high sensitivity (CCSD 2013). The primary effect that is anticipated from climate change is the loss of habitat due to altered disturbance regimes. The dynamic-landscape restoration approach that is emphasized in this alternative would result in landscapes, including disturbance regimes, that are more resilient to climate change through the application of strategically located restoration treatments in priority locations, and greater use of managed fire to achieve desired conditions for landscape restoration and resiliency.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and more rigorous snag requirements to contribute to the viability of snag dependent wildlife (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitats and current required snag densities make limited contribution to the viability of surrogate wildlife species. The limited management direction for snag habitat on non-Federal lands adjacent to the planning area, places additional emphasis on providing for viable populations of snag dependent wildlife species on Federal lands. Fuels reduction projects are possible on all land ownerships, in particular where they are near residences. These can be done is such a way that they restore wildlife habitat that has been affected by fire exclusion, but treatments can lead to the loss of snag habitat for safety reasons.

Conclusion

The implementation of this alternative would make a relatively high contribution to the viability of snag dependent surrogate wildlife species. This determination is based on:

1) This alternative would focus on landscape restoration of habitats and disturbance regimes that directly influence the availability and condition of snag habitat.

2) This alternative would make substantial reductions in the negative effects of roads on snag habitat.

3) This alternative provides management direction to protect snag habitat during vegetation management activities and from being cut for firewood.

Riparian Habitats

Surrogate Wildlife Species

Direct and Indirect Effects

Forest activities that directly influence the quality and availability of habitat for riparian dependent surrogate species include management of roads, recreation sites, and vegetation treatments that occur within riparian habitats.

In this alternative, management direction for watersheds and riparian habitats is consolidated into one consistent set of plan components that applies to the entire Colville National Forest, and is consistent with other national forests in Region 6. Standards and Guidelines would limit management activities that are allowed to occur within riparian habitats. This alternative includes greater riparian management area widths along intermittent streams, lakes, and ponds than in the areas previously covered by the INFISH forest plan amendment (USFS 1995).

The implementation of this alternative would reduce the effects of roads on riparian habitat within 10 watersheds in the short-term (<20 years based on Objectives). In the longer-term (<50 years based on Desired Conditions) this alternative would result in road densities of equal to or less than 1 miles/square mile on 23 percent of the Forest, and equal to or less than 2 miles/square mile on 48 percent of the Forest.

Overall, this alternative would provide greater habitat protections for riparian dependent surrogate wildlife than the No Action, Proposed Action, B and O alternatives, and similar to alternative R. The viability outcomes for riparian dependent surrogate wildlife species would be improved.

Climate Change

Some of the riparian associated surrogate species are rated as high sensitivity to climate change (CCSD 2013) and riparian habitats are considered vulnerable to the anticipated effects of climate change (Lawler et al. 2014). The primary effect that is anticipated from climate change is the loss of habitat and reduced connectivity of riparian habitats due to altered hydrologic and disturbance (fire) regimes (Lawler et al. 2014). The dynamic-landscape restoration approach that is emphasized in this alternative would result in landscapes, including disturbance regimes, that are more resilient to climate change through the application of strategically located restoration treatments in priority locations. In addition, emphasis of this alternative in reducing the negative effects of roads on riparian habitats would help to make them more resilient to disturbances.

Cumulative Effects

The adjacent federal land managers include the Okanogan-Wenatchee National Forest to the west, the Idaho Panhandle National Forest to the east, and the Pend Oreille National Wildlife Refuge to the southeast. The Idaho Panhandle National Forest and the Pend Oreille National Wildlife Refuge have management plans that reduce the negative effects of roads on wildlife habitats and to protect and restore riparian habitats (USFWS 2000, USFS 2015). The Okanogan-Wenatchee National Forest is in the process of revising their Forest Plan and current plan provides limited management direction to reduce the effects of roads on wildlife habitat, and riparian habitat protections in the original Forest Plan were found to be inadequate and were amended (PACFISH, INFISH-USFS 1995, ACS-USFS 1994).

On private lands, Washington State Forestry Practices Act provides some limited protections for riparian habitats. Management of priority watersheds emphasizes using an “all lands” approach to

enhance coordination across landowners and may enhance conditions for riparian associated wildlife species. However, habitat protections for riparian habitats on federal lands would help to mitigate for the limited protections and cumulative effects that occur on private lands.

Conclusion

The implementation of this alternative would make a relatively high contribution to the viability of riparian dependent surrogate wildlife species. This determination is based on the following:

1) This alternative would make substantial reductions in the negative effects that road have on riparian habitats.

2) This alternative would consolidate and make more consistent management direction for riparian habitats using Standards and providing larger management zones that existing direction.

3) This alternative would emphasize landscape restoration that would reduce the potential effects of uncharacteristically severe fires on riparian habitats.

Species of Management Interest

Deer and Elk

Direct and Indirect Effects

Forest management activities can influence deer and elk populations and habitat use. Vegetation management activities may affect the distribution and abundance of cover and forage. Adequate forage is particularly important during the summer and fall before the following birthing season when this can affect the condition pregnant females (Lenz 1997, Cook 1998, Cook 2002, Cook et al. 2004, Cook et al. 2005). The management of forest roads and trails can influence how deer and elk use habitats, and influence the interactions between deer and elk (Rowland et al. 2005, Wisdom et al. 2005a, and b). Additionally, deer and elk can compete with domestic livestock for both food resources (Findholt et al. 2005) and space (Coe et al. 2001, Coe et al. 2005). Thus, the potential effects that vegetation management, road and trail management, and grazing management can have on deer and elk habitats and population are evaluated for each of the alternatives.

Under Alternative P, cover and forage for deer and elk on winter and summer ranges would be managed commensurate with the historic range of variability. This would result in a sustainable level of cover and more emphasis on enhancement of forage conditions. Considerable research has shown that the management of deer and elk winter habitat should be less focused on the retention of thermal cover, and more focused on the availability of forage on summer and fall habitats (see Cook et al. 2005 for a review).

This alternative would improve habitat effectiveness for deer and elk on summer and winter ranges. The Selkirk Elk Herd has a moderate level of habitat effectiveness (low level of human influence) on their winter ranges. Under this alternative, the habitat effectiveness would be improved to high (a low level of human influence). Overall, habitat effectiveness would be restored on approximately 48,000 acres of habitat on elk range under this alternative. The desired conditions for elk winter ranges would be to have a high level of habitat effectiveness (low level of human influence, <30 percent of the winter range in the zone of influence of an open road, motorized route, or designated ski trail).

For deer, this alternative would result in a high level of habitat effectiveness (low level of human influence) on 81 percent on the winter ranges, a moderate level on 13 percent, and a low level of habitat effectiveness on 6 percent. The desired conditions for deer winter ranges would be to have a high level of habitat effectiveness (low level of human influence, <30 percent of the winter range in the zone of influence of an open road, motorized route, or designated ski trail).

Current management direction for winter ranges is based on road density standards and would be changed to use of the zone of influence, based on new science (Rowland et al. 2005). This alternative includes more robust range management direction to aid in the recovery of range conditions that are poor and slow to recover from past grazing practices.

Climate Change

Deer and elk have a low level of sensitivity to the effects of climate change due to their ability to tolerate a relatively wide range of climatic conditions, their high mobility, and as habitat generalists (CCSD 2013). However, alternatives that restore landscape pattern and functions while reducing the effects of roads on deer and elk summer and winter habitats would provide more resilience deer and elk populations. This alternative emphasizes landscape-scale restoration and provides consistent management direction for roads that would make modest contributions to restore habitat effectiveness for deer and elk.

Cumulative Effects

The historical cattle and sheep grazing that occurred on portions of the Forest degraded range conditions (Wissmar et al. 1994, Bunting et al. 2002). These conditions, combined with current domestic (cattle) and wild ungulate grazing (primarily elk and deer), have resulted maintenance or slow recovery of poor range conditions in some areas (Wissmar et al. 1994, Bunting et al. 2002). In turn, these poor range conditions have had negative effects on some important unique habitats such as riparian areas and meadows (Beebe et al. 2002, Evans 2006, Lehmkuhl et al. 2013). This alternative would result in more rigorous grazing management direction that would help to address this situation.

Winter ranges for the deer and elk occur on Federal lands, adjacent Wildlife Management Areas managed by the State, and private lands. Elk herd management plans (WDFW 2001) provide guidance for elk management on state lands and make recommendations for elk management on Forestland. Management plans for deer include the White-tailed Deer Management Plan that covers the two management units on the Colville National Forest and provides direction to manage hunting to either maintain or increase white-tailed deer populations (WDFW 2010). A considerable amount of historical winter range for deer and elk is now in private land ownership or under the waters of Lake Roosevelt (created by the Grand Coulee dam). The cumulative effects of the existing management plans (state and federal lands) would provide for the conditions that contribute to sustainable populations of deer and elk, while considering the effects of private land development.

Conclusion

The implementation of the P Alternative would make a relatively high contribution to the conditions that support sustainable populations of deer and elk. This is based on the following:

1) This alternative would address new science that recommends de-emphasizing the importance of winter thermal cover and increasing the emphasis on summer and fall forage quality and quantity.

2) This alternative provides consistent and effective direction on the management of roads and trails to restore habitat effectiveness on deer and elk summer and winter ranges.

3) This alternative would include more rigorous management direction to improve the conditions of key habitats, such as riparian areas and meadows that are in poor condition due to the cumulative effects of past grazing practices, and current domestic and wild ungulate grazing.

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Appendix A – Description of Viability Outcomes for Surrogate Wildlife Species

Environmental outcomes defined in Raphael et al. (2001) were used as a basis to describe five viability outcomes. These outcomes were calculated for current and historical conditions for each surrogate species to assess changes in habitat conditions. The term ”suitable environment” refers to a combination of source habitat and risk factors that influence the probability of occupancy and demographic performance of a surrogate species. The viability outcomes are based on departure from historical conditions. The five viability outcomes we used were:

1. **Outcome A**—Suitable environments are broadly distributed across the historical range of the species throughout the assessment area. Habitat abundance is high relative to historical conditions. The combination of distribution and abundance of environmental conditions provides opportunity for continuous or nearly continuous intraspecific interactions for the surrogate species.

2. **Outcome B**—Suitable environments are broadly distributed across the historical range of the species. Suitable environments are of moderate to high abundance relative to historical conditions, but there may be gaps where suitable environments are absent or present in low abundance. However, any disjunctive areas of suitable environments are typically large enough and close enough to permit dispersal among subpopulations and to allow the species to potentially interact as a metapopulation. Species with this outcome are likely well distributed throughout most of the assessment area.

3. **Outcome C**—Suitable environments moderately distributed across the historical range of the species. Suitable environments exist at moderate abundance relative to historical conditions. Gaps where suitable environments are either absent or present in low abundance are large enough such that some subpopulations may be isolated, limiting opportunity for intraspecific interactions especially for species with limited dispersal ability. For species for which this is not the historical condition, reduction in the species’ range in the assessment area may have resulted. Surrogate species with this outcome are likely well distributed in only a portion of the assessment area.

4. **Outcome D**—Suitable environments are low to moderately distributed across the historical range of the species. Suitable environments exist at low abundance relative to their historical conditions. While some of the subpopulations associated with these environments may be self-sustaining, there is limited opportunity for population interactions among many of the suitable environmental patches for species with limited dispersal ability. For species for which this is not the historical condition, reduction in species’ range in the assessment area may have resulted. These species may not be well distributed across the assessment area.

5. **Outcome E**—Suitable environments are highly isolated and exist at very low abundance relative to historical conditions. Suitable environments are not well distributed across the historical range of the species. For species with limited dispersal ability there may be little or no possibility of population interactions among suitable environmental patches, resulting in potential for extirpations within many of the patches, and little likelihood of recolonization of such patches. There has likely been a reduction in the species’ range from historical conditions, except for some rare, local endemics that may have persisted

in this condition since the historical period. Surrogate species with this outcome are not well distributed throughout much of the assessment area.

Appendix B – Viability Outcomes for Surrogate Wildlife Species

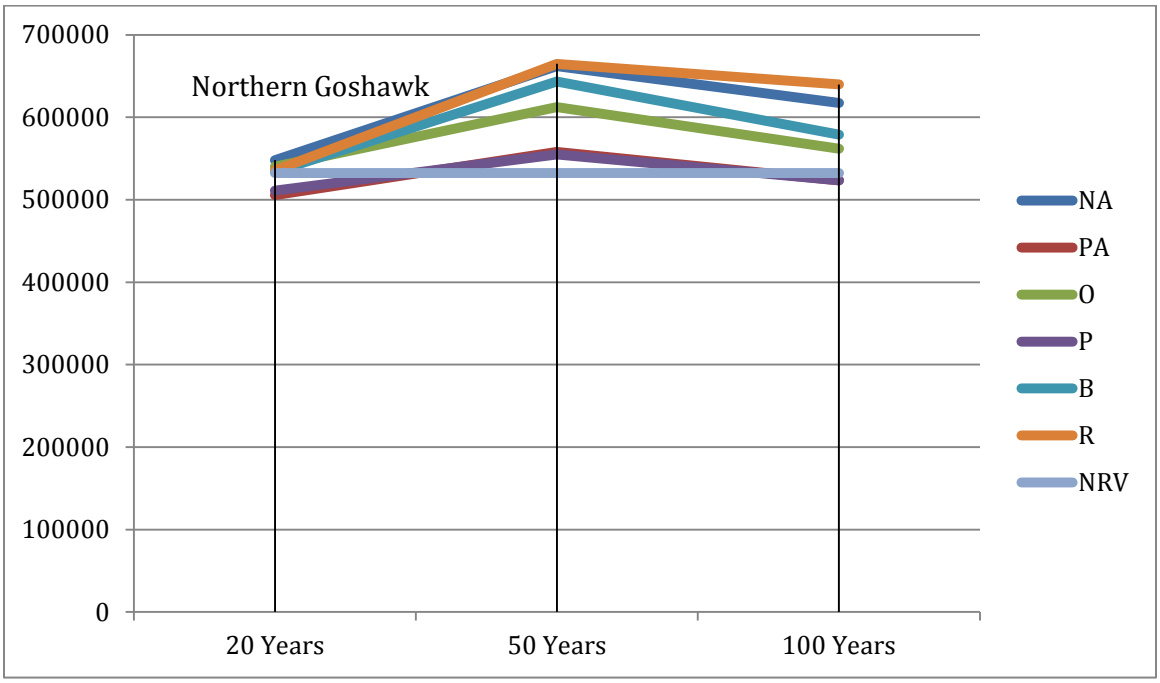
Table 6. Viability outcomes for surrogate wildlife species assessed on the Colville National Forest in short (<20 years) and long (<50 years) time periods

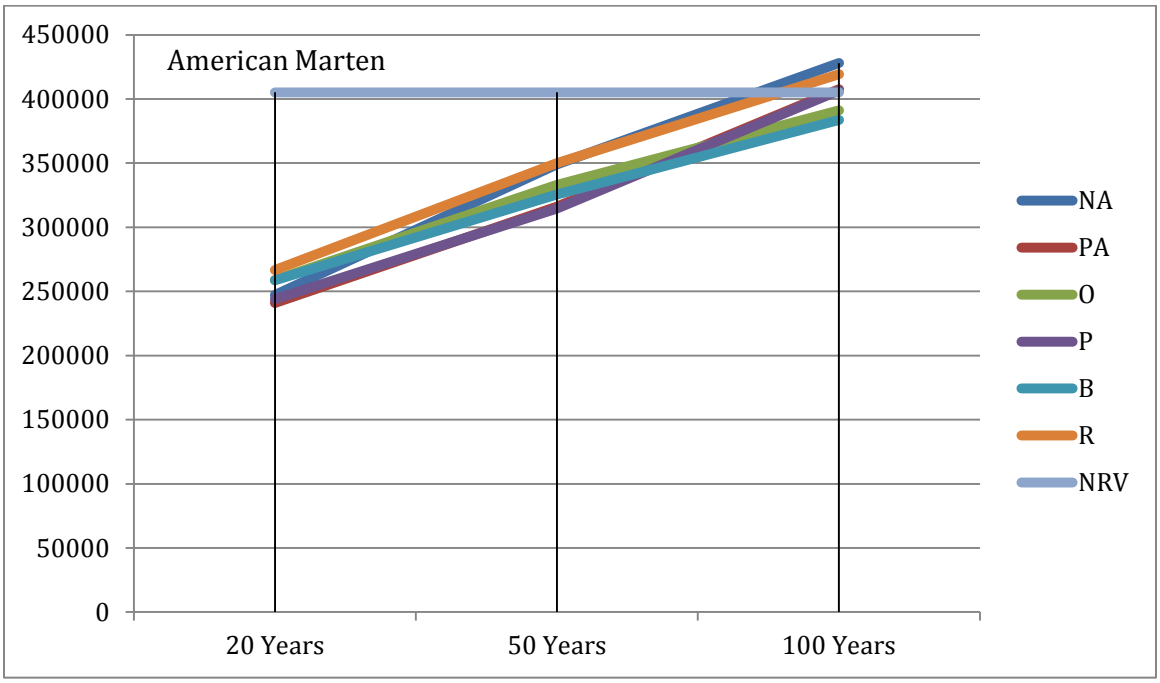
Surrogate Wildlife Species	Historical	No Action		Proposed Action		R		P		B		O	
		Short	Long	Short	Long	Short	Long	Short	Long	Short	Long	Short	Long
American Marten	A/B	C	B/C	B	B	B	A/B	B	A/B	C	B/C	C	B/C
Bald Eagle	A	C	C	B	B	B	A/B	B	A/B	C	C	C	C
Black-backed Woodpecker	A	C	C	B	B	A/B	A/B	A/B	A/B	C	C	C	C
Canada Lynx	A	B	B	A/B	A/B	B	A/B	A/B	A/B	B	B	B	B
Cassin's Finch	A	D	C	C	B	B	B	B	B	D	C	C	B
Columbia Spotted Frog	A	C	C	B	B	A/B	A	A/B	A	C	C	C	B/C
Fox Sparrow	A	E	D	C	B/C	C	B	C	B	E	D	E	B/C
Golden Eagle	A	A/B	A/B	A/B	A/B	A/B	A	A/B	A	A/B	A/B	A/B	A/B
Harlequin Duck	A	B	B	A/B	A/B	A/B	A/B	A/B	A/B	B	B	B	B
Lewis's Woodpecker	A	C/D	C/D	C	B	B	B	B	A/B	C/D	C/D	C/D	C/D
MacGillivray's Warbler	A	C	C	B	B	B	B	B	B	C	C	C	C
Marsh Wren	A/B	C	C	B	B	B	A/B	B	A/B	C	C	C	B
Northern Goshawk	A	B	A/B	A/B	A/B	A/B	A/B	A/B	A/B	B	B	B	B
Pileated Woodpecker	A	C	C	B/C	B	B	A/B	B	A/B	C	C	C	C
Western Bluebird	A	D	C/D	C	C/B	C	B	C	B	D	C/D	D	C/D
White-headed Woodpecker	A	D/E	C	C	A/B	C	B	C	A	D/E	C	D/E	C
Wolverine	A	B	B	B	A/B	A/B	A/B	A/B	A/B	B	B	B	B

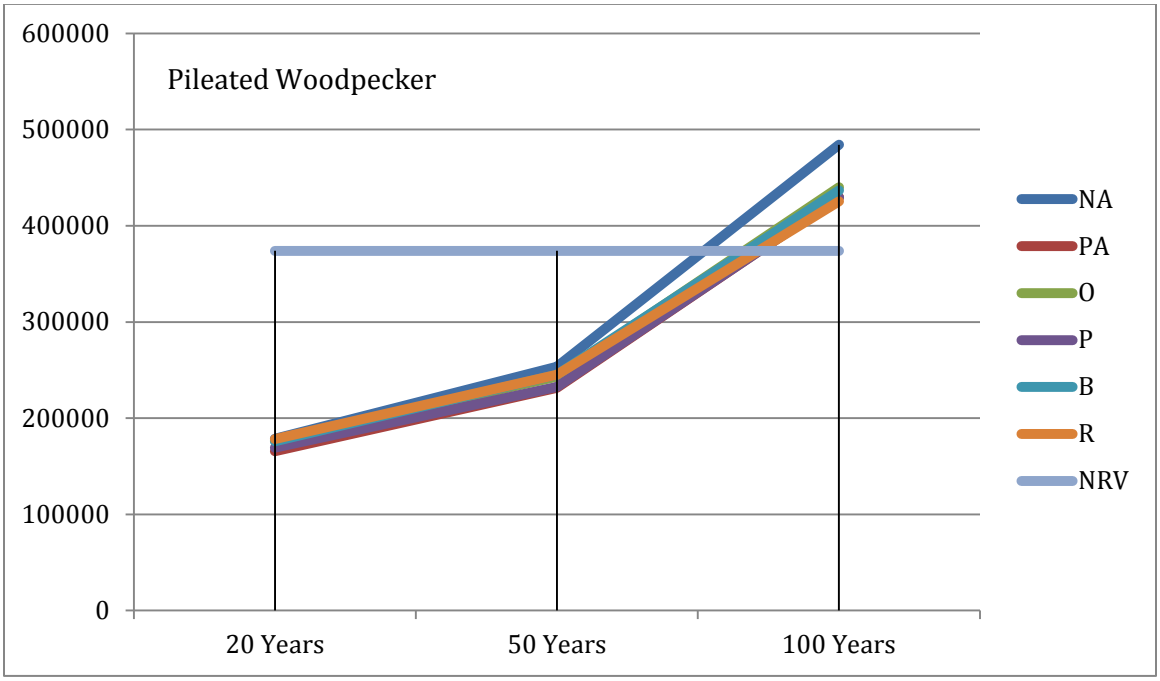
Appendix C – Results of Wildlife Habitat Models

Figure 1. Results of wildlife habitat models at 20, 50, and 100 years for selected surrogate wildlife species by alternative for the Colville National Forest plan revision

*The Y-axis shows acres of habitat within the planning area






Pileated Woodpecker
600000
500000
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300000
200000
100000
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20 Years
50 Years
100 Years
NA
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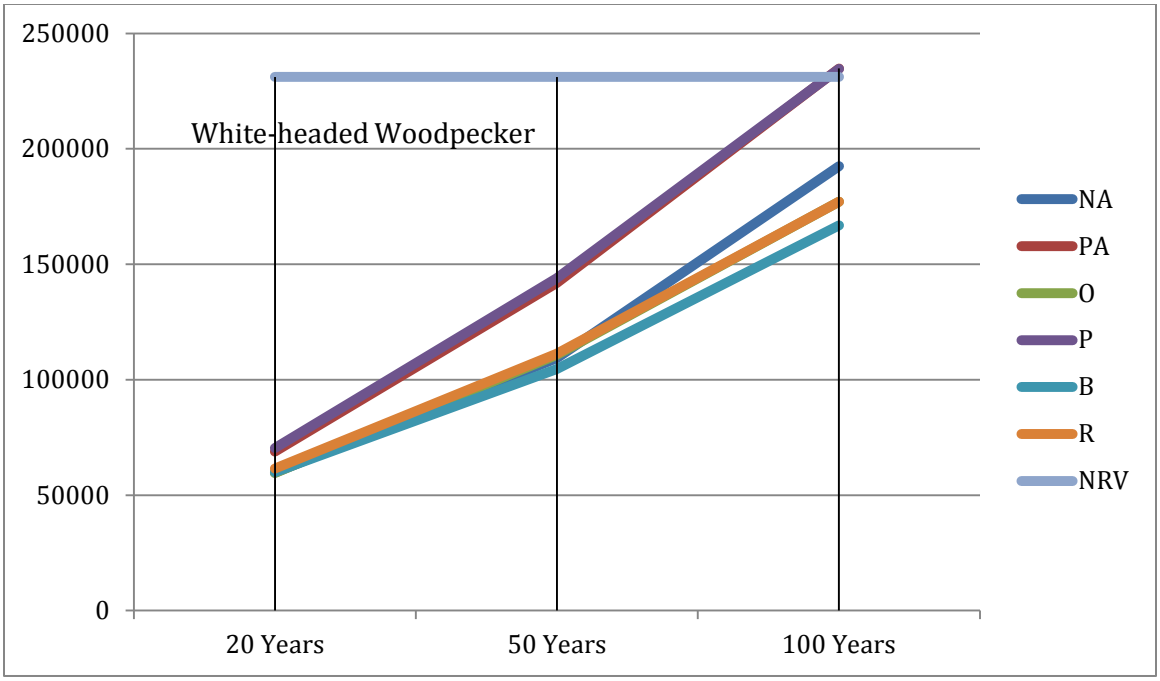
White-headed Woodpecker
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200000
150000
100000
50000
0
20 Years
50 Years
100 Years
NA
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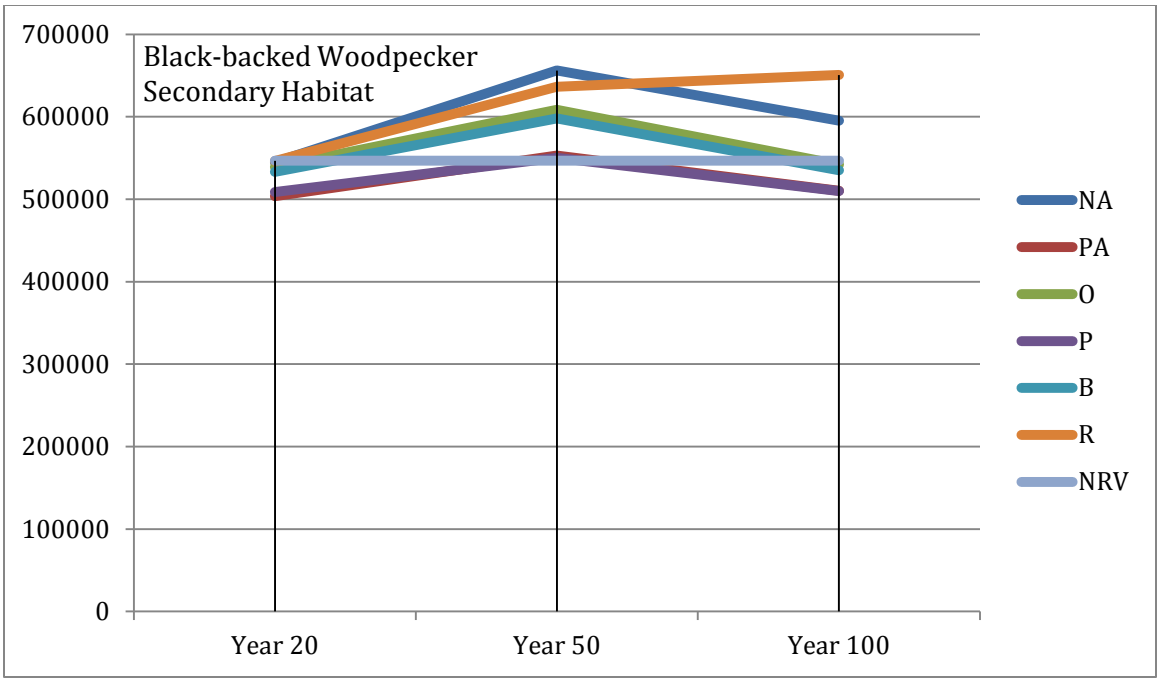
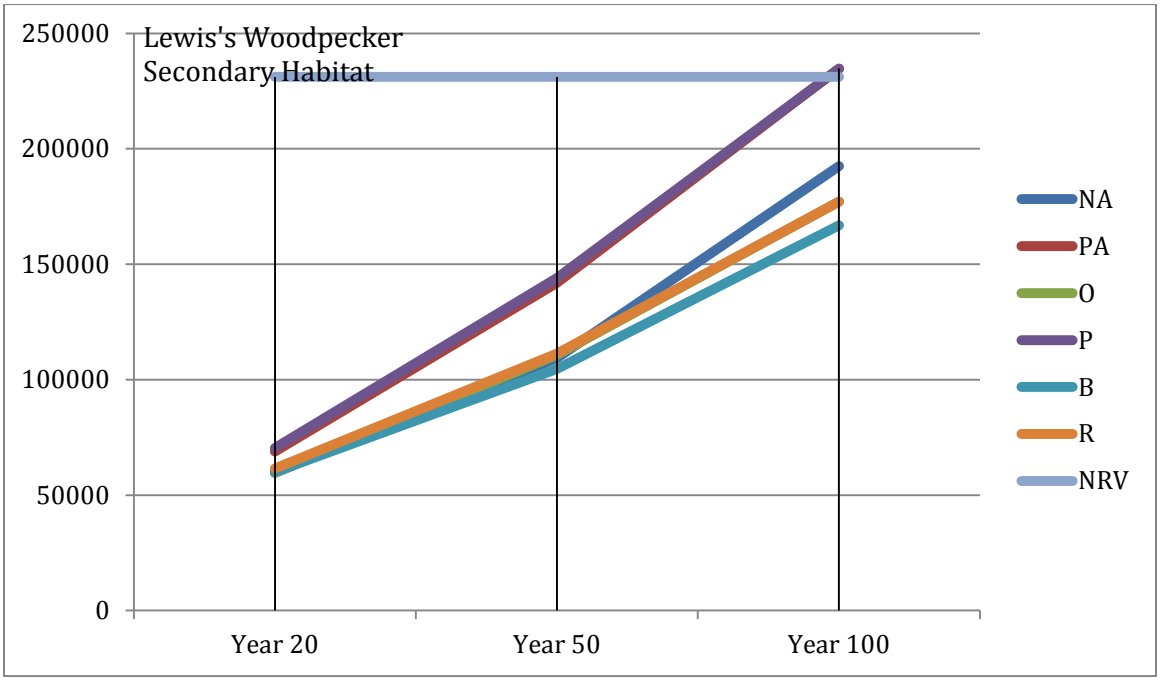
R
NRV


Black-backed Woodpecker
Secondary Habitat
700000
600000
500000
400000
300000
200000
100000
0
Year 20
Year 50
Year 100
NA
PA
O
P
B
R
NRV


Lewis's Woodpecker
Secondary Habitat
250000
200000
150000
100000
50000
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Year 20
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Year 100
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Appendix D – R6 Sensitive Species and R6 Surrogate Species

Relationship between Region 6 Sensitive Species[1] and Region 6 Surrogate Species[2] used in the Colville National Forest Wildlife Evaluation Report.

Sensitive Species	**Status on Forest[3]**	**Habitat Group**	**Surrogate Species**
Northern Goshawk	D	Medium-large trees/all forest communities	Northern Goshawk
Peregrine Falcon	D	Habitat generalist/Cliff	Peregrine Falcon
Common Loon	D	Wetland/Marsh/Open water	Eared Grebe
Sandhill Crane	D	Wetland/Marsh/Wet Meadow	Wilson's Snipe
Bald Eagle	D	Riparian/large tree	Bald Eagle
Harlequin Duck	D	Riparian/large tree	Harlequin Duck
Lewis's Woodpecker	S	Open forest/post-fire	Lewis's Woodpecker, Three-toed Woodpecker
Whiteheaded Woodpecker	D	Medium-large trees/dry forest	Whiteheaded Woodpecker
Great Gray Owl	D	Forest Mosaic/all Forest Communities	Northern Goshawk
Northern Leopard Frog	S	Riparian/Pond/Small Lake/Backwater	Columbia Spotted Frog
Gray Wolf	D	Habitat Generalist	Wolverine, Grizzly Bear
Wolverine	D	Habitat Generalist	Wolverine, Grizzly Bear
Townsend's Bigeared Bat	D	Chambers/caves	Townsend's Bigeared Bat
Little Brown Myotis	D	Open Forest/Woodland/Grass/Shrub/Caves	Fringed Myotis, Pallid Bat, Townsend's Bigeared Bat
Bighorn Sheep	D	Woodland/Grass/Shrub	Bighorn Sheep
Pacific Fisher	D	Medium-large trees/cool-moist forest or all forest communities	Pileated Woodpecker, American Marten, Northern Goshawk, Woodland Caribou
Pygmy Shrew	D	Boreal Forest	Canada Lynx, Northern Bog Lemming

1/R6 Sensitive Species List as of 15 July 2015 (USFS 2015) 2/R6 Surrogate Species (formerly Focal Species) for Species Viability Assessments (USFS 2010) 3/D=documented, s=suspected to occur on Forest