Species	General Habitat Summary[1]	Environmental Consequences Assessed
	interspersed with openings.	
Brewer's Sparrow	Associated with shrublands, primarily sagebrush. Prefer unburned to burned habitat.	Habitats – Meadows and Shrubland
Cassin's Finch	Prefers open dry coniferous forests with mature lodgepole and ponderosa pine but will utilize Douglas fir or mixed coniferous forest. Post-fire and heavily logged sites used extensively.	Habitats – Dry and Cool, Moist Forest

1 – Habitat information taken from Montana Partners in Flight (2000)

Environmental Consequences

Methodology

Information used in the effects analysis includes aerial photographs, stand exam data, Northern Region Vegetation Mapping Project (R1-VMAP) data, field surveys and photos, data collected from project field visits and research literature including species and regional conservation assessments. Because this assessment involves a multi-scale analysis, Geographical Information System (GIS) coverages and data sets for vegetation stand and landscape structural characteristics, past management activities, stream, riparian and aquatic data, wildfire activity, national and state wildlife documentation databases and district and Forestwide observation data and surveys were collectively used to assess wildlife habitat conditions and effects.

This section discusses effects of individual treatments, alternative effects and effects to species and habitats evaluated in detail (table 90). Because anticipated effects are based upon implementation of project design features, design features specific to wildlife are also presented.

Project Design Features

The Stonewall Vegetation Project has been designed with features that are intended to minimize or avoid potential adverse effects while meeting project objectives. Project design features apply to both action alternatives. A description of the project design features relating to wildlife and other resources is displayed table 9, chapter 2.

All anticipated effects are based on implementation of the following wildlife project design features. Table 89 identifies project-specific pdfs related to wildlife and the estimated effectiveness of each design feature.

Table 89. Action alternatives - project design features and effectiveness for wildlife

Number	Category	Project Design Feature	Units/Roads	Effectiveness
WL-1	Roads and Corridor Design	To retain habitat for snag dependent species and species dependent on large diameter trees, the location of roads to be built then obliterated immediately following timber removal, would ensure, whenever practical, that veteran and relic survivor trees and snags would not be removed during construction.	Alt 2 – Roads 3-9, Alt 3 – Roads 5, 7 and 8	**Moderate**: road location is determined to a large degree by FS road construction standards and the local terrain near the site to be accessed. Cost reduction is also an important consideration. It is likely that some veteran and relic survivor trees would be removed when locating project roads, although overall there is a moderate likelihood that large diameter trees would be retained during layout.
WL-2	Skid Trail and Cable Corridor Design	To maintain habitat for snag-dependent species, the timber sale contract or contract administrator would ensure, whenever practical, that the design of skid trails and cable corridors avoid veteran and relic trees and snags	To be determined during implementation	**Moderate**; the sale administrator has authority under timber sale contract provisions to approve all skid trail and cable corridor locations. However, there are many practical considerations in choosing these locations. Avoiding individual desirable trees is only one of those considerations. It cannot be expected that all veteran and relic trees would be protected by this measure.
WL-3	Road Management (Wildlife Security)	Existing roads which are currently closed or restricted and utilized for this project would be retained in their pre-project road status.	Roads, all alternatives.	**High**; This would be implemented under the sale contract and by FS personnel following project completion. These treatments have been used effectively for many years and have a high likelihood of achieving desired objectives.
WL-4		Roads built then obliterated immediately following timber removal will be closed (e.g., gates, barricades) throughout project implementation to limit use to administrative use only.	Alt 2 – Roads 3-9, Alt 3 – Roads 5, 7 and 8	**High**; this is part of the proposed action and would be implemented under the sale contract and compliance monitoring, and post implementation by FS personnel. These treatments have been used effectively for many years and have a high likelihood of achieving desired objectives
WL-5	Snags	Retain a minimum of 2, 12- 20-inch d.b.h. snags per acre. If snags are not available, retain recruitment trees. Preferred species for retention include larch, ponderosa pine, Douglas fir, spruce and sub-alpine fir, in that order. No lodgepole snags would be retained to meet Forest Plan direction.	Harvest units	**Moderate/High**; these measures would be implemented using project layout, contract provisions and compliance monitoring and are standard practices used to help field crews identify appropriate trees to leave for wildlife habitat. These measures have been used successfully for many years and would have a moderate to high chance of avoiding and/or reducing adverse effects on snag dependent wildlife**.**
WL-6		In harvest and precommercial thinning units, retain snags greater than 20 inches diameter of any species unless they pose a specific safety or operability concern	Harvest and precommercial thinning units	

Number	Category	Project Design Feature	Units/Roads	Effectiveness
WL-7		In prescribed burn units, retain snags greater than 12 inches d.b.h. unless they pose a safety hazard	Prescribed burn Units	
WL-8		Whitebark pine snags would be retained unless they pose a safety or operability concern	Harvest and prescribed burn units	
WL-9	Downed Woody Debris	Forest Plan wildlife downed woody debris objectives would be met through retention guidelines under S/WS/F-3. The following measures would be implemented to ensure larger-diameter material is left on site: · Where they are present on site, maintain at least 4 down logs per acre at least 12 inches in diameter (at large end) and 20 feet long. · During burning, avoid the consumption of large coarse woody debris (e.g., logs greater than 10 inches in diameter at midpoint) to the extent possible.	All alternatives, treatment units.	**Moderate/High**; these measures would be implemented using project layout, contract provisions and compliance monitoring and are standard practices used to help field crews identify appropriate trees to leave for wildlife habitat. These measures have been used successfully for many years and would have a moderate to high chance of avoiding and/or reducing adverse effects on downed wood dependent wildlife.
WL-10	Vegetative Diversity	Where feasible and when consistent with fuel reduction objectives, use control lines and firing techniques to maintain pockets of understory vegetation and shrubs retained during timber harvest and small pockets of understory vegetation at scattered locations in un-harvested burn units.	All alternatives burn units.	
WL-11		Units would be evaluated following burning to determine if protective measures (e.g. fencing or grazing modifications) are necessary to allow vegetation recovery and promote aspen. This should be coordinated with the wildlife biologist if deemed necessary.	All alternatives burn units	**Moderate to High** – This would be implemented by FS personal during implementation and the likelihood that grazing impacts would be reduced is moderate to high. -

Number	Category	Project Design Feature	Units/Roads	Effectiveness
WL-12	Aspen	Promote and protect existing aspen as needed during implementation	All alternatives, treatment units.	**High**: This is part of the proposed action and would be implemented as part of sale contract or by FS personal and the likelihood that aspen would be protected is high.
WL-13	Elk	If elk calving (late May through mid-June) or nursery areas (late June through July) are identified prior to or during project implementation, management activities would be delayed during active periods.	All alternatives, treatment units.	**Moderate to High**: While it is possible that some calving areas would be missed, historical areas are known and there is a moderate to high likelihood that this would be effective at reducing impacts.
WL-14	Elk	To minimize impacts to elk, logging operations would be limited to one drainage at a time, designed to provide undisturbed areas within the drainage, and work would be completed in the shortest time possible.	All alternatives, treatment units	**High**: This is part of the proposed action and would be implemented through contract provisions and compliance monitoring under the sale contract. It has been used in the past and there is a high probability of reducing adverse effects to elk.
WL-15	Elk	If an elk wallow is identified during layout, treatment would be modified if necessary to ensure that adequate cover is retained adjacent to the wallow.	All alternatives, treatment units.	**Moderate**: While this would have a high likelihood of success in reducing impacts, some potential wallows could be missed depending on the time of year (wet conditions) during layout and marking and the overall effectiveness of this PDF is moderate.
WL-18	Elk	Recreational use of firearms would be prohibited for anyone working within an area closed to the general public.	All alternatives, Treatment units	**High**; These would be implemented through contract provisions and compliance monitoring under the sale contract or by FS personnel during implementation. They have been implemented for many years and there is a high probability of success.
WL-19	Elk	Slash depth would not exceed 1.5 feet across regeneration harvest units.	All alternatives, regeneration harvest units	
WL-20	MIS	If nest sites for MIS are discovered during the layout and/or implementation of the proposed action, the wildlife biologist will be notified to determine appropriate protection measures	All alternatives, treatment units.	**Moderate**: this would be implemented by FS personal during layout and through compliance monitoring. However it is possible some nesting would fall outside this period and some mortality would occur. As a result the likelihood of reducing impacts is moderate.

Number	Category	Project Design Feature	Units/Roads	Effectiveness
WL-21	Goshawk	Maintain a 40-acre no-activity buffer around known goshawk nests. Within the Stonewall East nest territory (Sucker Creek drainage), no openings created by mixed severity burning will occur between the 40-acre no-activity buffer and within a 180-acre radius of the nest.	Alt 2 and 3 - Units 43 and 72. Alt 2 - Unit 80, Alt 3 – Unit 80a	**High**; These would be implemented through contract provisions and compliance monitoring under the sale contract or by FS personal during implementation. They have been implemented for many years and there is a high probability of avoiding or reducing adverse effects on goshawk.
WL-22		Within active goshawk territories restrict ground disturbing activities inside Post-fledgling Areas (420 acres) between April 15th and August 15th. This will be coordinated with a wildlife biologist and buffer distances will be expanded if field data indicates that it is necessary.		
WL-23	Raptors	If raptor nests are identified during project implementation, a wildlife biologist will be contacted and appropriate buffers and Limiting Operating Periods established.	All alternatives, treatment units.	
WL-25	TES Species	If any threatened, endangered or sensitive species are located during project layout or implementation, a wildlife biologist will be notified. Management activities would be altered, if necessary, so that protection measures can be applied.	All alternatives, treatment units.	**High**; This would be implemented through contract provisions and compliance monitoring under the sale contract. It has been used from many years and has a high probability of avoiding or reducing adverse effects on the intended species(s).
WL-26	Lynx	Cutting of brush along low speed (closed) roads will be done to the minimum amount necessary to maintain public safety	Roads to be identified during implementation	**High**: This would be implemented by FS personnel or contractors as part of project implementation. As a result road maintenance is controlled and there is a high likelihood the reduction in roadside cover would be minimized.
WL-27[1]		Within burn units outside the 2-mile zone, a pre-treatment field review would be conducted to identify firing patterns and control lines that would be necessary to ensure that inclusions of stand initiation and multi-story hare habitat are not affected.	Alternative 2 units 81-84, 88; Alternative 3 units: 82-84, 88.	**High:** this would be implemented by FS personnel during layout and implementation prior to treatment. While some habitat may be treated to meet fuel objectives, the likelihood that lynx habitat will be affected will be greatly reduced.
WL-28[1]		To promote or maintain lynx habitat characteristics while reducing fuels and promoting aspen/ponderosa pine, treatment would be designed and laid out in coordination with a wildlife biologist.	Alternative 2 units: 40-43, 46, 47 and 75: Alternative 3 units: 40-43, 46a, 46b, 46c, 47a, 47b, 47c and 75.	**High:** this would be implemented by FS personnel during layout and implementation prior to treatment. While some habitat may be treated to meet fuel objectives, the likelihood that lynx habitat will be affected will be greatly reduced.

Number	Category	Project Design Feature	Units/Roads	Effectiveness
WL-29	Bald Eagle	Project prescribed burn plans will consider the Beaver Creek Eagle Nest as sensitive and ensure that smoke is adequately dispersed away from the nest during the nesting season (January 1 through July 15th).	All alternatives, burn units	**High:** Smoke sensitive targets are identified in burn plans prepared prior to treatment and there is a high likelihood that smoke would be adequately dispersed away from the nest.
WL-30		Aircraft associated with proposed burning shall not be permitted within 1000 ft. of the Beaver Creek nest between January 1 and August 31.	All alternatives, burn units	**High:** this would be implemented by FS personnel or contractors a part of project implementation. Airspace is highly controlled and there is a high likelihood that aircraft would not adversely affect the nest.
WL-31	Migratory Birds	Prescribed burns and underburning would be implemented prior to May 15 or after July to protect nesting birds.	All alternatives underburning units	**High:** this would be implemented by FS personnel during project implementation and there is a high likelihood that burning would comply with seasonal restrictions
WL-32	Grass/forb And Shrub Communities	To maintain a shrub component and where feasible and consistent with fuel reduction objectives, use control lines and firing techniques to maintain 30 to 50 percent of existing shrubs in a patchy mosaic.	Alternatives 2 and 3, Unit 88	**Moderate to High:** Ignition and firing patterns can be effectively used to control fire intensity within prescribed fire units and reduce consumption of shrubs within mountain shrub communities. However because fire conditions can change during burning, effectiveness is considered moderate to high.
WL-34	Old Growth	Stands classified as old growth would be burned with low-intensity fire to minimize mortality to trees greater than 19 inches d.b.h.	Alternative 2 Unit 81	**High:** Pre-treatment surveys and ignition and firing patters can be effectively used to reduce burning intensity reducing the likelihood that large diameter trees would be killed.

Alternative Effects

Alternative Effect Summary

The following table displays a summary of effects to habitat and species in the Stonewall Vegetation Project area by alternative. Information presented is based on alternative, treatment and species- or habitat-specific effects discussed throughout the analysis.

Table 90. Wildlife effects summary by alternative

BPS/Habitat/Species	Alternative 1	Alternative 2	Alternative 3
Dry Forest[1]	Due to the absence of low severity fire, open-canopy mid to late seral dry forest habitat would continue to decline. There may also be a long-term reduction in species diversity (ponderosa pine, western larch and aspen) and large diameter trees and snags. Early seral habitat would continue to decline. Habitat for species that prefer or require mid to late seral closed canopy habitat would continue to increase and would predominate on 82 percent of the dry Douglas fir BPS and 98 percent of the ponderosa pine/Douglas-fir BPS.	Under this alternative, early seral and open canopy mid and late seral habitat would increase and move closer to reference conditions. Mid to late seral closed canopy habitat would decrease, would move closer to reference conditions and would continue to predominate on 62 percent of the dry Douglas fir BPS and 51 percent of the ponderosa pine/Douglas fir BPS. Species diversity, ponderosa pine and large diameter trees and snags would be maintained in the short term and increase over time. Habitat for species that prefer or require dry forest open-canopy mature forest and large ponderosa pine would increase, whereas closed canopy habitat would decline. Of the alternatives considered, this alternative moves closest to reference conditions for both BPS's and all seral stages.	Early seral habitat would move closer to reference conditions for both the dry Douglas-fir and ponderosa pine/Douglas-fir BPS. Like alternative 2, open canopy mid to late seral habitat would increase and move closer to reference conditions, but at a reduced level. Closed canopy habitat would decrease to 72 percent of the dry Douglas-fir BPS and 65 percent of the ponderosa pine/Douglas-fir BPS. All closed canopy seral stages would move closer to reference conditions. Like alternative 2, species diversity, ponderosa pine and large diameter trees and snags would be maintained in the short term and increase over time. Habitat for species that prefer or require dry forest open-canopy mature forest and large ponderosa pine would increase, whereas closed canopy habitat would decline.
Cool-moist Forest[1]	In the short and long term stands would continue to progress to climax, with a decrease in seral species (ponderosa pine, aspen, whitebark pine, western larch, aspen, Douglas-fir and Engelmann spruce. Stands would become more homogeneous with closed-canopy conditions predominating. Early seral and open canopy habitat would remain well below reference conditions, whereas closed canopy habitat would remain above reference conditions. Closed canopy habitat would occur on 85 percent of the moist Douglas-fir BPS and 67 percent of the lower sub-alpine fir BPS.	Early seral habitat would increase and move closer to reference conditions. Within the moist Douglas-fir BPS, mid and late seral open closed habitat would move closer to reference conditions. Within the lower sub-alpine fir BPS, late seral closed and mid-seral open habitat would move closer to reference conditions, whereas mid-seral closed and open habitat would move farther away from desired conditions. Due largely to the restoration of fire, species diversity (ponderosa pine, aspen, western larch, whitebark pine) would increase. Large diameter trees and snags would be maintained over the long-term. Closed canopy habitat would occur on 61 percent of the moist Douglas-fir BPS and 52 percent of the lower sub-alpine fir BPS.	Changes in early seral habitat and changes in seral conditions within the lower sub-alpine for BPS would be the same as alternative 2. Within the moist Douglas-fir BPS, late-seral habitat and mid-seral open habitat would move closer to reference conditions, but at a reduced level from that of alternative 2, whereas this alternative comes closest to mid-seral closed reference conditions. Species diversity (ponderosa pine, aspen, western larch, whitebark pine) would increase on sites treated. Large diameter trees and snags would be maintained over the long-term. Closed canopy habitat would occur on 68 percent of the moist Douglas-fir BPS and 52 percent of the lower sub-alpine fir BPS.

BPS/Habitat/Species	Alternative 1	Alternative 2	Alternative 3
Upper Sub-alpine[1] Fir	Due the continued absence of fire and insect and disease concerns, both stand and landscape level whitebark pine would likely continue to decline. If high intensity fire does occur it is likely that existing pine regeneration would be reduced. Habitat for species such as grizzly, red squirrel and Clark's nutcracker, as well as many mammals and birds that utilize its seeds may also decline.	Approximately 900 acres of stands containing a predominance of whitebark pine would be burned with mixed severity fire. Of this, 125 acres or 21 percent of the upper sub-alpine fire BPS would be treated. Over the long term this is expected to maintain whitebark pine across the landscape and provide habitat for grizzly and other species that prefer or require this declining habitat.	
Riparian	Riparian habitats would be largely unchanged and continue to be available. Over the long term, hardwood and shrub diversity would likely continue to decline due to conifer encroachment and habitat for species that prefer these components may be reduced.	With implementation of INFISH buffers, much of the riparian habitat would not be treated, although scattered low-intensity burning would occur. Where burning occurs, herbaceous vegetation and shrubs/hardwoods would increase and riparian habitat would be maintained or improved. Riparian habitats will remain intact and would continue to be available.	
Mountain Meadow/Shrub	Shrub and meadow habitat may expand somewhat where MPB mortality is high, although continued conifer encroachment would likely reduce meadow/shrub habitat over the long term. Little shrub regeneration would occur and mature and decadent shrubs would increase. This habitat would largely be maintained, although herbaceous vegetation and shrub diversity would continue to be low or decline.	Prescribed fire is proposed in 11 percent and 13 percent of the mountain meadow and shrub habitat respectively. Over the short term herbaceous vegetation and shrubs would be reduced on the acreage treated. Grass/forb abundance and diversity would increase within 1-2 years of treatment and with implementation of project design features a shrub component would be maintained on all sites. Over the long term, herbaceous vegetation and shrubs would increase due to stimulation of new growth by burning and reduced conifer encroachment. Forage and cover associated with these communities would be improved on the acreage treated.	
Aspen	Due to the absence of fire, existing aspen would continue to decline and over the long term the distribution and abundance would be reduced or eliminated (in the absence of future disturbance). Habitat for wildlife species that prefer or require aspen would continue to decline.	Lands containing an aspen component would be treated on approximately 6,000 acres. In addition to improving the amount of aspen, prescribed fire is also expected to improve the quality of forage. Habitat for wildlife species that prefer or require aspen would be maintained or improved on sites treated.	Lands containing an aspen component would be treated on approximately 5,000 acres. In addition to improving the amount of aspen, prescribed fire is also expected to improve the quality of forage. Habitat for wildlife species that prefer or require aspen would be maintained or improved on sites treated.

BPS/Habitat/Species	Alternative 1	Alternative 2	Alternative 3
Dead Wood	Snag availability in all size classes would remain high for the next few years. While the availability of small to medium diameter snags would remain high over the long-term, as existing large snags fall down and due to a reduction in ponderosa pine regeneration, recruitment of future large diameter snags would be reduced. Habitat for species that utilize downed woody debris would remain high.	Approximately 69 percent of the project area would be unaffected by treatment and snags and down wood will remain high on these lands. Harvest would reduce snags and down wood on 3,099 acres and burning would reduce down wood on another 4,370 acres. Snag availability would increase within burn units and harvest sites would retain large snags and between 5 and 20 tons per acre of down wood. Adequate snags and downed wood would be maintained to meet wildlife needs.	Approximately 73 percent of the project area would be unaffected by treatment and snags and down wood will remain high on these lands. Harvest would reduce snags and down wood on 2,298 acres and burning would reduce down wood on another 4,265 acres. Snag availability would increase within burn units and harvest sites would retain large snags and between 5 and 20 tons per acre of down wood. Adequate snags and downed wood would be maintained to meet wildlife needs.
All Biophysical Settings	Due to elevated fuels across the project area the risk of wildfire would remain high. The likelihood of high intensity stand-replacing wildfire is highest under this alternative.	Risk of wildfire would be reduced on approximately 35 percent of the project area proposed for treatment. Due to the landscape level burning proposed, wildfire risk would also be reduced on lands interspersed with treated areas and this alternative would result in the lowest risk of stand-replacing wildfire.	Risk of wildfire would be reduced on approximately 27 percent of the project area proposed for treatment. Due to the landscape level burning proposed, wildfire risk would also be reduced on lands interspersed with treated areas. Wildfire risk would be reduced, but at a reduced level from that of alternative 2.
Lynx	Over the short term there would be little change in lynx habitat. As stands open up due to MPB mortality, conifer regeneration and foraging habitat would increase. Cover would remain high due to elevated levels of downed wood and continued development of the understory. Stands with little MBP mortality would remain closed and cover and forage would be slow to develop. Den and foraging habitat have been reduced on 28 percent of BL-08 as a result of recent fires. Due to wildfire risk, the likelihood of a further reduction in cover/foraging habitat would remain high. Stand initiation habitat occurs on 1,971 acres. Multi-storied foraging habitat would occur on 11,913 acres, and mid-seral habitat would occur on 16,445 acres. Winter use and snow compaction would be largely unchanged.	There would be a 8 percent reduction in winter hare habitat under this alternative, whereas mid-seral habitat would be reduced by five percent. All winter foraging habitat proposed for treatment occurs in the CWPP WUI. While some foraging habitat would be retained on sites treated (unburned areas and riparian buffers), it would take 15 to 20 years before foraging habitat is restored. There would be some increase in over snow activity at lower elevations in harvest sites. Over time proposed actions would promote aspen, increase shrub and conifer diversity and promote development of foraging habitat on approximately 5,800 acres of mapped lynx habitat. Connectivity and landscape-level habitat would be maintained. Risk of high intensity wildfire would be reduced. Proposed actions and anticipated effects are consistent with the NRMLD and BO. Multi-storied critical habitat would be reduced by 117 acres.	There would be a five percent reduction in winter hare habitat, whereas mid-seral habitat would be reduced by four percent. All winter foraging habitat proposed for treatment occurs in the CWPP WUI. While some foraging habitat would be retained on sites treated (unburned areas and riparian buffers), it would take 15 to 20 years before foraging habitat is restored. There would be some increase in over snow activity at lower elevations in harvest sites, but fewer acres would be affected than under alternative 2. Over time proposed actions would promote aspen, increase shrub and conifer diversity and promote development of foraging habitat on approximately 4,200 acres of mapped lynx habitat. Connectivity and landscape level habitat would be maintained. Risk of high intensity wildfire would be reduced. Proposed actions and effects are consistent with the NRMLD and BO. Multi-storied critical habitat would be reduced by 94 acres.

BPS/Habitat/Species	Alternative 1	Alternative 2	Alternative 3
Wolf	No known den or rendezvous sites would be affected. Human access and potential impacts to wolves, as well as prey availability (deer and elk) and suitable den, rendezvous and foraging habitat would also be largely unchanged.	No known den or rendezvous sites would be affected. Short-term disturbance to foraging wolves could occur. Big game populations and wolf foraging opportunities would be maintained.	
Grizzly	Core, security habitat, TMRD and OMRD would be unchanged. Human access and potential impacts to bear would be largely unchanged. Over the short term there would be little change in habitat. Over time whitebark pine would continue to decline.	During implementation, core habitat would not be reduced by in either subunit, and OMRD and TMRD would also remain unchanged in the Red Mountain subunit. Wuthin the Arrastra Mountain subunit, OMRD would increase by 2%, and although the TMRD percentage would remain unchanged, there would be a slight increase due to 2.6 miles of roads built then obliterated immediately following timber removal. Following implementation, Core, TMRD and OMRD would revert back to the existing condition.While no mortality is anticipated, short-term disturbance and displacement is possible during treatment. A total of 5,526 acres and 2,691 acres of the Arrastra and Red Mountain sub-units would be affected. Cover would be reduced on most of this acreage, although un-treated areas would be maintained and interspersed within and adjacent to treatment units. Within modeled den habitat, 250 acres would be reduced and 980 acres would be burned. No high quality den habitat would be treated and 94 percent of the existing den habitat would be unaffected. Treatment would ensure that whitebark pine is retained on sites affected and across the landscape.	During implementation, core habitat would not be reduced by in either subunit, and OMRD and TMRD would also remain unchanged in the Red Mountain subunit. Within the Arrastra Mountain subunit, OMRD would increase by 1%, and although the TMRD percentage would remain unchanged, there would be a slight increase due to 0.4 miles of roads built then obliterated immediately following timber removal.While no mortality is anticipated, short-term disturbance and displacement is possible during treatment. A total of 4,179 acres and 2,039 acres of the Arrastra and Red Mountain sub-units would be affected. Cover would be reduced on this acreage, although un-treated areas would be maintained and interspersed within and adjacent to treatment units. Within modeled den habitat, 232 acres would be reduced and 937 acres would be burned. No high quality den habitat would be treated and 94 percent of the existing den habitat would be unaffected. Treatment would ensure that whitebark pine is retained on sites affected and across the landscape.

BPS/Habitat/Species	Alternative 1	Alternative 2	Alternative 3
Wolverine	Human access, prey availability including big game (carrion) would be largely unchanged. Den habitat would be maintained or possibly improved due to increased levels of downed woody debris. Landscape level connectivity and travel/dispersal corridors would be maintained..	Seven percent of the analysis area natal den habitat would be affected by burning. There are no impacts to denning animals anticipated although disturbance to foraging animals could occur. Suitable foraging habitat would be reduced on approximately 2,221 acres. Foraging habitat quality would be modified on another 5,249 acres due to reduced canopy and DWD. Landscape connectivity, travel corridors and prey/carrion availability would be maintained	Seven percent of the analysis area natal den habitat would be affected by burning. There are no impacts to denning animals anticipated although disturbance to foraging animals could occur. Suitable foraging habitat would be reduced on approximately 1,641 acres. Foraging habitat quality would be modified on another 4,472 acres due to reduced canopy and DWD. Landscape connectivity, travel corridors and prey/carrion availability would be maintained.
Fisher	While there would likely be some future reduction in canopy cover, with increased levels of downed woody debris, suitable habitat would be largely maintained. Similarly, prey availability would not be expected to change, although risk of stand-replacing wildfire is greatest under this alternative.	Human access would be largely unchanged. While no mortality is anticipated short-term disturbance to foraging individuals could occur during treatment Suitable habitat would be reduced on approximately 994 acres of den/rest habitat and 287 acres of foraging habitat. Approximately 71 percent of the existing suitable habitat would be maintained. Preferred riparian habitat and travel corridors as well as prey availability would be maintained.	Human access would be largely unchanged. While no mortality is anticipated short-term disturbance to foraging individuals could occur during treatment. Suitable habitat would be reduced on approximately 470 acres of den/rest habitat and 135 acres of foraging habitat. Approximately 86 percent of the existing suitable habitat would be maintained. Preferred riparian habitat and travel corridors as well as prey availability would be maintained.
Townsend's big-eared bat	Hibernacula, swarming and roost habitat would not be affected and foraging habitat would be largely unchanged.	Hibernacula, swarming and roost habitat would not be affected A total of 8,562 acres of suitable foraging habitat would be affected by treatment. No mortality is anticipated although short-term disturbance from smoke to foraging bats could occur. Available foraging habitat would be widespread.	Hibernacula, swarming and roost habitat would not be affected. A total of 6,562 acres of suitable foraging habitat would be affected by treatment. No mortality is anticipated although short-term disturbance from smoke to foraging bats could occur. Available foraging habitat would be widespread.
Bald Eagle	Nest, foraging and roost habitat would be largely unchanged. There are no anticipated impacts to the existing eagle nest.	With implementation of project design features, there are no direct effects to nesting birds or reproduction anticipated. Approximately 100 acres of potentially suitable nest habitat would be reduced. Foraging habitat would not be treated, although short-term disturbance to foraging birds could occur. Untreated nest and foraging habitat would continue to be available.	

BPS/Habitat/Species	Alternative 1	Alternative 2	Alternative 3
Black-backed Woodpecker	Existing low quality habitat would be unchanged, whereas high quality post-burn habitat would continue to decline. Because the risk of wildfire is highest under this alternative, it is likely that suitable high quality habitat would continue to be available in the future. Suitable BBW habitat would continue to be available across the Forest.	Because no high quality habitat would be affected, there is no mortality anticipated and the likelihood of disturbance is low. Low quality habitat would be reduced on approximately 3,100 acres, whereas future high quality habitat would be created on approximately 1,200 acres due to high intensity burning. Existing high quality burned habitat would continue to decline and the likelihood that future high quality habitat would be created through wildfire would be reduced. Suitable BBW habitat would continue to be available across the Forest.	Because no high quality habitat would be affected, there is no mortality anticipated and the likelihood of disturbance is low. Low quality habitat would be reduced on approximately 1,895 acres, whereas high quality habitat would be created on approximately 800 acres due to high intensity burning. Existing high quality burned habitat would continue to decline and the likelihood that future high quality habitat would be created through wildfire would be reduced. Suitable BBW habitat would continue to be available across the Forest.
Flammulated Owl	Because this species is strongly associated with open-canopy habitats, particularly in the dry forest BPS, suitable flammulated owl habitat would continue to decline under this alternative. While large diameter nest trees would increase in the short term, availability would decline over time. The likelihood of high intensity wildfire is greatest under this alternative.	Disturbance to nesting/foraging birds is possible. Existing habitat would be reduced by 126 acres or nine percent, whereas treatment would promote preferred structural conditions on 31 percent of existing habitat. Within currently unsuitable dry forest habitat, proposed burning and intermediate harvest would promote preferred structural conditions on 3,288 acres. Treatments would promote ponderosa pine and long-term recruitment potential nest trees. .	Disturbance to nesting/foraging birds is possible. Existing habitat would be reduced by 71 acres or nine percent, whereas treatment would promote preferred structural conditions on 22 percent of existing habitat. Within currently unsuitable dry forest habitat, proposed burning and intermediate harvest would promote preferred structural conditions on 2,353 acres. Treatments would promote ponderosa pine and long-term recruitment potential nest trees. .
Western Boreal Toad	Western boreal toads and their habitat would not be affected. The risk of stand-replacing wildfire and a long-term reduction in breeding and upland habitat is highest under this alternative.	Breeding habitat would not be treated, although foraging individuals could be affected. Over 8,500 acres of upland habitat would be affected. Suitable habitat would continue to occur on sites treated and long-term foraging habitat would be improved. The likelihood of impacts to breeding and upland habitat from high severity wildfire are lowest under this alternative.	Breeding habitat would not be treated, although foraging individuals could be affected. Over 6,500 acres of upland habitat would be affected. Suitable habitat would continue to occur on sites treated and long-term foraging habitat would be improved. The likelihood of impacts to breeding and upland habitat from high severity wildfire would be reduced.

BPS/Habitat/Species	Alternative 1	Alternative 2	Alternative 3
Northern Goshawk	Human access and disturbance to nesting and foraging birds would be largely unchanged. Existing old growth habitat would remain unchanged. Closed canopy conditions and suitable nest habitat would increase. Landscape diversity associated with foraging and post-fledging habitat would be largely unchanged.	With implementation of project design features, no direct effects to nesting birds or reproduction are anticipated. Short-term disturbance to foraging birds and fledged young during implementation could occur. Regeneration harvest and openings created by mixed severity fire would reduce nesting and foraging habitat by 444 acres and 684 acres respectively. Approximately 90 percent of the suitable nest and foraging habitat would be retained. Suitable nest, forage and PFA habitat would occur in all affected drainages and landscape conditions resulting from treatment are consistent with goshawk use.	With implementation of project design features, no direct effects to nesting birds or reproduction are anticipated. Short-term disturbance to foraging birds and fledged young during implementation could occur. Regeneration harvest and openings created by mixed severity fire would reduce nesting and foraging habitat by 324 acres and 261 acres respectively. Approximately 95 percent of the suitable nest and foraging habitat would be retained. Suitable nest, forage and PFA habitat would occur in all affected drainages and landscape conditions resulting from treatment are consistent with goshawk use.
Pileated Woodpecker	Old growth habitat would not be treated. Suitable large diameter snags for nesting would remain common for the next 10-20 years. Due to reduced ponderosa pine regeneration and concentrated mortality of existing trees, large diameter snags would be reduced in the future. Foraging habitat would increase due to continued insect and disease related mortality.	Approximately 67 percent of the suitable habitat within the project area would be unaffected. A long-term reduction in habitat would occur on 542 acres, whereas the quality of suitable habitat would be reduced for 10 to 20 years on 2,035 acres. Over the long term restoration of open grown ponderosa pine and western larch may improve habitat on approximately 5,700 acres.	Approximately 77 percent of the suitable habitat within the project area would be unaffected. A long-term reduction in habitat would occur on 352 acres, whereas the quality of suitable habitat would be reduced for 10 to 20 years on 1,455 acres. Over the long term restoration of open grown ponderosa pine and western larch may improve habitat on approximately 4,500 acres.
Hairy Woodpecker	Suitable snags and nesting and foraging habitat would be maintained and continue to be widely available.	Effects are expected to be similar to those described under pileated woodpecker.	Effects are expected to be similar to those described under pileated woodpecker
American Marten	Suitable closed-canopy habitat has been reduced due to MPB mortality, although it is expected that existing habitat would be largely maintained.	While mortality or disturbance are possible, because marten are largely restricted to upper elevations and deep snow (i.e. lands not proposed for treatment) and because widespread canopy reduction has reduced habitat suitability and likely use of the area, the likelihood of mortality is low. Suitable habitat would be reduced by 459 acres (7 percent)due to regeneration harvest and fire created openings. Due to structural changes (canopy/dead wood), there would be a 15- to 20-year reduction in habitat quality on 1,731 acres. Treatments would improve species and landscape diversity. 64 percent of the suitable habitat would be unaffected.	While mortality or disturbance are possible, because marten are largely restricted to upper elevations and deep snow (i.e. lands not proposed for treatment) and because widespread canopy reduction has reduced habitat suitability and likely use of the area, the likelihood or mortality is low. Suitable habitat would be reduced by 283 acres (4 percent) due to regeneration harvest and fire created openings. Due to structural changes (canopy/dead wood), there would be a 15- to 20-year reduction in habitat quality on 1,088 acres. Treatments would improve species and landscape diversity. 75 percent of existing habitat would be unaffected.

BPS/Habitat/Species	Alternative 1	Alternative 2	Alternative 3
Elk	Hunter access would be unchanged. No change in open road density, elk security or habitat effectiveness would occur. Neither herd unit would comply with Plan standard 4a. Hiding cover would be provided on 56 percent and 36 percent of the Beaver Creek and Keep Cool Creek HUs respectively. Compliance with Plan standard 3 for hiding cover would occur on Beaver Creek HU, whereas Keep Cool Creek HU would continue to fall below the Plan threshold. Winter range thermal cover would be provided on approximately 5 percent of the Beaver Creek HU, and 4 percent of the Keep Cool Creek HU. Both units would continue to fall below Plan standard 3 thermal cover thresholds. Continuing MPB mortality would reduce hiding and thermal cover in some areas. Forage would remain low, hardwood and shrub diversity would continue to decline. Herd numbers would be largely unchanged.	During implementation, open road density would increase by 14.3 miles and there would be a 2044 acres (6 percent) reduction in security habitat. Post-implementation open road densities and security would be the same as alternative 1. Neither herd unit would comply with Plan standard 4a. Hiding cover would be provided on 48 percent and 35 percent of the Beaver Creek and Keep Cool Creek HUs respectively. Neither herd unit would comply with hiding cover requirements in Plan standard 3. Winter range thermal cover would be provided on approximately 3 percent of the Beaver Creek HU and 4 percent of the Keep Cool Creek HU, and both units would continue to fall below Plan standard 3 thermal cover thresholds. Forage diversity would be increased on approximately 3,933 acres and 2,498 acres of the Beaver Creek and Keep Cool Creek HUs respectively. Elk use of the project area would change during and post-implementation. Habitat would be maintained in the short term to support desired levels of elk. Over the long-term habitat would be maintained or improved.	During implementation, open road density would increase by 11.0 miles and there would be a 1367 acres (4 percent) reduction in security habitat. Post-implementation open road densities and security would be the same as alternative 1. Neither herd unit would comply with standard 4a. Hiding cover would be provided on 51 percent and 35 percent of the Beaver Creek and Keep Cool Creek HUs respectively. Keep Cool Creek HU would not comply with hiding cover requirements in Plan standard 3. Winter range thermal cover would be provided on approximately 4 percent of the Bevaer Creek and Keep Cool Creek HUs, and both units would continue to fall below Plan standard 3 thermal cover thresholds. Forage diversity would be increased on approximately 3,244 acres and 1,838 acres of the Beaver Creek and Keep Cool Creek HUs respectively. Elk use of the project area would change during and post-implementation. Habitat would be maintained in the short term to support desired levels of elk. Over the long-term habitat would be maintained or improved.
Mule Deer	Hunter access would be largely unchanged. Hiding and winter range thermal cover would be reduced in areas with MPB mortality and unchanged over much of the project area. Forage would remain low and hardwood/shrub diversity would continue to decline. Herd health is not expected to change.	Short-term and localized increase in hunter access would occur, although no long-term changes in hunter access are anticipated. Hiding cover would be reduced by approximately 3,538 acres, and winter range thermal cover would be reduced by 92 acres. 81 percent of the existing hiding and thermal cover would be maintained. Forage diversity on summer, winter and transition range would be increased on over 7,000 acres. Shrub, hardwood and landscape diversity would be improved. Herd health and cover and forage would be maintained in the short and long-term.	Short-term and localized increase in hunter access may occur. No long-term changes in hunter access are anticipated. Hiding cover would be reduced by 1,980- acres and winter range thermal cover would be reduced by 78 acres. 90 percent of existing hiding cover and 84 percent of winter range thermal cover would be maintained. Forage on summer, winter and transition habitat would be increased on over 5,000 acres. Shrub, hardwood and landscape diversity would be improved. Herd health and cover and forage would be maintained in the short and long-term.

BPS/Habitat/Species	Alternative 1	Alternative 2	Alternative 3
Migratory Birds	While overstory cover would decline in some areas due to continued MPB mortality, understory cover would continue to increase. Migratory bird habitat would remain largely unchanged. This alternative complies with the MBTA.	Proposed treatments would alter overstory and understory conditions on approximately 7,470 acres. Migratory bird habitat, including habitat for bird species of conservation concern, would be maintained across the landscape and declining habitats would be increased over the long term. Early, mid and late seral habitat would move closer to reference conditions. Project design features are in place to maintain migratory bird habitat and reduce potential mortality. This alternative complies with the MBTA.	Proposed treatments would alter overstory and understory conditions on approximately 5,710 acres. Migratory bird habitat, including habitat for bird species of conservation concern, would be maintained across the landscape and declining habitats would be increased over the long term. Early, mid and late seral habitat would move closer to reference conditions. Project design features are in place to maintain migratory bird habitat and reduce potential mortality. This alternative complies with the MBTA.

1 – see table 3 for an alternative comparison of seral habitats provided under each of the Biophysical settings.

Alternative 1 (No Action)

There would be no direct effects to wildlife because there are no treatments proposed under this alternative. Forested communities that largely developed with long fire-return intervals and the wildlife species characteristic of these communities would be largely unchanged.

Many project area forest communities historically developed with short fire-return intervals. Anticipated indirect effects under this alternative include continued shifts in species composition and diversity within these communities. For example, understory conditions including conifer encroachment and increased abundance of shade-tolerant species have increased in mid- and late-seral hab itat across the project area. In the absence of large-scale disturbance, these understory conditions would continue to increase. Effects on wildlife include increased habitat for species that prefer closed-canopy forest conditions and for species that prefer understories dominated by regenerating conifer. Conversely, there would be continued reduction in the open understory conditions that characterize fire dependent communities (e.g., ponderosa pine), and continued decline in suitable habitat for species that prefer or require open, mid- to later-seral forested stands with an herbaceous and shrub understory.

In the short term there would be little change in species composition. In the long-term without future disturbance stands would continue to progress successionally with continuing decreases in seral species and increases in climax species. Species composition within subalpine fir types would continue to change as seral species (ponderosa pine, whitebark pine, aspen, Douglas-fir and Engelmann spruce) die out and are replaced by sub-alpine fir. Species in Douglas-fir habitat types would experience similar changes, with species composition shifting to Douglas-fir.

Due to the shifts in fire and fire-tolerant species, as well as increased stand density, stands would be more susceptible to insect and disease-related mortality under this alternative. As a result, there would continue to be an increase in snags and down woody debris (DWD) and habitat for species that prefer or require these components. However due to the anticipated reduction in ponderosa pine, over the long term the availability of large-diameter trees and snags would be reduced. Along with species composition shifts, shade tolerant species would increase, making individual stands and the landscape more homogeneous and less structurally diverse.

As described under affected environment, due to years of fire suppression and past harvest, much of the project area currently contains dense forested stands that are relatively continuous across the landscape. As a result and considering fuels have further increased due to MPB mortality, the risk of stand-replacing wildfire is highest under this alternative.

Potential effects of invasive plants on wildlife are discussed in the Forest Weed Treatment FEIS (USDA Forest Service 2006c), whereas the likelihood of increased spread within the project area are discussed in the project weed report (USDA Forest Service 20011d). Without control it is expected that existing infestations would increase by approximately 14 percent per year. With implementation of biological and chemical control, this increase would be reduced and is expected to be largely contained. Stand-replacing wildfires are known to increase the risk of invasion and spread of invasive species (D'Antonia 2000). As a result, and considering that the risk of high intensity wildfire is greatest under this alternative, it is expected that invasive weeds would increase in the event of a wildfire. The effect on wildlife would vary depending on the acres affected and access (i.e., for control), but there would likely be a localized decrease in cover and forage as a result.

Alternatives 2 and 3 (Action Alternatives)

Direct and indirect effects of treatments are discussed by group and include species composition and structure changes, as well as potential direct and indirect effects to wildlife and wildlife habitat. Potential

effects from timber harvest are discussed under Groups 1 through 5. Some burning is proposed within all groups, and because effects vary depending on the type of burning proposed (e.g., low intensity vs. mixed severity), effects of burning are discussed by burning type. Also, effects of roads and road management are discussed separately. The habitat and species-specific effects discussed are based, in part, on the treatment effects discussed here.

Effects by Treatment Group

Group 1(Intermediate Harvest) – Proposed harvest treatments would thin live trees and remove dead trees. All thinning would be from below and would favor trees of desired species. Trees would be thinned to an average spacing of 20 to 40 feet and 25 to 40 percent canopy cover would be maintained. Snags and 5-20 tons per acre of DWD including large-diameter logs would be retained.

Treatment would alter stand structure and understory conditions by removing primarily small and medium diameter trees and increasing light levels to the forest floor. This results in a decrease in cover and an increase in the establishment of understory vegetation. While increases in herbaceous vegetation would occur within 2 to 3 years of treatment, increased availability of woody vegetation would take longer (5-15 years). For stands where the target canopy closure is 25 to 40 percent, it is estimated that these sites would again provide 40 percent canopy closure in approximately 10 to 15 years.

Direct effects to wildlife from these harvest treatments may involve some direct mortality to less mobile species during logging. Cutting may also result in avoidance of the site by some species sensitive to disturbance, while other species would be attracted to the site because of the increased forage available on the site (generally within 2 years of treatment).

Over the long term (greater than 10 years) as the woody understory develops, treatment would create more diverse stand conditions with continued increases in both forage and cover. While mature forest species in the Rocky Mountains are generally less affected by partial harvest than regeneration harvest (Hejl 2011), a shift in species use following harvest can be expected, with benefits to ground foraging birds and small mammals and decreased use of some canopy and bole foraging species (Raphael et al. 1988 *in* Hejl 2011, Salabanks and Arnett 2002, USDA Forest Service 2006b). Potential effects to reptiles and amphibians would also vary, and because few reptiles occupy closed-canopy forests in the western United States, potential impacts to this group would be expected to be low. Conversely, because reducing canopy cover would result in warmer and drier conditions, potential impacts to amphibians would be greater including some reduction in diversity and abundance (USDA Forest Service 2006b). Due to increased structural diversity on these sites, amphibian diversity and abundance is expected to be restored as the understory develops and maintained over the long term.

Dead trees would be removed, so impacts to species requiring snags can be expected (Salabanks and Arnett 2002; Hejl 2011). Project design features that retain snags greater than 20 inches, as well as a component of small-diameter snags and snag recruitment trees, would reduce impacts to these species and ensure suitable snags would be retained on all sites. While treatment would reduce down wood, implementation of pdfs would retain between 5 and 20 tons per acre of for warm dry types, 10 to 20 tons per acre for other types and a component of large diameter logs. Treatments would result in improved stand structure and diversity (i.e., increase in aspen, ponderosa pine and western larch) over the long term; it is expected that the diversity of snag and downed wood dependent species would be maintained or improved (USDA Forest Service 2006b).

Following harvest, units would be underburned to promote ponderosa pine, early and fire-tolerant species or jackpot burned to reduce fuels. Also periodic low-intensity fire would be used to maintain stand resistance to fire and insects (described in the following section Burn Treatment Effects).

Collectively, treatments would initiate restoration of open stands dominated by mature Douglas-fir and ponderosa pine. Stands would be more resistant to wildfires and insect activity reducing potential for high intensity and high severity wildfires (USDA Forest Service 2012b) and insect epidemics. Treatment would promote development of future large-diameter trees and snags.

Under alternative 3, Group 1 treatments would be reduced by 76 percent (743 acres), maintaining closed canopy, early to mid-seral forest habitat on these lands. Reducing treatment would also reduce ponderosa pine and aspen increases by 664 acres and 464 acres respectively and maintain increased fuels and wildfire risk.

Group 2 (Intermediate Harvest) – Precommercial thinning treatments would thin small-diameter trees to a spacing of 12 to 20 feet and would be completed by hand or machine, depending on tree size. Target canopy closure would be 25 to 40 percent, and like Group 1 harvest, with implementation of pdfs a minimum of 5-20 tons per acre DWD, and large-diameter DWD and snags would be retained following treatment.

Direct effects to wildlife would be similar to Group 1 and involve avoidance of the site and some direct mortality to less mobile species. Like group 1, treatment involves modifying the overstory stand structure by opening up the canopy and increasing light to the forest floor. As a result, treatment would increase herbaceous and woody vegetation on the forest floor and increase understory diversity on the site. While there would be an immediate (1-2 years) increase in herbaceous species, increases in woody vegetation would take longer (5-10 years). Conversely, there would be a decrease in cover until woody understory vegetation is established on the site and more closed canopy conditions are restored (10 to 15 years). As a result, effects include a reduction in habitat, decreased abundance of some mature forest species and improved habitat conditions for early seral and ground foraging species. Over the long term, treatments would result in a more diverse stands with increased levels of foraging and cover throughout the site.

Slash would be piled and burned in some units; effects are described in the Burn Treatment Effects section below.

Treatment would improve the health and vigor of remaining trees and increase resistance to insects and disease. Treatment would also promote the growth of large, fire-resistant trees and over the long term, would promote restoration of open stands of mature Douglas-fir, ponderosa pine and western larch.

Under alternative 3, Group 2 treatments would be reduced by 26 percent (310 acres), maintaining closed canopy, early to mid-seral forest habitat on these lands. Reducing treatment would also reduce the potential increases of ponderosa pine, western larch and aspen by 204 acres, 106 acres and 76 acres respectively. Fuels and wildfire risk would remain unchanged on this acreage.

Group 3 (Regeneration Harvest) - Treatments include seedtree and shelterwood regeneration harvest. This treatment differs from Group 1 and Group 2 in that most of the live, and many of the dead trees would be removed, although seed and reserve trees would be retained. In some shelterwoods trees would be retained in groups, whereas in other units the remaining trees would be evenly distributed. Ponderosa pine, Douglas-fir and western larch would be planted where necessary to regenerate the stands to the desired seral and fire-resistant species.

Because most of the existing canopy would be reduced, contiguous blocks of mature forest habitat would be reduced. However, regeneration harvest is not proposed in areas of remote habitat (e.g., elk security or grizzly bear core) and these areas would be maintained. Treatments are only proposed in areas with concentrated mortality where connectivity and habitat for species that prefer closed canopy forest has already been reduced.

As with Groups 1 and 2, effects include some direct mortality to less mobile species and avoidance by species that are sensitive to disturbance. While intermediate harvest treatments (Groups 1 and 2) result in relatively minor changes in wildlife use, regeneration treatments can result in a much more dramatic change and some mature forest wildlife may be displaced for over 50 years, until a predominantly mature canopy is re-established. Species diversity and abundance can be expected to change (Salabanks and Arnett 2002). The reduction in overstory trees results in an increase in herbaceous vegetation, shrubs and tree seedlings, which provides habitat for many early seral species, as well as species that utilize a combination of early successional and mature forest.

Wildlife use of the site following treatment also varies over time. For example habitat for species that utilize herbaceous vegetation would be improved within 1 to 2 years of treatment, whereas it would take up to 15 years for woody vegetation (seedlings and shrubs) to develop on the site. So while the wildlife community would shift to primarily early seral species immediately following treatment, many mature forest species such as elk would continue to use the sites due to the large quantities of forage and low-growing cover created. As the canopy closes (30-40 years), early seral species would be replaced by mid-seral species and over the long term, wildlife diversity and abundance would be improved on the site due to changes in species (increase in aspen, ponderosa pine and western larch) and structural diversity.

Many of the units would be burned following harvest to reduce fuels and prepare the site for natural regeneration or planting. Natural regeneration in combination with species diversity planting would increase dominance by Douglas-fir, ponderosa pine and western larch. Over the long term, treatment would promote development of a multi-storied stand that is dominated by fire resistant species, but also contains a minor Engelmann spruce and subalpine fir component that is more resilient to wildfire and insect activity.

Under alternative 3, treatments would be reduced by 11 percent (81 acres), maintaining open and closed canopy mid- to late-seral forest habitat on these lands. Reducing treatment would also reduce the potential increases of ponderosa pine, western larch and aspen by 86 acres, 8 acres and 14 acres respectively. Fuels and wildfire risk would remain unchanged on this acreage.

Group 4 (Regeneration Harvest) – Treatments include a clearcut harvest in which all trees would be removed except for scattered clumps or individual trees and trees necessary to meet resource needs (e.g., snags and DWD to meet wildlife and soil objectives). Following harvest, units would be burned to reduce fuels and promote natural regeneration. Sites are expected to naturally regenerate, although some planting of Douglas-fir, lodgepole pine and western larch may be done.

In the short term, units would naturally regenerate to single-storied stands of predominantly lodgepole pine with some Douglas-fir and ponderosa pine regeneration and remnant large-diameter trees. Over the long term, treatment (including supplemental planting) would promote a more diverse insect and fire resistant stand that is predominantly lodgepole pine, but contains an increased component of ponderosa pine, Douglas-fir, aspen and western larch. Like Group 3, these sites occur in areas that have already experienced concentrated mortality.

Effects on wildlife and wildlife habitat would be similar to those of Group 3 and the resulting stand conditions would be maintained by periodic low intensity fire described in the Burn Treatment Effects section below.

Under alternative 3, treatments would be reduced by 32 percent (70 acres), maintaining open and closed canopy mid- to late-seral forest habitat on these lands. Reducing treatment would also reduce the potential increases of ponderosa pine, western larch and aspen by 53 acres, 55 acres and 15 acres respectively. Fuels and wildfire risk would remain unchanged on this acreage.

Group 5 (Intermediate Harvest) – Treatment includes a sanitation salvage harvest that would remove dead and dying trees. Trees would be removed using ground based equipment. Slash would be reduced by hand piling and burning. While there would be little change in overstory stand conditions, effects of treatment include a reduction in ladder and surface fuels and understory vegetation.

Because 40 to 60 percent canopy cover would be maintained on all sites and with implementation of pdfs to retain snags and downed woody debris, effects on wildlife and wildlife habitat would be similar to those described under Group 1.

Slash would be piled and burned in some units; effects are described in the Burn Treatment Effects section below.

There is no difference between alternatives

Group 6 (Prescribed Burn) – Treatment involves cutting small trees on portions of the treatment units to create fuel beds conducive to low intensity burning. The prescribed burning would create openings less than 5 or 10 acres in size, with opening size varying by unit. Units would be prescribed burned to reduce fuels, kill small-diameter undesirable trees and prepare sites for natural regeneration. Prior to burning, all units would be assessed to identify existing whitebark pine regeneration that needs to be protected during treatment, and existing aspen clones would be released by cutting conifers within and around the clone.

Herbaceous vegetation would increase within the second year of treatment and continue to provide increased levels of forage for up to 30 years. Within 5 years woody vegetation (trees and shrubs) would start to become established on the site. Tree regeneration would establish in the openings and other areas of low stocking, with increases in Douglas-fir, ponderosa pine, whitebark pine and western larch. Over the long term, stands would be characterized by more complex, multi-stored conditions with a variety of age classes, and would be more resilient to wildfire and insects.

Overall, burning would occur in a patchy mosaic and approximately 20 percent of the site being unaffected, 25 percent of the site would appear as fire-created openings, and approximately 55 percent of the site would be underburned.

Effects on wildlife and wildlife habitat are discussed in the Burn Treatment Effects section below.

Groups 7 and 8 (Prescribed Burn) – Treatments include cutting small trees on portions of the site to create fuelbeds conducive to low intensity burning. Where the opportunity exists, small trees would be cut to create small openings around whitebark pine, ponderosa pine, western larch and Douglas-fir to promote regeneration. Units would be burned to reduce fuels, cause additional mortality of undesirable trees and prepare the sites for natural regeneration. Treatments would create patches of mortality of 5, 10 or 20 acres in Group 7 units and 30 to 75 acres within Group 8 units. Like Group 6, all units would be assessed prior to burning to identify existing whitebark pine regeneration that needs to be protected during burning. Pre-burn treatments that would be implemented to promote whitebark pine include cutting and direction felling of conifer trees to increase fuel loading, improve the continuity of the fuelbed and reduce fuel loads around whitebark pine trees. These treatments would also be used to establish 1- to 5-acre areas that can be established as nutcracker caching sites. Like Group 6, suppressed conifers would be removed around existing aspen.

Effects would be similar to those described under Group 6, however, because of the larger canopy gaps created by more intense burning conditions, shade intolerant and fire tolerant species would increase, with the greatest increase occurring under Group 8. Also horizontal structure and age class diversity would increase due to the larger openings and pockets of understory regeneration created.

Approximately 20 percent of the site would be unburned within both group 7 and 8 units. Also within group 7 units approximately 25 percent would occur in openings 5 to 20 acres in size approximately 55 percent would receive a low-intensity burn. Within Group 8 units. approximately 30 percent of the site would be in fire-created openings of between 30 and 75 acres, and approximately 55 percent of the site would be underburned with low-intensity fire. Effects on wildlife are discussed below.

Group 9 (Prescribed Burn) – This treatment is only proposed under alternative 3 and involves prescribed burning using low-intensity fire to reduce fuels on the site following harvest. Effects are similar to those described under Group 6.

Group 10 (Intermediate Harvest mix with no harvest and Jackpot/pile burning) – This treatment is only proposed under alternative 3 and involves patches of thinning to promote ponderosa pine and aspen and reduce ladder fuels. . Like Group 1, understory vegetation would be enhanced, although more closed canopy conditions (i.e. greater than 40 percent canopy closure) would be maintained.

Effects on wildlife are discussed in the Burn Treatment Effects section below.

Burn Treatment Effects

This section summarizes effects of proposed burning under each of the action alternatives including low severity/underburning, mixed severity (MS) burning and pile/jackpot burning. Table 8 identifies the amount of each treatment proposed under each of the action alternatives.

Low Severity Fire, Site Preparation Burn, Broadcast Burn and Underburning

To ensure that desired burning conditions are met, all areas would be burned when weather conditions provide for safe ignition. A prescribed burn plan and all required documentation in accordance with USDA Forest Service, Region 1 or Helena National Forest standards must be completed and approved prior to implementation. These actions would ensure that burning conditions would be controlled and adequate smoke dispersal would occur.

Prior to treatment, Forest Service personnel would survey the site and identify firing patterns and retention areas expected to achieve objectives, including protection of riparian areas, shrub communities and unique or uncommon habitats. Collectively these actions would help to ensure fire-related effects are consistent with those anticipated.

Burning would take place in the spring or fall as long as required fuel, moisture and weather conditions are present. Once ignited, the burn moves through the project area driven by wind and terrain. Flame lengths should range from a few inches to 3 feet in height, consuming litter, grass, forbs and smaller fuels.

Effects on wildlife and wildlife habitat are determined by a number of factors including the burning intensity, as well as site-level fuels, topography and moisture conditions. This burn intensity is expected to consume the litter, fine fuels and small diameter trees and shrubs less than 5 inches in diameter (Bowles et al. 2007); it generally would not be hot enough to scorch the soil or result in mortality of overstory trees on most of the area burned. There would be small areas that contain higher fuel levels and/or site conditions that create more intense burning conditions. In these areas, some overstory mortality may occur; however, any mortality would be widely scattered and consist of small canopy gaps.

Burning intensity would not be uniform and treatment areas would have a mosaic of burned and unburned lands due to variations in site conditions. On average and based on past treatments, it is estimated that approximately 75 to 80 percent of the treatment area would be burned, with fingers and pockets of unburned areas occurring on approximately 20 to 25 percent of the unit. The amount and uniformity of burning would vary by forest type and topographic position. For example, south-facing slopes, plateau

tops and drier forest types would likely experience a higher percentage of burned area. Burning intensity would be reduced in riparian areas, on northern exposures and within portions of units containing more mesic sites due to higher moisture conditions and lower slope position.

After ignition operations are completed and the prescribed burn has adequate time to move through the unit, mop-up operations extinguish those areas that are still burning. Mop-up usually involves putting out burning or smoldering vegetation such as tree stumps, snags or downed logs. Mop-up does not occur unless the source is likely to cause the fire to spread outside of the control lines. Control is accomplished with water spray and/or hand tools, although it may also include falling burning snags that would drop outside the fire line.

Direct Effects

Approximately 64 percent and 73 percent of the project area would not be treated under alternatives 2 and 3 respectively, and there would be no direct effects on those areas. The following is a discussion of potential direct effects on the acres proposed for treatment (table 8).

Proposed burning is expected to have some direct effects on wildlife inhabiting the site at the time of treatment, although this would vary depending on time of burn and fuel conditions, proximity to breeding habitat and species. For example, fall burns burn hotter, increasing the likelihood of mortality. While some animals may be killed during burning, behavioral avoidance of fire by wildlife is well documented, and large mobile mammals, adult birds and even small less mobile species (e.g., frogs and toads) are capable of either moving quickly to unburned refugia, or seeking out refugia in burrows and crevices (Kennedy and Fontaine 2009; Russell et al. 1999; Smith 2000; Yager et al. 2007). Potential direct impacts to riparian areas, as well as impacts to amphibian breeding habitat would be reduced with implementation of pdfs, streamside management zones, and considering that burned areas would be interspersed with unburned lands.

Most undesirable direct effects are overcome by choosing proper times, places and methods of prescribed burning. For example, because burning would occur largely outside the breeding season, potential for direct mortality is reduced (Bagne and Purcell 2008). Natural and human-ignited fire has historically been a part of Montana landscapes (Amacher et al. 2008) and many forest species have evolved with the presence of fire. Consequently, when mortality does occur, it is usually negligible at the population level (Lyon et al. 1978) and is not expected to adversely affect local populations for any species.

Indirect Effects

Indirect effects of proposed burning include modifications or changes in vegetative conditions on the affected sites at both the stand and landscape level (Kennedy and Fontane 2009). Generally, burning would result in a reduction in shrubs and woody material and an increase in herbaceous vegetation (Bowles et.al. 2007; USDA Forest Service 2006b). In the short term this is expected to improve habitat for species that prefer or require forested habitat with a grass/forb understory, and decrease habitat for species that utilize understory shrubs or low cover provided by small- diameter woody vegetation. Burning intensity would vary and most treatment areas are expected to have a mosaic of understory conditions. These changes vary over time and Metlen and Fiedler (2006) found that while burning initially reduced cover and richness of the understory, by year 3, understory richness increased when compared to the pre-treatment and control. While there would be a reduction in DWD on the site, implementation of pdfs would retain between 5 and 20 tons per acre for warm, dry types, and 10 to 20 tons per acre for other types. As a result, suitable standing and downed wood habitat would continue to be available following treatment.

Burning would modify understory conditions on up to 80 percent of the site, so there would be shifts in species diversity and abundance immediately following treatment. Changes in understory would vary over time. For example, small mammals that need high shrub cover to avoid predators may do poorly the first few years following treatment, whereas their numbers would be expected to exceed pre-treatment population levels when shrubs recover and forage (herbaceous vegetation and mast) increases (USDA Forest Service 2006b). So while impacts would affect species that prefer closed-canopy mature forest and utilize DWD and woody vegetation removed during burning, habitat would be restored within approximately 5 to 15 years. Implementation of pdfs (i.e., no ignition in riparian areas) and stream management zones would reduce burning in riparian areas. So while some fire may back into riparian habitat, these areas would be left largely intact. Considering that structural complexity and heterogeneity may be improved on the site (USDA Forest Service 2006b) and that the treated stand may be more resistant to wildfire and insects and disease over the long term, habitat conditions and wildlife diversity and abundance would be improved both within the unit and across the landscape.

Mixed Severity Fire

Like low-severity fire, a prescribed burn plan would be completed prior to implementation. Since mixed severity burning is complex, Forest Service personnel would identify firing and holding patterns to achieve objectives, including protection of sensitive or unique communities/features. So like low-severity burning, these actions would ensure that mixed-severity fire effects are consistent with those anticipated. Burning and mop up processes and conditions described under low-severity burning would be similar.

Treatment consists of low-intensity burning that consumes herbaceous vegetation and small diameter woody vegetation as well as pockets of more intense burning (resulting from fuels created in the pre-burn treatments) where much of the overstory is killed. Low-intensity burning would occur on 50 to 55 percent of the site, whereas mixed-severity burning would result in overstory mortality on between approximately 10 percent (Group 6), 20 percent (Group 7) and 20 to 30 percent (Group 8) of the unit. Approximately 20 to 25 percent of the site would be unburned, and based on effects of past treatment, unburned areas are expected to be dispersed across the site. Like low-severity burning, pdfs would reduce burning within streamside management zones and riparian habitat would be maintained.

Direct Effects

Direct effects to wildlife resulting from mixed-severity burning would be similar to those described under low-severity burning, except due to increased burning intensity in portions of the unit, the likelihood of mortality is greater. Mortality is expected to be low since approximately 80 percent of the site would be unburned or lightly burned.

Indirect Effects

Burning stimulates re-growth of vegetation and effects include enhancement of herbaceous vegetation on the area burned, as well as development of grasses, forbs, seedlings and shrubs within the canopy gaps created. Vegetative conditions post burning would be more diverse with small pockets of regenerating forest or herbaceous vegetation imbedded within the larger forested landscape. Over the long term the resulting forest communities would be more diverse and more resistant to stand-replacing wildfire due to the development of fire-tolerant trees (e.g., ponderosa and whitebark pine) and shrubs as well as early seral species (e.g., aspen).

Mixed severity burning promotes both early and late-successional habitat conditions that Halofsky et al. (2011) suggest can provide a unique vegetation and wildlife response. The critical habitat feature of mixed severity fire regimes affecting wildlife habitat is the mosaic of vegetation created, as well as the dynamic nature of that mosaic over time and space (Agee 1998 *in* Lehmkuhl et al. 2006). For example,

low severity fires typically result in mature single-storied stands dominated by fire-resistant species. On mesic sites, understories can have a high component of fire-adapted shrubs. Moderate severity fires typically result in patchy mixed-age stands dominated mostly by large trees of fire-resistant species with a diverse understory. Consequently, the proposed burning is expected to promote more diverse habitat conditions (Arno 2000).

While burning would decrease DWD, the dynamics following a mixed severity burn are complex, with consumption of debris on the forest floor compensated by the creation of snags and patches of higher severity burning (Agee 2002). Also on average, woody debris appears relatively abundant in mixed severity vegetation types, although availability varies over time (Lehmkuhl et al. 2004), with high quality snags available for cavity nesting species (Bull et al. 1997). Also, although the availability of DWD fluctuates more than that of low severity fire, it contains elevated and relatively uniform levels of DWD, when compared to low intensity burning (Lehmkuhl et al. 2004).

Wildlife use of a site varies and species in early seral to mid-seral patches can vary depending on the size of the patch, seed source availability, or vegetative regeneration. Generally, the larger the patch, the greater the dominance of early seral tree species, and the proportion of species breeding in early seral stages tend to increase with increasing fire size and intensity (Lehmkuhl et al. 2004). As a result, sites receiving a Group 8 treatment (30- to75-acre openings) would provide more habitat for species that utilize a mixture of early and mid- to late-seral habitat, whereas sites receiving a Group 6 treatment (less than 10 acres) would be favored by species that prefer a mid- to late-seral habitat, but also utilize the structure provided by small early-successional forest. Due to the development of small to medium-sized openings, Group 7 treatment would likely provide habitat for a diverse group of species including early successional, and mid- to late-seral species.

Different fire severities produce different post-fire structures (i.e., stands of live trees with some dead snags with 100 percent and snags or shrubs) and these variations in post-fire structure should translate into variation in the wildlife response to fire (Smucker et al 2005 In OSU 2009). Recent studies have documented that avifaunal response varies with burn severity. For example Kotliar et al (2007) detected a broad range of responses to increasing burn severity. Overall 70 percent of the species included in their analysis exhibited either positive or neutral density responses to fire effects across all or portions of the severity gradient evaluated, although more research is necessary. Generally, management that includes a broad range of natural variability, including areas of severe fire, and that accounts for the legacy of past land uses is more likely to preserve a broad range of wildlife habitat restoration objectives (Allen et al 2002, Fule et al 2004, Kauffman 2004, Schoennagel et al 2004, Noss et al 2006, Kotliar et al 2007).

Landscape distribution is also a factor, and in their evaluation of fire severity and patch size on bird species response, Saab and Powell 2005, found that unburned areas in close proximity to burned areas were needed to serve species dependent upon live woody vegetation, especially foliage gleaners. While some species were more abundant in unburned sites (golden crowned kinglet, mountain chickadee, hermit thrush) and some species more abundant in burned sites (black-backed woodpecker, olive-sided flycatcher, three-toed woodpecker, mountain bluebird), a mixture of burned and unburned forest provides habitat for a wide variety of species. Some species that frequently nest in large dead trees but forage in live trees for seeds such as the white-headed woodpecker benefit from the mosaic of live and dead trees created by low and mixed severity fires (Saab and Powell 2005). Conversely, habitat for species that prefer or require closed-canopy mature forest conditions would be reduced on the areas that are intensively burned.

While proposed mixed severity burning would create openings within existing forest, approximately 20 percent of the burn unit would be unaffected and existing canopy conditions would be maintained on another 50 to 55 percent. As a result forest habitat would not be isolated due to the creation of openings,

and connectivity would be maintained. Also treatments would create landscape conditions characteristic of historic conditions.

Low and Mixed Severity Burning Summary

Effects of proposed broadcast burning (low and mixed severity fire) on wildlife habitat vary by forest community (e.g., lodgepole, mixed conifer and ponderosa pine), as well as by fire return interval (Saab and Powell 2005). Many western conifer forests were historically affected by frequent, low to mixed severity fires (Amacher et al. 2008), therefore, native species are adapted to historical fire regimes and the resulting habitats (Saab and Powell 2005). While treatment would reduce habitat for some species and benefit others, fire management that includes a broad range of variability, including areas of more severe fire, are more likely to preserve a broad range of wildlife habitat than restoration with narrowly defined historic fire regimes (Allen et al. 2002 *in* USDA Forest Service 2006b; Fulé et al. 2004, Kaufman 2004, Kotliar et al. 2007, Noss et al. 2006, Schoennagle et al. 2004 *in* Kennedy and Fontaine 2009). Collectively, implementation of the proposed burning, combined with the widespread availability of untreated habitat is expected to result in a more diverse landscape that provides habitat for all species that currently use the project area, as well as improve habitat for species that prefer or require declining fire dependent communities.

Under alternative 3, low- and mixed-severity burning would be reduced by approximately 15 percent (705 acres) from that of alternative 2. While fuels and wildfire risk would not be reduced, open and closed mid- to late-seral forest habitat would be maintained on approximately 141 acres, or the lands affected by higher-severity fire, whereas understories would be unchanged on the deferred low-severity fire sites. Treatment changes under alternative 3 would reduce establishment or restoration of ponderosa pine, aspen and white-bark pine by 1,316 acres, 315 acres and 629 acres respectively, when compared with alternative 2, whereas western larch would increase on 38 acres.

Pile and Burn and Jackpot Burning

This activity involves piling harvest-generated fuels, natural fuels, brush, and heavy accumulations of litter with mechanize equipment such as a tractor-mounted brush rake or a grapple or by hand. Burning usually occurs in the winter when fire danger is low. On some sites burning is allowed to creep away from piles allowing for a small scale underburn. This treatment would also reduce concentrations of natural fuels and those created from harvest activities resulting in predicted fire behavior within desired intensities.

While there is a possibility wildlife could be directly affected by this treatment, the likelihood of mortality is low because of the widespread availability of unburned lands interspersed between burned sites. Like low and mixed severity burning, indirect effects include a reduction in DWD on the site and habitat for species that utilize this component would be reduced. With implementation of pdfs, down woody debris including large-diameter logs would be maintained on site and suitable habitat would continue to be available.

Roads

Roads can affect wildlife in many ways including;

- Direct loss of habitat through a loss of forest cover
- Degradation of habitat quality through increased sedimentation or risk of invasive plants
- Habitat fragmentation including increased edge or a loss of interior habitat
- Avoidance by wildlife sensitive to the disturbance

- Increased mortality associated with hunting or poaching
- Road mortality, or barriers to wildlife movement and dispersal (NRDC 1999)

Conversely, benefits may result to species that utilize the herbaceous vegetation associated with the road right-of-way (ROW).

Road activities including roads built then obliterated immediately following timber removal and road maintenance are identified in table 8. The following is a description of the road treatments and a discussion of the general effects on wildlife, whereas additional road related effects are also addressed in the species-specific analysis.

Roads Built then Obliterated Immediately Following Timber Removal

Direct effects are largely limited to activities that occur to the roadbed and the associated right-of-way (ROW). Roads built then obliterated immediately following timber removal would involve clearing a 20-foot ROW within existing forest, which would result in approximately a 6-acre and 1-acre reduction of forested habitat under alternatives 2 and 3 respectively. It may also include shaping, adding culverts, improving drainage, and applying surfacing material. Effects include a short-term increase in sediment, as well as possible mortality to less mobile wildlife and behavioral avoidance of some species during construction. Potential effects depend in part on the location of the project road corridors. For example, all proposed roads occur within 0.25 mile of an existing road and do not access previously unroaded areas. As a result, the areas affected do not provide preferred habitat for interior species, or species sensitive to disturbance and use associated with roads.

All roads would be closed to public access during project implementation, reducing potential impacts associated with road use including road related mortality, poaching, noise and increased human activity. While roads would be permanently closed following use, by creating a new ROW, some increased human access would be expected to occur. Also low standard roads similar to those proposed have been shown to be barriers to the dispersal of some small mammals, reptiles and amphibians (NRDC 1999); hence, potential effects can be expected to occur on a localized basis for some species. Effects to movement and dispersal are not expected to affect long-term reproduction or local populations due to the small amount of acres affected, proximity to existing roads, and considering proposed roads do not isolate any forest patches.

Road Maintenance

Road maintenance includes shaping the roadbed, adding culverts and/or applying surfacing material. Like road construction, this activity is expected to result in increased sedimentation during activities, although implementation of pdfs would reduce these impacts. Like road construction, effects to wildlife also include possible mortality to less mobile species, as well as behavioral avoidance during maintenance activities. Wildlife related disturbance and mortality would be low because this activity would occur along a narrow strip on existing roads.

Road Management

Many effects to wildlife are determined by road management, or whether a road is open, closed or restricted. The HNF reduces impacts to wildlife by keeping roads into key habitats closed or restricted during critical periods of the year. In addition, all roads used by the project which are currently closed or restricted to meet wildlife or other resource objectives would be maintained in their pre-project status. Further, in order to reduce disturbance-related impacts to wildlife, all roads to be built then obliterated immediately following timber removal would be closed to public access during and following

implementation. As a result, the road management strategy in effect is expected to reduce potential road-related impacts to wildlife under both alternatives.

Invasive Weeds

Of the 24 species of noxious weeds found in the State, five are known to occur within the project area including butter and eggs (*Linaria vulgaris*), Canada thistle (*Cirsium arvense*), houndstongue (*Cynoglossum officinale*), St. Johnswort (*Hypericum perforatum*) and spotted knapweed (*Centaurea maculosa*). In addition Common mullein (*Verbascum thapsus*) is listed as a noxious weed by Lewis and Clark County and it is likely that oxeye daisy (*Leucanthemum vulgare* also known as *Chrysanthemum leucanthemum*) and cheatgrass (*Bromus tectorum*) occur along roadways, especially near areas of recent disturbance. There are currently 564 acres of known infestation (USDA Forest Service 2011d).

The Forest weed treatment project FEIS (USDA Forest Service 2006c) provides a detailed discussion on the effects of invasive weeds and their control on wildlife and this information is incorporated by reference into this analysis.

A number of weed prevention project design features are in place to reduce the spread of invasive species during treatment and anticipated effects are discussed in detail in the project invasive weed report (USDA Forest Service 2011d). While the spread of noxious weed would continue under all alternatives, the rate of spread would be expected to be faster in areas proposed for treatment and it is estimated that alternatives 2 and 3 would result in an additional 311 and 233 acres of weed infestation respectively. Combined with known infestations within treatment areas, it is estimated that 653 acres of invasive weeds would occur under alternative 2 and 526 acres would occur under alternative 3.

It is anticipated that a combination of biological and chemical control would be used to control infestations and by year 2 or 3 the project would continue to treat a minimum of 114 acres or potentially more depending on monitoring results. While invasive weeds would continue to spread over time, it is expected that ongoing monitoring and weed control would provide benefits over time through control of existing and new infestations. So while potential effects to wildlife and wildlife habitat from invasive plants would increase under both action alternatives, with implementation of pdfs to reduce weed infestation and monitoring and control treatments to reduce spread, it is expected that any effects would be localized and there would be no large areas of cover or forage affected. Also, effects to sensitive habitats such are riparian areas and wetlands would be reduced due to implementation of INFISH buffers that reduce treatment in these areas. Finally there are no effects to wildlife anticipated that were not considered in the Forest Weed Treatment FEIS (USDA Forest Service 2006c).

Cumulative Effects for All Alternatives

This section summarizes anticipated cumulative effects that would occur under all alternatives and information presented is used in the habitat and species cumulative effects analysis presented in the following sections.

Cumulative effects related to wildlife are evaluated by looking at past, present and foreseeable future activities that could affect wildlife when considered cumulatively over time. When considering cumulative effects to wildlife based on past and anticipated future disturbances, the primary factors of change included timber harvest, wildfire, insects and disease, road construction and management, private land development, grazing and recreational use. A complete list of past, ongoing and future activities that were considered in the cumulative effect analysis, including a discussion of effects to wildlife habitat, can be found in volume 2, appendix C; whereas a general discussion of effects to wildlife and wildlife habitat is provided below.

The cumulative effects boundary used in this analysis varies by species. For example, cumulative effects for species with small home ranges would be analyzed across the project area, whereas some species are analyzed across designated management areas such as lynx analysis units, bear management units, or elk herd units. For species that have large home ranges and select habitat based partially on landscape conditions (e.g., wolverine, gray wolf, fisher, etc.), the cumulative effects analysis area includes the project area combined with adjacent lands affected by mountain pine beetle (MPB) mortality and recent wildfire. This combined area totals approximately 101,977 acres, including 67,042 acres of NFS land, and 34,935 acres of private land. Rationale for selection of this area includes the following:

- This area is large enough to assess effects to species to species with large home ranges, thereby framing the context and significance of potential impacts to each species.
- The cumulative effects area includes more developed private lands adjacent to the project area, which contain habitat components or levels of disturbance that may influence wildlife use of NFS lands.
- This area includes all of the two Elk Herd Units (EHU) and Lynx Analysis Units (LAU) affected.
- This area is large enough to assess landscape-level considerations and connectivity, including potential impacts to affected Bear Management Units (BMUs), EHUs and LAUs.
- Including lands to the north and northwest would tend to dilute effects because of the large amounts of designated Wilderness and Inventoried Roadless Areas.
- The cumulative effects area includes over 20,000 acres that have recently (since 2003) been affected by wildfire, which influences landscape-level use and effects.
- Wildlife habitat conditions and land uses within the area are representative of those found across the larger landscape or watershed(s).

A determination of significance is made for each species/habitat evaluated. For the purpose of this analysis, significant cumulative effects are defined as effects that singly or incrementally could result in long-term impacts to wildlife or wildlife habitat that could result in a loss or reduction in viability (defined above).

Past, Ongoing and Future Activities

Past activities include commercial and non-commercial timber harvest, reforestation treatments, fuel treatments, grazing, mining, special use and outfitter guide permitting, motorized and non-motorized recreational use and wildfire (appendic C). Effects of these activities vary spatially and temporally and while understory cover and forage was reduced immediately following partial harvest, reforestation and fuel treatments, understory structure and resulting cover and forage on many of the sites have been restored. Similarly, overstory conditions on older regeneration harvest sites and sites affected by sanitation and intermediate harvest have closed, whereas more recent treatments (since 2000), continue to have more open overstory conditions. Levels of harvest have been declining. In addition, many of the treatments between 2003 and 2009 were designed to remove fuels and re-establish natural vegetation following wildfire, as indicated by the small amount of harvest and large amount of reforestation treatments.

In addition to management activity, approximately 23,000 acres have been affected by more recent wildfire (2003 to 2009). Most of this occurred as high intensity wildfire associated with the 2003 Snow Talon fire in the Copper Creek and Landers Fork drainages in the northeast corner of the analysis area. Overstory mortality within these drainages was widespread and most of the meadow shrub biophysical setting that exists on the analysis area was created by this event. Understory conditions are somewhat

variable and while herbaceous vegetation has become established, woody regeneration is scattered. Also because of the widespread reduction in overstory, many of these lands currently don't provide habitat for species that require high forested cover, or species that require overstory cover in close proximity to forage. Conversely, because of the abundance of snags and downed wood, this area provides habitat many species that utilize dead wood, as well as species such as the black backed woodpecker that prefer post-fire landscapes.

As described in the project silvicultural report (Amell and Klug 2015), insect- and disease activity has been occurring across much of the analysis area and has resulted in widespread overstory mortality. This has increased levels of standing and downed wood, created more open canopy conditions and increased understory development on many sites. Vegetation and habitat changes resulting from past activities are largely reflected in the existing habitat condition discussed throughout this analysis. Also, effects of these activities on wildlife are variable and the methodology section for each species discusses the data source(s) used. Ongoing and future activities are displayed in volume 2, appendix C. Wildfires that occurred within the analysis area in 2011 and 2012 are displayed in the 2010 to present table. Future timber harvest activities proposed under the action alternatives have been grouped into intermediate harvest and regeneration harvest because they have similar effects on wildlife and wildlife habitat,. A brief discussion of the effects of these past, ongoing and future treatments on wildlife follows, whereas more detailed analysis is provided in the individual species/habitat cumulative effects sections.

Cumulative Effects Pertaining to Wildlife

Not all activities result in long-term cumulative effects. For example, areas affected by outfitter guide use, or much of the trail or road maintenance work, does not modify habitat conditions and effects of these activities are short term (a few days per year), whereas activities such as grazing, hazard tree removal, prescribed burning, dispersed recreation, or firewood collection, can have long-term effects. The following is a brief summary of ongoing and future activities on wildlife. Also, it should be noted that a biological evaluation would be completed to assess any future in-stream work or NNIS treatment and potential impacts would be reduced through that process.

Personal Use Firewood – Standing dead trees and downed woody debris would be removed on lands adjacent to roads open to the public. Effects include disturbance during collection, as well as reduced standing and downed wood along open road corridors.

Road Maintenance – This involves re-surfacing, culver replacement, and right-of-way (ROW) maintenance (e.g., brushing) of existing roads. Effects include disturbance during maintenance activities, and periodic removal of woody vegetation and associated wildlife cover along road ROWs. Short-term sedimentation would also occur, although activities would result in a reduction in sediment over the long term.

Mining – Effects include localized disturbance to vegetation, soils, and stream banks. Effects to wildlife include disturbance during mining and a localized reduction in habitat for species sensitive to disturbance.

Outfitter Guide Permits – This includes outfitter and guide special use permits for big game and spring bear seasons and associated day use and overnight camping. Effect include temporary displacement of wildlife from the affected area.

Non-motorized Dispersed Recreation – This includes trail use (e.g., hiking, mountain bikes, stock use) maintenance on approximately 6 miles of hiking trial in the Sauerkraut drainage (outside the project area), use at three dispersed campsites in the northern half or the project area and hunting/fishing use. Effects to wildlife include avoidance of the immediate trail corridor and campground sites by species sensitive to

human disturbance, as well as changes in movement patterns during hunting seasons. Effects also include increased presence of nonnative plant species, particularly at heavy use areas such as trailheads.

Motorized Dispersed Recreation – This includes both road and snowmobile use and occurs largely on the existing road system, although the combined area also contains 15 miles of motorized trail. Because vehicle access in much of the project and combined area is good, effects include increased stress, changes in foraging behavior and use, long-term avoidance of open road corridors, seasonal avoidance along roads open for part of the year, and increased presence of invasive species. This impact is controlled to some extent through area closures, travel management and invasive weed control, which is discussed in the Blackfoot Travel Plan (USDA Forest Service 2012g).

The cumulative effects area contains over 50 miles of snowmobile trail, most of which occur as groomed trails along existing roads, although there are approximately 8 miles of un-groomed trail. Additionally, all of the project area and most of the CE area are open to cross country snowmobile use. Effects of snowmobile on wildlife are discussed in detail in the Blackfoot Travel Plan (USDA Forest Service 2012g) and include increased stress, altered forging behavior and possible disturbance to denning or hibernating individuals. Similar to road related use, this can result in a long-term effects and loss of suitable habitat for species sensitive to disturbance.

Effects of motorized and non-motorized use are evaluated in the Blackfoot Travel Plan, which includes reducing existing snowmobile trails within the cumulative effects area (USDA Forest Service 2012g).

Private Land Development – This includes development for housing in several areas in the vicinity of Lincoln. Effects include increased disturbance and road use and possible displacement of wildlife. Because these lands occur in highly fragmented portions of the analysis area, effects would occur primarily to species that are not sensitive to human disturbance or fragmentation.

Grazing – Grazing has the potential to reduce understory diversity and composition. This could reduce wildlife forage, including both herbaceous and woody vegetation. Overgrazing could also reduce understory vegetative structure and wildlife cover, as well as the diversity of preferred species such as aspen, increase the spread of invasive species, and result in impacts to streams, riparian areas, and water quality. Conversely, managed grazing by livestock can increase the productivity and nutritive quality of forage (Clark et al. 2000).

There is currently one riparian area adjacent to the Pine Grove campground that is receiving multiple impacts from grazing and recreation. Fencing will be installed to alleviate this problem, and it is expected that resource impacts would be reduced. In the Stonewall allotment, conifer encroachment reduced grasses and forbs and has affected use on transitory range. Use on the Keep Cool allotment has not exceeded 25 to 35 percent annually and use of this allotment is considered light to moderate. Also there are established INFISH buffer monitoring sites on Beaver Creek and Keep Cool Creek, which would be implemented in the future to identify and reduce resource impacts. Most of the primary forage areas on the Arrastra allotment occur on leased ground and cattle use on the allotment is strictly drift from these lands (USDA Forest Service 2012b). While continued cattle use is expected to affect wildlife cover and forage, considering that (1) the existing impacts to Beaver Creek would be reduced with approved fencing, (2) use of the area has generally been moderate to light, (3) use is not expected to change but would be modified if necessary to reduce resource impacts, and (4) grazing systems would be designed to be compatible with wildlife needs (USDA Forest Service 2012b), it is expected that wildlife cover and forage conditions would be maintained. Additionally, implementation of pdfs (SILV-1, WL-10, 11, 12) under the action alternatives help ensure that aspen and vegetation diversity is maintained following treatment.

Hazard Tree Removal – Harvest involves removal of dead and dying trees within approximately 100 feet of roads. While snags and future downed woody debris are reduced, treatment includes implementation of Forest Plan standards, which include retention of snags on the site. As a result, a snag and future downed wood component is maintained. Effects to wildlife include disturbance during treatment, a reduction in available snag and den trees, and an increase in herbaceous vegetation along affected roadsides. Due to the proximity to open roads, effects would occur primarily to species that are not sensitive to human disturbance.

Campground Activities – This includes activities associated with campground maintenance and ongoing recreational use. Because of the concentrated human activity, effects are primarily related to disturbance during maintenance and use. Although habitat conditions would be largely unchanged, effects would include a localized long-term reduction in habitat for species sensitive to human activity.

Wildfire – All recent (since 2011) fires burned in a patchy mosaic including some areas of low to moderate burning, as well as areas where the burning intensity was high. Based on assessment of the East Fork fire, which affects the largest area, approximately 60 percent of the recent wildfires burned hot enough to result in overstory mortality, whereas approximately 40 percent were unburned or lightly burned. Effects include a long-term loss of forested cover on 60 percent of the acreage affected and a reduction in habitat for species that require mature forest conditions. Effects on the remaining 40 percent would be similar to those described under low severity burning and would include a reduction in woody vegetation and cover. Wildlife forage would be expected to increase on all of the affected acres within the next 5 to 10 years.

While older wildfires such as the Snow Talon fire (2003) reduced wildlife cover, they also increased herbaceous and woody vegetation on the site. Due to the continued development of understory vegetation, wildlife forage has been and would continue to increase, and it is expected that by the end of the analysis period (2022) suitable habitat for species such as snowshoe hare, and species that utilize forage and low cover would increase. Conversely, habitat for species that require high forest cover would continue to be widely scattered or absent.

Mountain Pine Beetle Mortality – It is expected that MPB mortality would continue to occur with some areas of concentrated mortality. As a result, recruitment of snags and downed wood, including larger diameter trees, would continue to occur across the landscape during the analysis period; whereas habitat for species that require more closed canopy conditions would be reduced.

Blackfoot Travel Management Plans – The Blackfoot Winter Travel Decision was implemented in 2013 and the Blackfoot Non-Winter Travel Decision is anticipated in 2015. Each of the travel plans include a complete analysis of effects to wildlife. Any decision would be consistent with existing regulation and direction related to wildlife. While motorized and non-motorized recreation can adversely affect wildlife, ongoing travel planning efforts would likely be beneficial through modifications to access management and authorized recreational use (USDA Forest Service 2012g).

Invasive Plants Treatment – Treatment of nonnative invasive plants involves both mechanical and chemical treatment of target species, primarily along roads, infested riparian areas and administrative sites. Effects to wildlife include disturbance during treatment, although long-term benefits to native vegetation and associated wildlife cover and forage would occur due to the control or containment of nonnative species.

Prescribed Burning – Effects of burning activities included in the proposed action are described under treatment effects and effects to wildlife vary depending on the type of burning proposed. Pre-approved burning would be similar to low-intensity burning.

Trail Work – These activities would result in some localized tree removal and a loss of understory vegetation on the trail surface. While effects include avoidance of the area by wildlife during construction/maintenance, habitat conditions are largely maintained.

Timber Harvest – Effects of harvest under the action alternatives is discussed in the Alternative Effects section, whereas effects of past harvest are discussed in appendix C. Off-forest harvest would be variable and include localized disturbance during operations, removal of live and dead and dying trees and potential for the spread of invasive species. It is assumed that habitat for species that utilize mature forest would be reduced on the affected acres. Because lands of other ownerships occur at lower elevations in highly fragmented portions of the analysis area, it is not expected that harvest activities would further reduce landscape-level connectivity or adversely affect movement of wildlife species that are sensitive to fragmentation and human activity such as lynx, wolverine and grizzly.

Habitat Effects

This section describes alternative effects on the wildlife habitats associated with the biophysical settings described previously. Direct and indirect effects are evaluated across the Stonewall project area, whereas cumulative effects are evaluated across the combined cumulative effects boundary described above. Table 91 displays the amount of each habitat affected by treatments proposed under the two action alternatives, and this information is used in the evaluation of effects described in the following sections. Collectively the action alternatives strive to restore fire to a landscape that has been affected by years of fire suppression and better mimic ecological processes and reference conditions. Table 92 displays the forested biophysical reference conditions and the conditions that would result under each of the alternatives (USDA Forest Service 2012c).

Table 91. Alternative treatment acres by biophysical setting

Habitat	Area Treated			
	Alt 2		Alt 3	
	Acres	%[1]	Acres	%[1]
Barren 68 acres - (<1%)				
Prescribed Fire	7	10	5	7
Douglas Fir Dry – 5,579 acres (23%)	1,798	32	1,140	20
Intermediate Harvest	187	3	66	1
Prescribed Fire	1,511	27	975	17
Regeneration Harvest	100	2	99	2
Douglas Fir Moist – 5,862 acres (24%)	1,783	30	1,192	20
Intermediate Harvest	50	1	22	<1
Prescribed Fire	1,702	29	1,156	20
Regeneration Harvest	31	<1	14	<1
Mtn. Meadow with Shrub - 678 acres				
Prescribed Fire	75	11	75	11
Mtn. Shrubland - 138 acres				
Prescribed Fire	18	13	18	13
Ponderosa Pine/Douglas-fir – 7,742 acres	3,821	49	3,077	39
Intermediate Harvest	1,849	23	1,350	17
Prescribed Fire	1,134	15	1,023	13
Regeneration Harvest	838	11	704	9

Habitat	Area Treated			
	Alt 2		Alt 3	
	Acres	%[1]	Acres	%[1]
Lower Subalpine Forest – 3,331 acres				
Prescribed Fire	890	27	887	27
Upper Subalpine Forest - 580 acres				
Prescribed Fire	125	21	125	21

[1] Percent of the biophysical setting within the project area

Table 92. Forest biophysical setting seral conditions by alternative

Biophysical Setting	Early-seral			Mid-seral Closed			Late-seral Closed			Mid-seral Open			Late-seral Open		
	Alternative			Alternative			Alternative			Alternative			Alternative		
	1[1]	2	3	1[1]	2	3	1[1]	2	3	1[1]	2	3	1[1]	2	3
Dry Douglas-fir	2 (15)	7	6	31 (25)	21	25	55 (15)	41	47	4 (20)	12	8	8 (25)	19	14
Ponderosa Pine Douglas-fir	1 (15)	14	11	31 (10)	16	20	67 (10)	35	45	0 (25)	11	7	1 (40)	24	16
Douglas-fir Moist	1 (15)	6	4	35 (25)	22	27	50 (15)	39	42	5 (20)	14	11	10 (25)	18	16
Lower sub-alpine fir	1 (20)	5	5	21 (40)	15	15	46 (25)	37	37	7 (10)	12	12	25 (5)	32	32
Upper sub-alpine fir	0 (20)	3	3	22 (25)	21	21	46 (15)	38	38	11 (25)	11	11	22 (15)	27	27

[1] – Reference conditions shown in parenthesis

Dry Forest Habitats

Table 93 displays wildlife species that would likely be associated with mid- to late-seral communities resulting under the alternatives considered and this information is used in part to assess changes in wildlife use.

Table 93. Dry forest wildlife habitat summary by alternative

Species Status	Species Likely to Occur within Mid to Late Seral Closed or Open Canopy with Dense Conifer Understory	Species Likely to Occur within Mid to Late Seral Open Canopy stands with Grass/ Forb/ Shrub Understory
Species Likely to be Abundant or Relatively Common	red-breasted nuthatch, pine siskin, mountain chickadee, ruby-crowned kinglet, dark-eyed junco, yellow-rumped warbler, Clark's nutcracker, red squirrel, deer mouse, mule deer, porcupine	red-breasted nuthatch, pine siskin, dark-eyed junco, mountain chickadee, yellow-rumped warbler, American robin, Clark's nutcracker, red crossbill, western wood-pewee, chipping sparrow, deer mouse, dusky flycatcher, mule deer, elk, coyote
Species Likely to be Present but Less Common	white-breasted nuthatch, Townsend's solitaire, hairy woodpecker, red crossbill, gray jay, evening grosbeak, blue grouse, American robin, northern redback vole, dusky flycatcher, elk, coyote, ruffed grouse	white-breasted nuthatch, Townsend's solitaire, hairy woodpecker, gray jay, evening grosbeak, blue grouse, western tanager, mountain bluebird, common flicker, pygmy nuthatch, lark sparrow, tree swallow, violet-green swallow, vesper sparrow, mourning dove, red-tailed hawk, red squirrel, mountain cottontail, yellow pine chipmunk, Richardson's ground squirrel, badger,

Species Status	Species Likely to Occur within Mid to Late Seral Closed or Open Canopy with Dense Conifer Understory	Species Likely to Occur within Mid to Late Seral Open Canopy stands with Grass/ Forb/ Shrub Understory
		northern pocket gopher, red fox, porcupine, gopher snake
Species of Special Concern	northern goshawk, pileated woodpecker, western toad, wolf	flammulated owl, northern goshawk, pileated woodpecker, western toad, wolf
Priority Species	chipping sparrow, blue grouse, pileated woodpecker, red crossbill, Cassin's finch	flammulated owl, chipping sparrow, blue grouse, pileated woodpecker, Lewis's woodpecker, red crossbill, Cassin's finch
Featured Species	elk, mule deer, moose, ruffed grouse	elk, mule deer, moose, ruffed grouse

Alternative 1

Direct and Indirect Effects

No treatments are proposed in the dry forest wildlife habitat, therefore no direct effects are anticipated. When compared against reference conditions, early seral forest would continue to be well below desired conditions , whereas closed-canopy seral forest would continue to be over-represented and open-canopy mid- to late-seral forest would continue to be under-represented.

Restoration activities would not be implemented and existing ponderosa pine would continue to be lost due to ongoing MPB mortality; trends toward Douglas-fir- and sub-alpine fir-dominated stands would continue. Habitat for open-canopy mid- to late-seral ponderosa pine-associated species including the flammulated owl, Cassin's finch, and Williamson's sapsucker would continue to decline, whereas habitat for closed-canopy mid- to late-seral mature forest species, as well as species that utilize dead wood, would continue to increase over time. Snag densities including a component of large- diameter ponderosa pine snags would remain high for 10 to 20 years. The availability of large-diameter snags would decline after this period as existing snags fall to the ground, and ponderosa pine may not become established in the understory. Disturbance agents would continue to increase, generally outside the natural variability.

The likelihood of stand-replacing wildfire is highest under this alternative because stand density would continue to increase and fuel loading would remain high or increase.

Cumulative Effects

Past, present and anticipated future cumulative effects considered in this analysis are described in volume 2, appendix C. As described under methodology, cumulative effects are evaluated across the combined boundary, of which dry forest makes up 41 percent of the analysis area where biophysical data is available. Past timber harvest has reduced ponderosa pine, as well as dry forest old-growth habitat within the analysis area. Past regeneration harvest has affected approximately 20 percent of the dry forest community, although most of this occurred prior to 1980 and many of these stands are now characterized by closed-canopy conditions. Approximately 5 percent has been affected by partial harvest, most of which has involved sanitation cutting and these stands are characterized by more open stand conditions, many of which are characteristic of this community. Fuel treatments have also occurred on another 5 to 10 percent, although understory conditions have largely been restored. Wildfire has affected approximately 5,000 acres and much of the recent timber harvest has been focused on establishing natural regeneration on lands affected by fire. Many of the past and ongoing activities such as trail and campground activities would result in minor and localized changes in vegetation. Personal use firewood would reduce levels of

downed woody debris along open roads. Ongoing and future activities that would likely modify dry forest habitat and result in changes in structure or diversity include the following:

- Prescribed fire – 113 acres
- NNIS treatment on 2,120 acres
- Grazing – 8,136 acres,
- Hazard tree removal- 460 acres
- Timber harvest on 241 acres
- Wildfire – 44 acres.

Collectively, these treatments would affect approximately 11,000 acres or 38 percent of the dry forest community within the analysis area. However, not all activities would have adverse effects to this community since NNIS treatment would reduce impacts associated with nonnative invasive species and prescribed fire would be expected to restore conditions. Grazing would be expected to modify understory diversity within this community, although monitoring is in place to identify and mitigate resource concerns associated with grazing. Firewood collection would remove downed woody debris along open road corridors and this could be expected to continue over the long term. Activities that would result in long-term changes in stand structure include timber harvest, hazard tree removal and past wildfire. Collectively this would affect approximately 6,000 acres of the dry forest community. Additionally MPB mortality would continue with some areas of concentrated mortality.

While wildlife would continue to be affected by ongoing and future activities, existing uses (e.g., grazing and recreation) are not expected to change. Nonnative invasive species treatments and prescribed fire treatments would help to maintain or promote desired vegetation. In addition, over 75 percent of the dry forest community would be unaffected by ongoing or future activities and therefore, would not alter the availability of dry forest habitat.

Irreversible or Irretrievable Commitments

There are no irreversible commitments to the dry forest community under this alternative. While there are no irretrievable commitments that can be reasonably predicted at a single point in time, there would be a long-term decline in species diversity and canopy conditions characteristic of the dry forest community, including a reduction in habitat for species that prefer or require large diameter snags. Some wildlife associated with the dry forest community may continue to decline.

Alternative 1 Conclusions

While there would be little short-term change in dry forest habitat, in the absence of fire, existing ponderosa pine would continue to be lost due to MPB mortality and encroachment of shade-tolerant species in the understory. Habitat for closed-canopy species and species that prefer dense understory conifers would increase, whereas open-canopy species would continue to decline. Departure from reference conditions would remain moderate to high and the risk of stand-replacing wildfire would remain high.

Alternative 2

Direct and Indirect Effects

Approximately 58 percent of the dry-forest setting would not be treated and effects on these lands would be similar to those described under alternative 1. Alternative 2 is designed to reduce tree density and/or

return stands to earlier seral stages and promote stand sustainability and resiliency through timber harvest and prescribed fire. Treatments, including 2,974 acres of commercial and non-commercial timber harvest and 2,645 acres of prescribed burning would be implemented. These treatments would result in changes displayed in table 91and overall treatment under this alternative would bring project area vegetation closer to reference conditions for all structural stages.

Effects on wildlife would mimic the changes in seral conditions. For example habitat would be improved for species that utilize open canopy forest conditions such as flammulated owl, Lewis's woodpecker and Cassin's finch, whereas habitat would be reduced for species that utilize closed canopy seral stages such as fisher or goshawk (nesting habitat). Effects of treatments on structure and species composition are discussed under treatment effects and in addition to overstory changes (see table 91) include a reduction in understory cover for species such as elk, and snowshoe hare, as well as migratory birds that utilize woody understory vegetation. Conversely, grasses and forbs would increase within one to two years of treatment and forage for species such as elk or ground foraging birds would be improved, whereas habitat for shrub dependent species would be restored within 10 to 15 years.

Changes in hard and soft mast would be variable Mast in the form of conifer seed would be reduced due to improvement cutting, regeneration harvest and portions of mixed severity burning sites that receive high severity fire. Soft mast (e.g., berries) would increase within a few years of treatment (USDA Forest Service 2000b) and be maintained over the long term (i.e., greater than 10 years). While there would be a reduction in mast within treatment sites, due to improved species diversity (i.e., increased aspen, ponderosa pine, and western larch), over the long term it is expected that mast availability would be increased within treated stands as well as across the landscape.

Some snags would be removed within harvest sites, although with implementation of PDF's snags in a variety of size classes, including larger diameter snags would be retained. Similarly, while harvest and fuel treatments would reduce downed wood, between 5 and 20 tons per acre of downed wood would be retained in dry forest sites, including large diameter logs. As a result and considering that burning would increase snags and future recruitment of dead wood, and that approximately 20 percent of the prescribed fire sites would be unburned, dead wood habitat would continue to be available within all stands.

Collectively, activities proposed under alternative 2 would maintain or increase species such as ponderosa pine, aspen and western larch and increase species diversity, In addition to stand-level changes, treatment would also create a more heterogeneous landscape that more closely represents reference conditions and the associated wildlife species.

Alternative 3

Direct and Indirect Effects

Approximately 68 percent of this community would not be treated and effects to that area would be similar to those described under alternative 1. Alternative 3 also moves early, mid and late seral habitat closer to reference conditions, but at a reduced level from alternative 2. A total of 2,219 acres of commercial and precommercial harvest and 1,998 acres of prescribed fire treatments would be implemented.

Effects to wildlife would be similar to those described under alternative 2, in that the project area would move closer toward reference conditions and the associated wildlife species. However due to reduced timber harvest and mixed severity burning, there would be less of a reduction in mid to late seral closed canopy habitat, and less of an increase in early and open-canopy mid- to late-seral habitat. Alternative 3 would also maintain or increase ponderosa pine, aspen and western larch, but at a reduced level. Like

alternative 2, alternative 3 would create a more heterogeneous landscape that more closely represents reference conditions and the associated wildlife species

Alternatives 2 and 3

Cumulative Effects

In addition to cumulative effects described under alternative 1, implementation of the action alternatives would result in up to (alternative 2) the following:

- Intermediate Harvest – 2,036 acres
- Regeneration Harvest – 938 acres
- Prescribed Fire – 2,645 acres

Mature forest would be reduced on the acres proposed for regeneration harvest and on approximately 275 acres proposed for mixed severity burning, due to fire-created openings. While ongoing and anticipated future activities would affect up to (alternative 2) approximately 20 percent of the dry forest habitat, mid- to late-seral habitat would continue to predominate and activities would move the project area closer to reference conditions. Regeneration treatments are proposed in areas with concentrated mortality. While mature forest would be reduced, over the long term treatment is expected to help maintain ponderosa pine on the sites. Most anticipated activities are designed to restore historic conditions, and considering closed-canopy mid- to late-seral habitat would continue to predominate, the availability of dry forest habitat would be maintained or improved

Irreversible or Irretrievable Commitments

There are no irreversible commitments to wildlife under any alternative. While the action alternatives would reduce snags and DWD and modify understory and overstory structure and species composition, these habitats would continue to be available across the landscape. Due to fire restoration and reduced conifer encroachment, habitat for species that prefer or require the dry forest community would be maintained or improved over the long term.

Action Alternative Conclusions

Alternatives 2 and 3 would reduce closed-canopy, dry, seral forest by approximately 24 percent and 14 percent respectively, although closed-canopy conditions would continue to predominate across the project area (i.e., greater than 60 percent). Open-canopy mid- to late-seral habitat would be increased by 51 percent and 32 percent under alternatives 2 and 3 respectively, and both alternatives would move the project area closer to reference conditions for all structural classes. Treatments under the action alternatives are expected to re-introduce fire to the landscape, promote fire-tolerant species, (including ponderosa pine, aspen and western larch), provide long-term habitat for species that prefer or require large-diameter snags, and reduce the risk of stand-replacing wildfire. Collectively this is expected to help ensure the long-term sustainability of the dry forest community.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Forest Plan Standards applicable to management of dry forest habitat is included in the respective management area direction that pertains to the maintenance of big game forage and cover, as well as improvement of non-game habitat in MA W-1. Effects to big game habitat are described under the elk and mule deer environmental effects sections, whereas non-game habitat is discussed under migratory birds and the individual species sections. Big game cover and forage would be maintained in the short term under all alternatives, and improved over the long term under alternatives 2 and 3, therefore, both

alternatives are consistent with Forest Plan direction related to big game. All alternatives would maintain or improve habitat for migratory birds, sensitive species, birds of conservation concern and non-game MIS species, therefore, all alternatives are consistent with Forest direction to promote nongame habitat. Finally, because proposed actions would help ensure that this community and the wildlife species that rely on it are sustained over time, both action alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (36 CFR 219.26)

Cool-moist Forest Habitat

Alternative 1

Direct and Indirect Effects

There are no treatments proposed in this alternative, so there would be no direct effects. In the short- and long-term stands would continue to progress successionally with continuing decreases in seral species (ponderosa pine, whitebark pine, aspen, and Engelmann spruce) and increases in climax species(Douglas fir and sub-alpine fir). In the absence of fire, stands would continue to become more homogeneous with closed-canopy conditions predominating and the availability of open-canopy, early and mid- to late-seral habitat would remain low.

The dense stand conditions resulting under this alternative would provide cover for a variety of species including snowshoe hare, deer, and elk. A variety of bird species and small mammals (e.g., squirrels and marten) also seek food, cover and nest sites within dense mature forests. Conversely, herbaceous vegetation and shrubs as well as wildlife forage would continue to decline, as would habitat for species that utilize open-canopy, mid- to late-seral forest conditions. As succession continues, the project area landscape would become more homogenous, reducing habitat for species that utilize a diversity of age classes and seral habitat conditions..

Due to the continued increase in fuels, the likelihood of stand-replacing wildfire would increase. Should a wildfire occur, a long-term decrease in the availability of mid- to late-seral would occur, whereas early-seral habitat would increase. Under either scenario (no fire or stand-replacing wildfire), cool-moist forests would continue to decline in species and structural diversity and deviate from historical conditions, although the availability of snags and DWD would continue to increase.

Cumulative Effects

Past, present and anticipated future cumulative effects are described in appendix C. Since 1960, regeneration harvest has occurred on approximately 950 acres or 4 percent of this community, whereas partial harvest (e.g., thinning, sanitation and improvement cuts) has occurred on approximately 125 acres. Approximately 2,600 acres or 11 percent of this community has been affected by fuel treatments since the late 1950s. Effects of on vegetative structure and habitat from these activities were considered when evaluating the existing condition. Most activities occurred prior to 1980, so by now, understory structure has been restored on many of the sites. More recent wildfire (since 2003-2009) has affected approximately 5,500 acres of this community. While understories have started to become re-established and created elevated levels of wildlife forage, with the exception of large quantities of standing and downed wood, cover on many of these lands is still low.

Ongoing and future activities under this alternative within the cool-moist community include, NNIS treatment on 502 acres, road hazard tree removal on approximately 15 acres, grazing on 1,712 acres, burning on an estimated 178 acres, and 587 acres affected by 2011 wildfires. Collectively, these treatments would occur on approximately 3,000 acres and affect approximately 14 percent of the cool-

moist forest community within the analysis area. This would include a long-term reduction in mature forest on approximately 370 acres. Mortality due to stand overstocking and MPB would continue.

While long-term changes in vegetation and structure have altered habitat conditions within this community, ongoing uses (e.g., grazing and recreation) are not expected to change, and approximately 75 percent of the community would be unaffected by ongoing and future activities. Because most anticipated activities are designed to restore historic conditions, and considering closed-canopy, mid- to late-seral habitat would continue to predominate, the availability of these biophysical settings would be maintained.

Irreversible or Irretrievable Commitments

There would be no irretrievable commitments to wildlife under this alternative. As in the dry forest setting, while there are no irreversible commitments that can be reasonably predicted at a single point in time, there would be a long-term decline in habitat for some species that require open-canopy conditions characteristic of this community, including a reduction in habitat for species that prefer or require large diameter snags.

Alternative 1 Conclusions

Alternative 1 would maintain the current distribution of cool-moist forest seral stages. Species composition would continue to decline, structural diversity would remain low and risk of wildfire would continue to increase.

Alternatives 2 and 3

Direct and Indirect Effects

Much of this community is remote with little access, therefore, proposed timber harvest would occur on less than 1 percent of this setting under either alternative. Proposed treatments would result in a small increase in open-canopy, mid-seral habitat (improvement cutting and precommercial thinning) and early seral habitat (regeneration cutting). Both alternatives also propose a small amount of low-severity fire including 50 acres under alternative 2 and 30 acres under alternative 3. Effects of treatment would be similar to those described under treatment effects and under dry forest setting.

Mixed-severity fire was the primary disturbance regime in the cool-moist community; as a result, over 95 percent of the treatment under both alternatives includes restoring mixed-severity fire to the landscape. Under alternative 2, mixed-severity fire would occur on 28 percent of this type, whereas alternative 3 would restore fire on 22 percent. Treatments would create more open-canopy conditions with increased herbaceous understory diversity on much of the acreage treated, as well as small (less than 5 acres) to medium (up to 75 acres) pockets of early seral habitat on sites receiving a mixed-severity prescribed burn.

Changes in wildlife would be similar to those described under the dry forest setting, including a reduction in habitat for species that prefer closed-canopy conditions with a dense understory, and an increase in habitat for species that utilize open-canopy, mid- to late-seral and early seral habitat. While wildlife use would change as a result of changes in cover and forage, treatment would promote the structural diversity characteristic of these biophysical settings while leaving approximately 75 percent unaffected, therefore, habitat would continue to be available to support local populations in the short and long term.

Cumulative Effects

In addition to effects described under alternative 1, implementation of the action alternatives would result in up to (alternative 2) the following:

- Prescribed Fire – 2,602 acres

- Intermediate Harvest – 50 acres
- Regeneration Harvest – 31 acres

Cumulatively ongoing and anticipated future activities would affect approximately 5,700 acres or 26 percent of the cool-moist community, including a reduction in mature forest conditions on approximately 900 acres or 4 percent of this community (due to wildfire, regeneration harvest, hazard tree removal and openings created by mixed severity burning). While treatments would reduce mature forest, treatment would help to restore open-canopy, moist Douglas fir forest, while maintaining a predominance of closed-canopy mid- to late-seral forest. Approximately 74 percent of these biophysical settings would be unaffected, and a variety of habitat conditions would continue to be available..

Irreversible or Irretrievable Commitments

There are no irreversible commitments anticipated. The action alternatives would reduce snags and DWD, and modify understory and overstory structure and species composition, including a reduction in mature forest; however, these habitats would continue to be available across the landscape. Due to fire restoration and reduced conifer encroachment, habitat for species that prefer or require the open-canopy or early seral cool-moist forest community would be restored and increased.

Action Alternative Conclusions

Alternatives 2 and 3 would affect approximately 2,673 and 2,079 acres of the cool-moist communities respectively. Both alternatives would reduce available closed-canopy habitat and increase early and open-canopy habitat. Overall, proposed treatments would move vegetation closer to reference conditions for the Dry Douglas-fir biophysical setting, promote stand- and landscape-level structural diversity, and increase ponderosa pine, western larch, whitebark pine and aspen. Wildlife habitat diversity would be maintained in the short term and improved over the long term

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Forest Plan Standards applicable to management of cool-moist habitat is included in the respective management area direction that pertains to the maintenance of big game forage and cover, as well as improvement of non-game habitat in MA W-1. Effects to big game habitat are described under the elk and mule deer environmental effects sections, whereas non-game habitat is discussed under migratory birds and the individual species/habitat sections. Because big game cover and forage would be maintained in the short term under all alternatives, and improved over the long term under alternatives 2 and 3, all alternatives are consistent with management area direction related to big game. Additionally, because all alternatives would maintain or improve habitat for migratory birds, sensitive species, birds of conservation concern, and non-game MIS species, all alternatives are consistent with MA W-1 direction to promote non-game habitat. Finally because both action alternatives would restore fire to the landscape, improve species composition, and promote long-term sustainability of this community, both action alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (36 CFR 219.26).

Upper Sub-alpine Fir (Whitebark Pine)

Alternative 1

Direct and Indirect Effects

There are no treatments proposed for this alternative, so there are no direct effects. However due to the absence of fire, continued insect- and disease-related mortality and conifer encroachment, both stand- and landscape-level whitebark pine would continue to decline. As a result, habitat for species such as grizzly

bear, red squirrel and Clark's nutcracker, as well as many mammals and birds that utilize its seeds may decline. Due to elevated levels of fuels, wildfire risk would remain high.

Cumulative Effects

Past, ongoing and anticipated future cumulative effects are in volume 2, appendix C. Because this habitat is found at upper elevations, there have been few past activities, which have consisted of approximately 30 acres of timber harvest and fuel treatment and 200 acres of reforestation since 1960. More recent wildfire has also occurred on approximately 200 acres. Ongoing and anticipated future activities are limited largely to firewood collection and 32 acres of recent (2011) wildfire. Collectively, approximately 20 percent of this community has been affected, although vegetative structure and habitat from most past activities have been restored (appendix C). While there would continue to be a reduction in whitebark pine, because over 80 percent of this community has been unaffected.

Irreversible or Irretrievable Commitments

There would be no irreversible commitments under this alternative. While there are no irretrievable commitments that can be reasonably predicted at a single point in time, in the absence of wildfire, whitebark pine would continue to decrease.

Alternative 1 Conclusions

Whitebark pine is a fire-dependent species and fire suppression would continue to occur; therefore, risks of stand-replacing wildfire would continue to increase and the current decline in whitebark pine is expected to continue. Over the long term, suitable habitat for species such as the grizzly bear that rely on whitebark pine would be further reduced.

Alternatives 2 and 3

Direct and Indirect Effects

Both action alternatives propose approximately 125 acres of mixed-severity fire, as well as supplemental planting of whitebark pine in select stands proposed for harvest. As described under treatment effects, mixed-severity fire would result in a mosaic of low intensity burning conditions, high severity burning conditions, and unburned areas. As a result, early seral habitat would be created on approximately 20 percent of the acreage treated or 8 percent of the existing upper sub-alpine fir community, whereas 80 percent of this community would be unaffected (includes unburned portion of treatment units).

While effective treatments to restore whitebark pine are still being researched, based on the available information (USDA Forest Service 2010a; PIF 2000), the mix of treatments proposed, including pre-burning fuel enhancement and prescribed fire are the primary tools available for treating deteriorating whitebark pine stands and restoring this important species across the landscape. Because it may take decades to establish pine seedlings on the site (USDA Forest Service 2010a), it is important to maintain existing regeneration and available seed sources. Consequently, maintenance and regeneration of whitebark pine would be promoted in all units through a combination of planting and site preparation in harvest units, as well as through landscape burning using low- and mixed-severity fire. All units would be evaluated prior to burning to protect existing whitebark pine seedlings, and identify areas where pre-burn treatments can be applied to promote future regeneration from nutcracker caching. While research indicates that the mix of proposed treatments may be effective at development of nutcracker caching sites, because of the complexity of whitebark pine regeneration, it is expected that it may take at least 10 to 20 years for regeneration to become established (USDA Forest Service 2010a). While both alternatives would promote restoration of whitebark pine, there are no short-term benefits and benefits associated with regeneration and restoration of pine would be long term.

Maintenance of whitebark pine has important implications for wildlife because of the reliance of grizzly bears on whitebark pine nuts in some ecosystems (Mattson and Jonkel 1989, Mattson et al. 1992 in PIF 2000). Whitebark pine seeds are also an important food source for many small mammals and bird species. Red squirrels (*Tamiasciurus hudsonicus*), chipmunks (*Eutamias spp.*), and golden-mantled ground squirrels (*Citellus lateralis*) are known to forage on whitebark pine seeds, with red squirrels demonstrating a high dependence on whitebark pine in subalpine habitats (Hutchins 1989 in PIF 2000). Whitebark pine is also used for foraging by a number of bird species and Clark's nutcrackers are highly dependent on whitebark pine seed in the late summer and fall of each year, utilizing the seed caches throughout the winter (PIF 2000). Whitebark pine benefit directly from a mutual relationship with Clark's nutcrackers through enhanced dispersal and seeding success resulting from germination of un-retrieved nutcracker caches (Tomback 1982 *in* PIF 2000). Consequently promoting the long-term restoration of whitebark pine, would improve habitat for a variety of mast- dependent wildlife.

Cumulative Effects

In addition to effects described under alternative 1, both action alternatives propose prescribed fire on 125 acres of the upper sub-alpine community. Because existing whitebark pine would be protected and considering that proposed burning is expected to maintain or restore whitebark pine, while leaving 80 percent of this community unaffected, suitable habitat would continue to be available in the short and long term.

Irreversible or Irretrievable Commitments

There are no irreversible commitments under these alternatives. Because proposed treatments would reduce snags, DWD and modify overstory and understory structure, there would be shifts in available mature and early seral upper sub-alpine fir habitat. However, due to anticipated whitebark pine regeneration over the long term, treatments are expected to promote the long-term sustainability of this forest community and the wildlife species that depend on it.

Action Alternative Conclusions

Based on available information, treatments proposed under the action alternatives are expected to promote conditions necessary to maintain whitebark pine across the landscape. Habitat would be improved for grizzly bear and Clarks nutcracker, as well as for species that rely on hard mast in this important community.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Forest Plan Standards applicable to management of upper sub-alpine habitat is included in the respective management area direction that pertains to the maintenance of big game forage and cover, as well as improvement of non-game habitat in MA W-1. Effects to big game habitat are described under the elk and mule deer environmental effects sections, whereas non-game habitat is discussed under migratory birds and the individual species/habitat sections. Because big game cover and forage would be maintained in the short term under all alternatives, and improved over the long-term under alternatives 2 and 3, all alternatives are consistent with management area direction related to big game. Additionally, because all alternatives would maintain or improve habitat for migratory birds, T&E, and sensitive species, all alternatives are consistent with MA W-1 direction to promote non-game habitat. Finally, because of the importance of white-barked pine for grizzly bear, and a variety of other wildlife, both action alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (36 CFR 219.26).

Riparian Habitats

Alternative 1

Direct and Indirect Effects

There are no treatments proposed for this alternative, so riparian habitats would be largely unchanged. Over the long term, species and structural changes described under alternative effects would continue to occur. There is mounting evidence that simply protecting riparian areas from fire and other disturbances may result in deterioration of habitat for wildlife (USDA Forest Service 2000b). For example, without low-intensity fire, uplands and streamside areas succeed to shade-tolerant coniferous species, with reduced dominance or loss of early successional deciduous trees and shrubs. These altered conditions can have important consequences for habitats of terrestrial and aquatic fauna (USDA Forest Service 2000b). Further, because of elevated levels of fuel loading, riparian areas and the species that depend on them would continue to be at risk from stand-replacing wildfire.

Cumulative Effects

While there has been a small amount of timber harvest and fuel treatments within riparian areas since 1960 (less than 100 acres), riparian habitat has been largely unchanged from treatment. An exception would be the Copper Creek and Lincoln Gulch drainages, where wildfire has greatly reduced forested riparian habitat.

Ongoing and future activities that occur within riparian habitat include grazing, a small amount of NNIS treatment (10 acres), and a small amount of burning associated with future prescribed fire. Fire is only allowed to back into riparian areas and with implementation of design features to reduce burning intensity, most of the riparian areas would be unburned or lightly burned.

While wildfire has altered riparian habitat in the Copper Creek/Lincoln Gulch drainages, riparian habitat outside these areas and across most (over 75 percent) of the analysis area is expected to be maintained.

Irreversible or Irretrievable Commitments

While there may be a gradual reduction in hardwoods and shrubs due to continued conifer encroachment, there are no irreversible or irretrievable commitments to the riparian community anticipated under this alternative.

Alternative 1 Conclusions

Riparian habitats would be largely unchanged under this alternative, although due to conifer encroachment and continued reduction of aspen, vegetative diversity and structure may be reduced over time.

Alternatives 2 and 3

Direct and Indirect Effects

Based on treatment effects discussed in section 4.3, the action alternatives would result in removal of some mature trees, as well as smaller diameter down woody debris. However, with implementation of pdfs and streamside management zones, very limited harvest would occur. Any burning within riparian areas would be low intensity, and much of the riparian habitat would be unburned or lightly burned. Habitat for riparian-dependent wildlife would be maintained or improved due to increases in herbaceous, woody and hardwood (aspen) vegetation and forage adjacent to and within the riparian community.

Due to reduced fuels in adjacent uplands, the risk of high-intensity wildfire in riparian areas would be reduced.

Cumulative Effects

Cumulative effects include those described under alternative 1, as well some burning that enters riparian areas and limited harvest. Fire would only be allowed to back into riparian areas, with the exception of scattered areas that receive a low-intensity burn, riparian vegetation would be largely unchanged. As a result, and due to the small amount of habitat affected, and considering any burned areas would help to maintain the riparian shrub/hardwood component, riparian habitat would be maintained over the short and long term.

Irreversible or Irretrievable Commitments

While there may be small changes in structure and understory/overstory conditions on a localized basis, there are no irreversible or irretrievable commitments anticipated under the action alternatives.

Action Alternatives Conclusions

While there would be some localized changes in the structure and composition of riparian forest in scattered areas from low-severity burning, both action alternatives would maintain riparian habitat and reduce the likelihood of high intensity wildfire and a reduction in mature riparian forest.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

The Forest Plan requires that riparian areas be managed to be compatible with dependent wildlife species. Because riparian habitat would remained relatively unchanged under alternative 1 and considering that both action alternatives protect riparian areas, as well as increase the shrub/hardwood component, all alternatives are consistent with this direction, as well as with National Forest Management Act requirements to provide for a diversity of animal communities (36 CFR 219.26).

Mountain Meadow and Shrub

Alternative 1

Direct and Indirect Effects

There are no treatments proposed for this alternative, so there are no direct effects. In areas where MPB mortality has occurred, shrub and meadows may expand somewhat as the canopy opens. This may benefit some species in the short term, since cover in close proximity to foraging habitat would increase. However, due to the absence of fire and expansion of conifers over the long term, mountain meadow and shrub habitat would decline, resulting in decreased forage and herbaceous/shrub cover. Also, because many shrubs are decadent with little regeneration occurring, the diversity of shrub age classes would continue to decline and the structural diversity important to many bird species that utilize the mountain shrub community would likely be reduced.

Cumulative Effects

Past, ongoing and anticipated future cumulative effects are in volume 2, appendix C. Most of the existing mountain meadow and shrub habitat is a result of recent wildfires (2003 to 2009). Consequently, past activities have largely been associated with fuel reduction and re-establishment of vegetation. Past activities within the small meadow/shrub inclusions that are scattered across the analysis area have included primarily grazing. Ongoing and future cumulative effects include approximately 1,100 acres of continued grazing, 365 acres of NNIS treatment, and 75 acres of wildfire (2011). Cumulatively, approximately 1,550 acres or 11 percent of these communities may be affected. As described in section

4.4, grazing use is not expected to change and NNIS treatment would reduce the spread of invasive species. As a result, habitat conditions would be largely maintained and there are no long-term adverse effects anticipated.

Irreversible or Irretrievable Commitments

While conifer encroachment would continue to reduce mountain meadow and shrub communities, it is likely a wildfire would maintain them in the future and there are no irreversible or irretrievable commitments under this alternative.

Alternative 1 Conclusions

While habitat would be maintained in the short term under this alternative, conifer encroachment would continue to reduce mountain meadow and shrub communities across the project area.

Alternatives 2 and 3

Direct and Indirect Effects

Alternatives 2 and 3 propose prescribed fire (mixed severity) on 75 acres of meadow habitat (11 percent) and 18 acres of mountain shrub habitat (13 percent). Effects of proposed burning include mortality and a reduction in shrubs, as well as a change in shrub density on the acres treated. There would be mortality in the decadent and mature size class, and burning would result in development of a younger age class or rejuvenate decadent shrubs, as well as increase herbaceous vegetation (Peterson and Best 1987). By killing encroaching conifers, fire has also been found to create habitat diversity in sagebrush by establishing a mosaic of age classes (Young 1983).

Soil disturbance during burning may make meadows more susceptible to weeds, so implementation of burning could lead to increased risk of nonnative invasive plant species.

While treated shrub stands would be more open, with implementationretention of pdfs, burning would occur in a patchy mosaic and 30 to 50 percent of the existing shrubs would be retained. As a result all sites would retain wildlife cover and forage within treatment units. Effects within burned portions of the sites would vary. For example, prescribed burning in Idaho indicated that while there may be a short-term (1 to 2 years) reduction in use for birds such as brewer’s sparrows immediately following burning, some species such as the sage sparrow and sage thrasher are largely unaffected, whereas western meadowlarks increase slightly immediately following burning. Also within 4 years of the burn, total burn densities were higher than on control plots, and densities of Brewer’s sparrow doubled (Peterson and Best 1987).

Big game forage associated with shrubs would be reduced initially following burning, but would be restored within 10 to 15 years. Burning within both mountain meadow and shrub communities would increase herbaceous vegetation, forage availability for species such as elk and mule deer would increase (USDA Forest Service 2006b). Hobbs and Spoward (1984) found that prescribed burning elevated concentration of protein and digestible matter in grassland and mountain shrub communities and improved deer winter range.

In summary, there would be an initial reduction in big game forage on the lands burned, and species diversity and abundance would change following burning. With implementation of pdfs, 30 to 50 percent of the units would be unburned, and in the short term, all sites would continue to provide big game forage and habitat for mountain meadow and shrub-dependent species. Over the long term, treatment would increase big game forage, improve shrub vigor and improve wildlife diversity and abundance and help ensure the sustainability of these communities.

Cumulative Effects

In addition to cumulative effects described under alternative 1, prescribed fire would occur on up to 93 acres (alternative 2). While some shrub mortality would occur, project design features are in place to ensure that some existing shrubs are retained. It is expected that proposed burning would increase shrub vigor and reproduction on treatment sites, whereas 89 percent of these communities would not be treated. Mountain meadow and shrub habitat would continue to be available in the short and long term.

Irreversible or Irretrievable Commitments

There are no irreversible or irretrievable commitments of shrubs and meadows associated with the action alternatives.

Alternative 2 and 3 Conclusions

Alternatives 2 and 3 would result in some mortality of existing shrubs and reduce available cover and forage on portions of the sites treated, and elevate the risk of invasive plants. The risk of nonnative invasive plant species would be reduced through implementation of pdfs (NOX-1-8) and post-treatment monitoring. Habitat for wildlife that depend on shrub and meadow communities would continue to be available since a shrub component would be maintained on all sites (WL-10), and over 80 percent of these communities would not be treated. The health and vigor of native shrubs and grasses would be improved on approximately 15 percent of the available habitat, and conifer encroachment would be reduced. Both alternatives would help promote the long-term sustainability of the mountain meadow and shrub communities.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Forest Plan Standards applicable to management of mountain meadow-shrub habitat is included in the respective management area direction that pertains to the maintenance of big game forage, as well as improvement of non-game habitat in MA W-1. Effects to big game habitat are described under the elk and mule deer environmental effects sections, whereas non-game habitat is discussed under migratory birds and the individual species sections. Because big game cover and forage would be maintained in the short term under all alternatives, and improved over the long-term under alternatives 2 and 3, all alternatives are consistent with management area direction related to big game. All alternatives would maintain or improve habitat for a variety of nongame species, including bird species of conservation concern, all alternatives are consistent with MA W-1 direction to promote nongame habitat. Finally, because proposed actions would reduce conifer encroachment and improve herbaceous and woody diversity, both action alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (36 CFR 219.26).

Aspen

Alternative 1

Direct and Indirect Effects

There are no treatments proposed under this alternative, so there would be no direct effects. Due to the absence of disturbances such as fire, existing aspen would continue to decline in the short term, and would be largely eliminated in the long term (USDA Forest Service 2010a). Should a wildfire occur, aspen would be rejuvenated and maintained, although the longer it takes for a wildfire to occur, the greater the likelihood that the distribution of aspen may be reduced.

Cumulative Effects

Past, ongoing and anticipated future cumulative effects are in volume 2, appendix C. Past activities have included some timber harvest and wildfire which has helped to maintain aspen, as well as grazing which has reduced aspen in some areas. Ongoing and future cumulative effects include continued browsing by livestock and elk, possible increases in invasive plant species and localized improvements due to burning associated with the Blackfoot and Dry Creek prescribed fires. Grazing use is not expected to change and considering proposed fire would help to maintain aspen in affected drainages, there would be little change in aspen from proposed treatments.

Irreversible or Irretrievable Commitments

There are no irreversible commitments anticipated. While it is likely that future wildfire would maintain an aspen component, due to continued conifer encroachment, aspen may continue to decline.

Alternative 1 Conclusions

Due to the absence of fire and conifer encroachment the aspen community has been declining across the project area. With continued fire suppression, and in the absence of future fire, the amount and distribution of aspen would continue to decline and habitat for species that prefer this community would be reduced over the long term under this alternative.

Alternatives 2 and 3

Direct and Indirect Effects

Successful regeneration of aspen requires disturbance that stimulates sucker regeneration. As a result disturbance associated with prescribed fire and timber harvest proposed under both alternatives would successfully regenerate existing aspen and lands containing an aspen component would be treated on approximately 2,292 and 1,408 acres of alternatives 2 and 3 respectively. While alternative 2 proposes treatment on more acres, pdfs require that aspen be promoted and maintained where it occurs (WL-12). As a result, treatments proposed under both action alternatives are expected to maintain or improve the aspen component (USDA Forest Service 2006b, USDA Forest Service 2000b) on the acres affected. Effects to wildlife include improved habitat for species that prefer or require aspen such as ruffed grouse, deer, elk, and snowshoe hare, as well as a number of nongame species including the olive-sided flycatcher. In addition to improving the amount of aspen, prescribed fire is expected to improve the nutritional quality of forage within 1 to 2 years following treatment (USDA Forest Service 2006b).

Cumulative Effects

In addition to effects described under alternative 1, burning and harvest treatments would occur on approximately 2,300 acres of aspen (alternative 2). Proposed treatments are expected to promote aspen; although continued browsing by livestock and wildlife would occur. Project design features are in place to protect and promote aspen, including potential impacts from livestock grazing. As a result, habitat would be maintained in the short term and improved over time.

Irreversible or Irretrievable Commitments

There are no irreversible commitments anticipated. Because proposed activities are expected to promote the long-term sustainability of aspen, there are no irretrievable commitments on the acreage treated. Like alternative 1, aspen would continue to decline where it exists outside of treatment areas.

Alternative 2 and 3 Conclusions

Implementation of alternatives 2 and 3 would result in the reduction of scattered mature aspen due to proposed burning, whereas, proposed treatments are expected to promote existing aspen by reducing conifer encroachment and stimulating regeneration. Over the long term, proposed treatments are expected to promote the distribution and sustainability of the aspen community across the project area.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Forest Plan Standards applicable to management of aspen is included in the respective management area direction that pertains to the maintenance of big game forage, as well as improvement of non-game habitat in MA W-1. Effects to big game habitat are described under the elk and mule deer environmental effects sections, whereas non-game habitat is discussed under migratory birds and the individual species sections. Big game cover and forage would be maintained in the short term under all alternatives, and improved over the long term under alternatives 2 and 3; all alternatives are consistent with management area direction related to big game. All alternatives would maintain or improve habitat for a variety of non-game species, therefore, all alternatives are consistent with MA W-1 direction to promote non-game habitat. Finally, because both action alternatives would help to retain aspen across the landscape, both action alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (36 CFR 219.26).

Dead Wood

Alternative 1

Direct and Indirect Effects

There are no treatments proposed for this alternative, so there are no direct effects. However, habitats would continue to change and result in effects to wildlife habitat. For example, risks associated with disturbance such as wildfire, root disease and insects would likely increase as forested stands become denser and more susceptible to these agents. As a result, standing dead and DWD would continue to be available and provide habitat for wildlife dependent on snags and down wood. While the availability of large-diameter snags would remain high for the next 10 to 20 years, as snags fall to the ground and the availablity of large-diameter trees (i.e. ponderosa pine) is reduced over time, the availability of large diameter snags is expected to decline..

Historically, wildfires included a combination of low, mixed and high-severity fires where some snags and large DWD were maintained or increased across the landscape (low- and mixed-severity fires). Increasing levels of dead wood and ladder fuels leave the project area susceptible to increased, severe stand-replacing wildfire, and reduce the likelihood of low-severity fires.

Standing and downed, dead trees have many ecological roles in a landscape recovering from wildfire (Beschta et al. 1995, Saab and Dudley 1998, Smith 2000, Brown et al. 2003, Beschta et al. 2004, Saab et al. 2004 in USDA Forest Service 2008a). The snags and down logs that result from fire serve a vital role in the structure and function of healthy forest ecosystems and play an important role in post-fire recovery and long-term site productivity. Also Hutto (1995) found that 15 species of birds were more frequently found in post-fire habitats than in any other major cover type in the northern Rockies. As a result, and considering that the possibility of stand-replacing wildfire is highest under this alternative, the likelihood that habitat would be provided for these species is high. Conversely, because of the large acreage burned, habitat for some species that utilize dead wood within a live forest canopy such as mountain bluebirds or Lewis’s woodpecker would be reduced (Saab et al. 2007).

Cumulative Effects

Cumulative effects are evaluated across the combined boundary and past, ongoing and anticipated future effects are in volume 2, appendix C. Many past activities have reduced standing and downed wood. While activities since 1986 have maintained a dead wood component, many of the snags retained have since fallen to the ground. As a result, post treatment snag estimates assume that these sites do not contain snags. Conversely, past MPB mortality, as well as wildfire has greatly increased the amount and distribution of snags and downed wood.

Potential ongoing and future cumulative effects include a reduction in dead wood along open roads due to firewood collection and hazard tree removal, although recent wildfires and continued MPB mortality would increase snags and future downed wood. While there would be localized areas where dead wood is lacking, snag density will remain high within all watersheds and dead wood would continue to be available.

Irreversible or Irretrievable Commitments

There are no irreversible commitments anticipated, although irretrievable commitments include a reduction in large-diameter snags.

Alternative 1 Determination

Due to continued fire suppression, snags and DWD would continue to be abundant. While the component of large diameter snags would be reduced in the future under this alternative, dead wood habitat would continue to be widely available across the landscape and adequate habitat would exist to meet the needs of species that prefer or require this component. Due to increased risk of large-scale wildfire, it is likely that habitat would be provided for species that utilize dead wood associated with post-fire habitat.

Alternatives 2 and 3

Both alternatives propose a mix of treatments that would have varying effects on snags and DWD. Table 94) displays the different treatments, the amount proposed under each alternative and general effect on dead wood.

Table 94. Snag and DWD effect and treatment summary

Treatment	Effects	Alternative 2		Alternative 3	
		Acres	%	Acres	%
Regeneration Harvest	Long-term reduction in snags and DWD. Retention of large diameter snags >20 inches, as well as a component of small diameter snags and snag recruitment trees. Some DWD including component of large diameter logs retained.	1,713	7	816	3
Intermediate Treatments	Reduction in snags and DWD. Retention of large diameter snags >20 inches, as well as a component of small diameter snags and snag recruitment trees. Some DWD including component of large diameter logs retained.	2,106	9	1,054	4
Low Severity Fire	Large and medium diameter snags retained and an increasing number of small diameter snags available. Reduction in small diameter DWD across the area treated, although some DWD including large diameter logs would be retained. Distribution would be patchy or clustered (Agee 2002). Twenty percent of the site would be unaffected.	449	2	1,366	6

Treatment	Effects	Alternative 2		Alternative 3	
		Acres	%	Acres	%
Mixed Severity Fire	Increase in small and large diameter snags. Some DWD including large diameter logs retained. DWD patchy in areas with low severity fire, whereas more intense burning would have decreased DWD and increased snags in all size classes. Net increase or pulse of DWD likely (Agee 2002). Twenty percent of the site would be unaffected.	5,014	21	3,301	14
Unaffected Habitat	Standing and down wood available in the short and long-term, although possible long-term reduction in large diameter snags on sites containing ponderosa pine.	14,723	61	17,478	73

Alternative 2

Direct and Indirect Effects

Under alternative 2 approximately 61 percent of the project area would not be treated, and effects would be the same as that described under alternative 1. Approximately 39 percent of the project area would be affected by treatment and there would be a reduction in DWD on most of this acreage. Project design features acknowledge the importance of snags in individual units and while precise retention is not guaranteed, the following would contribute to maintaining habitat for snag dependent species:

- Some small-diameter snags would be left due to merchantability.
- All whitebark pine snags would be retained where available unless they pose a specific safety or operability concern.
- In all regeneration harvest units, retain all snags 20 inches d.b.h.unless they pose a safety concern, and a minimum of two snags 12 to 20 inches d.b.h. per acre. If snags are not available, retain recruitment trees. Preferred species for retention include larch, ponderosa pine, Douglas-fir, spruce and sub-alpine fir, in that order. There would also be a few reserve tree/patches and inoperable areas to provide replacement trees (5 to 150 trees per acre).
- In intermediate harvest units, retain all snags greater than 20 inches d.b.h. unless they pose a safety concern, and a minimum of two snags 12 to 20 inches d.b.h. per acre. If snags are not available, retain recruitment trees of preferred species. There would also be abundant live trees in various size classes retained for snag replacement (75-300 trees per acre).
- In burn units, do not cut any snags greater than 12 inches d.b.h. unless they pose a safety or operability concern.

It is assumed that intermediate and regeneration harvest treatments would reduce snags to two snags per acre, whereas modeling of prescribed burning would increase snags by about 74 to 76 snags per acre in the moderate-severity burn areas. Assuming that snag availability within the rest of the project area was unchanged, it is estimated that post-treatment, snag numbers would decrease to about 42 snags per acre within drainage 0203, 47 snags per acre in drainage 0204, and increase to 48 snags per acre across the project area as a whole (USDA Forest Service 2012c). While it is recognized that snags per acre will vary, and that a range of conditions will exist, because of the widespread availability of snags in all size and decay classes within all project area drainages, retention of snags within treatment units, and recruitment of new snags due to ongoing MPB mortality, as well as high stand density within unaffected stands, habitat would continue to be available to support species dependent on dead wood.

Alternative 3

Direct and Indirect Effects

Effects would be similar to those of alternative 2, except that 73 percent of the project area would not be treated and effects on this acreage would be similar to that of alternative 1. Approximately 27 percent of the project area would have a reduction in DWD. Snag numbers for alternative 3 would be slightly different from alternative 2, but given the magnitude of the recent mortality and the large number of snags within the analysis area, the difference would be slight. Using the same assumptions described under alternative 2, average snag numbers would decrease to 41 snags per acre in drainage 0203, increase to 47 snags per acre in drainage 0204A and increase to 48 snags per acre in the project area (USDA Forest Service 2012c). Like alternative 2, because of the widespread availability of snags in all size and decay classes within all project area drainages, retention of snags within treatment units, and recruitment of new snags due to ongoing MPB mortality, habitat would continue to be available to support species dependent on dead wood.

Effects Common to the Action Alternatives

The action alternatives would meet or exceed Forest Plan standards related to snags by retaining snags greater than 20 inches d.b.h.(unless they pose a safety hazard) and implementation of pdfs (WL-5, 6, 7, 8); snag-replacement trees would be retained and untreated patches of snags would continue to be provided. While snags would be reduced on the lands affected, all treatment sites would continue to provide habitat for snag dependent species. Similarly, while dead wood habitat would be reduced, with implementation of pdf WL-9, between 5 and 20 tons per acre of dead wood would be retained, including a component of large-diameter logs. Treatments proposed under both alternatives would increase the ponderosa pine component, therefore, future recruitment of large-diameter snags and large, downed wood would increase under both alternatives, when compared to no action.

The distribution of snags also affects wildlife. For example, within treatment units snags retained would be more evenly distributed and would likely favor secondary cavity nesters, whereas a more patchy distribution of concentrated snag mortality associated with mixed-severity fire would likely favor primary cavity nesters (Bunnell et al. 2002). The mix of treatments proposed combined with the large area that would not be treated would provide an adequate distribution of snags to meet the needs of both primary and secondary cavity nesting species.

In summary, both alternatives would result in a reduction in snags and DWD reducing habitat for snag-dependent species and species that prefer or require down wood. With implementation of pdfs, forest plan standards related to snags would be met and all sites would provide between 5 and 20 tons per acre of downed wood. All treatment sites would continue to provide habitat for wildlife dependent on standing and downed wood. As a result and considering; (1) 20 percent of all prescribed burning units would be left untreated, (2) over 61 percent of the project area would be unaffected, (3) treatment would promote ponderosa pine and recruitment of future large diameter snags, and (4) snags and down wood would continue to be available across the landscape and within affected watersheds; habitat for wildlife species that prefer or require dead wood would continue to be available.

Cumulative Effects

Like alternative 1, anticipated cumulative effects include a continued reduction in snags and DWD due hazard tree removal, firewood collection and past wildfire. Additionally, proposed timber harvest would reduce snags and downed woody debris on (alternative 2) approximately 3,100 acres whereas burning would reduce down wood on up to 5,463 acres. Snags and DWD would be retained on all units and prescribed burning would be expected to result in an increase in snags and recruitment of downed wood.

As a result and considering the elevated levels of snags and DWD across the landscape, dead wood habitat would continue to be available.

Irreversible or Irretrievable Commitments

There are no irreversible commitments anticipated. While the action alternatives would reduce snags and DWD on the acreage treated, standing and downed woody debris would continue to be available, and there are no irretrievable or irreversible commitments to wildlife species dependent on dead wood under either alternative. Like alternative 1, there would continue to be a reduction in large-diameter snags on sites containing ponderosa pine that are not proposed for treatment.

Alternative 2 and 3 Conclusions

Alternatives 2 and 3 would affect dead-wood habitat on 36 and 27 percent of the project area, respectively. Based on the above analysis and the following rationale, both alternatives would maintain habitat for wildlife species dependent on dead wood.

- Due to MPB mortality, levels of standing and downed woody debris greatly exceed historical levels. Because over 60 percent of the project area habitat would not be treated, snags and DWD would continue to be available across the landscape.
- Forest Plan standards related to snags would be met in all sites proposed for treatment.
- Proposed treatments would promote development of future large-diameter snags.
- Snags and downed woody debris would continue to be available to meet the needs of wildlife species dependent on dead wood.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

The following Forest Plan direction is related to snags (USDA Forest Service 1986 p. II-21-22)

- To keep an adequate snag resource through the planning horizon, snags should be managed at 70 percent of optimum (snags/acre) within each third order drainage – With implementation of pdfs, all sites would provide a minimum of 2 snags per acre, whereas all watersheds would continue to provide an average of over 40 snags per acre. As a result all alternatives are consistent with Forest Plan direction.
- *Large, ponderosa pine, Douglas*-fir, *spruce and subalpine fir,* in that priority, are the preferred species for snags and replacement trees – With implementation of pdfs that identify this order of priority for snag retention, all alternatives are consistent with this direction.
- *Management areas other than T-1 should be the primary source for snag management. However if adequate snags cannot be found outside of T-1, then sizes and snags should be retained at rates designated on page II-21 of the Forest Plan* – Project design features require that snags be retained at designated levels and all alternatives are consistent with this direction.

Landscape Diversity, Connectivity and Fragmentation

This section describes alternative effects to landscape diversity, connectivity and fragmentation, although connectivity and fragmentation are also discussed under species-specific sections.

While many species prefer specific forest communities, wildlife use of an area is often determined by the diversity of habitat conditions that exist across the landscape (Reynolds et al. 1992; Wright 1992). This section summarizes alternative changes in the size and age-class diversity of forested habitat, which is summarized in table 95. Non-forest habitat, which makes up approximately 4 percent of the project area,

is not displayed as it is essentially the same under all alternatives. Existing landscape diversity is discussed in the Project Area Description section.

Table 95. Forested size and age class diversity by alternative

Size Class	Alternative 1		Alternative 2		Alternative 3	
	acres[1]	%[2]	Acres[1]	%[2]	Acres[1]	%[2]
<1 inch d.b.h. (seedling)	0	0	968	4	816	3
1-4 inches d.b.h. (sapling/pole)	3,845	17	3,747	16	3,776	16
5-9.9 inches d.b.h. (small diameter mature)	10,743	47	10,049	42	10,142	42
10-14.9 inches d.b.h. (medium diameter mature)	8,103	35	7,909	33	7,938	33
>= 15 inches d.b.h. (large diameter mature)	333	1.4	333	1.4	333	1.4

[1] Acres within the project area.
[2] Percent of project area.

Alternative 1

Direct and Indirect Effects

Diversity, Connectivity and Fragmentation

Landscape diversity would remain largely unchanged under this alternative. As a result, small and medium-sized mature forest would continue to predominate on 82 percent of the project area, whereas seedling forest would continue to be largely absent. The Stonewall Project area would continue to be characterized by a predominance of mature forest habitat. While some seedling habitat would continue to occur in areas with concentrated MPB mortality and recent wildfire, there would be little change in horizontal or landscape-level diversity, reducing habitat for species that prefer a diversity of age and structural conditions. Due to conifer encroachment, the availability of mountain meadow and shrub habitat would continue to decline.

As described under affected environment, closed canopy forest within the project area has been reduced from approximately 80 percent of 19 percent due to past and on-going MPB mortality. These changes have already altered travel patterns for species such as fisher that prefer or utilize dense overhead cover. While the standing dead trees would continue to provide cover for a few years, within five to 10 years areas, areas of concentrated mortality would no longer provide screening and large amounts of down wood would act as barriers for some species. As a result these changes would continue to alter movement patterns in the future. The availability of dispersal, migration, and travel corridors depends on the species of interest and their requirements for movement. Also over time, the availability of wildlife corridors would fluctuate somewhat with forest succession and, potentially, wildfire. While travel and migration corridors would continue to be available, these corridors would change spatially and temporally.

Fragmentation would change somewhat under this alternative as the successional stages result in a shift in the spatial arrangement of edges and ecotones over time. Most species would be able to adjust to these changes, although large-scale wildfire would result in landscape-level fragmentation.

Cumulative Effects

Cumulative effects are evaluated across the combined boundary and past, ongoing and anticipated future cumulative effects are discussed in volume 2, appendix C. Long-term changes in the landscape and effects on wildlife dispersal and travel are most affected by activities that alter the overstory or isolate forest patches. Past activities that have fragmented mature forest have included road construction, private land development and regeneration harvest on all ownerships and wildfire. Most off-forest harvest occurred at

lower elevations within portions of the analysis area that had already been fragmented due to human development or adjacent to lands dominated by nonforest. Approximately, 8,000 acres of regeneration harvest have occurred since the late 1950s. While most of these stands are now characterized by predominantly closed canopy conditions, young forest still predominates on approximately 2,200 acres, and these sites would continue to reduce habitat and modify movement for many mature forest obligates. While past intermediate harvest, (on 2,300 acres) affected movement following treatment, understory conditions and cover as well as movement by wildlife has been largely restored. Similarly, understory conditions and wildlife movement would have been largely restored in most area affected by past fuel treatments. Recent wildfire (2003 to 2009) has affected 23,418 acres, which has greatly reduced seasonal movements and altered migration and dispersal of forest obligate species within much of the Copper Creek and Lincoln Gulch drainages. Finally, past and ongoing mountain pine beetle mortality has killed most of the mature lodgepole pine, which has altered dispersal, migration and travel corridors.

While some new development of private lands may occur in the future, this is expected to be localized and to occur largely in areas that are already developed. No new road work is proposed, although the existing road system would continue to impact wildlife species that are affected by the road itself or associated edge effects. Ongoing hazard tree removal will affect approximately 570 acres of roadside habitat by removing dead and dying trees on approximately 100 feet on either side of the road. Additionally, recent wildfire has reduced mature forest on another 450 acres. While the future and recent loss of cover from hazard tree removal and wildfire may cause some species to alter movement patterns, because the canopy is already dead and considering lands affected by recent wildfire (since 2011) are interspersed with intact mature forest, it is not anticipated that the seasonal migration, dispersal or daily movement for any species would be significantly altered.

Implementation of alternative 1 would contribute to the effects associated with past timber harvest, fuel treatments and wildfire. Ongoing and future MPB mortality would continue to reduce mature forest and create seral forest conditions. These areas would continue to be avoided by forest obligates. Road use that is the result of past actions would continue to impact wildlife that avoid roads. Cumulatively, past ongoing and future effects have reduced closed canopy conditions and altered wildlife movement. However, with the exception of the Copper Creek and Lincoln Gulch watersheds, connectivity within the analysis area would remain relatively unchanged and unaffected forest would continue to be available to accommodate seasonal movement and travel corridors within and adjacent to the analysis area.

Irreversible or Irretrievable Commitments

Early seral habitat would continue to decline, although due to increased risk of wildfire, it is likely that this component would increase in the future and there would be no landscape-level irreversible or irretrievable commitments under this alternative.

Alternative 1 Conclusions

While MPB mortality would continue to reduce closed canopy forest conditions, there would be little change in landscape-level habitat or age class diversity, and the analysis area would continue to provide habitat preferred by species that favor mature forest conditions. While some earl seral habitat would be provided in areas of concentrated MPB mortality, habitat for species that prefer or require higher levels of horizontal and vertical diversity across the landscape would remain low.

Hazard tree removal and continued MPB mortality would reduce connectivity and alter the seasonal and daily movement and dispersal of wildlife. However, unaffected lands would continue to be available to serve as alternate movement corridors and existing connectivity would be largely maintained.

Action Alternatives

Direct and Indirect Effects

Diversity

Like alternative 1, late-successional habitat (greater than 15 inches d.b.h.) would remain largely unchanged. While alternative 2 would result in more seedling (18 percent) habitat, both alternatives would increase early seral habitat by 3 to 4 percent and result in a corresponding decrease in mature forest habitat. Landscape-level diversity would increase, mature forest conditions would be maintained on over 75 percent of the project area, and habitat for species that prefer landscapes dominated by mature forest would continue to predominate. As described previously, both action alternatives would move vegetation structure closer to historical or reference conditions.

Connectivity

Under the action alternatives, timber harvest and prescribed burning would occur within existing dispersal, migration and travel corridors. Intermediate harvest would result in a reduction in canopy cover and tree density that may render these areas unsuitable as corridors for mature forest obligates. Treatment could also affect movement corridors between summer and winter range or alter the way in which big game and other wildlife use these seasonal corridors. Because understory vegetation, including the amount and diversity of forage, would increase on these sites, treatment would allow animals to forage as they move through the area, modifying seasonal use.

Regeneration harvest treatments are proposed mainly in stands with concentrated mortality. These stands have already lost their suitability as a corridor for species associated with more closed canopy conditions. For some species, the removal of standing dead trees would further reduce hiding cover or screening that otherwise could allow safe passage throughout the area.

Low-severity and most of proposed mixed-severity burning would have little impact on dispersal, migration and travel patterns of wildlife. While there may be some displacement during prescribed burning activities until the understory is re-established, because all units would have a mosaic of burned and unburned land, impacts would be reduced. Larger openings created by mixed severity burning could result in long-term changes in movement or dispersal for species such as wolverine, which are reluctant to cross burned areas (Hornocker and Hash 1981). Conversely, species including deer and elk would be attracted to these areas because they provide elevated levels of forage adjacent to cover (USDA Forest Service 2006b). Finally while burning would alter movement and dispersal for wildlife that use the project area, considering that many western conifer forests were historically affected by frequent, low- to mixed-severity burning, native species are adapted to historical fire regimes and resulting habitats (Saab and Powell 2005), and that multi-story fires typically leave a patchy erratic pattern of mortality on the landscape that fosters development of highly diverse ecosystems (Arno 2000), it is expected that landscape level dispersal, movement and migration following proposed fire would be maintained in the short term and long term.

Alternative 2 proposes approximately 20 percent more regeneration harvest, would create approximately 25 percent more fire-created openings, and would result in approximately 45 percent more open-canopy habitat due to partial harvest. As a result, effects to closed-canopy forest and changes to wildlife movement and are higher under this alternative.

Fragmentation

Approximately 64 percent of the project area under alternative 2 and 73 percent under alternative 3 would be unaffected by treatment and like alternative 1, fragmentation of these lands would occur largely

through natural disturbances and succession. In the absence of large-scale wildfire, mid- to late-seral forested conditions would be unchanged.

Under alternatives 2 and 3 approximately 36 percent and 27 percent of the project area would be affected by treatment respectively. Timber harvest, construction of project roads built then obliterated, and mixed-severity burning would increase mature forest fragmentation and edge, with alternative 2 resulting in the greatest increase. Effects include a reduction in interior habitat and an increased likelihood of predation or brood parasitism.

Effects of fragmentation are well-documented, but vary across regions (Chalfoun et al. 2002, Cavitt and Martin 1993, Young and Hutto 1999) . For example, while fragmentation and associated predation and brood parasitism by the brown-headed cowbird (*Molothrus ater*) are well-documented effects in the east, effects in the west are more variable and fragmentation west of the Rockies does not always result in significant increases (Cavitt and Martin 1993). Effects also vary based on the landscape condition and local predator populations (Cavit and Martin 1993, Young and Hutto 1999, Hutto et al. 1993). Hutto and Young (1999) studied the habitat and landscape factors influencing the distribution of cowbirds. They found cowbirds were largely absent from old growth and high-elevation forest and were most abundant in ponderosa pine and partially logged sites, as well as grassland and riparian cover types. While distance from agricultural areas was a factor when detected in conifer forest, cowbirds were much more likely to be near open grassland and agriculture. The presence of host species was also found to be a factor (Tewksbury et al. 1998). In their evaluation, Hejl et al. (1995) found that only three of 19 studies had cowbirds, and there was no indication that they were more likely to occur in clearcut than uncut forests. Also it appears the presence of clearcuts does not draw cowbirds into forested areas (Young and Hutto 1999, Hejl et al. 1995).

Because the project area is predominantly forested, effects such as brood parasitism would be reduced from those that occur in more fragmented landscapes. This is consistent with data from the project area landbird transects, in that cowbirds were not documented on all transects, and that when they were documented, they occurred in low numbers closer to private land (i.e., agricultural and grassland). Because cowbirds are present, an increase in nest parasitism would likely occur in some sites proposed for regeneration and partial harvest. Because the project area is predominantly forested and considering that harvest would not be expected to draw cowbirds into forested lands (Young and Hutto 1999, Hejl et al. 1995), sites away from private land are less likely to be affected. Similarly, because they occur within the project interior, the likelihood that fire-created openings would result in increased parasitism is low.

Fragmentation resulting from treatment would also be expected to result in changes in predation, although this is also affected by landscape condition and the local predator populations. For example Tewksbury et al. (1998) demonstrated that nest predation was higher on sites that were not fragmented, when compared to sites fragmented by agriculture and human development in the Bitterroot Valley of Montana. They suggested that this was due to more abundant nest predators such as the red squirrel (*Tamiasciurus hudsonicus*) in forested landscapes. Predation effects are also more prevalent when fragmentation occurred at the landscape-scale, rather than at the patch- or edge-scales (Stevens et al. 2003, Chalfoun et al. 2002), suggesting that nest predation is driven more by the diversity of nest predators present. Also local edge-related effects were more common within agricultural landscapes (Chalfoun et al. 2002).

Structural changes resulting from proposed treatments would increase fragmentation of mature forest, increase the diversity of seral stages and result in changes to local predators. Stands proposed for timber harvest are concentrated in stands that have already been affected by MPB mortality, reducing changes to the live overstory. Also between 87 percent (alternative 2) and 92 percent (alternative 3) would be unaffected by harvest, whereas proposed burning would be characteristic of historic disturbance regimes.

While there may be changes in predation at the local scale, there are no changes anticipated that would result in long-term effects from predation.

Summary

Both alternatives would result in landscape-level changes that affect wildlife movement and use, with alternative 3 resulting in fewer changes. In the short term, wildlife would have to alter movements to adjust to changes. Adjacent unaffected habitat is available to accommodate changes in movement use, and anticipated shifts would be no greater than what animals would adjust to after small to moderate natural disturbances.

Habitat would be reduced for species that prefer closed-canopy mature forest, whereas habitat would increase for early seral species, and species that utilize multiple seral stages. Mature forest fragmentation and fragmentation-related effects would increase, mid- to late-seral habitat would continue to predominate across the project area, and changes in the landscape would approach conditions that occurred historically. As a result and considering that western populations of wildlife are adapted to naturally fragmented forested landscapes (Dobkin 1994, Hutto 1995, Saab and Powell 2005), it is expected that wildlife habitat diversity, dispersal and movement would be maintained.

Cumulative Effects

In addition to cumulative effects described under alternative 1, proposed activities would open up forest understories and reduce screening on up to 5,313 acres (intermediate harvest and low severity burning), and reduce mature forest habitat and connectivity on up to 2,227 acres (road construction, regeneration harvest, high severity fire) under alternative 2. Habitat for mature forest species would be reduced and movement and dispersal of wildlife on these lands would be altered.

Because lands affected by treatment are interspersed with unaffected lands and considering treatment would occur over a 10-year period, alternate travel routes would exist to accommodate changes in movement or travel. Conditions resulting from treatment would be similar to what occurred historically and native species have adapted to habitats created by low- and mixed-severity fire (Saab and Powell 2005). While use of the analysis area would change following treatment, the resulting mix of habitats would continue to accommodate wildlife use both in the short and long term.

Irreversible or Irretrievable Commitments

There are no irreversible commitments under either alternative. However, both alternatives would result in an irretrievable commitment in the form of proposed project roads to be built then obliterated immediately following timber removal.

Action Alternatives Conclusions

Timber harvest and prescribed burning would open up patches of forest habitat and occasionally disrupt movement patterns across the landscape for some forest obligates. Treatments would not preclude travel through most sites, but would affect movement to some degree. Areas of untreated forest would remain interspersed with treated stands, providing a variety of alternate travel routes.

Due to changes in the understory, proposed actions would increase sight distances and allow animals moving through the area to be seen from further away. The open stands created by partial harvest and most of the burning would continue to screen large animals such as elk, deer, moose, and black bear, but at reduced levels. Conversely, the forage value of the treated areas would be higher, allowing animals more opportunity to feed as they moved through the area. The proximity of forage to cover and potential effects are discussed in more detail in section 4.6 and under the species-specific sections.

Due to proposed regeneration harvest and avoidance of late-successional habitat/future old growth, landscape-level age and structural diversity would increase and habitat would be improved for species that prefer landscapes containing greater horizontal and vertical diversity. Like alternative 1, habitat for species that prefer mature forest conditions would continue to predominate.

In the short term, some wildlife would have to adjust their movement patterns to take advantage of untreated areas. Given that harvest and prescribed burn patterns would mimic historic patterns, it is expected that landscape level dispersal, movement and migration would be maintained.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

There are no specific Forest Plan standards applicable to management of dispersal, migration, and/or travel corridors. Because habitat connectivity would be maintained, all alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (16 USC 1604((g)(3)(B)); also see 36 CFR 219.10(b): and FSM 2670.12.

Threatened and Endangered Species

This section describes alternative effects on threatened and endangered species evaluated in detail (See the Habitat and Species Evaluated section).

Canada Lynx

The analysis of effects to lynx and their habitat concentrate on whether the proposed activities maintain critical habitat and promote the long-term sustainability of lynx. To this end, the effects to lynx by are evaluated with respect to their compliance with the objectives, standards and guidelines identified in the Northern Rockies Lynx Management Direction (NRLMD) (USDA Forest Service 2007a) and the Biological Opinion (BO) (USDI Fish and Wildlife Service 2007b). Impacts to lynx critical habitat are evaluated with respect to the Primary Constituent Elements identified by the USFWS (USDI Fish and Wildlife Service 2014; USDI Fish and Wildlife Service 2009a).

Alternative 1

Direct and Indirect Effects

No treatments are proposed for the no-action alternative, so there would be no direct or indirect effects on lynx from project activities. However, even in the absence of management actions, lynx habitat conditions in LAUs BL-07 and BL-08 will continue to undergo change. It is almost certain that the availability and distribution of winter snowshoe hare habitat for lynx foraging will change over the next few decades, but the exact trajectory of this change is difficult to predict.

Due to past fire suppression, the departure from historical conditions and increased fuel loading the risk of wildfire in this area has increased (Buhl 2015). Generally, spruce/fir types, which provide preferred lynx habitat have been less affected by fire suppression due to longer fire return intervals. Whereas lower-elevation mixed-conifer stands, which also provide some lynx habitat, are interspersed with dryer communities, and have shorter fire return intervals.

In the last 9 years 28 percent of BL-08 has been affected by high-severity wildfire. While these lands are in a stand initiation (unsuitable) stage and currently do not provide winter foraging habitat, stand development over the next 10 to 15 years is expected to increase the availability of winter foraging habitat in these areas.

Many of the current stem exclusion and mid-seral timber stands (stands that do not currently provide winter foraging habitat) have been affected by MPB mortality and have opened up (lost canopy cover),

putting them at an increased risk for fire. Stand-replacing fires in these areas could provide high quality snowshoe hare forging habitat after approximately 10 to 30 years (USDI Fish and Wildlife Service 2007b). In the absence of stand-replacing fire or other disturbance, some of these stands could begin to develop into multi-storied habitat, which also provides snowshoe hare foraging habitat, over time. However, this increased risk of fire could also negatively affect existing multi-storied stands that are currently providing snowshoe hare habitat, removing their suitability for lynx for many years.

Cumulative Effects

The cumulative effects analysis area for lynx in the Stonewall Project under all alternatives is the combined area of both LAUs (BL-07 and BL-08) overlapping the project area, which totals 54, 211 acres. Projects occurring (or planned) within this area are considered in this analysis with regard to how they contribute cumulatively with the Stonewall Project to affect lynx and lynx habitat. Projects outside this cumulative effect analysis area are not considered.

This area was chosen because:

1. It is large enough to assess habitat conditions over an area much larger than the home range of a breeding female lynx
2. The area contains a good distribution of lynx habitat components and can be used to adequately assess effects to lynx movement and landscapte connectivity.
3. It includes all lynx critical habitat potentially affected by project activities
4. Attempting to expand the boundary to the north would incorporate wilderness, which would potentially dilute project effects.
5. Expanding the boundary to the south would include private land that is highly fragmented and doesn't provide preferred lynx habitat conditions.
6. It is inclusive of landscape linkages used by lynx (USDA Forest Service 2007g)

There are a number of past and ongoing activities occurring within the analysis area that have affected lynx habitat; a complete list of all activities considered can be found in volume 2, appendix C. While some of these past activities have negatively affected lynx by reducing winter foraging and den habitat, others have had positive effects because they improved understory structure and the amount and distribution of snowshoe hare habitat. Lynx habitat conditions are dybnamic, and effects vary over time. For example, while past regeneration harvest treatments reduced multi-story or mid-seral habitat initially, many of these sites now provide useful stand initiation habitat. Similarly, while past partial harvest treatments such as thinnings and improvement cuts reduce forage and cover immediately following harvest, there has been very little thinning in the last 20 years and many of these sites are now provide winter foraging and denning. Much of the recent management (since 2000) in BL-08 has been related to salvage and reforestation activities (i.e., tree planting) associated with the Snow Talon fire. These treatments were designed to promote the development of tree regeneration following the fire, and promote increased stand diversity. While much of the land affected by the 2003 Snow Talon fire does not yet provide winter foraging habitat, due to the height of the existing cover, it is expected that winter hare habitat will increase substantially in this area in the next decade and beyond.

In addition to past activities that influence the existing lynx habitat conditions in this area, there are some ongoing and proposed Forest Service activities within the combined project LAUs, including; winter recreation, existing campground and outfitter guide use, prescribed burning, trail construction, campground rehabilitation, stream work, livestock grazing, nonnative invasive plant treatments, road maintenance, hazard tree removal, stabilization and rehabilitation of recent wildfire areas and

implementation of the Blackfoot Travel Plans (winter and non-winter). A total of approximately 9,148 acres of mapped lynx habitat would be affected by anticipated cumulative effects. Of these 3,610 acres or 26 percent of the existing winter foraging habitat would be affected. The following cumulative effects are expected to occur within the analysis area by 2022.

- Campground improvements or maintenance – 5 acres of mapped habitat (all winter foraging).
- Prescribed fire – 129 acres of mapped habitat including 86 acres of winter foraging.
- Grazing – 5,912 acres of mapped habitat including 2,250 acres of winter foraging.
- Off-road invasive plants treatment – 1,358 acres of mapped habitat including 636 acres of winter foraging.
- Road treatments including NNIS, hazard tree removal and wildfire-related work – 1,545 acres of mapped lynx habitat including 539 acres of winter foraging.
- Stream restoration – 3 acres of mapped habitat including 1 acre of winter foraging.
- Trail construction – 196 acres of mapped habitat including 93 acres of winter foraging.
- Implementation of Blackfoot Winter and Non-winter Travel Plans – project-specific travel plan analysis and consultation addresses wildlife issues related to motorized and non-motorized use throughout the analysis area.

In general, most of these activities will not adversely affect lynx habitat. For example, lynx habitat would be largely unchanged due to campground maintenance or improvements, trail construction, stream work and invasive plants treatments. Considering that lynx are generally tolerant of human activities (Ruediger et al. 2000), effects to lynx would occur largely in the form of short-term avoidance of project sites during treatment. Hazard tree removal and firewood collection would reduce snags and future downed woody debris along roads, although these sites do not provide preferred denning habitat (Ruediger et al. 2000; Koehler and Brittell 1990) and understory vegetation and winter foraging habitat would be largely unchanged. While grazing use is not expected to change, approximately 5,900 acres of mapped habitat will be affected by grazing and understory vegetation will continue to be influenced. While there is no evidence that grazing is a factor threatening lynx (USDI Fish and Wildlife Service 2007b), monitoring and grazing management strategies associated with existing allotment management plans and adherence to allowable use standards are expected to reduce impacts to lynx. The analysis for the Blackfoot Winter Travel Plan (decision 2013) and pending Blackfoot Non-Winter Travel Plan (decision anticipated in 2015) addressed wildlife issues, including potential impacts of motorized use to lynx. Generally, lynx do not appear to avoid forest roads or groomed snowmobile routes (Squires et al. 2010) and cumulatively there are no long-term adverse impacts to lynx from roads or winter recreation anticipated.

As Forest Service projects, these and other future activities are assessed for impacts to lynx and lynx habitat, and submitted for consultation with the USDI Fish and Wildlife Service, as appropriate. It is expected that future project decisions will be consistent with the Northern Rockies Lynx Management Decision (NRLMD).

The lynx cumulative effects analysis area contains 675 acres of private lands, and activities on these lands are outside of Forest Service control

While timber harvest on lands of other ownership is expected to continue into the future, generally these lands occur at lower elevations or as scattered parcels in fragmented portions of the analysis area. As a result these areas provide less lynx habitat, and it is not expected that future activities on lands of other ownerships would further reduce suitable lynx habitat or create barriers to lynx movement.

Most climate forecasting models generally predict a warmer and drier climate in the Northern Rocky Mountains indicating that climate change may be an issue of concern for the future conservation of lynx (Gonzalez et al. 2007). With a warming climate, fire seasons in the western United States are likely to be extended, resulting in a potential increase in the amount of and size of higher-severity fires (McKenzie et al. 2004). As stated previously, fires have the ability to reduce, and after sufficient time for regrowth, improve lynx foraging conditions. Reduced snow depth, condition, and persistence may diminish the competitive advantage of lynx relative to bobcats and coyotes.

In summary, there may be localized changes in lynx habitat from ongoing and future activities. However, in the absence of large natural disturbance events, the expected availability of lynx denning and winter foraging habitat would be largely unchanged in the foreseeable future, and there are no long-term adverse effects to lynx or lynx habitat anticipated under alternative 1.

Irreversible or Irretrievable Commitments

There are no irreversible or irretrievable commitments to lynx or lynx habitat under this alternative.

Determination and Conclusions

While the risk of wildfire remains high, there are no direct project effects associated with alternative 1. The objectives, standards and guidelines of the NRLMD apply when management actions are designed or implemented, but they do not compel any management activity to correct or improve a less than desirable existing situation. Alternative 1 is in compliance with the NRLMD and terms and conditions of the USDI Fish and Wildlife Service Biological Opinion. Implementation of alternative 1 would have no effect on Canada lynx.

Action Alternatives

Direct Effects

Scientific literature is limited regarding the effects of human activities and associated disturbance factors that might affect lynx. To date there is little evidence that lynx are particularly sensitive to human disturbance other than near reproductive den sites (Ruediger et al. 2000; Koehler and Brittell 1990) and some authors have described lynx as being generally tolerant of human activities (Ruediger et al. 2000).

Potential effects to den sites are largely affected by the likelihood that activities would occur during the denning period and research in Montana indicates that lynx mate in late winter and females localize at natal dens in mid-May. Also Squires et al. (2006) found that dens were usually located in mature mesic forests on northeast aspects and that during late May and June, lynx may move kittens from the natal den to a series of maternal dens. It is anticipated that proposed burning would occur largely in the fall outside the denning period. Harvest would occur in either frozen winter conditions or during the drier summer period outside the spring denning period. Most if not all of the spring denning period occurs during spring break-up, or when wet conditions would restrict timber harvest. Less than 4 percent of the proposed harvest aces (300 acres) occur on preferred north facing slopes.

Collectively for these reasons, as well as the widespread availability of unaffected denning habitat, the likelihood that an active den would be affected by treatment is reduced.

NRLMD Guideline Veg G11 addresses lynx denning habitat and discusses how this habitat should be distributed across the landscape within LAU's. Research suggests that denning habitat is generally not limiting (USDA Forest Service 2007b p. 15), especially when a substantial portion of the landscape is under Federal ownership. Because 98 percent or more of project area LAUs are under Forest Service

Ownership and because there are large blocks of mature forest with significant amounts of coarse woody debris, denning habitat is not considered to be limiting on the landscape.

Approximately 15 and 12 percent of the mapped lynx habitat would be affected under alternatives 2 and 3 respectively. Project activities occurring in May or June would have the greatest potential for disturbance or displacement from maternal dens. Proposed treatments would occur over a 10-year period and are interspersed with unaffected lands; therefore, suitable lynx habitat will still be available to accommodate any animals temporarily displaced by treatment under either action alternative.

Effects of Treatment Activities on Lynx Habitat

Treatments proposed under both action alternatives emphasize fuel reduction and reducing wildfire risk, while reintroducing fire and improving vegetative species diversity. This section contains a generalized discussion of the individual treatments proposed under the two action alternatives and their effects to lynx habitat conditions.

Individual treatments with similar effects on vegetation structure have been grouped together for analysis purposes. They include regeneration harvest (clearcutting, and shelterwood/seedtree harvest); intermediate harvest (improvement cutting, sanitation salvage); and prescribed burning (low- and mixed-severity fire, underburning and jackpot burning). Burning treatments include lands where only burning would be conducted, as well as lands that would receive both harvest and burn treatments.

All discussion regarding the effects of treatments on lynx habitat conditions incorporates implementation of specific project design features (WL-26, WL-27, and WL-28) as identified in (table 9) for particular treatment units (also identified in table 9), as well as the assumption that both action alternatives would retain downed wood, large-diameter logs and understory inclusions of shrubs.The following summarizes conditions related to these pdfs which are designed to reduce impacts to lynx habitat:

- **PDF WL-26 –** This design feature provides for minimal brush cutting along low-speed roads. This design feature provides for public safety while minimizing the loss of roadside cover.
- **PDF WL-27 -** While some of the proposed burn units located outside the Tri-County WUI contain pockets of multi-story habitat, this situation largely occurs along the unit perimeters and these areas of multi-storied habitat would be avoided during project layout and implementation. Also, there are a few patches of MS habitat that occur as small inclusions within the interior of a burn unit. Past experience has shown that the crew would spend up to 2 weeks prior to ignition to identify firing patterns and control lines that would meet objectives including retention of unique or sensitive wildlife habitats. This pre-treatment field review would identify control lines and firing patterns necessary to ensure that any inclusion of MS habitat would not be burned.
- **PDF WL-28 –** The stands where this design feature will be used contain multi-story hare habitat and occur within the CWPP WUI, but outside the WUI 2-mile zone. Treatment is proposed because they occur close to existing structures on private land and the Stonewall Interdisciplinary Team felt they were at risk from wildfire. Also units 46 and 47 contain an aspen component and scattered large ponderosa pine and release is necessary to maintain these inclusions. Under alternative 2, both units would receive an improvement cut followed by underburning. This treatment was modified under alternative 3 to retain various habitat components within the units. Under Alternative 3, approximately 50 percent of these units would not receive an improvement cut and fuels would be piled and jackpot burned (vs. underburning in alternative 2).

  This design feature also requires that these units be laid out with a wildlife biologist so that fuels can be reduced and aspen effectively released and maintained, while minimizing effects to multi-story habitat. It should also be noted that under alternative 3, 128 acres of precommercial thinning (unit 75)

was dropped between these two units (46 and 47), so that in addition to maintaining more den and winter foraging habitat, these changes would collectively maintain lynx travel corridors for approximately 2 miles along the southern project boundary.

Regeneration harvest: Under both action alternatives, regeneration harvests are prescribed for dense lodgepole pine stands or stands with a mix of ponderosa pine and lodgepole pine which have concentrated MPB mortality. Approximately 80 percent of the regeneration harvest under both alternatives occurs in mid-seral habitat that presently have a poorly developed understory and are not currently considered snowshoe hare habitat. The remainder would occur in multi-storied (MS) or stand initiation (SI) stands within the WUI that currently support snowshoe hares.

This proposed treatment removes or alters stand structure, and eliminates snowshoe hare foraging/cover and lynx cover until the site is regenerated. It can also reduce existing potential for denning and red squirrel habitat by removing large trees and down logs on the site (Ruediger et al. 2000). Regeneration harvest can also alter lynx movement through a stand, although this varies seasonally and temporally. For example, because they have deep snow and provide little horizontal cover for hares, clearcuts were avoided during the winter, whereas when dense deciduous shrubs and saplings were available to support hares, there was no evidence of avoidance in summer (Squires et al. 2010).

Treatment would create early successional conditions including dense understories preferred by snowshoe (USDA Forest Service 2007a, appendix P) and winter foraging habitat would be created within 15 to 20 years. Implementation of pdfs WL-5 through WL-9 will provide for retention of snags and downed woody debris that will help promote restoration of denning habitat conditions.

Intermediate harvest: This activity occurs in stands that are dominated by lodgepole pine or contain a mix of Douglas-fir and lodgepole pine (with small amounts of ponderosa pine/spruce) that have been affected by recent MPB mortality. The availability of down wood for denning habitat is variable and generally ranges from five to twenty tons per acre, with a few stands having 30 tons per acre. Stands proposed for treatment also contain a large number of mid-sized lodgepole snags. All treatment sites occur within the WUI and are near private land/structures that are at risk from wildfire. Approximately 50 percent of the improvement cutting under both alternatives would occur in mid-seral habitat that presently have poorly developed understory conditions and do not support snowshoe hares. The remainder would occur in MS and SI stands.

Partial or intermediate treatments remove understory and overstory vegetation, reduce the availability of down wood and denning habitat, and reduce any existing forage opportunities for snowshoe hare. This reduction in habitat may be due to the harvest of trees, or due to mechanical operations that create skid trails or damage to understory vegetation. These treatments can also modify vegetation structure that contributes to red squirrel habitat (Ruediger et al. 2000) and the quality of red-squirrel habitat could be reduced.

Lynx in the Northern Rockies are sensitive to changes in forest structure (Squires 2013, Koehler 1990, Squires 2010). Because proposed treatments would reduce overstory and understory cover and remove down wood, snowshoe hare habitat and the quality of lynx den and foraging habitat would be reduced over the short and long-term (greater than 10 years) (Squires 2013, Squires 2010). Thinning can also affect lynx movement across the landscape and can alter lynx distribution within their home range (Squires et al. 2006, Squires et al. 2010).

Use of treatments sites by hare and lynx will vary temporarily and by site and alternative. Between 25 and 40 percent canopy closure would be maintained under alternative 2, depending on the level of existing mortality. The treatments would remove dead/infested trees, and other less vigorous trees to reduce

susceptibility to insects, disease and catastrophic fire. Improvement cutting prescriptions under alternatives 2 and 3 are similar, except that greater than 40 percent canopy closure would be maintained on most sites under alternative 3. While understory conditions would be variable, existing regeneration that is experiencing poor vigor would be released and harvest and reforestation treatments would promote establishment of shrubs and understory conifer, providing hare habitat in the future. Retention of snags, down wood and large logs, combined with future dead wood recruitment would promote restoration of denning habitattreatment. Consequently there is a tradeoff between an initial reduction in hare/lynx habitat versus improved stand vigor/health and reducing the risk of catastrophic wildfire within the WUI, both of which would promote the long-term sustainability of lynx habitat.

Precommercial thinning: Precommercial thinning involves thinning young trees, which reduces the density of sapling-sized conifer trees and understory shrubs and therefore reduces available snowshoe hare habitat (Ruediger et al. 2000). Treatment is designed to reduce fuels in close proximity to private lands and all precommercial thinning occurs within the wildland urban interface. Winter foraging habitat would be reduced for 15 to 20 years and treatment within stand initiation habitat would result in a return to unsuitable stand initiation habitat conditions. Potential den habitat would also be reduced, although pdfs that retain snags and DWD would help to restore den habitat.

Pile and jackpot burning: Burning piles or concentrations (jackpots) of fuels is completed in association with a timber harvest and has little additional impact on lynx foraging habitat conditions. Depending upon the methods used to develop the fuel piles and how densely packed they are, this activity could reduce the quality of any potential denning habitat that may occur within fuel piles. Fuels that are piled by hand or grapple hooks tend to receive greater use as wildlife cover because they are less dense and contain less dirt and small debris than those that are pushed into piles by bladed equipment.

Broadcast burning: This treatment prescription includes sites proposed for low severity burning or underburning, as well as most of the sites (55 percent) proposed for mixed severity burning. Approximately 94 percent of the proposed burning under alternative 2 and 98 percent under alternative 3 occur in mid-seral habitat that presently has poorly developed understory conditions.

Because this treatment kills young trees and reduces small diameter woody debris, broadcast burning is expected to reduce available forage and cover on portions of the sites burned. Approximately 20 percent of the burning sites would be unaffected by the fire resulting in a mosaic of burned and unburned conditions. Because the pdfs discussed above would retain snags, DWD, and pockets of understory shrubs and vegetation, most existing denning and foraging habitat would still be retained within all treatment units. Broadcast burning is expected to stimulate regrowth of many herbaceous plants that are beneficial to snowshoe hares during summer, as well as provide the heat necessary to release seeds of conifers with serotinous cones. So while cover and forage would be reduced for 5 to 10 years, burning would also be expected to result in establishment of tree seedlings and shrubs and improve foraging habitat over the long term. Similarly, due to the retention and additional future recruitment of downed woody debris, denning habitat would be restored within a few years of treatment.

Mixed-severity burning: Mixed-severity burning will exhibit a wide range of effects on vegetation resulting in a mosaic of conditions ranging from unburned (20 percent of the site), to lightly burned (55 percent of the site) and moderate to severe fire (25 percent of the site). Over 95 percent of the mixed severity burning under both alternatives is proposed in mid-seral habitat that presently has poorly developed understories and do not currently support snowshoe hares. The remainder is proposed for stands that are classified as MS, however with implementation of pdfs, any existing inclusions of winter hare habitat should remain unburned and there would be little actual reduction in current habitat availability for snowshoe hares. Effects of lightly burned areas would be similar to those discussed above for broadcast burning. Moderate to severe fire would create overstory canopy openings of various sizes

ranging from 10 to 75 acres. Due to the canopy reduction resulting from higher severity fire, approximately 25 percent of the acres proposed for mixed severity treatment would have a long-term reduction (greater than 10 years) in the understory and unsuitable stand initiation habitat conditions would be created on this acreage. There would also be an immediate reduction in potential denning habitat in these fire created openings; however this is expected to improve within five to ten years due to the large quantities of down wood which would be created in these openings.

Mature forest stands that have openings created through fire can provide snowshoe hare habitat and over time (greater than 15 years) as the understory develops, winter foraging habitat would be created within these openings. Also due to the recruitment of dead wood from fire mortality, denning habitat potential would be restored or improved within these openings within 5 to 10 years of treatment. So while treatment would result in a short-term reduction in denning and summer foraging habitat, because all units would have a mosaic of burned and unburned lands and considering no winter foraging habitat would be treated, all units would retain den and foraging habitat in the short term and improve the amount and distribution of den and winter foraging habitat over the long-term.

Road Construction and Maintenance: While there is no evidence that suggests that forest roads pose a threat to lynx (USDA Forest Service 2007b, p. 3), road construction may reduce lynx habitat by removing forest cover and winter road use may provide access for lynx competitors. Conversely lynx have been documented using less traveled roads where the adjacent vegetation provides good hare habitat and Squires et al. (2010) concluded that forest roads with low vehicular or over-snow vehicle traffic had little effect on lynx seasonal resource-selection patterns in Montana. While preliminary information suggests lynx do not avoid roads (USDA Forest Service 2007b, p. 26), potential impacts are reduced when access, traffic volume and road speed are reduced.

Effects of Project Alternatives on Lynx Habitat

The following sections discuss and compare the expected effects of implementing each proposed action alternative on lynx and lynx habitat conditions and how each alternative relates to compliance with NRLMD standards and guidelines. Table 96 and table 97 display mapped lynx habitat affected by the treatment types discussed above under alternatives 2 and 3. Effects of these activities with respect to compliance with NRLMD objectives, standards and guidelines are also discussed and summarized in table 98, table 99 and table 100.

As illustrated in table 96 and table 97, Alternative 3 was designed in part to reduce effects to lynx and lynx habitat. Alternative 3 proposes reductions in regeneration harvest, intermediate harvest, and pre-commercial thinning by 16 percent, 47 percent, and 77 percent respectively, with a corresponding decrease in the expected effects of those treatments. Alternative 3 would also reduce both the total amount of burning by 15 percent, and decrease the overall proportion of mixed severity burning. In order to maintain more understory vegetation within harvest sites, jackpot burning is increased under Alternative 3 and understory burning following harvest is reduced. The following is a summary of the differences between alternative 2 and alternative 3 by LAU:

- Blackfoot 07 – Alternative 3 would drop 878 acres of mixed severity burning, 122 acres of low severity burning, 339 acres of improvement cutting and 260 acres of precommercial thinning. Benefits to lynx resulting from these changes include maintaining approximately 180 acres more SI winter hare habitat and reducing effects to potential denning habitat on approximately 800 acres in the Lincoln Gulch and Beaver Creek drainages. Because lands in the Beaver Creek drainage were identified by Squires et al (2013) as part of a dispersal corridor utilized during the summer months, these changes would also help facilitate movement within BL-07, as well as between BL-07 and BL-08 and with lands to the south. Roads built and then obliterated at the end of the project would be

reduced from 2.6 to 0.4 miles and effects associated with new road construction in the Lincoln Gulch drainage would also be reduced.

- Blackfoot 08 – Alternative 3 drops 629 acres of mixed severity burning, 47 acres of low severity burning, and 50 acres of pre-commercial thinning near the eastern boundary. It also reduces improvement cutting by approximately 80 acres and replaces underburning with jackpot burning. Benefits to lynx habitat resulting from these changes include maintaining 90 acres more MS winter hare habitat, and reducing effects to potential den habitat on approximately 590 acres. Lands where treatment is reduced are also part of the summer/winter dispersal corridor identified by Squires et al. (2013), and changes would have fewer effects to lynx movement within BL-08, as well as between BL-07 and BL-08 and lands to the south.

Table 96. Lynx habitat within BL-07 affected by treatment

Treatments	Lynx Habitat BL-07									
	Multi-storied 8,402 acres available		Stand Initiation 1,312 acres available		Mid-seral 7,431 acres available		Stem Exclusion 156 acres available		Unsuitable Stand Initiation 331 acres available	
	Alt 2	Alt 3	Alt 2	Alt 3	Alt 2	Alt 3	Alt 2	Alt 3	Alt 2	Alt 3
	Total Acres Treated[1]									
	527	289	460	230	2,284	1,646	9	0	34	33
Treatment Summary										
Intermediate Harvest	298	170	439	210	546	382	9	0	20	17
Improvement Cut	286	162	7	6	282	138	0	0	3	0
Sanitation Cut	0	0	0	0	22	22	0	0	0	0
Pre-commercial Thinning	12	8	432	204	242	222	9	0	17	17
Regeneration Harvest	107	91	21	20	566	464	0	0	7	7
Clearcut	27	12	5	5	157	112	0	0	6	6
Shelterwood/ Seedtree	80	79	16	15	409	352	0	0	1	1
Burning Only	122	28	0	0	1,172	800	0	0	7	9
Low Severity	32	0	0	0	0	12	0	0	0	0
Mixed Severity	90	11	0	0	1,172	667	0	0	7	7
Jackpot/Hand Burning	0	0	0	0	0	0	0	0	0	0
Underburning	0	17	0	0	0	121	0	0	0	2
Secondary Treatments										
Burning in Harvest Sites	397	255	196	65	870	684	0	0	7	10
Underburn/Site Prep Burn	363	123	164	56	690	596	0	0	7	10
Jackpot Burn	34	132	32	9	180	88	0	0	0	0

[1]-Total does not include burning in harvest sites (to avoid counting duplicate acres

Table 97. Lynx habitat within BL-08 affected by treatment

Treatments	BL-08 Lynx Habitat Acres									
	Multi-storied 3,511 acres available		Stand Initiation 659 acres available		Mid-seral 9,015 acres available		Stem Exclusion 373 acres available		Unsuitable Stand-initiation 7,864 acres available	
	Alt 2	Alt 3	Alt 2	Alt 3	Alt 2	Alt 3	Alt 2	Alt 3	Alt 2	Alt 3
	Total Acres Treated[1]									
	240	146	0	0	2,320	1,898	0	0	0	2
Treatment Summary										
Intermediate Harvest	199	127	0	0	289	247	0	0	0	0
Improvement Cut	194	127	0	0	3	3	0	0	0	0
Sanitation Cut	0	0	0	0	0	0	0	0	0	0
Pre-commercial Thinning	5	0	0	0	286	244	0	0	0	0
Regeneration Harvest	0	0	0	0	0	0	0	0	0	0
Clearcut	0	0	0	0	0	0	0	0	0	0
Seedtree/ Shelterwood	0	0	0	0	0	0	0	0	0	0
Burning Only	41	19	0	0	2,031	1,651	0	0	0	2
Low Severity	1	1	0	0	36	38	0	0	0	0
Mixed Severity	40	2	0	0	1,995	1,560	0	0	0	2
Jackpot Burning	0	16	0	0	0	53	0	0	0	0
Underburning	0	0	0	0	0	0	0	0	0	0
Secondary Treatments										
Burning in Harvest Sites	199	127	0	0	286	247	0	0	0	0
Underburn/Site Prep Burn	199	37	0	0	286	192	0	0	0	0
Jackpot Burn	0	90	0	0	0	55	0	0	0	0

[1]-Total does not include burning in harvest sites (to avoid counting duplicate acres)

Proposed regeneration treatments occur in areas with concentrated MPB mortality and regeneration harvest and reforestation treatments are designed to reduce fuels and wildfire risk, increase understory species diversity (including fire-tolerant species and hardwoods), and promote the long-term sustainability of forested habitat. As a result, treatments under both action alternatives are in compliance with VEG G1. Because unsuitable stand initiation habitat would remain well below 30 percent in BL-07 and new unsuitable stand initiation habitat in BL-08 would be covered by fuel treatment exemptions under the NRLMD (see WUI summary below), and less than 15 percent of the lynx habitat on NFS lands within affected LAUs would be regenerated during a 10-year period, both action alternatives are in compliance with VEG S1 and VEG S2. Because all MS and SI habitat proposed for treatment occurs within the WUI, treatments are in compliance with VEG S5 and VEG S6. Finally, 80 percent of the treatment would occur in stands that presently lack a developing understory. As a result and considering treatment would promote development of future SI habitat, increase hardwood and conifer species

diversity, and reduce the risk of future wildfire, proposed regeneration treatments would help promote the long-term sustainability of lynx habitat and both action alternatives are in compliance with VEG G10.

Proposed intermediate harvests, and associated post-harvest burning, are designed to reduce fuels, future conifer mortality and wildfire risk, promote development of herbaceous and woody (shrub and conifer) vegetation in the understory, and promote or maintain aspen. Approximately half of the intermediate harvest is proposed in mid-seral habitat which presently does not provide winter hare habitat, and treatment would result in development of future MS habitat. As a result, both action alternatives are in compliance with VEG G1 and VEG O4. Because all MS and SI habitat affected occurs within the WUI, treatments are in compliance with VEG S5 and VEG S6. Finally, because both alternatives retain between 92 and 95 percent of the existing winter hare habitat within affected LAUs, increase species and structural diversity within treatment sites, promote development of future MS habitat in mid-seral habitat, and reduce the risk of stand-replacing wildfire, treatment would promote the long-term sustainability of lynx habitat and are in compliance with VEG G10.

Precommercial thinning treatments are designed to reduce wildfire risk to private land and structures, while promoting development of large diameter trees and conifer diversity and reducing future insect and disease related mortality. Because all proposed precommercial thinning occurs within the CWPP WUI, both action alternatives comply with VEG G1 and VEG S5. About 78 percent of the stand initiation habitat was initially avoided (alternative 2) and thinning was only proposed on lands that pose a risk to private land/structures from wildfire. Also Alternative 3 was developed to retain approximately 90 percent of the existing stand initiation habitat. As a result, the Stonewall Vegetation Management Project was designed considering VEG S5 and complies with VEG G10.

Pile and jackpot burning treatments are designed to reduce fuels and the risk of wildfire within the wildland urban interface. Also this treatment is used in combination with intermediate or regeneration harvest activities and would help to achieve objectives described under these treatments. As a result, treatment is in compliance with VEG G1 and VEG G10 under both action alternatives.

The proposed broadcast burning is designed to achieve a variety of objectives including, restoring historic levels of fire to the landscape, reducing fuels and wildfire risk, increase understory herbaceous and woody (shrubs) vegetation, promote the development of fire tolerant conifer species, and maintain or enhance aspen. Also, all MS habitat proposed for treatment occurs within the WUI and most treatment occurs on lands that have poorly developed understories. Collectively, for these reasons, treatment proposed under both action alternatives would promote the long-term sustainability of lynx habitat and are consistent with VEG O4, VEG G1, VEG G10, and VEG S6. Both action alternatives are in compliance with VEG G4 because habitat and travel corridors along ridgelines would be maintained, and most burning is proposed on steeper sideslopes, and incorporates retention of un-burned lands within the treatment units. Because 20 percent of the sites would be left un-burned and treatment prescriptions require retention of large diameter trees and enhancement of conifer regeneration, potential habitat for alternate species such as red squirrel would be maintained and treatment under both action alternatives is consistent with VEG G5. Finally, because burning would help restore the historic role of fire to the landscape, as well as increase landscape level diversity, these proposed treatments are consistent with VEG O1, VEG O2, and VEG O3.

Mixed-Severity burning treatments would create a variety of conditions on the site and are designed to restore historic levels of low and mixed severity fire to the landscape, reduce fuels and wildfire risk, promote landscape diversity including future MS and SI habitat, and maintain or enhance species diversity including aspen, white bark pine, fire tolerant conifers and herbaceous and woody understory conditions. All MS habitat proposed for treatment occurs within the Tri-County WUI. Over 95 percent of the treatment occurs in mid-seral stands that currently have a poorly developed understory. As a result, treatments are expected to promote the long-term sustainability of lynx habitat while reducing wildfire

risk and treatment under both alternatives are in compliance with VEG O4, VEG G1, VEG G10, VEG S1 and VEG S6. Like underburning, due to the restoration of fire and increased landscape diversity, these treatments are consistent with VEG O1, VEG O2 and VEG O3. Because 20 percent of the sites would be left un-burned and due to retention of large diameter trees and downed wood, potential habitat for alternate species such as red squirrel would be maintained, making these treatments consistent with VEG G5.

With respect to roads necessary to implement proposed treatments, no new permanent roads are proposed under either action alternative nor does either alternative proposed changes in access management following implementation. Roads built and then obliterated after project activities will be utilized, with 2.6 miles and 0.4 miles in use in BL-07 under alternatives 2 and 3, respectively. No new roads are proposed in BL-08. All new roads to be constructed occur in portions of BL-07 that are already well roaded and they will not affect linkage areas or travel corridors identified by Squires et al. (2013). In summary, because no new permanent roads would be constructed, unroaded areas would be unaffected, and roads to be constructed would be closed to public access during implementation and obliterated following use, proposed roads under either action alternative would not be expected to increase long-term public access or open up new lands to possible competition from other predators.

NRLMD guidelines HU G6, HUG7, HU G8 and HU G9 restrict new permanent road construction in linkage areas and lands important to lynx movement, reduce potential impacts associated with public access and identify road maintenance and management considerations to reduce impacts to lynx. Because neither action alternative proposes upgrading unpaved roads to maintenance levels 4 or 5, both are in compliance with HU G6. Because no new permanent road construction is proposed, both action alternatives are in compliance with HU G7. With implementation of PDFs that limit the cutting of brush to the minimum necessary to meet public safety, both action alternatives are in compliance with HU G8. Finally, because new roads built and then obliterated at the end of project activities would be closed to public access during project implementation (approximately 5 years), both action alternatives are in compliance with HU G9.

WUI Summary

All of the timber harvest and over 60 percent of the burning proposed under both action alternatives occurs within the Tri-County CWPP WUI. While mid-seral habitat outside the WUI is proposed for prescribed burning, neither alternative proposes burning in multi-story or stand initiation habitat outside the WUI. Also, through implementation of project design features that restrict treatment within inclusions of multi-story or stand initiation habitat, there is no winter hare habitat proposed for treatment outside the 2-mile zone of the WUI under either action alternative.

The Northern Rockies Lynx Management Direction recognized the need to reduce wildfire risk and exempts a limited amount of treatment of suitable lynx habitat within a WUI, although certain restrictions apply (USDI Fish and Wildlife Service 2007b). All proposed treatments within winter hare habitat under both action alternatives occur only in the WUI (within the 2-mile zone described above, or in areas immediately adjacent to residences and other structures on private land that are believed to be “at risk” from wildfire by the Stonewall Interdisciplinary Team) and are consistent with the limitations identified in standards VEG S1, VEG S2, VEG S5 and VEG S6 in the NRLMD (USDA Forest Service 2007b).

Habitat Connectivity

Maintaining landscape level connectivity between lynx habitat, particularly in the southern extension of its range is important to ensure lynx conservation in the Northern Rockies (Squires et al. 2013, USDA Forest Service 2007b). Based on radio tracking data collected in Montana, Squires et al. (2013) identified patches of habitat capable of supporting lynx that are currently being utilized as travel corridors. The

approximate location of these corridors are displayed in figure 82. It is known that lynx are sensitive to changes in forest structure and tend to avoid openings (Koehler 1990, Squires et al. 2010, Squires 2013) and that due to the structural changes described under treatment effects, openings created by timber harvest can reduce connectivity and alter the movement and distribution of lynx within their home range and across the landscape (Squires et al. 2006, Squires et al. 2013). Although lynx movements might be altered by the openings that will be created in portions of sites receiving timber harvests and/or mixed severity burning treatments in either action alternative, from a landscape perspective, these sites are scattered, interconnected with unaffected habitat, and mimic openings created by natural disturbances. It is not expected that prescribed treatments under either action alternative would reduce connectivity between or within LAUs. Also, as described under treatment effects, the proposed roads to be built and then obliterated after use under the action alternatives will not isolate any forest patches and do not occur on lands that are being used for dispersal (Squires et al. 2013).

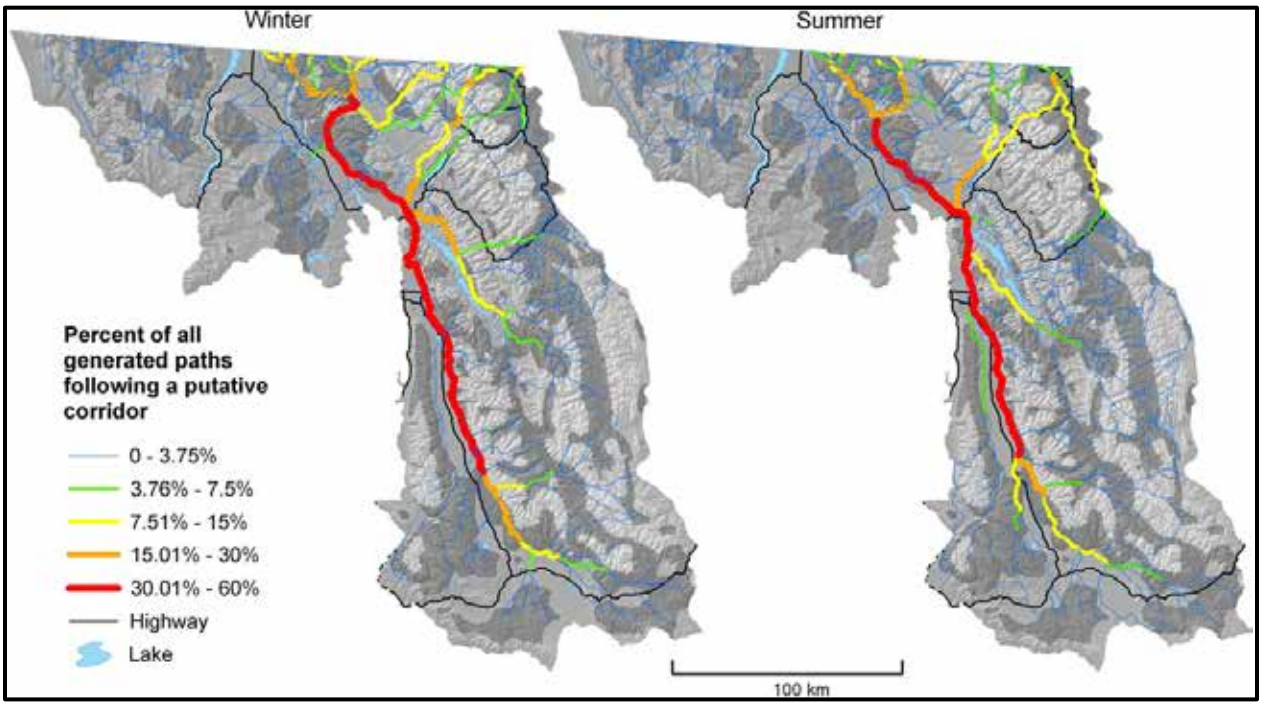

Figure 82. Lynx movemrnt corridors from Squires et al. 2013

Snow Compaction

Although NRLMD Objective HU 01 does not apply directly to vegetation management projects, it pertains to snow compaction and maintaining the lynx's natural competitive advantage over other predators in deep snow by discouraging the expansion of snow compacting activities in lynx habitat. There are currently 12 miles of designated snowmobile trails within the Stonewall Vegetation Management Project area including the Beaver Creek/Dry Creek Trail (7 miles groomed), the Sucker Creek Road (1 mile groomed), the Stonewall Mountain trail (3 miles ungroomed) and the trail near Reservoir Lake (1 mile ungroomed), whereas the Copper Bowls area north of the project area seems to be the most popular destination for cross-country snowmobiling.

While the Stonewall Vegetation Management Project would not change any motorized route designations or increase groomed trails, all project area lands where timber harvest is proposed are currently open to cross-country travel by snowmobiles and the creation of more open forest conditions by some treatments and the proximity to roads may enhance opportunities for snowmobiling. The greatest potential for increased snowmobile use would occur within sites proposed for regeneration harvest. Since regeneration

cuts would not provide winter snowshoe hare habitat for 10-30 years following harvest the impact of snowmobile use upon lynx or snowshoe hares in these units would be minimal. In intermediate harvest units snowmobile use and the potential impacts upon lynx use would be more variable dependent upon residual forest structure including understory and down wood retention until regeneration limits access by snowmobiles. The potential for increased snowmobile use within prescribed burn only units is anticipated to be considerably less since most units occur away from roads with access limited by topography and forest cover. Access to burn units would continue to be limited by live forest cover retained on unburned lands and the retention of standing dead and much of the down material within burned areas. Finally, research in northwestern Montana concluded that there is little evidence that compacted snowmobile trails increased exploitation competition between coyotes and lynx during the winter, suggesting that compacted snow routes did not appear to enhance coyotes' access to lynx and hare habitat and do not significantly affect competition for snowshoe hare (Kolbe et al. 2007). Collectively, for these reasons and considering anecdotal information suggests that lynx are not displaced by human presence, including moderate levels of snowmobile traffic (Mowat et al. 2000, Squires 1999, G. Byrne 1999), it is anticipated that increases in cross-country snowmobile use will have minimal impact upon lynx's competitive advantage over other predators in deep snow. Both action alternatives comply with HU-O1.

Grazing

Approximately 5,900 acres of mapped habitat would continue to be affected by grazing. While understory vegetation will be affected, existing lynx use is not expected to change. As a result, and with implementation of pdfs to reduce grazing impacts through monitoring and management changes, effects to recovering vegetation, winter forage and cover, and aspen, would be reduced. Finally there is no evidence that grazing is a factor threatening lynx (USDI Fish and Wildlife Service 2007b) and there are no long-term adverse effects to lynx anticipated by either action alternative. As a result, both action alternatives are in compliance with GRAZ O1, GRAZ G1, GRAZ G2, and GRAZ G3 as defined in the NRLMD.

Red Squirrel Habitat

NRLMD objectives include providing habitat for alternate prey species, primarily red squirrel in each LAU (VEG G5). Red squirrel habitat would be reduced over the long-term on sites proposed for regeneration harvest, and high severity burning, whereas the quality of red squirrel habitat would be reduced on sites proposed for improvement cutting. Under alternative 2 this would occur on approximately 10 percent of suitable red squirrel/lynx habitat in BL-07 and five percent of BL-08. Under alternative 3 red squirrel habitat would be reduced on 5 percent and 3 percent of the suitable habitat in BL-07 and 08 respectively.

While both action alternatives would reduce the amount and quality or red squirrel habitat, over 90 percent of the existing habitat would be left unaffected under both action alternatives. Also most of the reduction in mature forest would result from openings created by mixed-severity fire, and suitable habitat would be maintained on 75 percent of the treatment unit. Finally treatments would maintain or promote tree diversity and seed production while reducing the risk of catastrophic wildfire, which would maintain or improve red squirrel habitat over the long term. Collectively for these reasons, habitat for alternate prey species would continue to be available in both BL-07 and BL-08, and alternatives 2 and 3 both comply with VEG G5.

Denning Habitat Summary

NRLMD VEG G11 requires that denning habitat should be distributed in each LAU in the form of pockets of large amounts of coarse woody debris, either as down logs, root wads or large piles of wind thrown trees. Due to widespread MPB mortality and decades of increased stocking, snags and downed

wood are readily available across the landscape. Also with implementation of PDFs, downed wood, including a component of large diameter logs would be retained in all treatment units, which would help to maintain or restore den habitat. Further, implementation of INFISH buffers and maintaining unburned lands on sites proposed for burning would further maintain dead wood and den habitat within treatment sites. Denning habitat would continue to be well distributed within both affected LAUs and both action alternatives are in compliance with VEG G11.

Unsuitable Stand Initiation Habitat Summary

VEG S1 requires that each LAU have no more than 30 percent of the lynx habitat in the unsuitable stand initiation structural stage. Unsuitable stand initiation habitat currently exists on approximately two percent of the mapped lynx habitat within BL-07. Project activities will increase this percentage, but it will remain well under the 30 percent limitation required by the NRLMD. Because less than 30 percent of BL-07 would occur as unsuitable stand initiation habitat, both action alternatives are in compliance with VEG S1 for BL-07.

Approximately 37 percent of the mapped lynx habitat within BL-08 currently exists as unsuitable stand initiation habitat; with most of this resulting from the 2003 Snow Talon fire. While there is no regeneration harvest or pre-commercial thinning proposed in mapped habitat in BL-08 under either alternative, mixed severity burning may create up to 509 acres of additional unsuitable stand initiation habitat under alternative 2 and up to 390 additional acres under alternative 3 (25% of the planned mixed severity burning by alternative). Unsuitable early stand initiation habitat in this LAU already exceeds 30 percent of the mapped lynx habitat. Therefore, implementation of these activities will require utilization of the fuel treatment exemption allowed under the NRLMD. Because it will take 10 years to complete proposed burning and considering large stand replacing fires produce high quality winter snowshoe hare habitat after approximately 10 to 30 years (USDI Fish and Wildlife Service 2007b); it is expected that some of the currently unsuitable stand initiation habitat created by the Snow Talon fire will develop into suitable hare habitat before the Stonewall Vegetation Management Project is completed, thereby reducing the overall percentage of unsuitable stand initiation habitat, ultimately allowing it to fall below the 30 percent desired maximum described by the NRLMD. Until then, the fuel treatments prescribed under either action alternative fall under the allowable exemption described in VEG S1 and VEG S6, and treatment acreage will be deducted from the prescribed Helena National Forest allocation.

Summary of Habitat Changes For Lynx Analysis Units BL-07 and BL-08

Expected changes by alternative and compliance with NRLMD vegetation standards are displayed in table 98 and table 99 and table 100 for BL-07 and BL-08.

Table 98. Blackfoot 07 alternative lynx habitat

Habitat/Condition	Alternative 1	Alternative 2		Alternative 3	
	Existing Acres	Acres	Change	Acres	Change
Habitat Conditions					
Total acres	**26,662**	**26,662**	**0**	**26,662**	**0**
Acres mapped lynx habitat	17,632	17,632	0	17,632	0
Acres winter hare habitat	9,714	8,751	-987	9,201	-519
Acres of unsuitable stand initiation habitat	331[1]	1,780[1]	+1449	1,286[1]	+955
Compliance with VEG S1, VEG S2, VEG S5, VEG S6					
Acres of stand initiation hare habitat treated outside of the WUI	0	0	0	0	0
Acres of stand initiation hare habitat treated within the WUI	0	460	+460	230	+230
Acres of multi-story habitat treated outside the WUI	0	0	0	0	0
Acres of multi-story habitat treated within the WUI	0	527	527	289	+289
Meets VEG S1: No more than 30% of the lynx habitat currently in the unsuitable stand initiation structural stage. (17,632 acres x 30% = 5,290 acres	Yes 2% currently unsuitable[1]	Yes 10 percent in unsuitable condition[1]		Yes 7% in unsuitable condition[1]	
Do three or more adjacent LAUs exceed VEG S1?	No	No		No	
Meets VEG S2: Timber management projects shall not regenerate more than 15% of lynx habitat in a 10-year period. (17,632 acres x 15% = 2,645 acres)	Yes 38 total acres regenerated by timber management in the past decade	Yes 739 total acres regenerated by timber management within 10 year period	701 acres new regeneration	Yes 620 total acres regenerated by timber management within 10 year period	582 acres new of regeneration
VEG S5: Precommercial thinning - Acres of stand initiation hare habitat treated within a WUI	0	439	+439	210	+210
VEG S5 cont'd – Acres of stand initiation hare habitat treated under exceptions 1-6	0	0	0	0	0
VEG S6: Multi-story habitat - Acres of multi-story habitat treated within the WUI	0	527	+527	289	+289
VEG S6 cont'd: Acres of multi-story habitat treated under exceptions 1-3	0	0	0	0	0
Meets VEG G10 – Fuel treatment projects within the WUI	Yes Meets See Table 40	Yes Meets See Table 40		Yes Meets See Table 40	

[1] - Due to development of stand initiation habitat by project completion (10 yrs), it is anticipated that the amount of unsuitable stand initiation habitat would be reduced from that displayed (see unsuitable stand initiation habitat summary). Treatment acreage in this category includes: all MS regeneration harvest; all SI regeneration harvest; all Mid-Seral regeneration harvest; all SI intermediate harvest; and 25% of mixed-severity burning only treatments

Table 99. Blackfoot 08 alternative lynx habitat

Habitat/Condition	Alternative 1	Alternative 2		Alternative 3	
	Existing Acres	Acres	Change	Acres	Change
Habitat Conditions					
Total acres	**27,549**	**27,549**	**0**	**27,549**	**0**
Acres mapped lynx habitat	21,422	21,422	0	21,422	0
Acres winter hare habitat	4,170	3,931	-240	4,024	-146
Multi-story	8408				
Acres of unsuitable Stand initiation habitat	7,864[1]	8,373[1]	+509	8,254[1]	+390
Compliance with VEG S1, VEG S2, VEG S5, VEG S6					
Acres of stand initiation hare habitat treated outside the WUI	0	0	0	0	0
Acres of stand initiation hare habitat treated within the WUI	0	0	0	0	0
Acres of multi-story habitat treated outside the WUI	0	0	0	0	0
Acres of multi-story habitat treated within the WUI.	0	240	+240	146	+146
Meets VEG S1: No more than 30% of the lynx habitat currently in the unsuitable stand initiation structural stage. (21,422 acres x 30% = 6,426 acres)	No 37% currently unsuitable[1]	No 39% in unsuitable condition[1]		No 39% in unsuitable condition[1]	
Do three or more adjacent LAUs exceed VEG S1?	No	No		No	
Meets VEG S2: Timber management projects shall not regenerate more than 15% of lynx habitat in a 10-year period. (21,422 acres x 15% = 3,213 acres)	Yes 495 total acres regenerated by timber management in the past decade	Yes 495 total acres regenerated by timber management in the past decade	0 acres new regeneration	Yes 495 total acres regenerated by timber management in the past decade	0 acres new regeneration
VEG S5: Precommercial thinning - Acres of stand initiation hare habitat treated within a WUI	0	0	0	0	0
VEG S5 cont'd: Acres of stand initiation hare habitat treated under exceptions 1-6	0	0	0	0	0
VEG S6: Multi-story habitat - Acres of multi-story habitat treated within the WUI	0	240	+240	146	+146
VEG S6 cont'd: Acres of multi-story habitat treated under exceptions 1-3	0	0	0	0	0

[1] - Due to development of stand initiation habitat by project completion (10 yrs), it is anticipated that the amount of unsuitable stand initiation habitat would be reduced from that displayed (see unsuitable stand initiation habitat summary). Treatment acreage in this category includes: all MS regeneration harvest; all SI regeneration harvest; all Mid-Seral regeneration harvest; all SI intermediate harvest; and 25% of mixed-severity burning only treatments.

Table 100. Summary of NRLMD Exemptions for Stonewall Vegetation Management Project

	Alternative 1 Acres	Alternative 2 Acres	Alternative 3 Acres
Original NRLMD Exemption Allowance (6% of lynx habitat on Helena National Forest)	**26,400**	**26,400**	**26,400**
Current Balance (October 2014)	**26,269**	**26,269**	**26,269**
Veg S1 exemptions (for BL-08)	0	509	390
Veg S5 WUI exemptions for PCT	0	439	210
Veg S6 WUI exemptions for snowshoe hare habitat reduction in MS stands by vegetation management	0	767	435
Total acres of treatment exceptions for Stonewall Vegetation Management Project	0	1,715	1,035
Revised Balance	**26,269**	**24,554**	**25,234**

NRLMD Lynx Risk Factors

Table 101 summarizes the applicable lynx management objectives, standards and guidelines and conservation measures to address factors affecting lynx productivity as outlined in the NRLMD (USDA Forest Service 2007b).

Table 101. Lynx amendment alternative comparison of objectives, standards and guidelines

Criteria	Pre-treatment Compliance (Alternative 1)	Post-treatment Compliance	
		Alternative 2	Alternative 3
ALL MANAGEMENT PRACTICES AND ACTIVITIES (ALL): The following objectives, standards, and guidelines apply to all management projects in lynx habitat in lynx analysis units (LAUs) and in linkage areas, subject to valid existing rights. They do not apply to wildfire suppression or, or to wildland fire use.			
ALL O1 – Maintain or restore lynx habitat connectivity in and between LAUs and in linkage areas.	Large areas of forested habitat are available across the analysis area. Moderate road densities of 1.9 to 2.8 miles/mi^2 occur within both LAUs although many existing roads are closed year-round	BL-07 and BL-08 - The forested character of the area would be retained and connectivity within and between LAUs would be maintained. The project would have no effect upon lynx linkage area and both action alternatives comply with ALL O1.	
ALL S1 – New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.	Large areas of forested habitat are present within both LAUs. Road densities are moderate to high, but most roads are closed year-round. Potential linkage corridors have been identified	BL-07 and BL-08 – No new or permanent developments are proposed. Stands proposed for vegetation treatment would be more open and there would be a reduction in cover on treatment sites. However, because (1) regeneration harvest is restricted to areas with concentrated MPB mortality, (2) sites proposed for burning would still maintain landscape level connectivity, and (3) open road densities would not increase and roads built then obliterated immediately following timber removal would occur in areas that are already roaded, existing linkage areas and connectivity within and between LAUs would be maintained. Both alternatives comply with ALL S1.	
VEGETATION MANAGEMENT PRACTICES AND ACTIVITIES (VEG): The following objectives, standards and guidelines apply to vegetation management projects in lynx habitat within lynx analysis units (LAUs) in occupied habitat. With the exception of Objective VEG 03 that specifically concerns wildland fire use, the objectives, standards, and guidelines do not apply to wildfire suppression, wildland fire use, or removal of vegetation for permanent developments such as mineral operations, ski runs, roads, and the like. None of the objectives, standards, or guidelines apply to linkage areas.			
VEG O1 – Manage vegetation to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.	Fire has been excluded from the analysis area and stands are losing vigor. Edges between old and young forests are sharp due to past regeneration harvest. Existing stand initiation habitat is maturing providing less winter foraging habitat. Recent wildfire has reduced existing foraging and den habitat but would create future stand initiation habitat in portions of the project area LAUs. Widespread MPB mortality is increasing stand structure and den habitat.	BL-07 and BL-08 combined - Proposed treatments are designed to restore naturally occurring fire regimes and associated vegetative communities. Burning is proposed on 3,373 acres of mapped lynx habitat. Future wildfire risk would be reduced. 91% of existing winter forage habitat would be maintained. The distribution of foraging habitat across the landscape would be improved. Alternative 2 complies with VEG O1.	BL-07 and BL-08 combined - Proposed treatments are designed to restore naturally occurring fire regimes and associated vegetative communities. Burning is proposed on 2,509 acres of mapped lynx habitat. Future risk of wildfire are reduced. 95% of the winter foraging habitat would be maintained. The distribution of winter foraging habitat across the landscape would be improved. Alternative 3 complies with VEG O1.

Criteria	Pre-treatment Compliance (Alternative 1)	Post-treatment Compliance	
		Alternative 2	Alternative 3
VEG O2 – Provide a mosaic of habitat conditions through time that support dense horizontal cover and high densities of snowshoe hares. Provide winter snowshoe hare habitat in both the stand initiation structural stage and in mature, multi-story conifer vegetation.	BL-07 - Multi-storied habitat has been increasing. Existing stand initiation is limited to a few stands created by past timber harvest and is widely scattered. BL-08 - Recent wildfires have reduced MS habitat and created a large block of currently unsuitable stand initiation habitat that is expected to develop into suitable winter hare habitat within the next decade.	BL-07 and BL-08 combined – 94% and 77% of existing MS and SI habitat would be maintained in the short term. Over the long term, treatments would create SI habitat on 1,518 acres promoting horizontal and vertical structure and foraging habitat on approximately 5,800 acres. The distribution of foraging habitat would be improved across the landscape. Alternative 2 complies with VEG O2.	BL-07 and BL-08 combined – 96 and 88% of existing MS and SI habitat would be maintained in the short term. Over the long term, treatments would create SI habitat on 1,136 acres and promote horizontal and vertical structure and foraging habitat on approximately 4,200 acres. The overall distribution of foraging habitat would be improved across the landscape. Alternative 3 complies with VEG O2.
VEG O3 – Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat.	Fire has been successfully suppressed within the project area since the early 1900s. Little prescribed fire has been implemented within the project area to date.	BL-07 and 08 combined - Prescribed fire activities that restore fire to the landscape and result in the long-term improvement in lynx habitat would occur on 3,373 acres. Treatment would occur within all watersheds over a 10-year period, increasing the amount and distribution of foraging habitat. Denning habitat would be maintained across the landscape while restoring the role of fire. Alternative 2 complies with VEG O3.	BL-07 and 08 combined - Prescribed fire activities that restore fire to the landscape and result in the long-term improvement in lynx habitat would occur on 2,209 acres. Treatment would occur within all watersheds over a 10-year period, increasing the amount and distribution of foraging habitat. Denning habitat would be maintained across the landscape while restoring the role of fire..Alternative 3 complies with VEG O3.
VEG O4 – Focus vegetation management in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover.	Currently 36% of BL-07 and 15% of BL-08 provide winter snowshoe hare habitat.	BL-07 – 70% of the treatments are proposed in mid-seral or stem exclusion habitat that lacks a developing understory. Future winter snowshoe hare habitat would be created on 2,293 acres of existing mid-seral and stem exclusion habitat. BL-08 – 90% of the treatments are proposed in mid-seral habitat that lacks a developing understory. Future winter snowshoe hare habitat would be created on 2,320 acres of existing mid-seral habitat. Alternative 2 complies with VEG O4 for both BL-07 and BL-08	BL-07 – 75% of the treatments are proposed in mid-seral habitat that lacks a developing understory. Future winter snowshoe hare habitat would be created on 1,646 acres of existing mid-seral habitat. BL-08 – 93% of the treatments are proposed in mid-seral habitat that lacks a developing understory. Future winter snowshoe hare habitat would be created on 1,898 acres of existing mid-seral habitat. Alternative 3 complies with VEG O4 for both BL-07 and BL-08.

Criteria	Pre-treatment Compliance (Alternative 1)	Post-treatment Compliance	
		Alternative 2	Alternative 3
VEG S1 – Unless a broad scale assessment has been completed that substantiates different levels of stand initiation structural stages, limit disturbance in each structural stage as follows: If more than 30% of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects. In addition, fuel treatment projects may not result in more than three LAUs exceeding the standard.	BL-07 – Currently 2% of total lynx habitat exists as unsuitable stand initiation habitat. BL-08- Currently 37% of total lynx habitat exists as unsuitable stand initiation habitat primarily due to the 2003 Snow-Talon fire.	BL-07 – Regeneration harvest, mixed severity burning, and thinning in SI habitat would increase unsuitable stand initiation habitat to 1,780 acres or 10% of llynx habitat within the LAU. Three or more adjacent LAUs would not exceed VEG S1. BL-08 – Mixed severity burning would increase unsuitable stand initiation habitat to 8,373 acres or 39% of the LAU. Three or more adjacent LAU's would not exceed VEG S1. This activity is allowed as an exemption in NRLMD for fuel treatment outside a WUI. BL-07 and BL-08 – Because it would take 10 years to complete implementation of prescribed burning, existing unsuitable stand initiation habitat would be further reduced as it develops into winter hare habitat. Alternative 2 complies with VEG S1.	BL-07 – Regeneration harvest, mixed severity burning, and thinning in SI habitat would increase unsuitable stand initiation habitat to 1,286 acres or 7% of the LAU. Three or more adjacent LAU's would not exceed VEG S1. BL-08 – Mixed severity burning would increase unsuitable stand initiation habitat to 8,255 acres or 39% of the LAU. Three or more adjacent LAU's would not exceed VEG S1. This activity is allowed as an exemption in NRLMD for fuel treatment within a WUI. BL-07 and BL-08 – Because it would take 10 years to complete implementation of prescribed burning, existing unsuitable stand initiation habitat would be further reduced as it develops into winter hare habitat. Alternative 3 complies with VEG S1.
VEG S2 – Timber management projects shall not regenerate more than 15% of lynx habitat on NFS lands within a LAU within a 10-year period.	Regeneration harvest on NFS lands in the last 10 years has included: BL-07 – 38 acres (<1 percent) BL-08 – 495 acres (2 percent)	BL-07 – A maximum of 701 new acres or 4% of thelynx habitat on NFS lands would be regenerated with timber harvest during this project. BL-8 – No regeneration harvest would occur within lynx habitat during the next 10-year period. BL-07 and BL-08 – Because less than 15% of the NFS lands within both LAUs would be regenerated, alternative 2 complies with VEG S2.	BL-07 – A maximum of 582 new acres or 3% of the NFS lands would be regenerated with timber harvest during this project. BL-8 – No regeneration harvest would occur within lynx habitat during the next 10-year period. BL-07 and BL-08 – Because less than 15% of the NFS lands within both LAUs would be regenerated, alternative 3 complies with VEG S2.
VEG S5 – Precommercial thinning projects that reduce snowshoe hare habitat, may occur from	There has been no precommercial	BL-07 – A total of 439 acres of stand initiation hare habitat would be	BL-07 – A total of 210 acres of the stand initiation hare habitat would be

Criteria	Pre-treatment Compliance (Alternative 1)	Post-treatment Compliance	
		Alternative 2	Alternative 3
the stand initiation structural stage until the stands no longer provides winter snowshoe hare habitat only if they are: 1. within 200 feet of admin site, dwelling or outbuildings, 2. for research purposes, 3. if they are based on new information that has been peer reviewed, 4. for conifer removal in aspen or to restore whitebark pine. This applies to all precommercial thinning projects except fuel treatment projects that use precommercial thinning as a tool within the WUI as defined by HFRA. Fuel treatment projects within the WUI that do not meet VEG S1, VEG S2, VEG S5, and VEG S6, shall occur on no more than 6% of the lynx habitat on the Forest and would be designed considering standards VEG S1, VEG S2, VEG S5, and VEG S6 to promote lynx conservation (see VEG G10).	thinning in either LAU since 1997.	precommercially thinned. All treatments lie within the WUI as identified in the CWPP and are designed to reduce the risk of wildfire to private lands and structures. Treatment 26,400-acre forest limitation by 439 acres. BL-08 – No precommercial thinning would occur and alternative 2 meets the VEG S5 standard by utilizing the allowable exemption.	precommercially thinned. All treatments lie within the WUI as identified in CWPP and all treatments are designed to reduce the risk of wildfire to private lands/structures. Treatment within the WUI would reduce the 26,400-acre forest cap by 210 acres. BL-08 – No precommercial thinning would occur and alternative 3 meets the VEG S5 standard by utilizing the allowable exemption.
VEG S6 – Vegetation management projects that reduce snowshoe hare habitat in multi-story or late successional forests, may occur only if they are within 200 feet of admin site, dwelling or outbuildings, for research purposes, or for incidental removal during salvage harvest. This applies to all projects except fuel treatment projects within the WUI as defined by HEFRA. Fuel treatment projects within the WUI that do not meet VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6% of the lynx habitat on the administrative unit (Helena NF). Also fuel treatment projects should be designed considering VEG S1, S2, S5, and S6 (VEG G10).	There have been no vegetation management treatments within multi-storied habitat since 1996.	BL-07 – A total of 527 acres of the multi-storied hare habitat would be treated. All treatments are designed to reduce risk to private land/structures and all sites lie within the CWPP WUI. BL-08 – A total of 240 acres of multi-storied hare habitat would be treated. All treatments are designed to reduce risk to private land/structures and all sites occur within the CWPP WUI. Alternative 2 meets the VEG S6 standard by utilizing the allowable exemption.	BL-07 – A total of 289 acres of multi-storied hare habitat would be treated. All treatments are designed to reduce risk to private land/structures and all treatments lie within the CWPP WUI. BL-08 – A total of 146 acres of multi-storied hare habitat would be treated. All treatments are designed to reduce risk to private land/structures and all treatments occur within the CWPP WUI. Alternative 3 meets the VEG S6 standard by utilizing the allowable exemption.
VEG G1 – Vegetation management projects should be planned to recruit a high density of	No vegetation management is planned under alternative 1. . Due	71% of the treatments in BL-07 and 93% of the treatments in BL-08 are	76% of the treatments in BL-07 and 94% of the treatments in BL-08 are proposed in

Criteria	Pre-treatment Compliance (Alternative 1)	Post-treatment Compliance	
		Alternative 2	Alternative 3
conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority for treatment should be given to stem exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g., mesic monotypic lodgepole stands).	to overstocking and fire suppression, understory diversity has been reduced	proposed in mid-seral, or stem exclusion, habitat that presently does not provide the structural conditions necessary for winter hare habitat. BL-07 and BL-08 – Approximately 87 percent of BL-07 and 88 percent of BL-07 and 08 would be unaffected. Treatment would maintain or increase aspen and whitebark pine, as well as promote the development of understory shrubs and increase the diversity of prey habitat across the landscape. Alternative 2 complies with VEG G1.	mid-seral or unsuitable stand initiation habitat that presently does not provide the structural conditions necessary for winter hare habitat. BL-07 and BL-08 – Approximately 88 percent of BL-07 and 90 percent of BL-05 would be unaffected.. Treatment would maintain or increase aspen and whitebark pine, as well as promote the development of understory shrubs and increase the diversity of prey habitat across the landscape. Alternative 3 complies with VEG G1.
VEG G4 – Prescribed fire activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.	No prescribed fire or fire breaks are planned under alternative 1.	BL-07 and BL-08 – While some burning to ridgelines and saddles would occur, most burning occurs on steeper slopes away from existing snowmobile trails. Also portions of all units would be unburned and establishment of woody vegetation following treatment would reduce any long-term access. Planned prescribed burning activities are not expected to create permanent travel routes or facilitate snow compacting activities. As a result, and because no fire breaks would be constructed, both alternatives comply with VEG G4.	
VEG G5 – Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.	Suitable mature coniferous forest currently exists on 60 and 45% of BL-07 and BL-08, respectively.	Regeneration harvest and high severity burning would reduce suitable mature forest on 984 acres in BL-07 and on 509 acres in BL-08. Approximately 94% and 96% of the existing mature coniferous forest would be maintained in BL-07 and BL-08, respectively. BL-07 and BL-08 –Treatments would maintain or promote tree diversity and seed production and red squirrel habitat over the long term. Alternative 2 complies with VEG G5.	Regeneration harvest and high severity burning would reduce suitable mature forest on 745 acres in BL-07 and on 391 acres in BL-08. Approximately 95% and 97% of the existing mature coniferous forest would be maintained in BL-07 and BL-08, respectively. BL-07 and BL-08 –Treatments would maintain or promote tree diversity, seed production and red squirrel habitat over the long term. Alternative 3 complies with VEG G5.
VEG G10 – Fuel treatment projects within the WUI as defined by HFRA should be designed considering Standards VEG S1, VEG S2, VEG	No fuel treatments are planned under alternative 1.	BL-07 and BL-08 – See discussions for VEG S1, S2, S5 and S6 above. Treatments would reduce risks from fire	BL-07 and BL-08 – See discussions for VEG S1, S2, S5 and S6 above. Treatments would reduce risks from fire and insect and

Criteria	Pre-treatment Compliance (Alternative 1)	Post-treatment Compliance	
		Alternative 2	Alternative 3
S5, and VEG S6 to promote lynx conservation.		and insect and disease, increase the amount and distribution of winter forage on over 5,000 acres, increase hardwood, conifer and shrub diversity and promote long-term diversity and sustainability of lynx habitat. Treatments under alternative 2 were developed considering standards to VEG S1, VEG S2, VEG S5, and VEG S6.	disease, increase the amount and distribution of winter forage on over 4,300 acres, increase hardwood, conifer and shrub diversity and promote long-term diversity and sustainability of lynx habitat. Alternative 3 was developed in part to reduce impacts to winter hare habitat. Treatments under this alternative were developed considering standards to VEG S1, VEG S2, VEG S5, and VEG S6.
VEG G11 – Denning habitat should be distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads or large piles of wind thrown trees (jack strawed piles). If denning habitat appears to be lacking in the LAU, then projects should be designed to retain some coarse woody debris, piles or residual trees to provide denning habitat in the future.	Denning habitat is currently well distributed across both LAUs, both of which contain large blocks of mature forest.	BL-07 and BL-08 – Proposed treatments are designed to retain patches of dead and dying trees which would contribute to coarse woody debris recruitment. A minimum of 5 to 20 tons per acre of downed woody debris would be retained and pdfs require retention of large diameter snags and logs. Burning would be designed to retain pockets of understory vegetation and shrubs and 20% of the site would be unburned. As a result and considering that over 83% of the existing suitable habitat would be unaffected, den habitat would continue to be widely available in both LAUs and both alternatives comply with VEG G11.	
LIVESTOCK MANAGEMENT (GRAZ): *The following objectives and guidelines apply to grazing projects in lynx habitat in lynx analysis units (LAUs) in occupied habitat. They do not apply to linkage areas.*			
GRAZ O1 – Manage livestock grazing to be compatible with improving and maintaining lynx habitat.	Approximately 5,900 acres or 15% of the mapped lynx habitat is affected by grazing.	BL-07 and BL-08 – Existing grazing patterns would be largely unchanged. Grazing would be deferred in treatment units where aspen is regenerating and where necessary to establish vegetation. Both alternatives would increase landscape level forage, maintain riparian areas, promote shrub and understory diversity and maintain or improve aspen.	
GRAZ G1 – In fire- and harvest-created openings, livestock grazing should be managed so impacts do not prevent shrubs and trees from regenerating.	Approximately 5,900 acres of the project area are currently being grazed.	BL-07 and BL-08 – Livestock grazing will be maintained at existing levels unless range analysis monitoring indicates that changes in numbers are necessary. Grazing systems will be designed to be compatible with wildlife needs and if necessary improvements for livestock management will be designed in cooperation with a wildlife biologist. Both alternatives comply with GRAZ G1.	

Criteria	Pre-treatment Compliance (Alternative 1)	Post-treatment Compliance	
		Alternative 2	Alternative 3
GRAZ G2 – In aspen stands, livestock grazing should be managed to contribute to the long-term health and sustainability of aspen.	Aspen stands are declining due to lack of disturbance and existing regeneration is being grazed.	BL-07 and BL-08 – Grazing will be maintained at existing levels unless monitoring indicates that changes in numbers are necessary. Fencing, temporary herding, or other techniques may be used to protect regeneration and aspen where needed. Both alternatives comply with GRAZ G2.	
GRAZ G3 – In riparian areas and willow areas, livestock grazing should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages similar to conditions that would have occurred under historic disturbance regimes.	INFISH buffer monitoring for Keep Cool Creek and Beaver Creek have been occurring since 1999 and mitigation measures have been implemented to reduce grazing impacts to riparian areas.	BL-07 and BL-08 – Livestock use is not expected to change and INFISH buffers and monitoring will continue to be implemented to reduce grazing related impacts in riparian areas. Both alternatives comply with GRAZ G3.	
GRAZ G4 – In Shrub-steppe habitats, livestock grazing should be managed in the elevation ranges of forested lynx habitat in LAUs, to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.	There are three grazing allotments within the analysis area including the Stonewall and Arrastra cattle and horse allotments and the Keep Cool Liverpool sheep and goat allotment. Bunchgrass parks and shrub habitats are being invaded by conifer.	BL-07 and BL-08 – Livestock grazing will be maintained at existing levels unless range analysis monitoring indicates that changes in numbers are necessary. Grazing systems will be designed to be compatible with wildlife needs and if necessary improvements for livestock management will be designed in cooperation with a wildlife biologist. Both alternatives are in compliance with GRAZ G4 and LINK G2.	
Human Use Projects (HU): *The following objectives, standards, and guidelines apply to human use projects, such as special uses (other than grazing), recreation management, roads, highways, and mineral and energy development, in lynx habitat in lynx analysis units (LAUs) in occupied habitat, subject to valid existing rights. They do not apply to vegetation management projects or grazing projects directly. They do not apply to linkage areas.*			
HU O1 – Maintain the lynx's natural competitive advantage over other predators in deep snow by discouraging the expansion of snow compacting activities in lynx habitat.	Existing snow compacting activities are primarily associated with roads and designated trails. Some off road use is occurring.	BL-07 and BL-08 – Roads to be built will be closed to public access during project activities, and obliterated following timber removal. While some increased winter motorized use is likely within low-elevation treatment units, this would be short term due to encroachment of woody vegetation. Snowmobile use of burned areas is not expected to increase due to standing dead tree component. Future use is expected to occur largely on designated trails and there are no expected long-term increases in snow compacting activities. Both alternatives comply with HU O1.	
HU O2 – Mange recreational activities to maintain lynx habitat and connectivity	Existing recreational use is concentrated on designated trails. Some winter recreation use of suitable habitat occurs at scattered locations.	BL-07 and BL-08 – Recreational use would not significantly change or adversely affect lynx habitat and connectivity. Both alternatives comply with HU O2.	

Criteria	Pre-treatment Compliance (Alternative 1)	Post-treatment Compliance	
		Alternative 2	Alternative 3
HU O5 – Manage human activities – such as exploring and developing minerals and oil and gas, placing utility corridors and permitting special uses – to reduce impacts on lynx and lynx habitat.	All activities of this type are controlled through special use permits.	BL-07 and BL-08 – These activities are not expected to increase and would continue to be controlled through special use permits. Both alternatives comply with HU O5.	
HU O6 – Reduce adverse highway effects on lynx by working cooperatively with other agencies to provide for lynx movement and habitat connectivity and to reduce the potential of lynx mortality.	The Helena NF is involved with these interagency relationships	BL-07 and BL-08 – The Helena NF would continue to be involved in interagency relationships to provide for lynx movement and reduce potential lynx mortality. Both alternatives comply with HU O6.	
HU G6 – Methods to avoid or reduce effects on lynx should be used in lynx habitat when upgrading unpaved roads to maintenance levels 4 or 5, if the result would be increased traffic speeds and volumes, or a foreseeable contribution to increases in human activity or development.	BL-07 and BL-08 – No unpaved roads would be upgraded to maintenance levels 4 or 5 and all alternatives comply with HU G6.		
HU G7 – New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forest stringers.	BL-08 and BL-08 – There are no permanent roads proposed and all alternatives comply with HU G7.		
HU G8 - Cutting brush along low-speed, low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.	BL-07 and BL-08 – Cutting of brush along roads would be done at levels necessary to maintain public safety and all alternatives comply with HU G8.		
HU G9 – On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in the road designs. When the project is over these roads should be reclaimed or decommissioned, if not needed for other management objectives.	No roads would be built under alternative 1.	BL-07 – 2.6 miles of roads would be built then obliterated immediately following timber removal. All roads would be closed to public access and permanently closed and restored following project implementation. BL-08 – no roads would be built. BL-07 and BL-08 – alternative 2 is in compliance with HU G9.	BL-07 – 0.4 miles of roads would be built then obliterated immediately following timber removal. All roads would be closed to public access and permanently closed and restored following project implementation. BL-08 – no road would be built. BL-07 and BL-08 – alternative 3 is in compliance with HU G9.
LINKAGE AREAS (LINK): *The following objective, standard, and guidelines apply to all projects within linkage areas in occupied habitat, subject to valid existing rights*			

Criteria	Pre-treatment Compliance (Alternative 1)	Post-treatment Compliance	
		Alternative 2	Alternative 3
LINK O1 – In areas of intermingled land ownership, work with landowners to pursue conservation easements, habitat conservations plans, land exchanges or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat.	The Helena NF is currently involved in these types of activities and exchanges	BL-07 and BL-08 – The Helena NF would continue to be involved with landowners to reduce potential impacts to lynx and both alternatives comply with LINK O1	
LINK G2 – Livestock grazing in shrub-steppe habitats should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.	There are three grazing allotments within the analysis area including the Stonewall and Arrastra cattle and horse allotments and the Keep Cool Liverpool sheep and goat allotment. Bunchgrass parks and shrub habitats are being invaded by conifer.	BL-07 and BL-08 – Livestock grazing would be maintained at existing levels unless range analysis monitoring indicates that changes in numbers are necessary. Grazing systems would be designed to be compatible with wildlife needs and if necessary improvements for livestock management would be designed in cooperation with a wildlife biologist. Both alternatives are in compliance with LINK G2.	

Cumulative Effects

As described under alternative 1, the cumulative effect analysis area for lynx includes the combined LAUs (BL-07 and 08) which totals 54,211 acres. There are a number of past and ongoing activities occurring within the analysis area that cumulatively affect lynx and lynx habitat. Effects of these activities are discussed under alternative 1; Table 102 summarizes anticipated cumulative effects under each of the alternatives evaluated. A complete list of all activities considered when analyzing cumulative effects to lynx can be found in appendix C.

Table 102. Action alternative cumulative effects summary

Activity	Alternative 1-Acres			Alternative 2-Acres			Alternative 3-Acres		
	Mapped Habitat[2]	Winter Forage[2]	Denning Habitat[2]	Mapped Habitat[2]	Winter Forage[2]	Denning Habitat[2]	Mapped Habitat[2]	Winter Forage[2]	Denning Habitat[2]
Campground maintenance	5	5	5	5	5	5	5	5	5
Prescribed Fire[1,]	129	86	122	3,502	249	3488	2,638	136	2,629
Grazing	5,912	2,250	4,552	5,912	2,250	4,552	5,912	2,250	4,552
Off-road NNIS treatment	1,358	636	1,255	1,358	636	1,255	1,358	636	1,255
Road Treatments	1,545	539	1,342	1,545	539	1,342	1,545	539	1,342
Stream Restoration	3	1	3	3	1	3	3	1	3
Trail Construction	196	93	159	196	93	159	196	93	159
Partial Timber Harvest[2]	0	0	0	1,800	936	1,771	1,153	507	1,136
Regeneration Harvest	0	0	0	701	128	694	582	111	575
Total Acres	**9,148**	**3,610**	**7,438**	**15,022**	**4,837**	**13,269**	**13,392**	**4,278**	**11,656**
Percent of Total Habitat	31	26	25	38	35	44	34	31	38

1 – includes burn only to avoid duplication of acres
2 – habitat affected

Effects associated with winter recreation are identical to those discussed above under alternative 1.There are no long-term negative effects to lynx or lynx habitat anticipated from other recreation activities. As previously discussed, lynx habitat would also be largely unchanged due to campground maintenance, trail construction, stream work or NNIS treatments. Considering that lynx are also generally tolerant of human activities (Ruediger et al. 2000), effects from these activities would occur largely as short-term displacement of lynx (avoidance of the area during treatments). Similarly because roadside areas are not preferred for denning, and the expected results of hazard tree removal and firewood collection would not alter foraging habitat, the effects from these activities would also consist largely of avoidance during activities.

Lands affected by current livestock grazing regimes include approximately 5,900 acres of lynx habitat and this existing use is not expected to change. Proposed Stonewall Vegetation Management Project activities would result in increased understory vegetation across the analysis area, and in the short term, grazing would be deferred where necessary in areas where aspen is regenerating in accordance with NRLMD guidelines (GRAZ G2). As a result, and considering that there is no evidence that grazing is a factor threatening lynx (USDI Fish and Wildlife Service 2007b), there are no long-term adverse or cumulative effects to lynx or lynx habitat anticipated from continuation of current grazing programs.

Lynx habitat conditions are dynamic, with habitat suitability changing as stands develop from the early stand initiation stage toward mature and multi-storied stages. The analysis of management action effects on lynx habitat is generally focused on activities that will, at least in the short term, reduce the availability of foraging habitat, because maintenance of sufficient foraging habitat is considered essential to the maintenance and recovery of lynx populations. As described above under indirect effects, the low intensity burning planned for the Stonewall Project would result in some short-term effects to lynx habitat conditions, whereas longer-term effects (greater than 10 years), including an increase in unsuitable stand initiation habitat, would result from proposed regeneration harvests, precommercial harvest, precommercial thinning within existing SI habitat, and openings created by mixed severity burning. These proposed treatments would reduce winter forage and den habitat by up to 1,200 acres (9 percent of the existing amount). Although both action alternatives will reduce the amount and quality of existing winter forage in the short term, over 90 percent of the existing winter foraging habitat will be maintained, and current unsuitable stand initiation sites will continue their development toward suitable winter foraging areas. There are no expected shortages in lynx foraging habitat as a result of project activities as the availability of sufficient winter snowshoe hare habitat will be maintained over the short term, and actually increase over time.

Both action alternatives will also reduce the amount and quality of existing lynx denning habitat (by up to 5,800 acres (20 percent)). However, over 80 percent of the existing denning habitat will be retained and suitable denning habitat would likely be restored within 10 years on many treatment sites. Because denning habitat is widely available across the landscape and not considered limiting to lynx reproduction, there are no adverse or cumulative effects to this habitat component expected under either action alternative.

As discussed under alternative 1, the lynx cumulative effects analysis area contains 675 acres of private lands. Because these lands occur at lower elevations or as scattered parcels in fragmented portions of the analysis area, they provide less lynx habitat and it is not expected that future activities on private land would further reduce suitable lynx habitat conditions or create barriers to lynx movements in this landscape.

Both action alternatives provide for continued lynx movement and dispersal throughout the analysis area. Although some treatments, such as larger regeneration harvests or improvement cuts can be expected to have longer lasting effects to some localized lynx movements (Squires et al. 2010, Squires et al. 2013), post-treatment conditions will still provide for lynx movement within the project area, throughout the larger cumulative effects analysis area, and beyond. Implementation of the Blackfoot Travel Plans over the next several years is expected to address many wildlife issues, including the potential impacts of vehicle use on lynx movements and habitat use. Although lynx do not appear to avoid forest roads or groomed snowmobile routes (Squires et al. 2010) and there are no long-term adverse impacts to lynx from roads or winter recreation anticipated, implementation of the travel plans is expected to reduce the existing level of displacement and disturbance caused by vehicle use. Direct changes to lynx habitat as a result of these travel plans are expected to be minimal.

With respect to climate change and current climate trajectories, which will not be affected by any project activities, it is reasonable to expect that upper elevations within the analysis area would likely become more important due to possible climate changes. Both action alternatives are expected to reduce the risk and impact of future wildfires, and ultimately improve the amount, diversity and distribution of winter forage habitat at upper elevations, improving the likelihood that lynx and hare habitat would continue to be available in the future.

The NRLMD was developed to provide a framework that avoids or reduces the potential for projects to adversely affect lynx and promote and conserve the habitat conditions needed to produce adequate snowshoe hare (lynx primary prey) densities to sustain lynx home ranges, and thus sustain lynx populations. Because both action alternatives are consistent with NRLMD objectives and direction, there are no cumulative effects anticipated from implementation of either action alternative that would adversely affect the recovery of lynx populations

Irreversible or Irretrievable Commitments

There are no irreversible commitments to lynx or lynx habitat under either alternative. While there would be a temporary reduction in suitable lynx habitat or habitat quality on sites treated, suitable denning habitat would continue to be available within the project area. Sufficient foraging habitat would be maintained or improved in the long term, and no barriers to lynx movements within and across the broader landscape would be created. There are no irretrievable commitments anticipated.

Alternative 2 Determination and Conclusions

- Alternative 2 would reduce existing winter hare and denning habitat, and some increased snowmobile use is likely. However, these, although effects would be short term and are within the allowable exemptions outlined in the NRLMD. A total of 432 acres of SI habitat would be precommercially thinned, and 717 acres of multi-storied habitat would be treated as part of WUI exceptions for NRLMD standards VEG 05 and VEG 06. All proposed treatments comply with Northern Rocky Mountain Lynx Management Direction (USDA Forest Service 2007b), and there are no effects anticipated that were not considered in the BO (USDI Fish and Wildlife Service 2007b). As a result, the determination for implementation of alternative 2 is **“may affect, likely to adversely affect”** for Canada lynx.

Based on the above analysis and the following rationale, alternative 2 is expected to promote the long-term sustainability of lynx habitat.

- 80 percent of the mapped lynx habitat within the combined LAU's would be unaffected by proposed treatments.
- 91 percent of existing winter foraging and 83 percent of the potential denning habitat within the combined LAU's would be unaffected by proposed treatments.
- All roads would be closed to public access during and post implementation, and no increased development is anticipated. There would be no long-term changes in winter snowmobile use.
- Proposed treatments are designed to restore naturally occurring fire regimes and associated vegetation communities. Natural fire regimes would be restored on 3,373 acres.
- Regeneration treatments focus on stands that have MPB mortality and will promote conifer regeneration and stand diversity. Collectively treatments are expected to reduce risks from insects and disease, and reduce the likelihood of stand-replacing wildfire.
- Treatment would promote development of aspen, and increase shrub, conifer and understory diversity within treatment sites and across the landscape.

- Over the long term, treatments would result in greater stand and landscape diversity, including both spatial and temporal improvement in winter foraging habitat. Potential denning habitat would be maintained across the landscape during implementation and over the long term.
- All roads would be closed to public access during and post implementation and no increased development is anticipated.
- Collectively, treatments would promote the long-term sustainability of lynx habitat

Alternative 3 Determination and Conclusions

Alternative 3 would reduce winter hare and den habitat, but at a reduced level from that of alternative 2. Some increased snowmobile use is likely, although effects would be short- term. A total of 204 acres of SI habitat would be precommercially thinned and 435 acres of multi-storied habitat would be treated. All treatments fall within a WUI and utilize allowable WUI exceptions for VEG 05 and VEG 06. All proposed treatments comply with Northern Rocky Mountain Lynx Management Direction (USDA Forest Service 2007b). As a result, the determination for implementation of alternative 3 is “may affect, likely to adversely affect” for Canada lynx.

Based on the above analysis and the following rationale, alternative 3 is expected to promote the long-term sustainability of lynx habitat.

- 86 percent of the mapped lynx habitat within the combined LAU's would be unaffected by proposed treatments.
- 95 percent of the winter foraging habitat and 88 percent of the potential den habitat within the combined LAU's would be unaffected by proposed treatments.
- All roads would be closed to public access during and post implementation and no increased development is anticipated.
- Proposed treatments are designed to restore naturally occurring fire regimes and associated vegetation communities. Natural fire regimes would be restored on 2,498 acres.
- Regeneration treatments focus on stands that have MPB mortality and will promote conifer regeneration and stand diversity. Collectively treatments are expected to reduce risks from insects and disease, and reduce the likelihood of stand-replacing wildfire.
- Treatment would promote development of aspen, and increase shrub, conifer and understory diversity within treatment sites and across the landscape.
- Over the long term, treatments would result in greater stand and landscape diversity, including both spatial and temporal improvement in winter foraging habitat. Potential den habitat would be maintained across the landscape during implementation, and over the long term.
- Collectively, treatments would promote the long-term sustainability of lynx habitat.

Critical Habitat

Critical habitat contributes to individual species’ conservation by focusing on the species’ primary constituent elements (PCEs). Within the Northern Rocky Mountains, the primary constituent elements for lynx critical habitat include a boreal forest landscape supporting different successional forest stages, snow conditions that support lynx and hare, and abundant downed wood (USDI Fish and Wildlife Service 2009a). Effects to critical habitat are evaluated by looking at effects to, or changes in, these PCEs within the Stonewall Project area, which are summarized in table 103.

Table 103. Effects to primary constituent elements for designated lynx critical habitat

PCE	Effect
PCE (1): Boreal forest landscapes supporting a mosaic of differing successional forest stages and containing:	Effect of Stonewall Vegetation Management Project Action Alternatives
(a) Presence of snowshoe hares and their preferred habitat conditions, which include dense understories of young trees, shrubs or overhanging boughs that protrude above the snow, and mature multistoried stands with conifer boughs touching the snow surface	Ninety to 95 percent of the existing winter hare habitat would be maintained. Winter hare habitat would continue to be available within all watersheds and across both affected LAU's. Over 80 percent of the treatments occur in stands that currently lack a developing understory and treatments would promote hardwood, shrub and conifer diversity. Over the long-term the amount and distribution of winter hare habitat would be improved under both action alternatives.
(b) Winter snow conditions that are generally deep and fluffy for extended periods of time	The project is not expected to alter regional snowfall regimes. With respect to snow compaction from project activities or other human disturbances, most of the anticipated recreational snowmobile use is expected to continue to occur on designated trails that are groomed and currently do not provide winter hare habitat. Re-growth of woody vegetation following harvest, interspersion of unaffected lands and the remote nature of prescribed burning sites reduce the likelihood of additional cross country snowmobile use in the project area that would affect snow conditions for lynx. Ninety to 95 percent of the current winter hare habitat would be unaffected and both action alternatives would maintain the deep, fluffy snow conditions required by hare and lynx over the short and long term.
(c) Sites for denning that have abundant coarse woody debris, such as downed trees and root wads	While treatments would reduce downed woody debris within harvest and burning sites, sufficient large-diameter logs and between 5 and 20 tons per acre of down wood will be retained on all sites proposed for harvest. Unaffected denning habitat would be retained in all sites proposed for prescribed burning and the proposed mixed severity burning would reduce finer fuels, but ultimately increase large coarse woody debris after implementation. Due to the overstocked conditions and continued mountain pine beetle mortality, snags, downed wood, and suitable denning habitat would continue to be widely available across the landscape.
(d) Matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range) such that lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range.	Boreal forest predominates across project area LAU's and when combined with matrix habitat is well distributed and interconnected. While lynx movements would be altered by treatment, connectivity within and between LAU's and documented dispersal corridors (Squires et al 2013) would be maintained under both action alternatives.

Critical Habitat Determination

With no project activities, Alternative 1 is expected to have no effect on Canada lynx critical habitat. Based on the above analysis and the following rationale, a **May Affect, Likely to Adversely Affect Critical Habitat** determination is made for both alternatives 2 and 3.

- Eighty-five percent or more of the mapped lynx habitat would be unaffected.
- Ninety-one percent or more the existing winter foraging would be unaffected and winter hare habitat would be maintained in the short term and improved over the long term. Suitable denning habitat would continue to be widely available across the landscape.
- The risk of continued reduction in winter forage and denning habitat from high-intensity wildfire would be reduced.
- PCE 1d (matrix habitat) would still support the ability of lynx to travel within their home range.
- The Fish and Wildlife Service determined (USDI 2013) that new information made available since 2007 (USDA Forest Service 2013), is consistent with information considered for the NRLMD's 2007 Biological Opinion and thus reinitiation of consultation on the NRLMD is not required for Canada lynx critical habitat (USDI Fish and Wildlife Service 2009).

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Existing lynx habitat and its current trajectory would be largely unchanged under alternative 1. Under the action alternatives suitable denning habitat would continue to be abundant and well distributed across project area LAUs. Winter snowshoe hare habitat would continue to be available in the short and long term and treatments would reduce impacts from insect and disease and the likelihood of stand-replacing wildfire. All alternatives would comply with the NRLMD and are consistent with the Helena National Forest Plan, as amended (USDA Forest Service 2007b), National Forest Management Act requirements to provide for a diversity of animal communities (36 CFR 219.26). Endangered Species Act requirements to conserve endangered and threatened species and to ensure that actions authorized, funded, or carried out are not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of their critical habitat.

Grizzly Bear

The following issue indicators are used to evaluate effects to grizzly bear:

- Compliance with Forest Plan standards and guidelines
- Amendment 19 compliance and changes in TMRD, OMRD and Security Core within the NCDE
- Effects to denning bears and den habitat
- Effects to bears outside the denning period and changes in cover and forage.

Alternative 1

Direct and Indirect Effects

There are no treatments proposed under this alternative, so there would be no direct effects to bears, nor would there be changes in TMRD, OMRD or CORE habitat. Risk of wildfire would remain high, therefore the likelihood of long-term degradation or loss of grizzly bear habitat from stand-replacing wildfire is greatest under this alternative. Also as described under biophysical setting, due to continued fire suppression and insects and disease, whitebark pine is anticipated to continue to decline under this alternative.

Cumulative Effects

There is no way to predict the likelihood of a stand replacing fire and there are no direct or indirect effects under alternative 1, consequently, there are no cumulative effects anticipated for grizzly bear.

Irreversible or Irretrievable Commitments

There are no irreversible commitments to grizzly. Due to continued fire suppression, white bark pine will likely continue to decline and risks of catastrophic wildfire would remain high. Based on available information, the continued reduction in whitebark pine that would occur under this alternative may be considered an irretrievable commitment.

Alternative 1 Determination and Conclusions

The risk of stand-replacing wildfire remains high, but no direct effects are anticipated and in the absence of wildfire grizzly habitat would be unchanged. Because whitebark pine will likely continue to decline, implementation of alternative 1 may affect but is not likely to adversely affect grizzly bear.

Action Alternatives

Action alternatives are evaluated by key elements of grizzly bear habitat including roads/access, den habitat, cover/forage and food storage. Table 104 displays treatments within the recovery area by sub-unit, whereas changes in grizzly bear habitat resulting from the proposed treatments are displayed in table 106.

Table 104. Grizzly habitat treated[1]

Treatments	Core Habitat Treated				Den Habitat Treated				Total Treatment Acres			
	Arrastra Mountain		Red Mountain		Arrastra Mountain		Red Mountain		Arrastra Mountain		Red Mountain	
	Alt 2	Alt 3	Alt 2	Alt 3	Alt 2	Alt 3	Alt 2	Alt 3	Alt 2	Alt 3	Alt 2	Alt 3
Intermediate Harvest	0	0	0	0	0	0	0	0	1,935	1,191	197	197
Regeneration Harvest	0	0	0	0	16	2	0	0	860	612	108	108
Total Harvest[1]	**0**	**0**	**0**	**0**	**16**	**2**	**0**	**0**	**2,795**	**1,803**	**305**	**305**
Underburn	0	0	0	0		0	0	0		302	0	0
Low-Severity Fire	124	2	0	0	43	18	0	0	303	180	0	0
Mixed-Severity Fire <30 acres	1,684	411	1,110	0	442	456	59	27	2,428	1,695	1,352	373
Mixed Severity 30-75 acres	178	603	178	603	8	8	428	428	199	199	1,034	1,034
Jackpot Burning	0		0	78	0		0		0	0	0	326
Total Burning[1]	**1,986**	**1,014**	**1,288**	**603**	**493**	**482**	**487**	**455**	**2,930**	**2,376**	**2,386**	**1,734**

1 - Acres for the Arrastra subunit include 314 acres that fall outside the designated recovery zone boundary.

Both action alternatives propose a total of 81 acres of prescribed fire in Management Situation 1 lands, whereas all other treatments are in Situation 2 lands.

Direct and Indirect Effects

Disturbance

It is anticipated timber harvest would be completed in the next 5 years, whereas it may take up to 10 years to complete the proposed burning. Because all treatments increase human activity, it is expected some bears would be displaced during the non-denning period while treatments are implemented. Although road access would be unchanged following project completion, some long-term disturbance may occur on sites where harvest creates conditions that facilitate foot access. However, within the 24,000-acre project area, harvest is proposed on 12 percent of the project area under alternative 2, and 9 percent of the project area under alternative 3. Of those acres proposed for harvest, 80 percent occur close to roads and private land where bear use is typically lower, reducing the likelihood that a bear would be affected. Also untreated habitat to accommodate any displaced bears is widely available within both subunits. For the Arrastra subunit harvest acres represent approximately 3 percent and 2 percent of the subunit under alternatives 2 and 3 respectively. For the Red Mountain subunit harvest acres represent less than 0.5 percent of the subunit under either alternative. As a result disturbance related effects would be largely limited to short-term avoidance of the sites during treatment

Roads, Access and Core

Alternatives 2 and 3

A total of 2.6 miles and 0.4 mile of roads would be built then obliterated immediately following timber removal under alternatives 2 and 3 respectively. Under both action alternatives all roads that would be built and obliterated following harvest activities occur within the Arrastra subunit. No new road construction would occur in the Red Mountain subunit. These roads would be closed to public access during implementation and permanently closed and obliterated following harvest. Road maintenance would be completed to meet best management practices (BMP) on approximately 46 or 44 miles of roads under alternatives 2 and 3, respectively. The majority of road work would occur in the summer or fall therefore during project implementation all of these roads are analyzed as open during the non-denning period relative to access management. Upon completion of the Stonewall Vegetation project access management would revert back to the existing condition or reflect access management as defined by the final decision and FEIS of the pending Blackfoot Non-Winter Travel Plan anticipated to be completed in 2015.

Access Management - The NCDE grizzly bear recovery zone access management protocol incorporates a moving windows process to determine motorized access during the non-denning period for BMU subunits within the recovery zone. The results of the moving windows process are reflected as percentages for: open motorized route density (OMRD), total route density (TMRD), and secure core (CORE) within the respective subunits. The target thresholds identified for moving windows analysis are referred to as the 19/19/68 guidelines. The goal is to manage motorized access within each subunit during the non-denning period (4/1 through 11/30) so that both OMRD and TMRD do not exceed 19 percent of the subunit and CORE comprises at least 68 percent of the subunit. For OMRD and CORE the moving windows analysis treats all routes open to motorized use equally, regardless of the duration of public motorized use for individual routes during the non-denning period. Routes used for project implementation during the non-denning period that may otherwise restrict public motorized access are also analyzed as open. The process for the moving windows analysis and how routes are categorized based on closure methods etc. are described in the Protocol Paper - North Continental Divide Ecosystem Grizzly Bear Access Management and Flathead National Forest, Amendment 19 - Moving Window Motorized Access Density Analysis & Security Core Area Analysis for Grizzly Bear (filed in the project record as USDA FNF 2008). The 19/19/68 guidelines are described in more detail in the footnotes to table 105 below.

Under the 2013 final Record of Decision (ROD) for Blackfoot Winter Travel, snowmobile use within the Helena NF portion of the recovery zone, all NFS lands north of Highway 200, is restricted after March 31 with the exception of the Copper Bowls play area and the Copper Creek Road providing access. Although there is no spatial overlap with the project area there is overlap with the Arrastra and Red Mountain grizzly bear subunits. Under the final ROD, snowmobile use is allowed in the Copper bowls play area until May 31 resulting in a 2-month overlap with the recognized grizzly bear non-denning period. In essence, the OMRD, TMRD, and CORE values for the Red Mountain and Arrastra subunits are compromised due to late-season snowmobile use during the non-denning period. However, because harvest activities including road improvement work are restricted until after spring breakup, generally late May or June in most years, and snowmobile use of the Copper Bowls is restricted after May 31and often concludes earlier due to annual variability in snow conditions, the potential for late-season snowmobile use to overlap in time with project implementation activities is low. Therefore, the values for the Arrastra and Red Mountain subunits presented in table 105 below reflect results of the moving windows analysis both with and without late-season snowmobile use included for the three alternatives.

Table 105. Route Density and Security Core – Moving Windows Analysis

Subunit	Snowmobile use included (yes/no) y	Percent of subunit meeting 19/19/68 guidelines								
		Alt 1			Alt 2			Alt 3		
		OMRD	TMRD	CORE	OMRD	TMRD	CORE	OMRD	TMRD	CORE
Arrastra Creek	Yes	19*	21	72*	21	21	72*	20	21	72*
	No	17*	19*	74*	19*	19*	74*	19*	19*	74*
Red Mountain	Yes	26	25	56	26	25	56	26	25	56
	No	24	21	58	24	21	58	24	21	58

* Denotes those values meeting the 19/19/68 guidelines.

OMRD - Open motorized route density guideline: ≤19% of each subunit with >1.0 mile/mi2

TMRD - Total motorized route density guideline: ≤19% of each subunit with > 2.0 mile/mi2;

CORE - Core area (>2,500 contiguous acres, ≥0.3 mi. from motorized route, no roads or trails receive “high intensity use” and no motorized routes open during non-denning period) guideline: ≥68% of the subunit considered core area.

As reflected in table 105, the only change in values generated from the moving windows analysis under either action alternative, with or without late season snowmobile use, is the OMRD within the Arrastra subunit. Under both action alternatives TMRD and CORE values within the Arrastra subunit remain unchanged and for the Red Mountain subunit OMRD, TMRD, and CORE all remain unchanged. The slight increase in OMRD in the Arrastra subunit, 2 percent in alternative 2 and 1 percent in alternative 3, is consistent among alternatives under either snowmobile scenario. The increase is due to the fact that the majority of harvest units and associated haul routes occur within this subunit and all roads built and then obliterated following timber removal are within the Arrastra subunit. The low miles of road to be built then obliterated immediately following timber removal, 2.6 and 0.4 miles for alts 2 and 3 respectively, and the close proximity of existing roads to be used as haul routes serves to minimize the degree of change within the subunit. There would be a slight increase in the TMRD for the Arrastra subunit under both action alternatives due to roads built then obliterated following timber removal. However, the degree of change within the subunit is not enough to change the TMRD percentage under either alternative. CORE within both subunits would remain unchanged under either action alternative since all haul routes remain within the existing buffers for open routes.

As shown in table 105 under alternative 1 (existing condition), late season snowmobile use in the Copper Bowls increases OMRD and TMRD and decreases CORE values for both subunits. The Red Mountain subunit currently has a degraded baseline not meeting any of the 19/19/68 guidelines with or without inclusion of late season snowmobile use. However, OMRD, TMRD and CORE within this subunit remain unchanged under both action alternatives since minimal harvest activity is proposed and haul routes would be confined to existing open roads. The Arrastra subunit meets the guidelines under all three alternatives when snowmobile use is excluded. However, when late season snowmobile use is included, TMRD is exceeded by 2 percent under all three alternatives and OMRD is exceeded by 2 percent and 1 percent under alternatives 2 and 3 respectively.

Implementation of either alternatives 2 or 3 is not anticipated to have a substantive impact upon bears relative to access management. There would be no long-term changes to access management resulting from project implementation.Upon project completion access management would revert back to the existing condition pending any changes resulting from the Blackfoot Non-Winter Travel Plan. Neither action alternative would temporarily or permanently reduce the availability of CORE in either subunit and in the Red Mountain subunit OMRD and TMRD remain unchanged during implementation. During implementation there would be no measurable change to TMRD and only a slight increase in OMRD in the Arrastra subunit. The slight increase in OMRD is anticipated to be less than reflected by the moving windows analysis since harvest activities will not be ongoing throughout the entire project area at any given time. If late season snowmobile use is not included in the analysis since the area of use does not overlap the project area spatially and there is low potential for temporal overlap the Arrastra subunit would continue to meet the 19/19/68 guidelines under all three alternatives. In addition, current research has not substantiated that late season snowmobile use has had adverse impacts upon the increasing grizzly bear population within the NCDE.

Denning Habitat

Alternative 2

Acres of modeled denning habitat proposed for treatment is displayed by alternative in table 104. Treatments proposed under alternative 2 would affect 996 acres of modeled denning habitat. Of this, only 16 acres occur within harvest units while 978 acres occur in prescribed burn units. In the Arrastra subunit 509 acres of denning habitat are proposed for treatment. This includes the 16 acres within harvest units and 493 acres in prescribed burn units. In the Red mountain subunit all of the 487 acres of den habitat proposed for treatment occur within prescribed burn units. Of the 996 acres of den habitat proposed for treatment only 2 acres represent high potential (north aspects) den habitat while 994 acres are potential (all other aspects).

Under both alternatives 2 and 3, the proposed treatments would affect approximately 2 percent and 3 percent of modeled denning habitat in the Arrastra and Red Mountain subunits respectively. Although proposed treatments will reduce forest cover through regeneration harvest (16 acres) and mixed severity burning (978 acres), forest cover is not a necessary component of suitable den habitat. Reduction of forest cover therefore is not anticipated to preclude treated acres from functioning as denning habitat and does not reduce the overall availability of modeled denning habitat within the project area or the respective subunits.

Alternative 3

Under alternative 3, 939 acres of denning habitat are proposed for treatment which is 57 fewer acres than for alternative 2. For this alternative, 2 acres occur with proposed harvest units and no high-potential denning habitat would be treated. The reduction in denning habitat acres is slightly lower than in

alternative 2, however, the percentage of denning habitat treated by subunit remains consistent with that reflected for alternative 2 for each subunit.

Alternatives 2 and 3

No treatments are anticipated to occur in denning habitat during the denning period under the action alternatives; therefore, the potential to directly impact denned bears is negligible.

Food Storage and Sanitation

Alternatives 2 and 3

People working in the woods provide opportunities for grizzly bears to be attracted to food and garbage and to become food conditioned. The Lincoln Ranger District has been covered under Food Storage Special Order H-05-01 since 2005, which addresses food and garbage storage. A clause is included in all contracts that requires the contractor adhere to this order. As a result, it is unlikely that effects associated with inadequate food storage and increased risks to bear or people would occur under either action alternative.

Cover and Forage

Effects of individual treatments are discussed in the Alternative Effects section. The following is a discussion of effects to cover and forage conditions related to grizzly bear habitat. Anticipated effects are based on implementation of pdfs including riparian or INFISH buffers. Riparian buffers include 150 feet on either side of perennial streams and 50 feet on either side of intermittent streams. Over 500 acres of riparian buffers are proposed for treatment. Of this 300 acres are prescribed burn units, 170 acres are intermediate harvest units, and 50 acres are within regeneration harvest units. Because not all trees are harvested in intermediate treatment units, and burning is minimized or does not occur, these buffers would continue to provide cover. As a result these areas would continue to provide both cover and travel corridors that would help facilitate bear use within many of the treatments sites.

Alternatives 2 and 3

Changes in grizzly cover and foraging habitat resulting from the proposed treatments are summarized by alternative in table 106 including changes within and outside the designated recovery zone boundary. Effects to cover and forage are discussed by treatment below.

Table 106. Grizzly bear habitat changes

Treatment/Habitat Change	Arrastra Mountain		Red Mountain		Outside Recovery Area	
	Acres	%	Acres	%	Acres	%
Alternative 2						
Long-term Reduction of Forest Cover[1]	1,431	8	756	13	95	17
Timber Harvest	764	4	108	2	95	17
Burning	667	4	656	11	0	0
Reduction in Denning Habitat[1]	0	0	0	0	0	0
Reduced Cover[2]	3,509	20	1,457	25	219	40
Timber Harvest	1,832	10	197	3	102	19
Burning[3]	1,677	10	1,260	22	117	21
Increase in Forage	4,940	28	2,214	38	314	57
Remote Habitat [3,4]	2,568	15	1,221	21	0	0
Habitat Close to Human Activity[3,5]	2,372	13	993	17	314	57

Treatment/Habitat Change	Arrastra Mountain		Red Mountain		Outside Recovery Area	
	Acres	%	Acres	%	Acres	%
Alternative 3						
Long-term Reduction of Forest Cover[1]	1,085	6	460	8	96	18
Timber Harvest	612	3	108	2	96	18
Burning	473	3	352	6	0	0
Reduction in Denning Habitat[1]	0	0	0	0	0	0
Reduced Cover[2]	3,092	18	1,584	28	217	39
Timber Harvest	1,191	7	197	3	94	17
Burning[3]	1,901	11	1,387	24	123	22
Increase in Forage	4,177	24	2,044	35	313	56
Remote Habitat [3,4]	2,063	12	1,113	19	0	0
Habitat Close to Human Activity[3,5]	2,114	12	931	16	313	56

1 – loss of overhead cover due to regeneration harvest and openings created by mixed-severity burning
2 – reduction in cover due to intermediate timber harvest and low-severity burning
3 – only includes 80 percent of each burn unit
4 – includes treatment units beyond 0.25 mile from an open road
5 – includes treatment units within 0.25 mile of an open road

Timber Harvest

Alternatuve 2

Under alternative 2, proposed timber harvest would affect 14 percent of the Arrastra and 5 percent of the Red Mountain sub-units, whereas 36 percent of the lands outside the recovery area would be affected. Under alternative 3, the same amount of harvest would occur within Red Mountain (5 percent), although proposed harvest would be reduced to 10 percent of the Arrastra sub-unit.

Grizzly bear response to logging and logged areas is mixed and complex (Zager et al. 1983, Waller and Mace 1997a). Bear use can be affected by changes in the quality and quantity of forage and cover and by changes in human use patterns. Some studies documented reduced bear use while others found no evidence that logging impacted grizzly bears (MDNRC 2010). Areas most likely to be used are those that produce crops of preferred foods (typically soft mast), and those that are relatively free from human disturbance (ibid.). As a result, treatments were evaluated in terms of changes in cover and forage, as well as their proximity to human activity (table 106).

All harvest would result in a reduction in cover on the site, with regeneration harvest resulting in a long-term loss of overhead forested cover. As a result, bear use of regenerated sites would be reduced and most use within the next 10 years would be expected to occur largely near edges of treatment areas or riparian buffers. Cover would also be reduced on partial or intermediate harvest units, although residual overstory cover would be maintained on sites treated. Riparian buffers would be maintained and interspersed throughout many units, further limiting sight distances. Intermediate harvest prescriptions are expected to provide adequate cover to provide for bear security. The amount of human activity and access also determines the likelihood a harvest site would be used by bears. While there would be no change in public access in the project area, approximately 80 percent of all timber harvest occurs within 0.25 mile of an open road, and close to private land with more concentrated human activity. Due to the proximity to open roads and private land, existing as well as future use of these areas would be expected to be low. Benefits to grizzly in terms of increased forage would be greatest in areas farther than 0.25 mile from an open road. (table 106).

Overall treatment would result in a long-term reduction in forested cover on the acreage affected (6 percent of the recovery area). Conversely available forage would increase. For example Nielson et al. (2004) found the occurrence of critical grizzly bear foods, including roots and tubers, herbaceous vegetation and ants were more common in clearcuts than the surrounding forest. Also shrubs including huckleberry and buffalo berry were found to increase, although this varied by site (Martin 1980, Zager et al. 1983).

Bear use also varies over time. Some research indicates that grizzly do not utilize harvest units until 10 years after treatment (MDNRC 2010), whereas other research found that grizzly utilized recent clearcuts (Nielson et al. 2004, Wielgus and Vernier 2003). Also intermediate-aged clearcuts (approximately 30 years of age) were selected throughout the year, whereas recent and old clearcuts were utilized largely early in the year and again between early August and denning (Nielson et al. 2004). While grasses and forbs would be expected to increase on all sites, increases in shrubs (e.g., huckleberries) were found to be greatest on moist sites with northern and easterly aspects (Martin 1980). Consequently cover and forage availability as well as bear use would vary over time and by site.

Prescribed Burning

Prescribed burning proposed under alternative 2 would affect 17 percent and 41 percent of the Arrastra Mountain and Red Mountain sub-units respectively, whereas burning under alternative 3 would affect 10 and 30 percent of these sub-units. Most of the burning occurs as mixed severity, which includes some high- intensity burning that would create openings and result in a long-term loss of forest cover on 25 to 30 percent of the site. These openings would vary in size, and would be widely scattered and interspersed with riparian buffers, untreated areas and low-severity burn areas. Bear cover would be retained on all sites. As a result, bears would continue to utilize these fire-created openings for foraging following treatment. While there would be little change in overstory on areas affected by low severity burning (50 to 55 percent of the site), understory cover would be reduced. Riparian buffers and untreated areas (at least 20 percent of the unit) would also provide intact cover interspersed throughout the burn unit.

Proposed burning would result in a flush of herbaceous vegetation (grasses and forbs) and it is expected that spring forage would increase within a year of the burn and would be maintained at levels above current conditions well into the future (greater than 20 years). Similarly, production of shrubs such as huckleberry and buffalo berry would increase both in the short (5 years) and long term (greater than 50 years) (Martin 1980). Finally burning in combination with thinning would maintain whitebark pine on over 900 acres under both action alternatives. As a result, it is expected that proposed burning would maintain security cover, while increasing the diversity and distribution of grizzly bear foraging habitat across the landscape. Like timber harvest, use of burn areas where forage is created would be greatest in more remote areas.

Landscape Considerations

Landscape conditions have been shown to influence bear use of managed forests. For example in areas where natural openings or disturbed areas (e.g. fire) were available, bears have been found to avoid clearcuts. However, where fire suppression and succession has led to little if any forest openings, grizzly have adapted to utilizing closely related anthropogenic sites such as clearcuts. Also decades of fires suppression have reduced natural disturbance such as wildfire, and resulted in conifer encroachment that has further reduced natural openings and meadows (Nielson et al. 2004). This is a consideration for the Stonewall Project area because less than 4 percent of the project area occurs in meadow/shrub habitat.

Proposed mixed-severity burning would help restore fire to the landscape as well as increase the availability of openings/meadows in remote areas preferred by grizzly. As a result, both alternatives are

expected to create landscape-level conditions preferred by grizzly (Nielson et al. 2004, Herrero 1972) while promoting the sustainability of whitebark pine and maintaining existing core/remote habitat.

Alternative 3

In an effort to reduce short-term impacts to cover, alternative 3 reduces proposed harvest and burning. Within Arrastra Mountain sub-unit, regeneration and intermediate harvest are reduced by 31 percent and 35 percent respectively, whereas total and mixed-severity burning within this sub-unit is reduced by 19 percent and 27 percent. Although timber harvest within the Red Mountain unit is the same as that of alternative 2, total burning is reduced by 27 percent and mixed-severity burning by 52 percent. Collectively, the reduction in treatments would maintain more cover over the short term than alternative 2, although short- and long-term increases in forage would be reduced. While whitebark pine restoration would be similar and landscape diversity improved, fire risk would be somewhat higher under this alternative.

Cumulative Effects

As described above, the cumulative effect boundary includes 89,216 acres. Of this 75 percent occurs on National Forest, less than 1 percent is State owned land and 24 percent is in private ownership. Past, on-going and future activities within the action area include hazard tree removal, dispersed recreation, NNIS treatment, grazing, private land development, dispersed recreational use and firewood collection, timber harvest, trail maintenance, wildfire, prescribed burning (See section 3.2.2), and travel management planning. It is not anticipated that grazing or dispersed recreation change in the future. Also while there will be some private land development in the future, it is not anticipated that this will affect grizzly or their habitat. Other past activities include hazard tree removal, non-native invasive weed treatment, road maintenance and personnel use firewood. All of these activities occur in close proximity to open roads where grizzly are less likely to occur. As a result long-term impacts from these activities are not anticipated. Activities that could result in long-term effects to grizzly include those that would reduce cover or increase human activity, particularly into more remote habitat used by bears including wildfire, timber harvest and prescribed burning. Table 107 displays past and ongoing activities as well as the maximum amount of future activities anticipated (alternative 2). The cumulative effect analysis period includes regeneration harvest where grizzly bear use may still be affected due to reduced cover conditions, as well as wildfire.

Table 107. Action area cumulative effects

Activity	Past Activities				On-going/Future Activities				Total	
	Arrastra Mountain		Red Mountain		Arrastra Mountain		Red Mountain		Arrastra Mountain	Red Mountain
	Ac	%	Ac	%	Ac	%	Ac	%	%	%
Timber Harvest	1,1391	3	1,206	2	2,596	7	305	<1	10	<1
Prescribed Burning	86	3	0	0	2,930	8	2,386	5	8	5
Wildfire	899	2	25,276	57	NA		NA		2	57
Total Area Affected	**2,038**	**5**	**25,366**	**57**	**5,797**	**15**	**2,691**	**6**	**20**	**63**

1 – includes 227 acres on state land and final harvest on National Forest

2 – all but 90 acres include salvage associated with the snow talon wildfire and the acres affected included in wildfire

3 – occurs on harvest areas and acres reflected accounted for there

Over half of the Red Mountain sub-unit has been affected by wildfire. While past timber harvest has occurred on approximately 3 percent of this sub-unit, all but 90 acres was salvage harvested following the fire. Future activities will affect approximately 5 percent of this sub-unit, and of this, mature forest and

grizzly bear cover will be retained on 75 percent of the acreage treated. Openings created by mixed-severity fire and regeneration harvest will reduce forested habitat by approximately 2 percent of the unit. Overall during the analysis period approximately 63 percent of the Red Mountain unit will have been affected, with 90 percent of the affected acreage associated with past wildfire.

Approximately 20 percent of the Arrastra sub-unit has been affected by harvest, burning or wildfire during the analysis period. Past regeneration harvest has affected approximately 3 percent and proposed treatments will affect another 7 percent. Approximately 2 percent has been affected by past wildfire, whereas prescribed burning under the proposed action will affect another 8 percent.

While past, ongoing and future activities evaluated will affect 10 percent of the action area, 89 percent of the treatments included in the proposed action will maintain forest cover and bear security habitat (intermediate harvest and acres affected by low-severity burning), while promoting stand and landscape-level forage. Although forest cover will be reduced due to proposed regeneration harvest and openings created by mixed-severity burning, as described under direct and indirect effects, 80 percent of the harvest will occur close to roads/human activity reducing potential impacts to bears. Also openings created by mixed severity burning are widely scattered and would be expected to promote forage conditions preferred by grizzly, including maintenance of white bark pine. The action area has recently been affected by past wildfire and the proposed treatments are designed to reduce the risk of stand-replacing wildfire and a further reduction in grizzly bear cover.

The Forest issued the Blackfoot Non-Winter Travel Plan Final Environmental Impact Statement and Draft Record of Decision in March 2014. The travel plan will designate motorized and non-motorized routes for non-winter travel on the Lincoln Ranger District and addresses long-term grizzly bear access and security core habitat concerns. The Final ROD for that project has not been issued at this time. The Draft ROD identified alternative 4 as the preferred alternative, which would improve OMRD, TMRD, and CORE values for both the Arrastra and Red Mountain subunits. However, based on objections received to the travel plan, it is possible that the decision for the Final ROD may vary somewhat from alternative 4. The timing of the travel plan implementation is uncertain at this time, and analysis of the effects of the Stonewall Project alternatives if the travel plan decision is implemented prior to the Stonewall project would be speculative.

Several of the cumulative effects described above are not anticipated to have long-term effects on grizzly bear or its habitat (grazing, dispersed recreation, private land development, and hazard tree removal, weed treatment, road maintenance, and firewood gathering occurring close to open roads). Activities that reduce forest cover or increase human activity can result in long-term effects and include wildfire, timber harvest, and prescribed burning. Although the project proposes to add to the existing effects of past activities, most of the proposed acres occur close to roads and existing human activity. Openings created away from roads are anticipated to be beneficial to grizzly bear by increasing forage production and maintaining white bark pine into the future. It is not anticipated that implementation of the treatments under either alternative 2 or 3 would result in significant long-term adverse cumulative effects to the grizzly bear.

Irreversible or Irretrievable Commitments

There are no irreversible commitments to grizzly anticipated. While proposed activities would reduce cover over the short term, they would also improve habitat diversity, promote whitebark pine restoration and reduce the likely hood that stand-replacing wildfire may occur. As a result, habitat within sites affected would be restored.

Action Alternatives Determination and Conclusions

Both alternatives 2 and 3 would improve landscape level foraging habitat, maintain whitebark pine, result in short and long-term reductions in cover and increase the risk of bear/human interaction. However, based on the above analysis and the following rationale, implementation of alternatives 2 and 3 **may affect, and is likely to adversely affect** grizzly bear.

- Within the Arrastra Mountain sub-unit, guidelines for total motorized road density (TMRD) and open motorized road density (OMRD) would be exceeded by 1-2 percent during project implementation if activities temporally overlap with late-season snowmobile use in the Copper Bowls play area. If project activities do not overlap temporally the OMRD and TMRD guidelines would be met for the Arrastra subunit during implementation of either action alternative. The Arrastra subunit currently meets the guideline for CORE which would remain unchanged under either action alternative. The Red Mountain subunit currently has a degraded baseline exceeding all 19/19/68 guidelines and although there would be no further degradation of OMRD, TMRD, or CORE values under either action alternative, the determination of likely to adversely affect grizzly bears is due to the existing adverse access condition and short-term road use during implementation. After implementation of either action alternative access management would return to the existing condition.
- While up to 2.6 miles of roads would be built then obliterated immediately following timber removal under alternative 2, these segments would be closed to public access during implementation. There would be no change in public motorized access during or post implementation.
- All modeled den habitat will be maintained. No project activities are anticipated within suitable den habitat during the denning season, therefore no impacts to denning bears anticipated.
- Eighty percent of proposed timber harvest is in close proximity to open roads and concentrated human activity, reducing the likelihood that bears would be affected. Only short-term disturbance is anticipated during implementation and no long-term adverse direct effects to bears are anticipated.
- Existing forested cover would be maintained on a minimum of 92 and 87 percent of the Arrastra and Red Mountain sub-units respectively.
- Proposed treatments would promote the long-term sustainability of whitebark pine, increase stand and landscape-level forage, and restore fire to the landscape while reducing the risk of stand-replacing wildfire and a further reduction in grizzly bear habitat.
- All treatments are consistent with Forest Plan goals, objectives and standards and comply with Interagency Grizzly Bear Recommendations.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Grizzly habitat would be largely unchanged under alternative 1. Action alternatives would reduce grizzly bear habitat; however, all but 81 acres would occur within Management Situation 2 lands. Numeric goals for TMRD, OMRD and core would be met post implementation, and treatments would promote the sustainability of whitebark pine, promote landscape conditions preferred by grizzly and reduce the risk of stand-replacing wildfire. As a result, all alternatives are consistent with Forest Plan direction to maintain or enhance sufficient grizzly bear habitat to meet the population goals established in the Grizzly Bear Recover Plan for the Helena National Forest (USDA Forest Service 1986 p. II/1), and apply grizzly bear guidelines to essential and occupied habitat and to minimize man-caused mortality by not exceeding designated open road densities (USDA Forest Service 1986 p. II/19).

Sensitive and Federal Candidate Species

Wolverine

Alternative 1

Direct and Indirect Effects

Because there are no treatments proposed under this alternative, there would be no direct impacts or mortality to wolverine. In the absence of a disturbance event such as large-scale blowdown or stand-replacing wildfire, stands would continue to mature and late-successional conditions, including increasing levels of downed wood would develop. While fuel loading and the risk of wildfire would be greatest under this alternative, den and dispersal habitat would be largely unchanged. Similarly, big game forage and cover, deer and elk populations and wolverine foraging habitat would be maintained.

The existing road system would be unchanged under this alternative and human access is not expected to increase. Remote and natal denning habitat would be maintained and there would be no changes in trapping pressure or increased disturbance to denning habitat anticipated.

Cumulative Effects

Past, ongoing and anticipated future cumulative effects are discussed in volume 2, appendix C. The most far-reaching effect of past management activities has been the development of road systems, recreational trails, and sites that improved access and promoted human use in remote areas. Management activities such as timber harvest and reforestation treatments have altered vegetation and use of the area by big game, reduced overstory snow interception and further increased human access and potential disturbance. Natural disturbances such as the 2003 Snow Talon fire have affected over 23,500 acres within the analysis area, including lands suitable to wolverine reproductive needs..

Past, ongoing and future activities that are most likely to affect wolverine or its habitat during the analysis period are summarized in table 108, which includes activities within the analysis area as a whole, as well as those activities that would occur in natal denning habitat.

Table 108. Past, ongoing and future activities within the wolverine cumulative effect area

Activity	Analysis Area	Natal Denning Habitat
Hazard tree Removal	568 acres	None
NNIS treatment	4,000 acres	None
Firewood Collection	Within 100 ft. of Open Roads	None
Past Wildfire	23,000 acres	3,203 acres
Recent Wildfire	755 acres	301 acres
Trail Maintenance	446 acres (within 100 ft. of trails	35 acres (8 miles of trail)
Prescribed Fire	410 acres	210 acres

While there would be some modification of the understory and removal of downed wood, activities such as trail maintenance, firewood collection and invasive plants treatment would primarily result in short-term disturbance. There would be little habitat changes from these activities. Hazard tree removal would modify foraging habitat along open roads but but not to the point where potential wolverine use would be precluded. Trail maintenance, including trails through natal denning habitat, would continue. While trail use is not expected to change, existing levels of disturbance along the trail corridors would continue.

Also some dispersed recreation activities occur in areas with persistent snowpack. Because wolverines coexist with some level of human disturbance and habitat modification, and considering use is not expected to change, continued recreational use of the analysis area is not expected to adversely affect wolverine. Low-intensity prescribed fire would occur on approximately 400 acres and potential effects to wolverine and wolverine habitat include disturbance during treatment and a short-term reduction in understory vegetation and structure, although both natal denning and foraging habitat would be maintained following treatment.

Approximately 23 percent of the cumulative effects area has been recently (since 2003) affected by wildfire. While wildfire can create conditions preferred by big game and other prey species, fire may temporarily displace wolverines, which utilize late-successional conditions (Greater Yellowstone Coordinating Committee 1988 *in* USDA Forest Service 2012e) and generally post-fire habitat is less suitable than unburned habitats (Hayes, 1970 *in* USDA Forest Service 2012e). Generally, areas that have been recently burned are considered less suitable for wolverine than unburned habitats (Hayes, 1970 in USDA Forest Service 2012e). However post-fire conditions can improve habitat for big game (USDA Forest Service 2012e), therefore, wolverine foraging habitat conditions would be expected to recover and improve over time as a result of these fires. For example the 2011 wolverine documentation occurred on lands affected by the 2003 Snow Talon fire, indicating that foraging on these lands is occurring.

Remote lands within the analysis area and adjacent Wilderness would continue to provide abundant, high quality habitat for wolverines in the short term and long term. Climate change may continue to be an influence on wolverine populations in the long-term and may affect habitat conditions in the future but this is not currently considered a threat to the wolverine's existence. As a result, and considering the small amount of natal denning or foraging habitat impacted by on-going/future activities, and the continued availability of remote habitat within the analysis area, wolverine habitat would be maintained in this landscape

Determination of Effects and Rationale

Although recent fires have affected wolverine foraging and denning habitat, there are no direct project effects associated with alternative 1 and abundant suitable habitat would continue to be available in the foreseeable future. While the risk of future wildlife is greatest under this alternative, there is no way to predict if or when wildfire would occur. Based on the absence of direct project effects and the following rationale, implementation of alternative 1 is expected to have no impact on wolverines.

- Human access and the availability of remote habitat would be maintained and no increase in trapping pressure is anticipated.
- Sufficient natal den habitat would be maintained.
- Big game numbers and use, and wolverine foraging habitat would be largely unchanged.
- Late-successional forest conditions would be maintained or increase with in the analysis area.
- The available scientific and commercial information does not indicate that other potential stressors such as land management, recreation, infrastructure development and transportation corridors pose a threat to the DPS (USDI Fish and Wildlife Service 2013).
- The proposed rule to list the wolverine as threatened (USDI Fish and Wildlife Service 2013) states; "Little scientific or commercial information exists regarding effects to wolverines from development or human disturbances associated with them. What little information does exist suggests that wolverines can adjust to moderate habitat modification and human disturbance. In addition, large amounts of wolverine habitat are protected from human disturbances and

> developments, either legally through wilderness and National Park designation, or by being located at remote and high elevation sites. Therefore, wolverines are afforded a relatively high degree of protection from effects of human activities by the nature of their habitat".

The status of wolverine is currently under litigation and subject to change before this analysis is incorporated into a final NEPA document. Based on the above factors, if the USFWS decision (USDI Fish and Wildlife Service 2014) to not list the wolverine as a Threatened Species is overturned by the court, and the USFWS is ordered to list the wolverine as a threatened species, the determination of this analysis is that alternative 1 would have no effect on wolverines. If the wolverine were returned to Proposed status for further evaluation by the USFWS, the determination is that this alternative would have no effect on the wolverine population in the North American DPS.

Action Alternatives

Direct and Indirect Effects

Neither action alternative proposes any timber harvest in primary wolverine habitat identified by the snow persistence model (Copeland et al 2009) or the maternal habitat model (Inman et al. 2013). For both models the wolverine habitat within burn units is consistent between alternative 2 and 3. Based on the snow persistence model both alternatives propose mixed severity burning on approximately 2,250 acres of wolverine habitat whereas the maternal habitat model reflects approximately 1,010 acres within proposed burn units. While both alternatives propose mixed severity burning in primary wolverine habitat, because burning would not occur during the denning period, there are no direct effects to any potentially active wolverine dens or increased wolverine mortality anticipated as a result of any project activities..

Of the primary wolverine habitat that falls within proposed burn units in either action alternative, potential habitat changes include canopy loss, reduced understory structure and a reduction in downed woody debris. The majority of openings created by fire are expected to be less than 30 acres in size, widely scattered and interspersed with un-burned or lightly burned lands. So while it is recognized that some modeled denning habitat will be impacted, it is not possible to determine the actual extent of this impact to future wolverine denning potential without knowing very specific post-fire micro-site conditions related to opening locations, downed wood structure and availability, and more importantly, future snow conditions which will ultimately determine denning suitability on any particular acre of potential denning habitat. Under either action alternative, suitable denning habitat would continue to be maintained across the landscape.

While proposed treatments have the potential to affect dispersing or travelling wolverines through disturbance or displacement during project activities, wolverines are 20 times more likely to stay in the area of persistent snow cover during dispersal (Schwartz et al. 2009). As a result and considering that timber harvest is proposed in areas of low elevation and that burning would occur after the snow is gone, it is unlikely that dispersing animals would be directly affected by treatment activities. Rather, they are likely to be travelling on high elevation ridges east and north of treatment areas where there is persistent snow and contiguous remote habitat associated with the Scapegoat Wilderness.

Effects of proposed activities on vegetation structure and composition are discussed in detail in section 4.3 and include a reduction in mature forest on 2,221 acres under alternative 2 and 1,641 acres under alternative 3 due to regeneration harvest and openings created during mixed severity burning. Low intensity burning and intermediate harvest would reduce understory structure and downed woody debris, which would modify habitat for wolverine prey species and reduce downed wood. Habitat for species such as the red squirrel and snowshoe hare would be reduced (Ruediger 2000), whereas habitat for chipmunks and ground squirrels would increase (Woolf 2003). These changes in habitat would occur on 5,249 acres under alternative 2 and 4,472 acres under alternative 3.

In Montana and Idaho, big game carrion appears to be the major food source and large mammal carrion is an important dietary component, particularly in winter when other prey is scarce (Banci 1994, Pasitschniak and Lariviere 1995). Anticipated effects on elk and deer are described under big game. While big game use would change, considering that 90 percent of the analysis area would be unaffected, that big game security habitat would be maintained, and that the amount and quality of ungulate forage would be maintained or improved, adequate habitat would continue to be available both in the short and long term to support desired levels of elk and wolverine foraging habitat would be maintained under both action alternatives.

There would be no changes in road management or public access under either action alternative. New roads to be obliterated immediately following harvest are proposed on 2.6 miles under alternative 2 and 0.4 miles under alternative 3. Because these roads occur in areas that are already roaded, they would not further fragment intact forest or reduce landscape connectivity for wolverines, and there would be no reduction in remote forest habitat under either alternative. Harvest is proposed only at lower elevations that lack deep persistent snow, although disturbance to foraging animals during the winter months could occur.

Under the action alternatives; 92 percent or more of the analysis area would be unaffected by treatment, no effects to denning or dispersing animals are anticipated, wolverine denning, dispersal, and foraging habitat would continue to be available in the short and long term, and there would be no reduction in remote habitat. Collectively for these reasons wolverine habitat would be maintained across the landscape and the likelihood that animals would be directly affected is low

Cumulative Effects

In addition to effects described under alternative 1, up to 3,099 acres of timber harvest and 5,463 acres of burning would occur (under alternative 2). Ongoing and future activities would affect 829 acres of modeled denning habitat and reduce mature forest on up to 2,221 acres, which could potentially alter wolverine movement and use. The likelihood that an individual wolverine would be affected is reduced when you consider that the majority of available denning habitat would remain unaffected and that harvest occurs at lower elevations that lack deep persistent snow, reducing the possibility of wolverine occurrence there. Additionally both remote lands and big game habitat would be maintained and public access and trapping pressure would be unchanged.

In the past, wolverines may have been subject to overharvest, but evidence (USDI Fish and Wildlife Service 2014) indicates that wolverine populations have been expanding in recent years and trapping is no longer considered a threat. With the currently suspension of the Montana trapping season for wolverine, existing restrictions in public motorized access, and the continued availability of secure habitat, sufficient protection for wolverine populations remains under both action alternatives. As under alternative 1, dispersed recreation would continue to occur, although this use is not expected to change and there is no evidence that activities such as hiking, camping or hunting adversely affect wolverines. Because wolverines can coexist with some level of human disturbance and habitat modification (USDI Fish and Wildlife Service 2013), continued recreational use of the analysis area is not expected to adversely affect the wolverine.

As discussed above under alternative 1, remote lands within the analysis area and adjacent Wilderness would continue to provide abundant, high quality habitat for wolverines in the short term and long term. Climate change may continue to be an influence on wolverine populations in the long-term and may affect habitat conditions in the future but this is not currently considered a threat to the wolverine's existence (USDI Fish and Wildlife Service 2014). As a result, and considering the small amount of available natal, denning, or foraging habitat actually impacted by on-going/future activities, and the

continued availability of remote habitat within the analysis area, wolverine habitat would be maintained in this landscape under both action alternatives.

Irreversible and Irretrievable Commitments

There are no irreversible or irretrievable commitments to wolverine. While there would be changes in some vegetative conditions due to proposed burning and harvest, sufficient wolverine habitat will be maintained in the analysis area and the treatments do not represent a permanent loss of habitat suitability for wolverine.

Determination of Effects and Conclusions

The Stonewall project was analyzed for effects to wolverines based on vegetation changes and the distribution from human activities associated with the project. Based on the analysis provided and the following rationale, it is determined that implementation of the Stonewall Vegetation Management Project may impact individual wolverines but would not likely contribute to a trend toward Federal listing.

- Mature forest conditions would be maintained on 75 percent of the acreage treated and over 90 percent of the analysis area would be unaffected by any proposed action.
- There are no effects to wolverine denning or dispersal anticipated; no burning would occur during the denning period and burned areas are not anticipated to preclude future use for denning activities.
- There would be no increase in human access and remote habitat would be maintained. Trapping pressure would remain unchanged.
- Big game populations and wolverine foraging habitat would be maintained.
- Proposed treatments would reduce the risk of stand-replacing wildfire.
- The available scientific and commercial information does not indicate that other potential stressors such as land management, recreation, infrastructure development and transportation corridors pose a threat to the DPS (USDI Fish and Wildlife Service 2013).
- The proposed rule to list the wolverine as threatened (USDI Fish and Wildlife Service 2013) states; "Little scientific or commercial information exists regarding effects to wolverines from development or human disturbances associated with them. What little information does exist suggests that wolverines can adjust to moderate habitat modification and human disturbance. In addition, large amounts of wolverine habitat are protected from human disturbances and developments, either legally through wilderness and National Park designation, or by being located at remote and high elevation sites. Therefore, wolverines are afforded a relatively high degree of protection from effects of human activities by the nature of their habitat".

As explained earlier, the status of wolverine is currently under litigation and subject to change before this analysis is incorporated into a final NEPA document. Based on the above factors, if the USFWS decision (USDI Fish and Wildlife Service 2014) to not list the wolverine as a Threatened Species is overturned by the court and the USFWS is ordered to list the wolverine as a threatened species, the determination of this analysis is that the action alternatives **may affect, but are not likely to adversely affect wolverines**. If the wolverine were returned to Proposed status for further evaluation by the USFWS, the determination is that the action alternatives would **not jeopardize** the wolverine population in the North American DPS

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Wolverine habitat would be largely unchanged under alternative 1. While there would be some changes to vegetative conditions with modeled denning habitat under the action alternatives, no effects to wolverine denning or dispersal activities are anticipated, and suitable denning, foraging and dispersal habitat would

continue to be available in the analysis area. Landscape connectivity and remote habitat conditions would be maintained under all alternatives. Consequently all alternatives are consistent with Forest Plan (USDA Forest Service 1986) direction to ensure that viable populations of existing native and desired nonnative species are maintained (p. II/17); to maintain and improve wildlife habitat over time; to support big game and other wildlife species (p. II/1); provide habitat for small game, furbearers and other wildlife species (p. II/4); and to develop and implement a road management program with road use and travel restrictions that are responsive to resource protection needs (p. II/2). All alternatives are also consistent with National Forest Management Act requirements to provide for a diversity of animal communities (36 CFR 219.26).

Gray Wolf

To ensure the conservation of wolf populations, the Forest Service uses three limiting factors identified in the Gray Wolf Recovery Plan (USDI Fish and Wildlife Service 1987) to evaluate impacts from forest management including; (1) potential for wolf/human interaction, (2) effects on the wolf prey base, and (3) impacts to the integrity of key wolf habitat (i.e., rendezvous and den sites). The following is a discussion of these factors by alternative.

Alternative 1

Direct and Indirect Effects

There are no treatments proposed for this alternative, so there are no direct effects anticipated to the gray wolf. Landscape-level habitat is displayed in table 70 and alternative treatment effects discussed in the Alternative Effects section. As described, there would be little change in forest structure and diversity under alternative 1, although increased levels of DWD would occur. Mature forest conditions would continue to predominate across the project area. While forage for big game may continue to decline in some areas, it is expected that localized increases in big game forage would occur and cover would continue to be available within all drainages. There are no anticipated increases in human activity or access, and livestock grazing would be unchanged.

Cumulative Effects

Past, ongoing and anticipated future cumulative effects are in volume 2, appendix C. Anticipated effects are summarized in table 90 and include hazard tree removal, NNIS treatment, road and trail maintenance, trail reconstruction, campground use and improvement, firewood collection, livestock grazing, wildfire, off-forest harvest, ongoing dispersed use and approved prescribed burning.

As described in the Cumulative Effects for All Alternatives section, very little change in existing uses, including livestock grazing and dispersed recreational use, are expected. Also much of this activity would continue to occur along roads or in areas that already receive more concentrated human use (e.g., trails and campground) where wolves are less likely to occur. Wildfire, hazard tree removal, timber harvest and prescribed burning may result in long-term changes in wolf cover and forage conditions and cumulatively, approximately 1,500 acres (2 percent) of the analysis area. While there may be localized changes in big game use, deer and elk habitat would be largely unchanged, public access would not increase, there are no effects to den or rendezvous sites anticipated and habitat conditions necessary to support local populations of wolves would be maintained.

Irreversible or Irretrievable Commitments

Habitat for wolves would remain largely unchanged under this alternative and there are no irreversible or irretrievable commitments to wolves.

Determination and Conclusions

Suitable wolf habitat, including remote areas for denning and big game populations would remain largely unchanged. As a result, and considering that human use and access is not expected to increase, implementation of alternative 1 would have **No Impact** on wolves.

Action Alternatives

Direct and Indirect Effects

While wolves are in the area, there are no known wolf den or rendezvous sites affected and there is no mortality anticipated. While both action alternatives would result in some increase in human activity during implementation, effects would be short term and unaffected habitat is available to support any temporarily displaced animals. The likelihood that an animal would be affected is reduced when you consider that all roads to be built then obliterated immediately following timber removal occur in areas that are already roaded, that approximately 80 percent of the harvest is close to an open road, which is less likely to be used and that public access would be unchanged. .

Based on the treatment effects discussion in the Alternative 1-No Action section and the analysis presented under deer and elk, habitat for big game species would be maintained in the short term and long term. As a result, and due to the widespread availability of unaffected habitat, big game populations and wolf foraging habitat would be maintained.

Cumulative Effects

In addition to effects described under alternative 1, up to 3,099 acres of timber harvest and 5,463 acres of burning would occur (under alternative 2). Specific activities and their effects to wildlife habitat are discussed in the Cumulative Effects for All Alternatives section and under the Direct and Indirect Effects section above. While some activities would result in little change in habitat, treatments would reduce mature forest, alter big game use and increase human access during treatment, whereas approximately 70 percent of the analysis area would be unaffected by treatment, While there may be localized changes in big game use, deer and elk habitat would be maintained, public access would not increase, there are no effects to den or rendezvous sites anticipated and habitat conditions necessary to support local populations of wolves would be maintained.

Irreversible or Irretrievable Commitments

While there would be a short-term decrease in cover, this would be restored and foraging habitat would be maintained or improved. There are no irreversible or irretrievable commitments to wolves.

Action Alternative Determination and Conclusions

Alternatives 2 and 3 have potential for short-term disturbance to foraging or dispersing wolves and would modify big game use. However, based on the above analysis and the following rationale, implementation of alternatives 2 and 3 **may impact individuals, but are not likely to cause a trend toward federal listing** for the gray wolf.

- No den or rendezvous sites would be affected by treatment.
- Any increases in human activity would be short term and unaffected foraging habitat is available within all drainages.
- There are no anticipated increases in livestock use and any increased human activity would be associated primarily with existing trails and use areas.

- Big game habitat and populations are expected to be maintained over the short term and long term.
- Treatments would reduce the risk of stand-replacing wildfire.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

There are no den or rendezvous sites affected under any alternative. Foraging habitat would be largely unchanged under alternative 1. While the action alternatives would affect suitable foraging habitat, big game populations would be maintained or improved. Long-term human access would not be increased and remote habitat would be maintained; no new system roads would be constructed and all roads built would be obliterated immediately following timber removal and would be closed to public access during implementation. Risks of large-scale wildfire would be reduced. All alternatives comply with Forest Plan direction to maintain or improve wildlife habitat over time to support big game and other wildlife species and to maintain or enhance gray wolf habitat to facilitate recovery (USDA Forest Service 1986 p. II/1) and to develop and implement a road management program with road use and travel restrictions that are responsive to resource protection needs (p. II/2). All alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (16 USC 1604((g)(3)(B)); also see 36 CFR 219.10(b): and FSM 2670.12.

Fisher

Alternative 1

Direct and Indirect Effects

There would be no change in roads, road use, public access or risk of trapping mortality. However habitat would change, depending on future disturbances. In the absence of wildfire, while some mortality will occur, fisher habitat in the eastern third of the project area would remain largely intact. Also connectivity with suitable habitat in the Stonewall and Liverpool drainages would be maintained with habitat east of the project area in the Keep Cool drainage (see figure 83). Due to the predominance of lodgepole in the Lincoln Gulch and Beaver Creek drainages and continued MPB mortality, fisher habitat, including connectivity in these drainages would likely be reduced for the next five to 10 years. Levels of DWD would remain high, which would promote preferred structural conditions on lands that maintain adequate canopy closure.

Elevated fuel conditions and continued MPB mortality would increase the risk of stand replacing fire, similar to the 2003 Snow Talon fire, that reduced mature forest on over 20,000 acres in the Copper Creek drainage. If that occurs there would be a long-term reduction in fisher habitat. While there is no way to predict if a wildfire will occur, the risk of a large high intensity wildfire is greatest under this alternative.

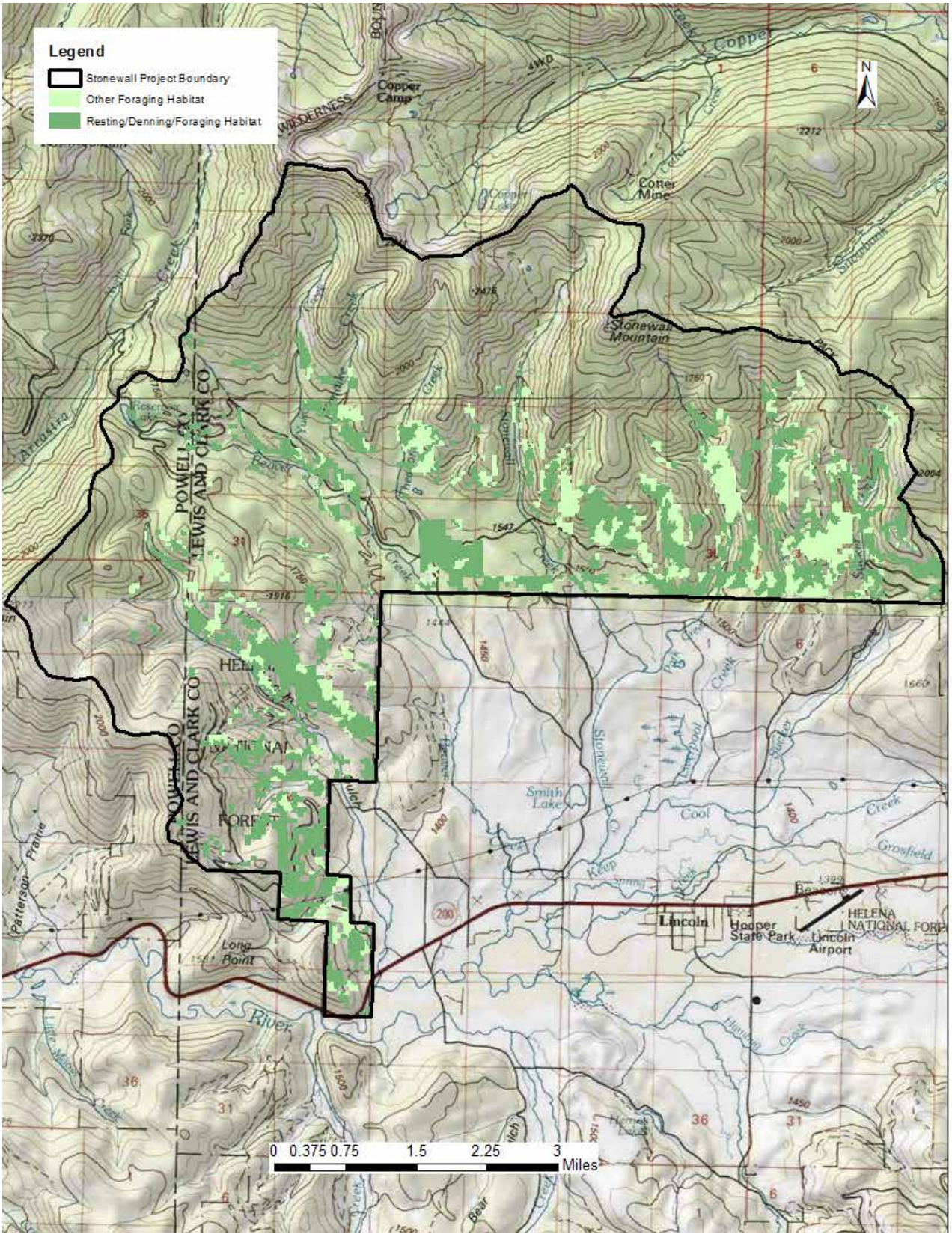

Figure 83. Alternative 1 fisher habitat

Cumulative Effects

Past, present and future cumulative effects evaluated are discussed in volume 2, appendix C. Cumulative effects are evaluated across the 101,977-acre combined boundary described previously, which contains approximately 9,500 acres of suitable fisher habitat. In addition to future MPB mortality, ongoing and future activities likely to affect fisher are displayed in table 109.

Table 109. Fisher cumulative effect summary

Activity	Foraging Habitat	Den/Rest Habitat
Invasive Plants Treatment	64 acres	442 acres
Trail Work (within 100 ft. of trail)	14 acres	22 acres
Prescribed Fire	8 acres	40 acres
Hazard Tree Removal	27 acres	118 acres
Stream Improvement	4 acres	3 acres
Recent (since 2011) Wildfire	2 acres	39 acres
Firewood collection	Within 100 ft. of open roads	Within 100 ft. of open roads

While all of the activities could result in short-term disturbance to fisher during treatment, there are no long-term effects anticipated. While there would be little change in habitat from NNIS treatment, trail work or stream habitat improvement, hazard tree removal and firewood collection would reduce downed wood, whereas prescribed fire would reduce downed wood and alter understory vegetation. While all of these treatments would reduce habitat quality, there would be little change in the overstory and the availability of fisher habitat would be maintained.

Irreversible and Irretrievable Commitments

There are no irreversible commitments anticipated for fisher. While implementation of alternative 1 may increase the risk of stand-replacing wildfire, there are no predictable irretrievable commitments.

Determination and Conclusions

Due to past MPB mortality, the availability of suitable fisher habitat has been reduced within the project area and on-going mortality is expected to further reduce canopy closure and fisher habitat in the next five to ten years. While suitable habitat would continue to be available, use of the project area would likely change and implementation of alternative 1 **may impact individuals, but are not likely to cause a trend toward federal listing.**

Action Alternatives

Direct and Indirect Effects

A total of 2,453 acres and 1,640 acres of fisher habitat fall within treatment units under alternative 2 and 3 respectively, although not all of this would be affected. Alternative 3 was developed to meet project objectives while reducing impacts to mature forest species such as fisher that require closed canopy forest and complex understory structure. As a result fewer acres of fisher habitat are affected under this alternative and more treatment sites would maintain closed canopy conditions. The following is a discussion of the differences between treatments under the action alternatives.

All of the proposed treatments have the potential to adversely affect fisher due to disturbance during implementation. The likelihood of disturbance is reduced when you consider; that most of the project area does not provide landscape conditions preferred by fisher, ,that habitat will continue to be reduced with on-going MPB mortality, that regeneration harvest is proposed in areas of concentrated mortality that provide marginal habitat, that surveys in the Beaver Creek drainage where most of the harvest is proposed did not document fisher use, and that riparian habitat, which provides movement corridors and preferred denning habitat would be maintained.

Table 110 displays existing fisher habitat, fisher habitat affected by treatment and post-treatment fisher habitat under the action alternatives.

Table 110. Effects to fisher habitat by action alternative

Habitat Conditions	Alternative 2			Alternative 3		
	Den	Foraging	Total	Den	Foraging	Total
Acres Existing Habitat	3,042	1,369	4,411	3,042	1,369	4,411
Acres Habitat Reduced	994	287	1281	470	135	605
Acres Post-tmt Habitat (% of existing habitat)	2,048 (67%)	1,082 (79%)	3,130 (71%	2,571 (85%)	1,233 (90%	3,805 (86)
Acres Structure Reduced[1]	543	331	874	433	233	666
Acres of Unaffected Habitat[2] (% of existing habitat)	1,505 (49%)	751 (55%)	2,256 (51%)	2,138 (70%)	1,000 (73%)	3,139 (71%)

[1] – habitat affected by low severity burning and intermediate harvest that maintains 40 percent canopy closure
[2] – includes INFISH buffer habitat

Alternative 2

Direct and Indirect Effects

Approximately 1,505 acres of existing den/rest (49 percent) habitat and 751 acres of other foraging habitat (54 percent) would be unaffected and effects would be similar to those described under alternative 1. A total of 2,171 acres of fisher habitat fall within treatment units and post-treatment suitable habitat that would result under this alternative is displayed in figure 84.

Many of the treatments proposed under this alternative have the potential to result in disturbance during implementation. While the possibility exists that a den or foraging/dispersing individual could be affected, the likelihood is reduced when you consider that (1) many of the treatments would occur outside the denning period, (2) preferred riparian habitat would be maintained (3) most of the harvest occurs in areas with concentrated pine beetle mortality that provide less preferred habitat and (4) surveys in the Beaver Creek drainage where much of the treatment occurs did not document fisher use. As a result the likelihood of direct effects are considered low. While some new road construction would occur under this alternative, because public access would not increase and considering all roads would be obliterated following use, there would be no increase in trapping pressure or associated mortality.

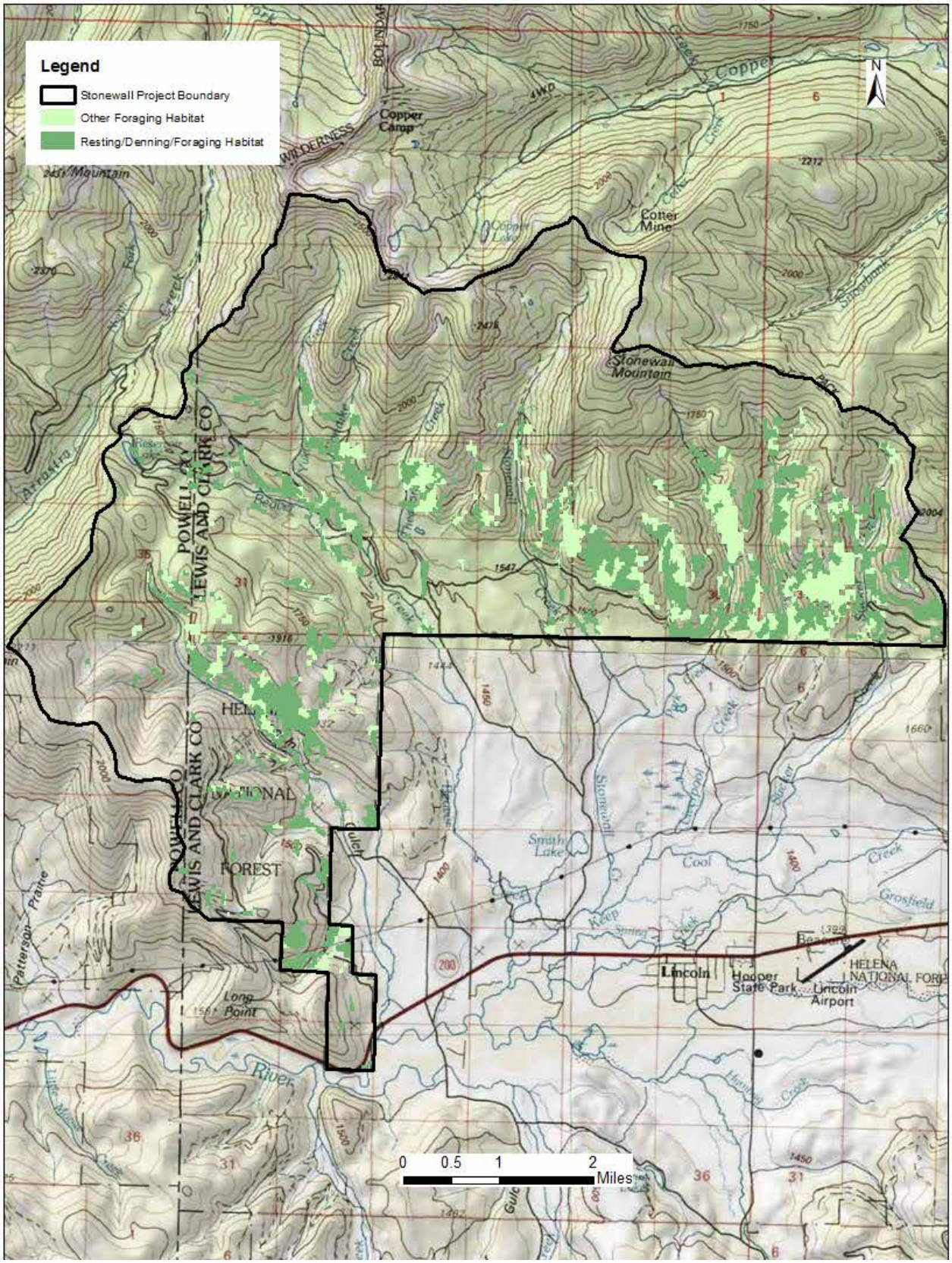

Figure 84. Alternative 2, fisher habitat and treatments

Changes to suitable fisher habitat under this alternative would vary by treatment. Because most intermediate harvest and regeneration treatments would reduce canopy cover below 40 percent, existing habitat affected would be made unsuitable. Suitable fisher habitat within intermediate harvest would be restored within 10 to 15 years, whereas regeneration harvest would result in a long-term reduction in habitat. Habitat would also be reduced on mixed severity burn sites that experience high intensity burning. Post-treatment under this alternative suitable fisher habitat would occur on approximately 3,130 acres (71 percent of existing habitat), including 2,048 acres of den/rest (67 percent of existing habitat) and 1,082 acres (79 percent of existing) of other foraging habitat. With implementation of harvest and burning restrictions within INFISH buffers, canopy closure and suitable habitat would be maintained within riparian areas.

While low severity burning and some of the partial harvest treatments would maintain 40 percent canopy closure and suitable fisher habitat, because downed wood would be removed during treatment, these activities would reduce understory structure and fisher habitat quality on an additional 543 acres of den/rest habitat and 331 acres of foraging habitat. With implementation of pdfs all units would continue to provide between 5 and 20 tons per acre of downed wood, as well as large-diameter logs. As a result and considering the large amount of standing and downed wood within all project area watersheds and retention of downed wood within riparian areas, downed wood will continue to be available at both the stand and landscape level.

Approximately 1.8 miles of new road construction would traverse suitable fisher habitat under this alternative, although no roads would be open to the public and all roads would be obliterated following implementation.

Spatial changes in habitat resulting under this alternative can be evaluated by comparing figure 83 and figure 84. Because lower Beaver Creek and Lincoln Gulch have a large lodgepole component and concentrated pine beetle mortality, most of the timber harvest and the greatest reduction in suitable fisher habitat occurs here and habitat connectivity within these drainages would be reduced under this alternative. Effects of these changes on fisher use are determined in part by the landscape conditions and amount of closed canopy mature forest (Heinmeyer and Jones 1994). As described under alternative 1, closed canopy forest has been recently reduced due to pine beetle mortality and the project area does not currently provide the landscape conditions preferred by fisher. While stands affected by MPB mortality would have elevated levels of dead wood, suitable habitat in the Beaver Creek and Lincoln Gulch drainages would be further reduced within the next five to ten years as canopy closure continues to decline. So while treatment under this alternative would reduce habitat connectivity in these drainages, use of the project area by fisher would be reduced.

As described under affected environment, fishers are strongly associated with riparian zones (Jones 1991, Heinmeyer and Jones 1994, Ruggiero et al. 1994), riparian areas are used extensively as travel corridors (Heinmeyer and Jones 1994), and prey are more readily available within forested riparian areas (Heinmeyer and Jones 1994, Jones 1991). With implementation of INFISH buffers, live trees would not be cut, increased amount of dead and down material would be left and existing riparian habitat would be maintained.

Alternative 3

Approximately 2,138 acres of existing den/rest habitat and 1,000 acres of foraging habitat (73 percent) would be unaffected and effects would be similar to those described under alternative 1. Under alternative 3 timber harvest and mixed-severity burning would be reduced; a total of 1,272 acres of suitable fisher habitat would be affected, including 904 acres of den/rest habitat and 369 acres of other foraging habitat. Post-treatment suitable habitat that would result under this alternative is displayed in figure 85.

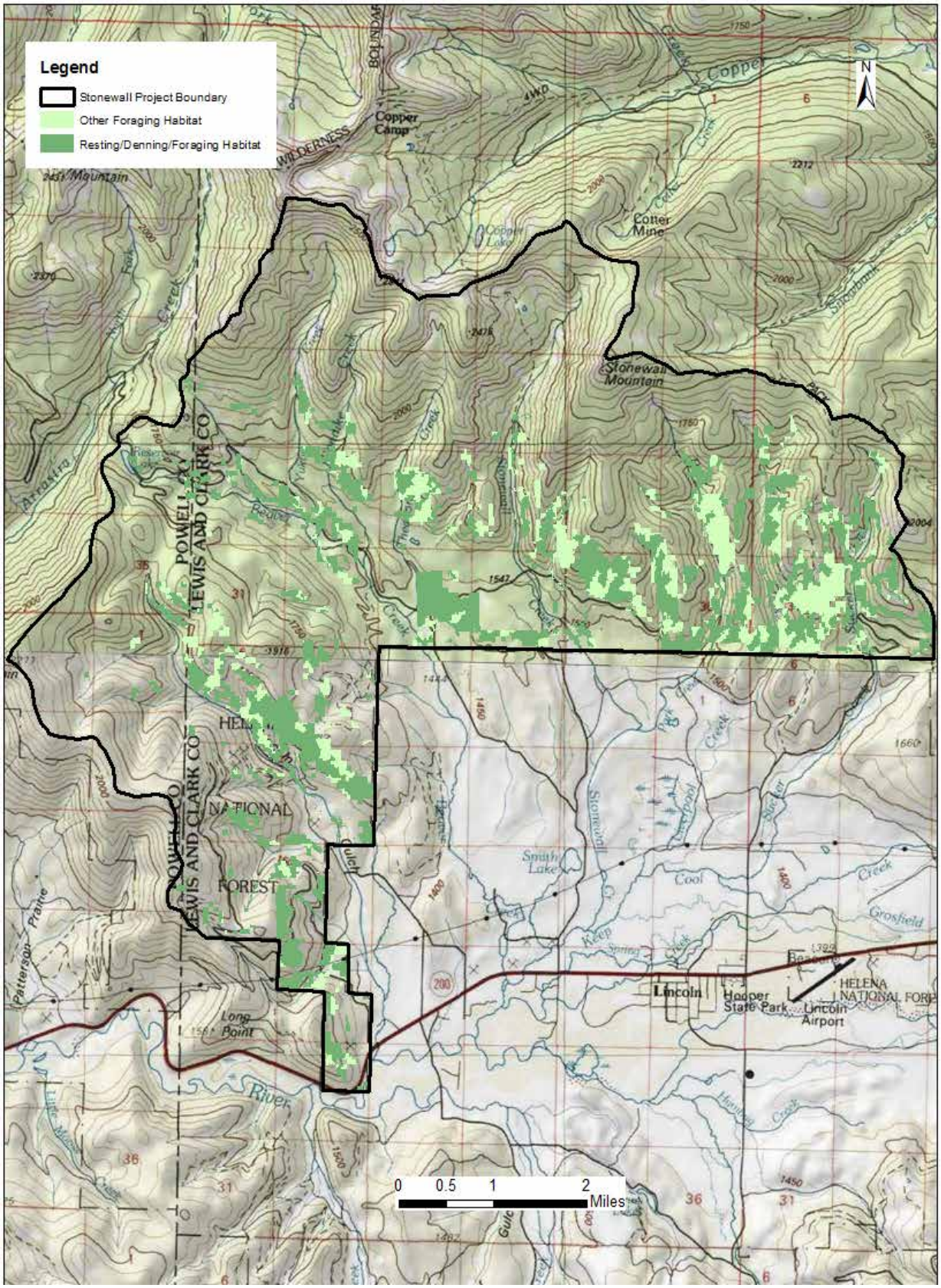

Figure 85. Alternative 3, fisher habitat and treatments

Potential direct effects would be similar to those described under alternative 2, although because fewer acres of den/rest habitat would be treated, the likelihood that a den would be affected is reduced under this alternative. Similarly, because treatment would be eliminated on 883 acres (when compared to alternative 2), the likelihood of disturbance to non-denning individuals is also reduced. Road construction within suitable fisher habitat would occur on 0.3 miles and like alternative 2 there would be no changes in public access or trapping pressure.

Because treatments under alternative 3 retain more closed canopy forest, approximately 86 percent of the existing suitable habitat or approximately 3,805 acres would be retained, including 2,571 acres of existing den rest habitat (85 percent) and 1,233 acres of existing foraging habitat (90 percent). While alternative 3 would retain more suitable habitat, because some harvest treatments are replaced by prescribed burning, the total acres where habitat quality would be reduced would be similar to those of alternative 2. Under alternative 3 habitat quality would be reduced on 233 acres of foraging and 433 acres of den rest habitat. Like alternative 2, while treatment would reduce the availability of dead wood, with implementation of PDF's all units would continue to provide between five and twenty tons per acre of downed wood and a component of large diameter logs. As a result and considering the large amount of standing and downed wood within all project area watersheds (see section 4.5.7) and retention of downed wood within riparian areas and on 20 percent of prescribed burn sites, downed wood will continue to be available at both the stand and landscape level.

As shown in figure 85, treatment changes under alternative 3 would retain larger blocks of closed canopy forest in both the Beaver Creek and Lincoln Gulch drainages. While project area use by fisher is considered low, habitat connectivity would be better maintained under this alternative.

Cumulative Effects

In addition to cumulative effects described under alternative 1, the action alternatives would result in up to the following (alternative 2)

- Prescribed burning on 438 acres of foraging habitat and 690 acres of den/rest habitat
- Regeneration harvest on 48 acres and 229 acres of foraging and den/rest habitat.
- Partial harvest on up to 146 acres and 620 acres of foraging and den/rest habitat.

Cumulatively during the analysis period, up to approximately 751 acres or 25 percent of the available foraging habitat would be affected and up to 2,203 acres or 34 percent of the available den/rest habitat would be affected. Closed-canopy conditions and suitable fisher habitat would be maintained on approximately 60 percent of the acres affected. Preferred riparian habitat and travel corridors would be retained, structural conditions preferred by fisher would be maintained, and habitat would continue to be available to accommodate use of the project area by fisher.

Irreversible and Irretrievable Commitments

Alternatices 2 and 3

There are no irreversible commitments anticipated for fisher. While both action alternatives would reduce suitable habitat on areas affected by harvest and alter structural diversity on fisher habitat, suitable habitat conditions would be restored on all sites.

Determination and Conclusions

Alternative 2

Based on the above analysis and the following rationale, implementation of alternative 2 **may impact individuals, but are not likely to cause a trend toward federal listing** for fisher.

- Due to widespread mountain pine beetle mortality, available fisher habitat has been reduced, and much of the project area does not provide the overstory or landscape conditions preferred by fisher. As a result, the likelihood of direct effects is low.
- Approximately 79 percent of the existing foraging habitat and 67 percent of the existing den/rest habitat would be maintained and 51 percent of existing habitat unaffected. Preferred riparian habitat would be largely unaffected and connectivity of existing habitat would be maintained outside of areas with concentrated MPB mortality.
- There would be no increase in open roads and fisher security habitat would be unchanged. Also there is no anticipated increase in trapping pressure.
- Proposed treatments are designed to reduce the risk of stand-replacing wildfire and a possible long-term loss of fisher habitat.
- Fisher habitat is well distributed across the forest and the Northern Region (Samson 2006b). Distances between areas of suitable habitat are within dispersal distance characteristic of this species.

Alternative 3

Alternative 3 strives to meet project objectives, while reducing effects to mature forest species. Based on the above analysis and the following rationale, implementation of alternatives 3 may impact individuals, but are not likely to cause a trend toward federal listing for fisher.

- Due to widespread mountain pine beetle mortality, available fisher habitat has been reduced, and much of the project area does not provide the overstory or landscape conditions preferred. As a result, the likelihood of direct effects is low.
- Approximately 90 percent of the existing foraging habitat and 85 percent of the existing den/rest habitat would be maintained, whereas 71 percent of existing habitat unaffected. Preferred riparian habitat would be largely unaffected and connectivity of existing habitat would be largely maintained in all drainages.
- There will be no increase in open roads and fisher security habitat will be unchanged. There is no anticipated increase in trapping pressure.
- Proposed treatments are designed to reduce the risk of stand-replacing wildfire and a possible long-term loss of fisher habitat.
- Fisher habitat is well distributed across the Forest and the Northern Region (Samson 2006b). Distances between areas of suitable habitat are within dispersal distance characteristic of this species

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Fisher habitat would be maintained under alternative 1. While both action alternatives would reduce suitable fisher habitat and alter structural conditions, the likelihood of mortality is low, any disturbance would be short term, preferred riparian habitat would be protected, and human access and trapping pressure would not change. As a result, all alternatives are consistent with Forest Plan (USDA Forest Service 1986) direction to ensure that viable populations of existing native and desired nonnative species are maintained (p. II/17), to provide habitat for small game, furbearers and other wildlife species (p. II/4), to manage riparian areas to be compatible with dependent wildlife species (II-35) and to develop and implement a road management program with road use and travel restrictions that are responsive to resource protection needs (p. II/2). All alternatives are also consistent with National Forest Management

Act requirements to provide for a diversity of animal communities (16 USC 1604((g)(3)(B)); also see 36 CFR 219.10(b): and FSM 2670.12

Townsend's big-eared bat

Alternative 1

Direct, Indirect and Cumulative Effects, and Determination

There are no treatments proposed under this alternative and suitable foraging habitat would remain largely unchanged. There are no direct or indirect effects. Project area cumulative effects are identified in volume 2, appendix C. Activities that are most likely to alter foraging habitat are displayed below.

- Campground rehabilitation – 5 acres
- Grazing – 5,977 acres
- NNIS treatment – 312 acres
- Hazard tree removal – 318 acres
- Stream rehabilitation – 15 acres
- Trail work – 5 acres
- Recent wildfire – 10 acres
- Firewood collection within 100 feet of open roads
- Continued MPB mortality

While these activities may alter habitat conditions on a localized basis, landscape-level foraging habitat would be largely unchanged and there are no significant cumulative effects anticipated. As a result, implementation of alternative 1 would have **no impact** on the Townsend's big-eared bat.

Action Alternatives

Direct and Indirect Effects

The project area does not provide suitable hibernacula or roost sites and only foraging bats would be affected. Because bat activity occurs at night or at dawn/dusk, it is unlikely timber harvest would result in direct effects (harm or harassment). While it is possible that smoke from prescribed burning could occur on a site when bats are actively foraging, all burning must adhere to state air quality standards and prior to implementation a prescribed burn plan would be developed. Smoke management is an important part of the burn plan and adherence to atmospheric guidelines helps to ensure that smoke is quickly dispersed. As a result, any smoke related impacts would be short term.

Proposed treatments would affect 8,562 and 6,562 acres of forested habitat under alternatives 2 and 3 respectively. Increased structural diversity would result from burning, and bat prey diversity and foraging habitat would be maintained or improved on sites burned. The remaining treatments would involve partial or intermediate harvest and regeneration harvest activities. Because this species typically does not use regenerating forest (Gruver and Keinath 2006), suitable foraging habitat would be reduced on 4 and 3 percent of the project area under alternatives 2 and 3 respectively. Because partial harvest would maintain a mature overstory while increasing understory development, treatments would likely improve habitat by increasing prey diversity and reducing forest "clutter" which would improve maneuverability. Due to the variety of treatments proposed, considering over 60 percent of the project area would not be treated, and

that foraging habitat would be improved on most of the acres affected by treatment, the project area would continue to provide a structurally diverse forest to support a diversity of prey for foraging.

Cumulative Effects

Cumulative effects are evaluated across the project area. A complete list of activities found within the project area can be found in volume 2, appendix C. In addition to cumulative effects described under alternative 1, foraging habitat would be affected on up to 5,463 acres of prescribed burning, 968 acres of regeneration harvest and 2,131 acres of partial harvest.

Of these activities, only regeneration harvest would likely modify the overstory to a level that would affect bat foraging habitat. Because treatments would increase stand and landscape diversity, it is likely that invertebrate diversity or bat foraging habitat would be maintained or improved. As a result, forested structural diversity and Townsend's big eared bat foraging habitat would continue to be available across the landscape.

Irreversible and Irretrievable Commitments

There are no irreversible or irretrievable commitments anticipated for Townsend's big-eared bat. The action alternatives would reduce suitable habitat on areas affected by regeneration harvest and alter structural diversity on sites proposed for partial harvest or burning; however, suitable habitat conditions would be maintained or restored on all sites.

Determination

The action alternatives would affect suitable habitat on 27 to 35 percent of the project area. Based on the above analysis and the following rationale, implementation of alternatives 2 and 3 **may impact individuals, but are not likely to result in a trend towards federal listing** for the Townsend's big-eared bat.:

- The project area does not provide suitable hibernacula or roost sites and the closest known hibernacula is over 30 miles from the project area, minimizing use of the area by foraging bats.
- Over 60 percent of the project area would not be treated; a diversity of habitat conditions would occur and suitable foraging habitat would continue to be available under both alternatives.
- While suitable foraging habitat would be affected on up to 4 percent due to proposed regeneration harvest, collectively, proposed treatments are be expected to improve foraging habitat.
- Proposed treatments would reduce risk of wildfire and insect- and disease-related mortality and reduce the likelihood of large stand-replacing wildfire.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

No hibernacula or roost sites would be affected and suitable foraging habitat would be maintained or improved. As a result all alternatives are consistent with Forest Plan (USDA Forest Service 1986) direction to; provide habitat for small game, furbearers and other wildlife and fish species (p. II/4) and to ensure that viable populations of existing native and desired nonnative species are maintained (p. II/17). All alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (16 USC 1604((g)(3)(B)); also see 36 CFR 219.10(b): and FSM 2670.12.

Bald Eagle

Alternative 1

Direct, Indirect and Cumulative Effects and Determination

There are no treatments proposed, so there are no direct or indirect effects anticipated. Cumulative effects are summarized in volume 2, appendix C. Cumulative effects likely to affect the bald eagle during the analysis period include off-forest timber harvest and private land development, continued use along the Blackfoot River and a possible loss of future nest trees due to MPB mortality. While there could be a localized reduction in suitable nest trees, available nest, foraging and roost habitat would remain largely unchanged and there are no significant cumulative effects anticipated for the bald eagle. As a result, implementation of alternative 1 would have **no impact** on the bald eagle.

Action Alternatives

Direct and Indirect Effects

The nearest known existing eagle nest is approximately 1.5 miles from proposed treatment. With implementation of pdfs to restrict aircraft during the breeding season and which require dispersal of smoke away from the nest, there are no direct effects to nesting birds or reproduction anticipated.

Disturbance and disruption of roosting/foraging birds can adversely interfere with feeding and affect productivity or survival of young (USDI Fish and Wildlife Service 2007a). Disturbance to foraging birds could occur because some burning and timber harvest is proposed within approximately 350 feet of suitable foraging habitat along the Blackfoot River. However, there are no communal roost sites or established foraging areas affected. As a result, and considering the small portion of the river affected (1.5 miles within 0.25 mile of a treatment) and widespread availability of unaffected foraging/roosting habitat, any adverse effects associated with smoke or disturbance are expected to be short term.

Proposed regeneration harvest would remove approximately 100 acres of potential bald eagle nest habitat within 1 mile of the Blackfoot River. These lands are immediately adjacent to Highway 200 and existing private land development. As a result they do not provide preferred bald eagle nest habitat. Further, unaffected nest habitat would continue to be widely available

Cumulative Effects

In addition to cumulative effects discussed under alternative 1, implementation of treatments under the action would reduce potential nest trees on lands adjacent to the Blackfoot River. Also, birds foraging along the river may be disturbed during treatment. However, any disturbance effects would be short term. Bald eagle nest, foraging and roost habitat would remain largely unchanged and implementation of project design features would protect existing and future nests. As a result, and considering future uses are not expected to change and that eagles have successfully nested in this area with ongoing uses, there no significant cumulative effects anticipated.

Irretrievable and Irreversible Commitments

There are no irretrievable or irreversible commitments anticipated for the bald eagle under this alternative.

Determination and Conclusions

Proposed activities have the potential to result in short-term disturbance to foraging eagles, although with implementation of project design features, there would be no impacts to nesting birds. Existing habitat in

the project area habitat would be largely unaffected. As a result alternatives 2 and 3 **may impact individuals, but are not likely to result in a trend toward federal listing** for the bald eagle.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

There would be no effects to eagles under alternative 1, while alternatives 2 and 3 propose treatment within suitable eagle nesting and foraging habitat, with implementation of pdfs the likelihood of impacts to nesting birds is low. As a result and because of the small amount of habitat treated and availability of unaffected nesting and foraging habitat along the Blackfoot River corridor, both alternatives are consistent with Forest Plan (USDA Forest Service 1986) direction to; provide habitat for small game, furbearers and other wildlife species (p. II/4) and to ensure that viable populations of existing native and desired nonnative species are maintained (p. II/17). Also all alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (16 USC 1604((g)(3)(B)); also see 36 CFR 219.10(b): and FSM 2670.12. Additionally, both alternatives comply with the Bald and Golden Eagle Management Act and are consistent with direction provided in the 2007 National Bald Eagle Management Guidelines (USDI Fish and Wildlife Service 2007a).

Black-backed Woodpecker

All Alternatives

Under all alternatives, insect infestations would continue to create snags and lower quality habitats. Suitable post-fire habitat currently occurs on over 100,000 acres of the HNF. Of this, almost 23,000 acres occur within or immediately adjacent to the Stonewall project area. Consequently suitable BBW habitat across the Forest and in the vicinity of the project area is widely available on areas that have recently burned. As a result and considering the availability of burned habitat region-wide, adequate habitat exists across the landscape to maintain viable BBW populations (Samson 2006a).

Alternative 1

Direct, Indirect, Cumulative Effects and Determination

There are no treatments proposed, so there would be no direct effects and the existing vegetation condition and BBW habitat would remain largely unchanged. Insect-infested trees would likely continue to provide limited foraging opportunities and suitable post-fire habitat would continue to be available northeast of the project area. The likelihood of stand-replacing wildfire would remain high and this alternative is most likely to result in development of high quality BBW habitat in the future.

Anticipated cumulative effects are in volume 2, appendix C. Activities that have affected BBW habitat includes fuel management activities, timber harvest and hazard tree removal activities that have reduced snags and suitable habitat; as well as past and recent wildfire and MPB mortality that have increased habitat. Future activities that would reduce BBW habitat include continued hazard tree removal, private timber harvest and firewood collection. While habitat quality associated with the Snow Talon fire has declined, smaller acreages of more recent wildfire has occurred within the analysis area and secondary habitat in MPB mortality is widespread. As a result and considering the BBW is capable of surviving in non-post fire areas (Hoyt and Hannon 2002 In Samson 2006a), suitable black-backed woodpecker habitat will continue to be available. Additionally, the risks of future wildfire, which would create future BBW habitat is greatest under this alternative and implementation of alternative 1 will have **no impact** on the black-backed woodpecker.

Action Alternatives

Direct Effects and Indirect Effects

While the possibility exists that a woodpecker could be affected, recently burned lands within the project area that provide preferred BBW habitat would not be treated. As a result the likelihood of mortality or disturbance is low.

Effects of treatment would be similar to those described under the dead wood section. Proposed harvest would reduce tree susceptibility to insects in all treatment units thereby reducing hazard from bark beetles. Unaffected areas of mortality will continue to be widely available and it is not anticipated that treatment would alter landscape level use by the BBW. Standing dead trees would be managed to Forest Plan standards, although snag density and suitable habitat would be reduced. A reduction in fire risk associated with the action alternatives would reduce potential black-backed woodpecker habitat in the analysis area, given their dependence on recently burned forests.

Alternative 2

Indirect Effects

Alternative 2 would reduce BBW habitat on approximately 3,100 acres receiving a timber harvest treatment. Proposed mixed-severity burning would result in recruitment of new snags including some large patches with higher snag density, therefore, BBW foraging habitat would be improved on approximately 1,200 acres affected by high-intensity burning. Lands proposed for low-intensity burning would remain largely unchanged.

Alternative 3

Indirect Effects

Alternative 3 would reduce snags and low quality BBW foraging habitat on 1,895 acres proposed for timber harvest, whereas lands proposed for low-intensity burning would remain relatively unchanged. Like alternative 2, proposed mixed-severity burning would increase snags and potential high quality BBW foraging habitat on approximately 800 acres.

Alternatives 2 and 3

Cumulative Effects

In addition to cumulative effects under alternative 1, there would be a reduction in snags and low-quality habitat on up to approximately 3,100 acres (alternative 2), whereas high-quality habitat would be increased in high-intensity burned areas. As described under the dead wood section, snag densities within all affected watersheds would remain high. Also lands affected by recent wildfire would continue to provide primary habitat, whereas secondary habitat, or lands with MPB mortality, would continue to be available across the landscape.

Irretrievable and Irreversible Commitments

There are no irretrievable or irreversible commitments. Both alternatives would result in a decrease in low-quality habitat and an increase in high-quality habitat for the black-backed woodpecker.

Action Alternatives Determination

Proposed activities would reduce suitable habitat for this species and reduce the risk of high-intensity wildfire. Based on the above analysis and the following rationale, implementation of alternatives 2 and 3

may impact individuals or habitat, but would not likely contribute towards a trend in federal listing for the black-backed woodpecker.

- Proposed mixed-severity burning would be expected to create high quality habitat on over 800 acres.
- Because only low-quality habitat is affected, and considering existing high-quality habitat would not be treated, the likelihood of direct mortality or disturbance from treatment is low.
- Evidence suggests that the black-backed woodpecker is increasing in the United States (Dixon and Saab 2000). No demographic information exists to suggest a decline in BBW numbers.
- Black-backed woodpecker habitat is abundant and well-distributed across the Forest and the Northern Region. Distances between areas of suitable habitat are within dispersal distance characteristic of this species.
- Habitat for the black-backed woodpecker has recently increased, and amounts are expected to increase as fires and bark beetle outbreaks continue to increase in size (Samson 2006b).
- A comparison of habitat required for a viable population, indicates well-distributed habitat greatly exceeds that needed, given the natural distribution of species and their habitats as mapped and according to available scientific literature (Samson 2006b).

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Black-backed woodpecker habitat would be unchanged under alternative 1. Because high- quality BBW habitat would not be treated under the action alternatives, and considering that all sites proposed for treatment would meet or exceed levels of snags and downed woody debris recommended in the Forest Plan (USDA Forest Service 1986 p. II/20-21), all alternatives are consistent with Forest Plan direction to provide habitat for small game, furbearers and other wildlife species (p. II/4) and to ensure that viable populations of existing native and desired nonnative species are maintained (p. II/17). Also all alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (16 USC 1604((g)(3)(B)); also see 36 CFR 219.10(b): and FSM 2670.12.

Flammulated Owl

Effects to flammulated owls are evaluated by looking at the amount of available Dry Forest habitat by alternative and by looking at the amount and distribution of large-diameter snags.

Alternative 1

Direct and Indirect Effects

No treatments are proposed under this alternative and there are no direct effects. Conifer stands not affected by MPB mortality would continue to succeed and closed canopy conditions would increase. Mountain pine beetle infested stands would shift to predominantly Douglas fir. As described under the biophysical setting discussion, in the absence of fire, the open-canopy dry forest and ponderosa pine component would continue to decline. Snag densities including a component of large-diameter ponderosa pine snags would remain high for 10 to 20 years, then would decline after this period as existing snags fall to the ground. Over time, flammulated owl habitat would decline due to the continued reduction in open canopy dry forest and large diameter ponderosa pine snags.

While the effects of fire on this species have not been well studied, it is known that fire suppression has led to a stand structure that did not characterize ponderosa pine forests prior to European settlement (Hayward and Verner 1994). The dense stands of conifer regeneration may provide suitable roosting habitat, but the dense shade would reduce grasses and forbs that provide habitat for many prey species.

Also owls have difficulty flying through the dense forests (Hayward and Verner 1994). Due to continued fire suppression and predominance of understory conifer, roosting habitat would continue to increase, whereas flammulated owl foraging habitat would decline.

Cumulative Effects

As described under methodology, cumulative effects are evaluated across the combined boundary. Anticipated cumulative effects are summarized and discussed in section 4.4, whereas a complete list of past, ongoing and future activities considered can be found in appendix A of this report. Past activities include commercial and non-commercial timber harvest, reforestation treatments, fuel treatments, grazing, mining, special use and outfitter guide permitting, motorized and non-motorized recreational use and wildfire. Effects of these activities vary spatially and temporally. While understory vegetation was reduced immediately following partial harvest, reforestation and fuel treatments, vegetation and flammulated owl prey habitat has been largely restored. Similarly, overstory conditions on older regeneration harvest sites and sites affected by sanitation and intermediate harvest have closed, whereas more recent treatments (since 2000), continue to have more open overstory conditions. Effects of these treatments are reflected in the existing flammulated owl habitat.

In addition to management activity, approximately 23,000 acres have been affected by more recent wildfire (2003 to 2009). Most of this occurred as high intensity wildfire associated with the 2003 Snow Talon fire in the Copper Creek and Landers Fork drainages in the northeast corner of the analysis area. Overstory mortality within these drainages was widespread and flammulated owl habitat largely eliminated. Insect and disease related mortality has affected many low elevation stands and has increased large diameter snags and created more open canopy conditions. Vegetation and flammulated owl habitat changes resulting from recent wildfire and MPB mortality is reflected in the existing flammulated owl habitat condition.

On-going/future activities discussed in section 4.4 include personal use firewood collection, approximately 27 acres of off-forest timber harvest, 13 acres of hazard tree removal, 8 acres of prescribed fire and 20 acres of recent (since 2011) wildfire. The following is a discussion of effects of these treatments on owl habitat.

Private Timber Harvest - Potentially suitable flammulated owl habitat would be reduced on approximately 27 acres.

Prescribed Burning - Effects for prescribed burning would be similar to those described under low intensity burning in section 4.3 and consist primarily of changes to understory vegetation, although some individual tree mortality may occur. Nesting habitat affected would be maintained, whereas roosting habitat would be reduced.

Hazard Tree Removal - Effects include short-term displacement during treatment and a long-term reduction in suitable nest trees on approximately 13 acres..

Recent Wildfire - Effects vary depending on the intensity of burning. Owl habitat would be reduced on approximately 8 acres affected by more intense burning conditions, whereas effects would be similar to those described under prescribed burning on the 12 acres affected by lower severity burning.

Personal use Firewood Cutting - Firewood collection would reduce snags and downed woody debris along open roads, reducing flammulated owl nest habitat on lands affected.

Conclusion

While there would be some reduction in suitable nest trees and a likely continued decline in open canopy habitat as succession continues, there would be little change in flammulated owl habitat during the analysis period, whereas over time habitat would decline.

Irretrievable and Irreversible Commitments

There are no irreversible commitments anticipated. Due to the continued decline in open canopy dry forest habitat and large diameter ponderosa pine, implementation of alternative 1 is expected to result in a long-term irretrievable reduction in habitat for the flammulated owl.

Alternative 1 Determination

While there are no direct effects and existing habitat would remain largely unchanged, fire suppression would continue to reduce suitable flammulated owl habitat over the long term. As a result implementation of alternative 1 **may impact individuals, but would not likely contribute towards a trend in federal listing or cause a loss of viability.**

Action Alternatives

Table 111 displays treatments by action alternative within existing flammulated owl habitat and dry forest, whereas effects of treatment are described below.

Table 111. Alternative Treatment of Flammulated Owl Habitat

Treatment	Alt 2		Alt 3	
	Acres	%	Acres	%[1]
Suitable Flammulated Owl Habitat (1,456 acres)				
Intermediate harvest	162	11[1]	13	1[1]
Regeneration harvest/fire-created openings	126	9[1]	71	5[1]
Low severity burning	282	20[1]	305	21[1]
Currently Unsuitable Dry Forest Habitat (13,320 acres)				
Intermediate Harvest	1,874	14[2]	998	8[2]
Regeneration harvest/fire created openings	1,418	112	1,030	82
Low Severity burning	1,414	11[2]	1,355	10[2]

1-percent of suitable habitat
2-percent of project area Dry forest habitat

Direct and Indirect Effects

Flammulated owls appear tolerant of some human disturbances, as this species has been known to nest in campgrounds and other areas of human activity with no apparent adverse effects (Hayward and Verner 1994). While proposed treatments have the potential to affect nesting birds, because owls appear tolerant of human activities and considering pdfs would retain all snags over 20 inches d.b.h., the likelihood of mortality is low. Similarly, disturbance to nesting/foraging birds would be short term during treatment.

Due to the retention of large diameter trees and snags and approximately 25 to 45 percent canopy closure, existing owl habitat would be maintained on sites proposed for thinning, whereas thinning in currently unsuitable dry forest habitat would create the open stand conditions that characterize owl habitat (Hayward and Verner 1994). Suitable flammulated owl habitat would be reduced on sites proposed for regeneration harvest and it would take several decades for habitat to be restored on these sites, or for

suitable stand structure conducive to flammulated owl habitat to be created. All sites proposed for harvest would reduce snag density.

Effects of proposed burning would vary. Because proposed low severity burning would promote open canopy conditions while retaining large diameter trees/snags, nesting and foraging habitat would be improved on these sites. While nesting/roosting habitat would be reduced in fire created openings associated with mixed severity burning, because edges are preferred for foraging and can increase prey density and foraging maneuvers used by the owl (Hayward and Verner 1994), over time (greater than 5 years), foraging habitat would improve within fire created openings. Both low-severity and mixed - severity burning would leave 20 percent of sites untreated, promote establishment of grasses, forbs and shrubs (preferred prey habitat), and retain large diameter trees. The mosaic of conditions provided, would improve both stand and landscape level flammulated owl habitat.

While proposed thinning would improve habitat for some predators such as the great-horned owl, preferred habitat for other predators such as the northern goshawk would be reduced (Hayward and Verner 1994). Treatments would create protective roosting cover in close proximity to nesting and foraging habitat and risks from predation are expected to remain unchanged.

Alternative 2

Treatments under this alternative would reduce existing nesting/forging habitat on approximately nine percent due to regeneration harvest and fire created openings, whereas nesting habitat would be maintained sites proposed for intermediate harvest. Proposed low severity burning and intermediate harvest would improve habitat preferred by many prey species, including improved foraging on 20 percent of the existing owl habitat.

Over time, proposed intermediate harvest would create stand conditions characteristic of owl nesting habitat on approximately 14 percent of the currently unsuitable dry forest, although use would vary depending on individual site conditions (Wright 1992, Hayward and Verner 1994). Sites that retain higher canopy closure and a greater number of large diameter trees/snags are more likely to be utilized or would receive use sooner. Foraging habitat would also be improved on sites proposed for intermediate harvest, as well as on sites proposed for low severity burning (11 percent) due to the more open understory conditions and increase in grass/forbs and arthropod prey (Hayward and Verner 1994).

Alternative 3

Alternative 3 reduces regeneration harvest and mixed severity burning and 95 percent of the existing flammulated owl habitat would be maintained. Existing habitat would be improved by approximately 22 percent under this alternative due to low severity fire and intermediate harvest.

Like alternative 2, proposed treatments would promote conditions characteristic of flammulated owl habitat within currently unsuitable dry forest. Open canopy conditions and nesting/foraging habitat would be improved on approximately 1,000 acres proposed for intermediate harvest, whereas low severity fire would improve foraging habitat on another 1,355 acres.

Alternatives 2 and 3

Cumulative Effects

In addition to cumulative effects described under alternative 1, flammulated owl habitat would be affected by the following activities within the combined boundary. The acres displayed would be the maximum treatment proposed (alternative 2).

- Partial Harvest – 162 acres
- Regeneration Harvest/Fire-Created Openings – 126 acres
- Low Severity Burning – 482 acres

Proposed treatments would reduce flammulated owl habitat by up to 126 acres and affect stand structure on approximately 440 acres or 30 percent of existing habitat. Over 98 percent of the existing habitat would be maintained, whereas nest and foraging habitat would be improved on approximately 3,288 acres or 13 percent of the existing dry forest. While treatments may result in short-term disturbance during treatment, the likelihood of mortality is low and flammulated owl habitat would be maintained in the short term and improved over the long term. Landscape conditions consistent with flammulated owl use would be maintained or improved.

Irretrievable and Irreversible Commitments

There are no irretrievable commitments anticipated. While there may be some reduction in nest habitat through cutting of hazard large-diameter snags and a small reduction in foraging habitat, proposed treatments would promote restoration of dry forest community that is required by the flammulated owl.

Action Alternative Determination

Both action alternatives would reduce suitable owl habitat on some of the sites treated, whereas other treatments would promote conditions preferred by the flammulated owl. Based on the above analysis, and the following rationale, implementation of alternatives 2 and 3 **may impact individuals or habitat, but would not likely contribute towards a trend in federal listing** for the flammulated owl**.**

- With implementation of pdfs that retain large-diameter snags during treatment, the likelihood of direct mortality is reduced.
- Ninty to 95 percent of the existing habitat would be maintained. Treatment would promote maintenance of ponderosa pine and future nest sites, improve foraging conditions on 20 percent of existing habitat and promote nesting/foraging habitat on between 18 and 25 percent of the ponderosa pine/dry Douglas-fir biophysical setting
- Proposed treatments would reduce the risk of large, stand-replacing wildfire.
- The level of timber harvest in the Northern Region is insignificant in relation to this species' habitat needs, and suitable habitat is well distributed across the Region (Samson 2006b).

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Suitable owl habitat would be maintained in the short term under alternative 1. While the action alternatives would reduce suitable habitat, the likelihood of mortality or disturbance is low. Also, the action alternatives would meet or exceed Forest Plan (USDA Forest Service 1986) guidelines, ensure that large-diameter snags and nest trees are available in the future and provide snags across the landscape. Treatments would also increase available habitat over the long term and reduce the risk of catastrophic fire. All alternatives are consistent with Forest Plan (p. II/20-21), and regional guidelines related to snags, direction to provide habitat for small game, furbearers and other wildlife species (p. II/4) and to ensure that viable populations of existing native and desired nonnative species are maintained (p. II/17). Also all alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (16 USC 1604((g)(3)(B)); also see 36 CFR 219.10(b): and FSM 2670.12.

4.6.10 Western Boreal Toad

Alternative 1

Direct and Indirect Effects

There are no treatments proposed under this alternative, so there are no direct effects anticipated. With continued fire suppression and high levels of fuel loading, the likelihood that suitable upland and riparian habitat would be reduced through severe wildfire would remain high under this alternative.

Cumulative Effects

Anticipated cumulative effects are in volume 2, appendix C. Few regulations were in existence in the 50s and 60s, so timber harvest and fuel activities on private and public lands extended into riparian areas, and it is likely treatment impacted boreal toads and their habitat. With implementation of Plan standards in 1986 and more recently INFISH buffers, much of the breeding habitat on NFS lands has been maintained. As described under methodology, cumulative effects are evaluated across the project area and ongoing and future activities are the same as those described under the Townsend's big eared bat. All activities have potential for disturbance during treatment and activities that would be more likely to affect this species or its habitat include; stream rehabilitation on 15 acres, NNIS treatment on 312 acres, recent wildfire on 10 acres, firewood collection along open roads and cattle grazing on 5,977 acres.

A biological evaluation has (in the case of hazard tree removal) or would be completed to assess any future in-stream work or NNIS treatment; potential impacts to this species would be reduced through that process. Proposed invasive plants treatment would help to maintain native vegetation and suitable boreal toad habitat. Breeding habitat would continue to be affected by grazing, although use is not expected to change and impacts would be reduced with on-going riparian monitoring and allotment management plan compliance.

Alternative 1 Determination

There are no treatments proposed and implementation of alternative 1 would not contribute to any past, ongoing or reasonably foreseeable activities. Implementation of alternative 1 would have **no impact** on the western boreal toad.

Alternatives 2 and 3

Direct and Indirect Effects

Approximately 16,536 acres under alternative 2 and 18,375 acres under alternative 3 would be unaffected by treatment and effects would be similar to those described under alternative 1. Boreal toad habitat would be affected by proposed treatments on approximately 7,500 acres under alternative 2 and 5,600 acres under alternative 3.

Because this species is known to occur within breeding and upland habitat within the project area, direct effects include disturbance or mortality associated with burning or mechanical treatments. Riparian buffers would reduce potential impacts to breeding habitat, although there may be some temporary water sources that are not protected by a riparian buffer and trampling or mortality to boreal tadpoles or adults could occur. Because toads can disperse miles from breeding habitat, mortality of dispersing adults within mechanical harvest or burn units could also occur. The likelihood of mortality is low when you consider; that many harvest units would have untreated buffers and occur during the winter while toads are hibernating, that no fire ignition would not occur within breeding habitat, that burned areas would be interspersed with un-burned lands, that less mobile species (e.g., frogs and toads) are capable of either

moving quickly to unburned refugia, or seeking out refugia in burrows and crevices (Kennedy and Fontaine 2009; Russell et al. 1999; Smith 2000; Yager et al. 2007), and that most of the project area would be unaffected by treatment. Because alternative 3 reduces harvest and mixed severity burning by approximately a third, the risk of direct effects are lowest under this alternative.

Changes resulting from proposed treatments include a reduction in both understory and overstory vegetation which will affect suitable boreal toad habitat. With implementation of PDF's and INFISH buffers, suitable breeding habitat a within treatment units would be maintained. Within upland habitat, proposed regeneration and partial harvest would reduce habitat until understory shrubs and vegetation are re-established. While prescribed burning may be allowed to burn into riparian areas (no active ignition would occur), the low intensity fire would help to reduce conifer encroachment and promote riparian shrub, grass and forb diversity, which would help to maintain habitat over the long-term. Burning within upland habitat would also help to maintain or promote habitat, as boreal.

Cumulative Effects

In addition to cumulative effects discussed under alternative 1, up to approximately 7,500 acres of the project area would be affected by anticipated activities (alternative 2). Suitable upland boreal toad habitat would be reduced, whereas breeding habitat within treatment units and across the landscape would be maintained. Proposed treatments would contribute to grazing effects, although pdf's would modify grazing use if necessary to reduce impacts. Over the long-term burning would help to maintain riparian and upland vegetation and promote foraging following treatment. Approximately 67 percent of the analysis area under alternative 2 and 75 percent under alternative 3 would be unaffected by on-going/future activities. Under both alternatives breeding habitat would be maintained within treatment units and across the landscape, upland foraging habitat would be improved over time, and suitable boreal toad habitat would continue to be available.

Irretrievable and Irreversible Commitments

Although there would be short-term structural changes to upland foraging and dispersal habitat, breeding habitat would remain largely unchanged and there are no irretrievable or irreversible commitments anticipated for the boreal toad.

Alternative 2 and 3 Determination

Implementation may result in some mortality and proposed treatments would reduce suitable upland habitat where as breeding habitat would be maintained. Based on the above analysis and the following rationale, implementation of alternatives 2 and 3 **may impact individuals or habitat, but would not likely contribute towards a trend in federal listing** for the western boreal toad.

- Potential impacts to breeding habitat would be reduced through implementation of pdfs, INFISH buffers and reduced burning intensity within riparian areas.
- Suitable habitat would be maintained or improved on sites proposed for burning treatments).
- Sixty-nine to 77 percent of the project area would be unaffected by treatment.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Western boreal toad habitat would be largely unchanged under alternative 1. While the action alternatives may result in structural changes to upland foraging and dispersal habitat, the likelihood of mortality is low; breeding habitat would not be maintained, and treatments are expected to improve upland foraging habitat. All alternatives are consistent with Forest Plan (USDA Forest Service 1986) direction to provide habitat for small game, furbearers and other wildlife species (p. II/4), to ensure that viable populations of

existing native and desired nonnative species are maintained (p. II/17) and to manage riparian areas to be compatible with dependent wildlife species (II-35). Also all alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (16 USC 1604((g)(3)(B)); also see 36 CFR 219.10(b): and FSM 2670.12.

Management Indicator Species

4.6.11 Northern Goshawk

Effects to goshawk habitat are based on impacts to habitat modeled according to Samson (2006) as described in Criteria for Wildlife Models Helena National Forest (USDA 2009a) and based on changes in vegetation diversity as described in Northern Goshawk Northern Region Overview: Key Findings and Project Considerations. Effects to Northern Goshawk are evaluated according to the following measures:

- Acres of foraging and nest habitat treated.
- Post-treatment home range/foraging diversity.
- Post-treatment PFA diversity

Alternative 1

Direct and Indirect Effects

There are no treatments proposed under this alternative, so there would be no direct impacts to the northern goshawk. Designated old-growth habitat would remain largely unchanged and structural conditions such as large-diameter trees and increased levels of snags and DWD would continue to occur both in the short and long term. Mountain pine beetle mortality has and would continue to affect canopy gaps and understory development. Continued fire suppression may affect species in designated or potential old growth due to the decline in fire tolerant species.

Over the long term (greater than 20 years) stands would continue to mature, late-successional habitat would develop and stand density and goshawk nest habitat would likely increase. While the quality of goshawk foraging habitat may change due to the more closed stand conditions, because they utilize a wide range of habitat conditions for foraging (Squires and Ruggiero 1996) suitable goshawk habitat would continue to be available under this alternative.

The current trends in species composition would continue, with a decrease in ponderosa pine, early seral and fire-tolerant species and a continued increase in climax and fire-intolerant species. Insect and disease-related mortality may increase. Fuel loading and stand structure (i.e. ladder fuels) would not be modified. The risk of wildfire and a possible long-term reduction in goshawk nest habitat is greatest under this alternative.

Existing goshawk foraging and nesting habitat is displayed in figure 86 and figure 87 respectively, which can be used to compare baseline conditions with those resulting under the action alternatives.

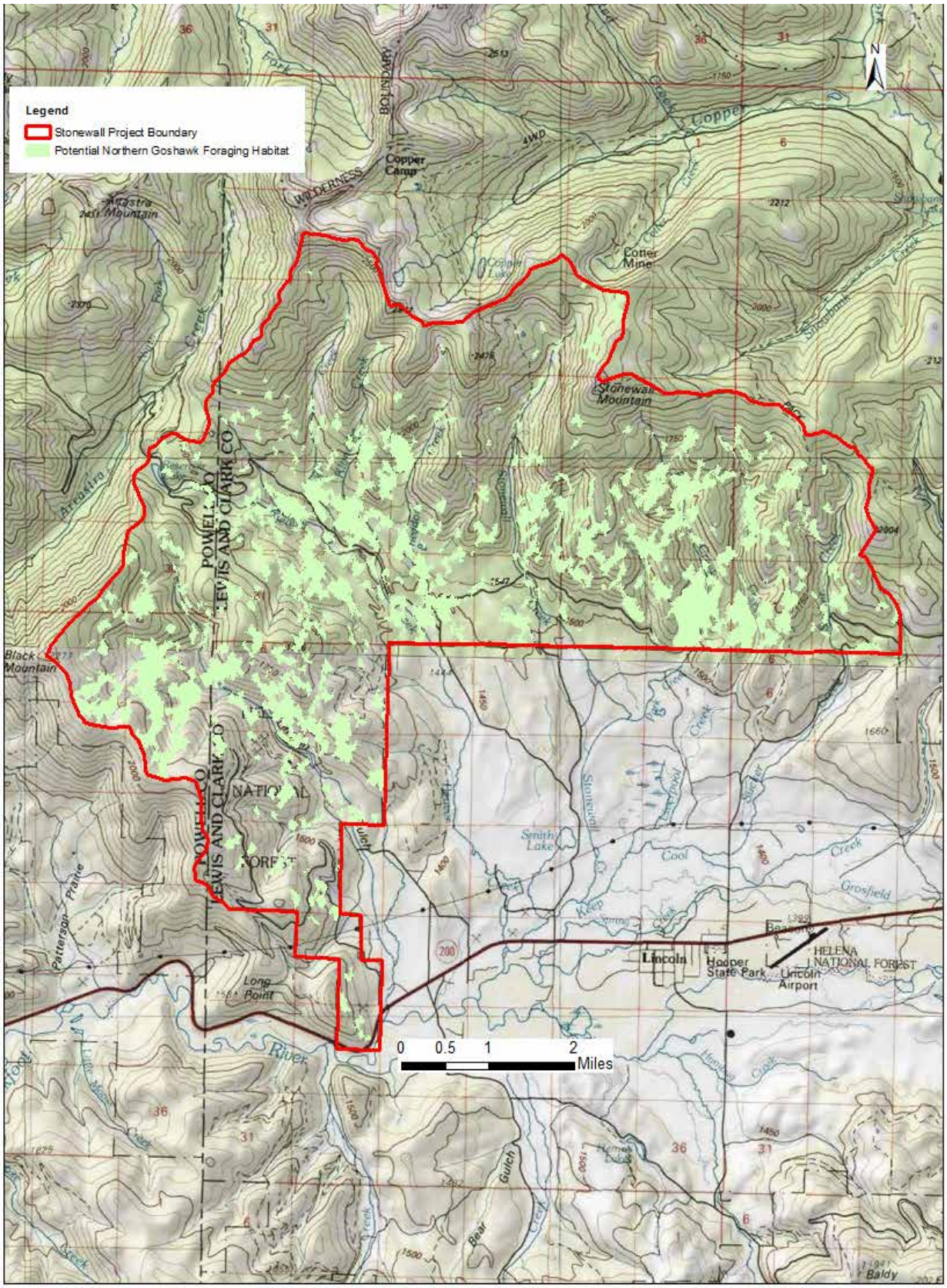

Figure 86. Existing Goshawk foraging habitat

Cumulative Effects

Anticipated cumulative effects are in volume 2, appendix C. Work such as trail maintenance and reconstruction, stream restoration, NNIS treatment and campground work would result in localized changes to habitat or occur in areas less likely to be used (e.g., along open roads and areas of concentrated human use). Disturbance from these treatments would be short term. Ongoing and future activities that could result in possible long-term effects to nesting or foraging habitat include firewood cutting, hazard tree removal, wildfire and prescribed burning. The following is a summary of these effects on goshawk.

Prescribed Burning

Effects for prescribed burning would be similar to those described under low intensity burning in section 4.3 and consist primarily of changes to understory vegetation, although some individual tree mortality may occur. Nesting habitat affected would be maintained and although there would be a short-term reduction in understory prey diversity, over the long-term understory structure and prey diversity would increase. A total of 46 and 11 acres of nesting and foraging habitat respectively would be affected.

Hazard Tree Removal

Approximately 167 acres of potential goshawk nesting habitat and 21 acres of foraging habitat were affected by hazard tree removal. Effects include short-term displacement during treatment and a long-term reduction in nest habitat. Understory vegetation would increase and prey availability would be maintained.

Recent Wildfire (since 2011)

These wildfires have affected 153 and 116 acres of nesting and foraging habitat respectively. Effects vary depending on the intensity of burning. In areas with low to moderate intensity burning (40 percent of the area burned), understory diversity would be reduced in the short term and increase over the long term. More intensively burned areas (60 percent of the area burned) would result in overstory mortality and a reduction in nesting and foraging habitat. While suitable habitat would be reduced on some of the acres affected, because the fires burned in a mosaic and considering understory diversity would increase, the area affected would continue to provide foraging and PFA habitat. Effects of past wildfire were included in the modeled habitat for this species.

Personal use Firewood Cutting

Firewood collection would reduce snags and downed woody debris along open roads. Goshawk nesting and foraging habitat would be largely unchanged because of the widespread availability of downed wood.

Conclusion

Human access and use of the area would be largely unchanged under this alternative, and there is no long-term disturbance anticipated. While ongoing and future activities would reduce goshawk nesting and foraging habitat on approximately 350 acres, nesting and foraging habitat would continue to be available within all watersheds. Also existing nests and PFA habitat would be maintained and adequate nest habitat would continue to be available to support goshawk.

Irretrievable and Irreversible Commitments

While there may be changes to vegetation structure and composition, there are no irretrievable or irreversible commitments to the northern goshawk anticipated.

Alternative 1 Determination and Conclusions

Although mountain pine beetle mortality would continue to reduce nest habitat, suitable goshawk habitat would continue to be available under this alternative. While alternative 1 would not result in direct impacts to the northern goshawk, it may result in an increased risk of catastrophic wildfire. There is no way to accurately predict when such an event would occur. Implementation of alternative 1 is not likely to cause a local or regional change in habitat quality or population status.

Action Alternatives

Designated old growth and approximately 67 percent of the project area under alternative 2 and 71 percent under alternative 3 would be unaffected by treatment andtreated, there would be no effects would be similar to alternative 1, including an increase in nest habitat and maintenance of foraging/PFA habitat.

Treatments within existing goshawk habitat are displayed by alternative in table 112, whereas alternative nest and foraging habitat conditions are displayed in table 113. The following is a discussion of effects of proposed actions on goshawk and their habitat.

Table 112. Goshawk habitat proposed for treatment

Treatment	Alternative 2				Alternative 3			
	Nest Habitat		Foraging Habitat		Nest Habitat		Foraging Habitat	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Intermediate Harvest	910	14	346	8	331	5	93	2
Regeneration Harvest	142	2	82	2	132	2	79	2
Low Severity/Jackpot Fire	143	2	156	4	651	15	532	12
Mixed Severity Fire	1,207	19	1,033	23	571	9	361	8
Total	**2,402**	**38**	**1,617**	**36**	**1,685**	**27**	**1,065**	**24**
Construction of roads that would be used and then obliterated after timber removal	1.4 mi.		1.0 mi.		0.1 mi		0.1 mi.	

Table 113. Remaining Goshawk habitat by alternative

Habitat	Alternative 1	Alternative 2		Alternative 3	
	Acres	Acres	% of Existing Habitat	Acres	% of Existing Habitat
Nest[1]	6,341	5,897	93	6,017	95
Nest over 40 acres	4,081	3,881	95	3,881	95
Foraging Habitat[1]	4,445	3,761	85	4,184	94

1 –See goshawk methodology for a description of nesting and foraging habitat.

Samson (2006a) summarized recent (2000 and newer) studies on the effects of vegetation treatments on northern goshawks that show, among others, that: (1) the majority of goshawk pairs move from nest stands when stand structure is modified by more than 30 percent (Penteriani and Faivre 2001, p. 213); (2) human disturbance is not a factor if 70 percent of the nest stand structure is maintained and timber management operations are time restricted during the nesting period (McGrath et al. 2003 as cited in

Samson 2005, p. 37); (3) timber harvest has no effect on goshawk breeding area occupancy, nest success, or productivity 1 to 2 years after treatment (Moses and Garton 2004 as cited in Samson 2006a, p. 36); and (4) no difference in the productivity of northern goshawks occurs in logged versus unlogged areas (Penteriani and Faivre 2001, p. 213).

Disturbance thresholds identified in numbers (1) and (2) above would be addressed through application of project PDF's including establishment of a 40 acre minimum no treatment zones and restricting treatments within 420 acres of active nests between April 15th and August 15th. Nest stand structure is maintained by restricting harvest and openings created through the use of mixed severity fire within 180 acres of active nests. These areas would be identified through field validation prior to and during implementation and would ensure that the goshawk family is adequately protected during courtship, egg laying, incubation, early nestling and late fledgling periods around any active nest site.

Activity timing recommendations vary among researchers. Reynolds et al (1992) in the southwestern U.S. recommend no adverse management activities in the PFA during the nesting season (March 1-September 30. Others have suggested restricting timber management operations during the breeding and fledgling periods (McGrath et al 2003, eastern Oregon). Fledging dates can vary by geographic area, elevation, or spring weather. In western Montana, Clough (2000) found a random sample of breeding goshawk began incubating eggs on May 5th, hatched June 6th, and fledged July 12th. On average then, goshawks in Clough's study were likely capable of sustained flight by August 10th, 65 days post-hatching. In northern Idaho (R1), Moser and Garton (2009) experimentally tested the impacts of clearcutting the nest area on goshawk re-occupancy rates and productivity and found that re-occupancy of the nest area was not impacted 1 to 2 years post-harvest provided harvest activities occurred after August 15th and adequate nesting habitat remained in the PFA post-treatment. Given the above, it is expected that the activity restrictions will be effective at reducing effects, although timing restrictions may be modified if site-specific conditions indicate a variation in fledgling dates.

Changes in Habitat

Existing nesting and foraging habitat and habitat that would occur under the action alternatives are displayed in table 114 and figure 87, figure 88 and figure 89. Sites proposed for regeneration harvest treatment would no longer provide goshawk nesting and foraging habitat. Harvest and openings created by mixed-severity fire would reduce nest habitat by approximately 444 acres under alternative 2 and by 324 under alternative 3. Because much of this reduction would be in small scattered parcels of nest habitat, nest habitat in blocks greater than 40 acres would be reduced by 200 acres under both alternatives.

All stands proposed for intermediate harvesttreatment would continue to provide nest habitat, whereas effects to foraging would vary by alternative. Because intermediate harvest under alternative 2 would reduce canopy closure below 40 percent, these sites would no longer be used for foraging and there would be a 15 percent reduction in foraging habitat under this alternative. Because alternative 3 was designed to reduce effects to closed canopy species, much of the proposed improvement cutting would maintain 40 percent canopy and under this alternative, 95 percent of the existing foraging habitat closure would be maintained under this alternative.

All sites proposed for intermediate harvest under both alternatives would modify understory structure, resulting in a change in prey availability. For example, the abundance of some small mammals such as red squirrels, red-backed voles and snowshoe hare have been shown to decline following partial harvest and there would be a reduction for these prey species on sites treated (USDA Forest Service 2009b, Woolf 2003), whereas chipmunks, mice and ground squirrels can be more common on sites that received thinning and burning treatments (Woolf 2003). Research suggests that despite preferences for high canopy

closure, basal area, and open understories in which to hunt, goshawks tolerate a broad range of forest structures (Boal et al. 2002 in Kennedy 2003), suggesting that the diversity of conditions provided by treatment would continue to provide suitable foraging habitat.

Low-severity fire would result in open understory conditions and, like partial harvest activities, there would be a shift in prey species abundance and diversity following fire. Generally, small mammal habitat specialists such as red-backed vole, flying squirrels and shrews decrease, whereas increases occur in habitat generalists such as mice, chipmunks and ground squirrels (Zwolak and Foresman 2007, Woolf 2003). While scattered overstory mortality would occur, a mature overstory would be maintained, 20 percent of all sites would be left untreated and snags, downed woody debris and a mosaic of understory conditions would be maintained.. Consequently all sites proposed for low severity burning would continue to provide suitable nesting and foraging habitat.

There would be a reduction in nest and foraging habitat on a portion of the mixed severity sites treated where more intense burning creates canopy openings. These canopy openings would be interspersed with areas affected by low-severity burning, and unburned areas resulting in a mosaic of age classes and structural conditions. Thinning from below before prescribed fire is applied, would reduce forest fuels, while simultaneously creating stand conditions that are favorable for goshawk nesting and foraging (Reynolds et al. 1992; Squires and Kennedy 2006). Finally, goshawks occur in forests that evolved under a diversity of fire regimes including mixed severity and stand replacing events and Reynolds et al (1992) and Graham et al. (1999) have suggested that the use of controlled fire and thinning may improve habitat for goshawks by creating favorable conditions for goshawk and their prey.

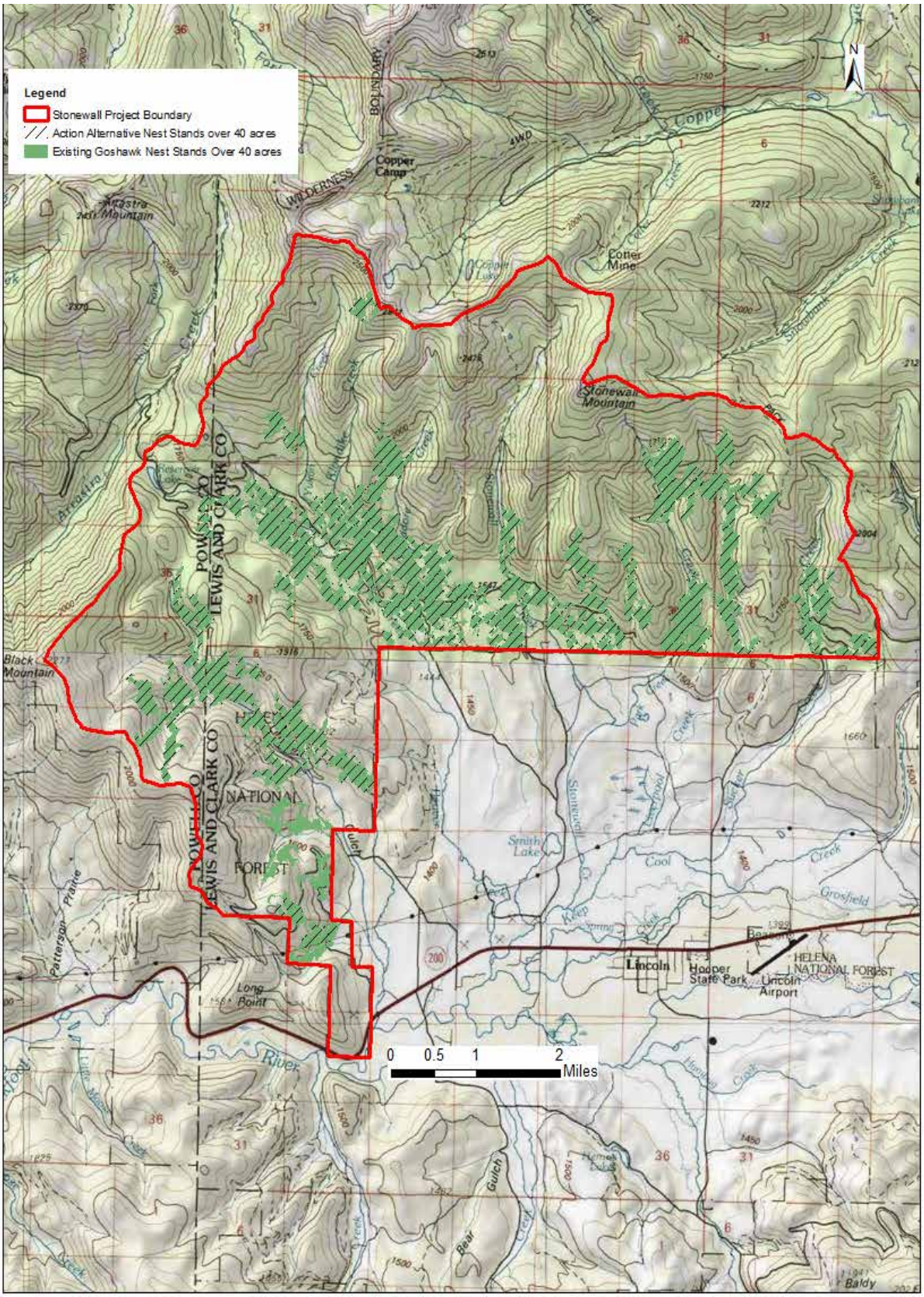

Figure 87. Existing and Post-treatment goshawk nest habitat

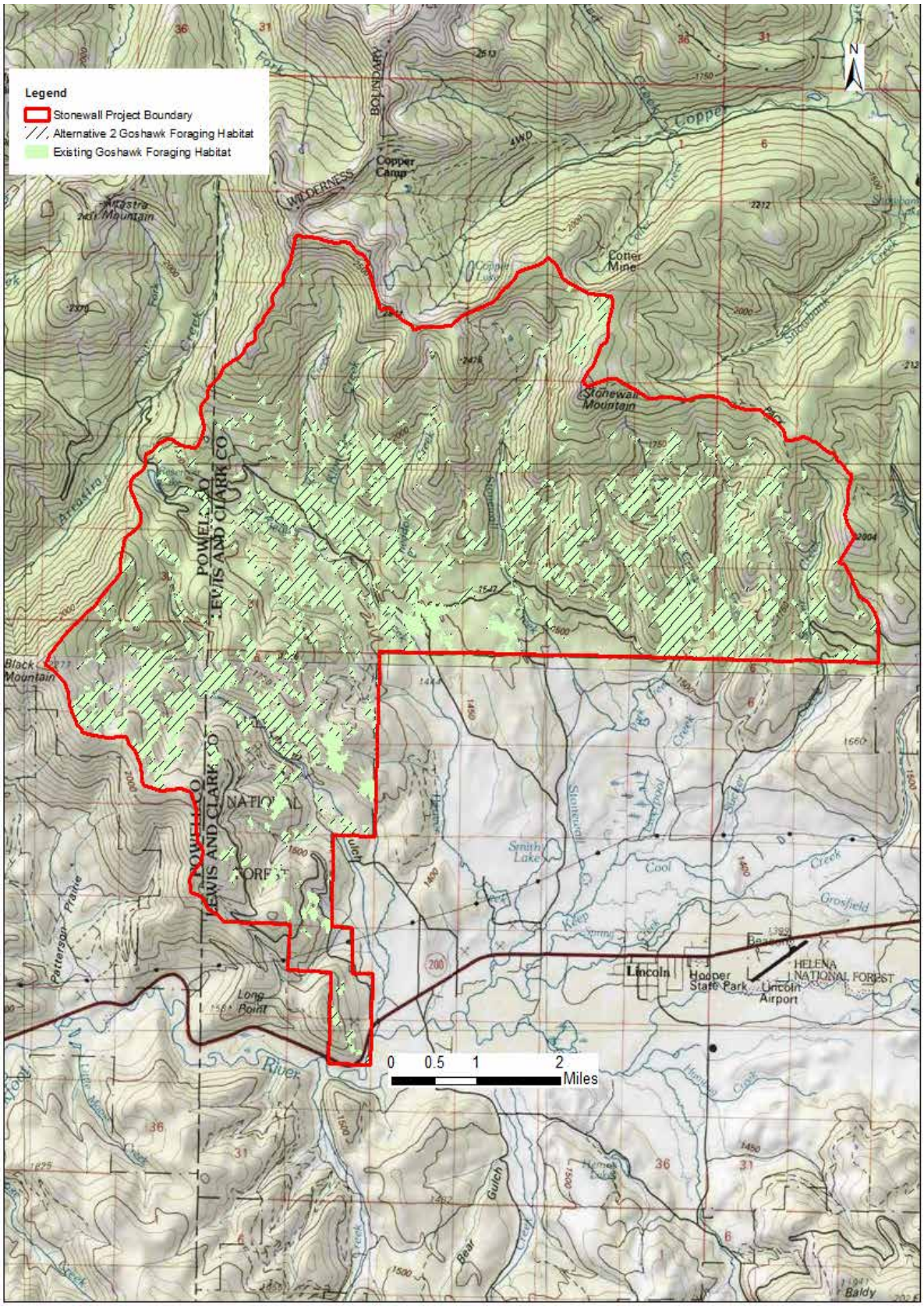

Figure 88. Existing and Alternative 2 Goshawk Foraging Habitat

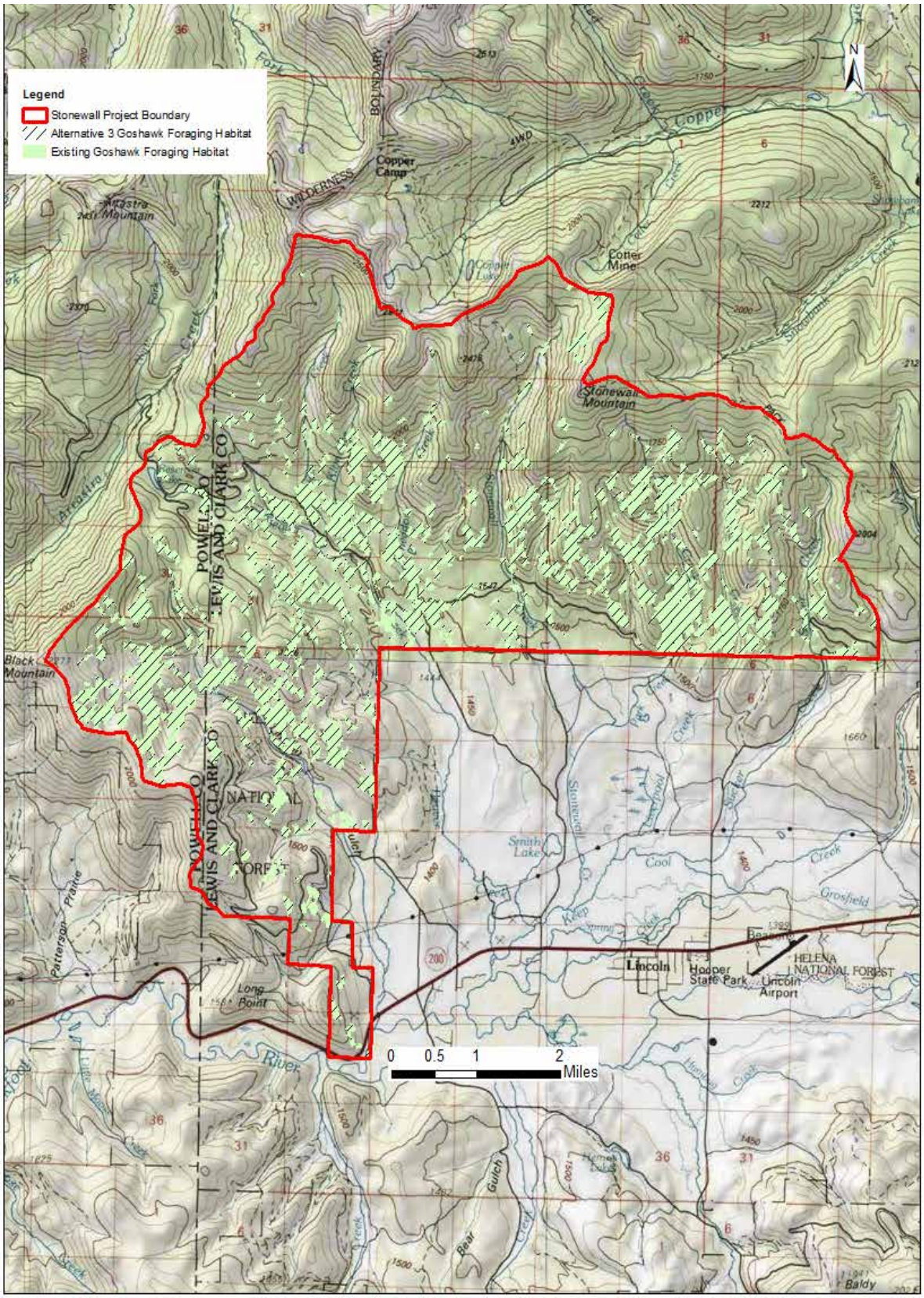

Figure 89. Existing and Alternative 3 Goshawk Foraging Habitat

Landscape Considerations

Table 114 displays landscape-level changes by alternative.

Table 114. Foraging area diversity matrix by alternative in the project area compared to research findings[2]

Size Class/Habitat Condition	Alternative 1		Alternative 2[1]		Alternative 3[1]		Reynolds (et al 1992)	Clough (2000)
	Acres	%	Acres	%	Acres	%	%	%
Seedling 0-4.9 inches d.b.h.	3,960	16	4,715	20	4,592	19	10 (0-5 inches d.b.h.)	9
Young Forest 5.9-9 inches d.b.h.	10,611	44	10,049	42	10,142	42	20 (5-12 inches d.b.h.)	66
Mature Forest >10 inches d.b.h.	8,433	35	8,241	34	8,271	34	60 (>12 inches d.b.h.)	11
Mature Forest >50% CC and >5 inches d.b.h.	4,339	18	4,262	18	4,266	18	60 (>12 inches d.b.h.)	69
Grass/Forb/Shrub	931	4	931	4	931	4	10	7

[1]Does not include openings created by mixed severity fire because they would be variable in size, distribution and canopy changes.
2 (based on R1-VMAP)

While there would be a three percent increase in seedling forest and a small decrease in mature forest, there would be little change in landscape level habitat and nesting and foraging habitat would continue to be available. Over time, as the various structural stages mature, a constant redistribution of habitats for goshawk and their prey may occur, which would help provide a long-term, sustainable mix of forest age classes and help ensure that goshawk habitat is maintained (Reynolds et al. 1992). While there would be small change in seedling/mature forest under the action alternatives, there would be little change in the distribution of available habitat and both alternatives would continue to provide landscape level habitat consistent with goshawk use. Also habitat would continue to be available to support three to four nesting pairs.

Post-fledgling Habitat

Post-fledgling habitat is analyzed for the Stonewall east and Stonewall west post-fledging areas (PFA) according to the guidelines identified in the Northern Goshawk Northern Region Overview: Key findings and project Considerations (USDA Forest Service 2009c). Table 115 displays treatments proposed under each of the action alternatives in the Stonewall East and Stonewall West PFA, whereas table 116 and table 117 display habitat conditions within the respective PFAs. For comparison, habitat conditions for alternative 1 are displayed also.

Table 115. Active nest PFA habitat treated

Size Class/Habitat Condition	Stonewall East				Stonewall West			
	Alternative 2		Alternative 3		Alternative 2		Alternative 3	
	Acres	%	Acres	%	Acres	%	Acres	%
Prescribed Fire	126	30	126	30	0	0	0	0
Intermediate Harvest	0	0	0	0	8	2	8	2
Regeneration Harvest	12	3	12	3	20	5	20	5

Table 116. Stonewall east PFA diversity matrix for habitat analysis by alternative[1]

Size Class/Habitat Condition	Alternative 1		Alternative 2[1]		Alternative 3[1]		Reynolds (et al. 1992)	Clough (2000)
	Ac	%	Ac	%	Ac	%	%	%
Seedling 0-4.9 inches d.b.h.	78	19	106	25	106	25	10 (0-5 inches d.b.h.)	9
Young Forest 5.9-9 inches d.b.h.	223	53	202	49	202	49	20 (5-12 inches d.b.h.)	66
Mature Forest >10 inches d.b.h.	118	28	111	26	111	26	60 (>12 inches d.b.h.)	11
Mature Forest >50% CC and >5 inches d.b.h.	99	24	80	19	80	19	60 (>12 inches d.b.h.)	69
Grass/Forb/Shrub	1	0	0	0	0	0	10	7

[1] (based on R1-VMAP)

Table 117. Stonewall west PFA diversity matrix for habitat analysis by alternative[1]

Size Class/Habitat Condition	Alternative 1		Alternative 2		Alternative 3		Reynolds (et al 1992)	Clough (2000)
	Ac	%	Ac	%	Ac	%	%	%
Seedling 0-4.9 inches d.b.h.	52	12	66	16	66	16	10 (0-5 inches d.b.h.)	9
Young Forest 5.9-9 inches d.b.h.	156	37	201	48	201	48	20 (5-12 inches d.b.h.)	66
Mature Forest >10 inches d.b.h.	212	51	153	36	153	36	60 (>12 inches d.b.h.)	11
Mature Forest >50% CC and >5 inches d.b.h.	132	31	130	31	130	31	60 (>12 inches d.b.h.)	69
Grass/Forb/Shrub	0	0	0	0	0	0	10	7

[1] (based on R1-VMAP)

Currently, neither of the existing PFAs meet the recommended amount of habitat within any category and the relatively small amount of closed canopy forest within both PFA's is due to recent MPB mortality. Effects under the action alternatives include reduction in mature and young forest due to proposed regeneration harvest and openings created by mixed severity burning. While the action alternatives would reduce young and mature forest by 28 acres and 14 acres in the Stonewall East and West PFAs

respectively, treatments would increase understory diversity and composition , pdfs would maintain mature forest within 180 acres of the nest sites, and over time, the action alternatives would result in a diverse mix of forest age classes and structure that would provide both cover and prey for immature and adult birds. These changes are aligned with certain desired PFA conditions described by Reynolds et al. (1992, pp. 22-24) that include the following:

- Provide hiding cover for fledglings
- Provide habitat for prey and foraging opportunities for adults and fledgling goshawks during the fledgling-dependency phase
- Provide snags and down woody debris
- Minimize disturbance during the fledgling-dependency period by restricting activities during this time
- Treatments in the early seral stages should result in lower basal area to promote tree growth
- Treatments in the older seral stages should promote irregular spacing
- Road densities should be managed to minimize disturbance

Competition

The extent to which species co-exist with goshawks and likelihood of competition with other raptors depend on the openness of the habitat (USDI Fish and Wildlife Service 1998). Natural and man-made changes that result in reduced forest canopy may favor the habitat needs of more open-forested competitors, such as red-tailed hawks, thereby decreasing the amount of habitat available to goshawks (ibid). The nest site selected by these two species varies, with goshawk selecting continuous mature forest with open understories, whereas red-tail nesting territories are often comprised of large open patches with dense understories and scattered trees (La Sorte et al. 2004 in USDA Forest Service 2009c). Whether some threshold level of fragmentation exists, beyond which red-tailed hawks completely replace goshawks is unknown and to date no scientific studies have conclusively documented such a replacement. Reynolds et al. (1992) recommend vegetation management treatments that maintain habitat at a home range scale to sustain goshawks across landscapes.

While proposed regeneration harvest would reduce mature forest on approximately 4 percent of the project area, treatment would occur in stands that have already experienced concentrated MPB mortality. Also openings created by mixe- severity fire would be scattered, largely surrounded by closed canopy forest, and create conditions similar to those that occurred historically. Consequently the mature forest conditions that characterize the project area would be maintained under conditions that would further promote use of the area by red-tailed hawks or other competitors.

Cumulative Effects

Effects of past, ongoing and future activities would be similar to those described under alternative 1. While most activities would result in short-term effects with little change in goshawk habitat, anticipated activities would reduce goshawk nesting and foraging habitat on 259 and 91 acres respectively due to hazard tree removal and wildfire. In addition to these effects, future activities would affect up to another 2,402 acres (alternative 2) of nest habitat and 1,617 acres of foraging habitat, including a 200-acre reduction in nest habitat greater than 40 acres in size, and a 684-acre reduction in foraging habitat.

Cumulatively during the analysis period, up to 2,768 acres (15 percent) of the nest habitat and 1,765 acres (18 percent) of foraging habitat would be affected, whereas approximately 80 percent of the existing nesting and foraging habitat would be unaffected. While the amount and distribution of habitat would

change, remaining habitat would continue to occur within all affected watersheds and adequate habitat would continue to exist to support three to four nesting pairs of goshawk.

Irretrievable and Irreversible Commitments

There are no irreversible commitments anticipated. Irretrievable commitments include a reduction in nest habitat, and altered structure and quality of foraging habitat (described above), although habitat conditions would be restored on all sites treated.

Alternative 2 and 3 Determination

Desirable northern goshawk habitat conditions include providing between 180 and 240 acres of nesting habitat per a 5,000-acre territory, heterogeneous foraging habitat including mature forest as well as a mix of other forest and non-forest components, and approximately 420 acres of post-fledgling habitat that includes some mid to later seral forests with structural diversity in the understory. While mplementation of the action alternatives would reduce existing nesting and foraging habitat these desired conditions would continue to occur under both action alternatives, and based on the above analysis and the following rationale, implementation of alternatives 2 and 3 **is not likely to cause a local or regional change in habitat quality or population status**.

- Implementation of pdfs and and maintenance of active nest site structural conditions will minimize the likelihood that nesting birds or their young would be affected.
- Approximately 95 percent of the project area nest habitat in patches of greater than 40 acres would be maintained. Also, habitat would continue to be well-distributed and adequate habitat would be maintained to support up to four nesting pairs of goshawks.
- Implementation of treatments may reduce the risk of stand-replacing wildfire and a possible long-term loss of goshawk habitat.

A Regionwide assessment (Samson 2006b, USDA Forest Service 2009c) of goshawk habitat has indicated the following:

- Goshawk habitat in Region 1 (R1) is abundant and well distributed where it occurs naturally; more forest and therefore nesting habitat exists on today's landscape than occurred historically.
- There have been substantial increases in connectivity for forested habitat since Euro-American settlement.
- The level of timber harvest of the forested landscape in R1 is insignificant in regard to altering goshawk habitat at the population scale.
- Not a single known nest in R1 is isolated from other known nests by more than the goshawk's estimated dispersal distance.
- A comparison of habitat estimates for maintaining viable populations indicates that given the natural distribution of habitat, each Forest in R1 has an excess of available goshawk habitat.
- Below (and not above) a threshold of 20 to 30 percent of historical habitat amounts, the effects of fragmentation (i.e. patch size and isolation) are suggested to have a negative impact on species persistence. No indication exists that forested ecosystems in Region 1 have reached the 20 to 30 percent threshold.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Goshawk habitat would be largely unchanged under alternative 1. While the action alternatives would reduce suitable habitat, there are no impacts to nesting birds or reproduction anticipated. Over 85 percent

of the existing nesting and foraging habitat would be maintained, post-fledgling habitat associated with existing nests would be maintained, long-term human access would not be increased, designated old growth would not be treated, and treatments would reduce the risk of stand-replacing wildfire and a possible long-term reduction in nest habitat. As a result, all alternatives are consistent with Forest Plan (USDA Forest Service 1986) direction to provide habitat for small game, furbearers and other wildlife species (p. II/4), to develop and implement a road management program with road use and travel restrictions that are responsive to resource protection needs (p. II/2), to ensure that viable populations of existing native and desired nonnative species are maintained (p. II/17) and to manage 5 percent of each 3rd order drainage for old growth (p. II/20). Also all alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (16 USC 1604((g)(3)(B)); also see 36 CFR 219.10(b): and FSM 2670.12 and Forest Plan standards related to snags and downed woody debris.

Pileated Woodpecker

Alternative 1

Direct and Indirect Effects

There are no treatments proposed under this alternative, so there would be no direct effects to the pileated woodpecker. Effects on old-growth structure and composition would be the same as described under northern goshawk and old growth structure would be maintained in designated and potential old growth.

As described under the affected environment, due to decades of overstocking and widespread MPB mortality, snags and coarse woody debris have increased and are available across the landscape. Changes in pileated woodpecker habitat on lands affected by mortality will be variable. Continued mortality will increase available snags in all size classes and downed wood for the next 10 to 20 years and improve habitat on many sites, whereas habitat quality may be reduced in areas of concentrated mortality due to canopy cover changes. While levels of down wood and small to medium diameter snags will remain high, because of increased mortality of large ponderosa pine and reduced ponderosa pine recruitment due to establishment of dense Douglas-fir understoriestrees, the availability of large ponderosa pine snags and preferred pileated woodpecker nest trees will decline over time.

In the absence of fire, late-successional forest conditions, including elevated levels of snags and DWD would continue to develop across the project area, and pileated woodpecker foraging habitat would increase. Because of continued fire suppression and increases in fuel loading, the risk of large-scale wildfire is highest under this alternative.

Cumulative Effects

Cumulative effects to the pileated woodpecker are evaluated across the combined boundary, as this area is large enough to evaluate landscape level effects and includes lands recently affected by wildfire. Past, ongoing and future cumulative effects are in volume 2, appendix C. Of the anticipated activities, trail construction (58 acres of suitable habitat affected), stream restoration work (8 acres of affected habitat) and campground use (2 acres of habitat) would result in small localized changes in habitat and short-term disturbance during treatment. Because of small changes to the overstory and future snag recruitment, overall nesting and foraging habitat would be maintained. Ongoing and future activities that could affect the availability of suitable habitat include prescribed burning, hazard tree removal, wildfire, off-forest harvest and firewood collection. The following is a summary of effects to the pileated woodpecker.

Prescribed burns

Prescribed burning would occur on 103 acres. Effects would consist primarily of changes to understory vegetation, although some individual tree mortality may occur. There would be localized reductions in canopy cover and an increase in primarily small diameter snags. While stands would continue to provide suitable habitat, because treatment would reduce downed wood and substrate for ants, on which pileated woodpeckers primarily forage, the quality of foraging habitat would be reduced on the acreage burned (Bull et al. 2005).

Hazard tree removal

Approximately 250 acres of pileated woodpecker habitat would be affected by hazard tree removal. Effects include a reduction in snags and DWD on the acreage treated. Although, forest-plan levels of snags are being retained.

Recent wildfire

These wildfires have affected 219 acres of suitable pileated woodpecker habitat. Effects vary depending on the intensity of burning. In areas with low to moderate intensity burning (approximately 40 percent of the acres burned), understory diversity would be reduced. More intensively burned areas (60 percent of the acres burned) would result in overstory mortality and a reduction in nesting and foraging habitat on approximately 130 acres. Areas that burned with moderate intensity would result in pockets of reduced canopy cover, as well as an increase in snags (including large diameter). Effects of past wildfire are included in the modeled habitat for this species.

Off-forest timber harvest

Off-forest timber harvest would occur on 75 acres of existing habitat. While the type of harvest may vary, it is assumed that pileated woodpecker habitat would be reduced on this acreage.

Personal use firewood cutting

Firewood collection would reduce snags and downed woody debris along roads, reducing snag availability for this species.

Conclusions

Cumulatively a total of approximately 715 acres of pileated woodpecker habitat would be affected, including a reduction in habitat on 455 acres. Snag recruitment would increase due to ongoing MPB mortality, over 95 percent of the available habitat would be unaffected, and suitable pileated woodpecker nesting and foraging habitat would continue to be available.

Irreversible and Irretrievable Commitments

There are no irreversible commitments anticipated. While habitat would continue to be widespread, the long-term reduction in large-diameter ponderosa pine snags that would occur under this alternative is considered an irretrievable commitment.

Alternative 1 Determination

Under alternative 1 suitable pileated woodpecker habitat would be maintained and snag availability would increase for the next 10 to 20 years. While the availability of future large diameter snags would be reduced over time, implementation of alternative 1 is **not likely to cause a local or regional change in habitat quality or population status** for the pileated woodpecker.

Alternatives 2 and 3

There are no treatments proposed in Forest Plan designated old-growth habitat under the action alternatives and preferred stand structure will continue to occur in designated and potential old growth.

Table 118 displays project area treatments proposed under the action alternatives.

Table 118. Alternative treatments within pileated and hairy woodpecker habitat[1]

Treatments	Alternative 2		Alternative 3	
	Acres	Percent	Acres	Percent
Intermediate Harvest	1,077	14	427	6
Regeneration Harvest	184	2	162	2
Low Severity Fire	182	2	611	8
Mixed Severity Fire	1,407	18	758	10
Jackpot Burn	0	0	124	2
Total within treatment units	2,850	36	2,082	26
Total unaffected habitat[2]	5,247	67	6,018	77

[1]-because there is only a 17 acres difference in pileated and hairy woodpecker habitat and this acreage is outside any treatment area, the affected habitat for these two species is discussed collectively.

[2]-includes unburned land withing prescribed burning units

Direct and Indirect Effects

While this species is usually tolerant of human activity near the nest, disturbance from treatment may cause roosting or foraging birds to on a site may move out of the area (Birds of North America 2011) or nesting could be affected if a nest tree is removed. With retention of large diameter snags in all units unless they pose a safety threat, increased availability of large snags and lower population density on the HNF and eastside forests, the likelihood that nesting birds would be affected is low. Unaffected habitat would continue to be available to accommodate any temporarily displaced birds.

Due to the reduction in canopy and considering the pileated woodpecker is not normally associated with moderately to severe burned forests, (Wightman and Saab 2008), proposed regeneration harvest and openings created by mixed -severity fire would no longer provide suitable pileated woodpecker habitat.

While sites proposed for intermediate harvest would continue to provide suitable habitat, because treatment would reduce the live overstory, snags and downed wood, the quality of nest and foraging habitat and likely use of these sites would be reduced. Similarly due to the reduction in downed wood, pileated woodpecker foraging would be reduced in lands affected by underburning (Bull et al. 2005), although the mosaic of burned and unburned lands resulting from treatment would continue to provide nesting and foraging habitat.

In upland habitats in the Northern Rockies, pileated woodpeckers nest almost exclusively in large-diameter ponderosa pine and western larch snags (Hills et al. 2001; McClellan and McClellan 1999). Treatments proposed under the action alternatives promote the long-term sustainability of both species while maintaining diversity of structural conditions including large-diameter snags, and more open grown ponderosa pine. Consequently over the long term suitable pileated woodpecker habitat is expected to be maintained or improved on sites affected by treatments.

Alternative 2

Sixty-seven percent of the project area would not be treated and effects on untreated areas would be the same as alternative 1. There would be a long-term reduction in nesting and foraging habitat, on up to 542 acres, due to proposed regeneration harvest and openings created by mixed-severity burning, where as habitat quality would be reduced on 2,035 acres affected by low-severity burning and intermediate harvest.

Approximately 5,700 acres that currently don't provide suitable pileated woodpecker habitat are proposed for treatment. Activities are designed to restore open-grown ponderosa pine habitat and promote sustainability of large-diameter ponderosa pine and western larch, and it is expected that pileated woodpecker habitat would be improved over the long term on this acreage.

Alternative 3

Alternative 3 proposes fewer harvest and mixed-severity fire treatments, so the likelihood of direct effects are reduced and 77 percent of the existing habitat would be unaffected. Effects on these lands would be the same as those described under alternative 1. Approximately 1,806 acres of existing habitat would be affected by treatment. Effects include a long-term reduction in habitat on 352 acres due to harvest and fire created openings, whereas habitat quality would be reduced on 1,455 acres.

Approximately 4,500 acres that currently do not provide suitable pileated woodpecker habitat would be treated. Like alternative 2, because treatments are designed to restore open grown ponderosa pine habitat and promote sustainability of large-diameter ponderosa pine and western larch, it is expected that over time, pileated woodpecker habitat would be improved these lands.

Alternatives 2 and 3

Cumulative Effects

Past, ongoing and future activities are discussed under alternative 1 and a total 715 acres of suitable habitat would be affected, including a reduction in suitable habitat on 455 acres. In addition to effects described under alternative 1, future activities would affect up to another 2,855 acres of pileated woodpecker habitat (alternative 2). Of this, low quality foraging and nest habitat would be created on 2,035 acres proposed for intermediate harvest and low severity burning, where as nesting and foraging habitat would be reduced on 542 acres due to regeneration harvest and opening created by mixed severity fire.

Cumulatively during the analysis period, up to 3,500 acres of the existing pileated woodpecker habitat would be affected by some activity. Of this, there would be a long-term reduction in nesting and foraging habitat on almost 1,000 acres due to regeneration harvest, openings created by mixed-severity burning, hazard tree removal, high intensity wildfire and off-forest harvest.

While pileated woodpecker nesting and foraging habitat would be affected on up to approximately 3,500 acres of the existing habitat within the analysis area would be affected by on-going and future activities, considering that snags, and downed wood would be abundant across the landscape (see dead wood section), and that approximately 85 percent of the existing habitat would be unaffected by treatment, suitable pileated woodpecker habitat would continue to be available to support local populations and use.

Irreversible and Irretrievable Commitments

There are no irreversible commitments anticipated. Irretrievable commitments include a reduction in nest habitat and altered structure and quality of foraging habitat, although habitat conditions would be restored

over time. Like alternative 1, future reduction in large ponderosa pine snags would occur on untreated lands.

Alternative 2 and 3 Determination

The action alternatives would affect up to 2,577 acres of existing pileated woodpecker habitat. Suitable habitat would continue to be available within all affected watersheds, and proposed treatments would maintain or improve pileated woodpecker habitat over the long term. Based on the above analysis and the following rationale, implementation of alternatives 2 or 3 are **not likely to cause a local or regional change in habitat quality or population status** for the pileated woodpecker.

- Both alternatives would maintain suitable pileated woodpecker habitat across the landscape, while providing for the long-term sustainability of large-diameter snags.
- No designated old-growth habitat would be affected.
- The risk of large stand-replacing wildfire would be reduced.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Suitable habitat would be maintained in the short term under alternative 1 and reduced under alternatives 2 and 3. The likelihood of mortality is low under the action alternatives and suitable habitat would continue to be available across the landscape under all alternatives. No designated old growth would be affected, and the risk of stand-replacing wildfire would be reduced. All alternatives meet Forest Plan (USDA Forest Service 1986) direction to provide habitat for small game, furbearers and other wildlife species (p. II/4), to ensure that viable populations of existing native and desired nonnative species are maintained (p. II/17) and to manage 5 percent of each 3rd order drainage for old growth (p. II/20). Also all alternatives are consistent with Forest Plan (p. II/20 to II-21) snag management guidelines (USDA Forest Service 2000a) and with National Forest Management Act requirements to provide for a diversity of animal communities (16 USC 1604((g)(3)(B)); also see 36 CFR 219.10(b): and FSM 2670.12.

Hairy Woodpecker

Alternative 1

Direct and Indirect Effects

There are no treatments proposed under this alternative, so there would be no direct effects to the hairy woodpecker. Indirect effects would be similar to the pileated woodpecker and small- to medium-diameter snags as well as DWD would increase over the short and long-term. Large snags would increase for the next 10 to 20 years, then decline over time. Suitable hairy woodpecker foraging and nesting habitat would continue to increase under this alternative. Due to continued fire suppression and increases in fuel loading, the risk of large scale wildfire is highest under this alternative.

Cumulative Effects

Anticipated cumulative effects are the same as those described under alternative 1 for the pileated woodpecker. Cumulatively during the analysis period a total of approximately 715 acres of hairy woodpecker habitat would be affected, including a reduction in habitat on approximately 455 acres. Snag recruitment would increase due to ongoing MPB mortality, over 90 percent of the available habitat would be unaffected, and suitable hairy woodpecker habitat would be maintained.

Action Alternatives

Treatments proposed under each of the alternatives within suitable hairy woodpecker habitat are displayed in table 128, under the pileated woodpecker analysis.

Direct and Indirect Effects

Because both woodpecker species utilize snags and DWD, anticipated direct effects would be similar to those described for the pileated woodpecker and possible mortality during treatment.

Suitable habitat would be reduced under both action alternatives on the acreage proposed for harvest and prescribed burning due to removal of snags and DWD on the sites treated, although, habitat for the hairy woodpecker would be maintained on site. For example, Bunnell et al. (2002) found that partial harvest activities did not affect the abundance of primary cavity nesters in most cases, and in some cases the abundance of species such as the hairy woodpecker increased due to small openings and creation of edges. In a study of dry forests in Washington, Lyon et al. (2008) found thinning and low-severity burning may enhance foraging habitat for bark gleaning species as a whole. Implementation of pdfs that retain snags and down wood suitable hairy woodpecker habitat would be maintained on sites affected by intermediate harvest treatments and low-severity burning.

Like the pileated woodpecker, regeneration treatments and openings created by mixed-severity burning would reduce suitable hairy woodpecker habitat.

Covert (2003) looked at the effect of mixed-severity wildfire on hairy woodpecker foraging in ponderosa pine in northern Arizona. His results indicate that hairy woodpecker relative abundance was greatest in high-severity burns relative to moderate-severity burns and unburned areas, although this preference decreased as burns age. Hairy woodpeckers selected trees and patches with greater tree bole scorch when available. Further, a number of authors suggest that major declines in forest dwelling birds, especially woodpeckers, results from fire suppression (Hutto 1995; Hobson and Sheik 1999, Brawn et al. 2001 *in* Covert 2003). Covert (2003) also suggests that high-severity burns may be important for resident bark-foraging birds as they provide high concentrations of over-winter prey resources. While pockets of treated areas may become unsuitable, over the long term, it is expected that restoration of historic levels of fire using both mixed- and low-intensity burning would result in the long-term improvement of hairy woodpecker habitat.

Alternative 2

Sixty-seven percent of the project area would not be treated, and effects on untreated areas would be the same as alternative 1. While pdfs would retain snags and suitable hairy woodpecker habitat on harvest sites and burning would create additional snags, effects of treatment include a reduction in snags and nesting habitat on the acres affected. Effects from intermediate harvest and prescribed burning would reduce snags and DWD on 2,035 acres. Regeneration harvest and openings created by mixed-severity burns may result in long-term reductions in nesting and foraging habitat on up to 542 acres. Over time treatments would improve structural diversity on treated sites, promote development of large-diameter snags and create a mosaic of habitat conditions.

Alternative 3

Seventy seven percent of the project area would not be treated, and effects on untreated areas would be the same as alternative 1. Effects from intermediate harvest and low severity burning include a reduction in snags and DWD on 1,455 acres. Additionally, there may be a long-term reduction in nesting and foraging habitat on up to 352 acres from regeneration harvest and openings created by mixed-severity

burns. Like alternative 2 over time treatments would improve structural diversity on treated sites, promote development of large-diameter snags and create a mosaic of habitat conditions.

Cumulative Effects

Past, ongoing and future activities are discussed under alternative 1 for the pileated woodpecker and cumulatively during the analysis period, up to approximately 3,570 acres (alternative 2) of the existing hairy woodpecker habitat would be affected by some activity, including a reduction in suitable habitat on almost 1,000 acres due to regeneration harvest, openings created by mixed severity burning, recent hazard tree removal, high intensity wildfire and off-forest harvest.

While hairy woodpecker nesting and foraging habitat would be affected on up to 3,570 acres, considering that snags would be abundant across the landscape (see dead wood section), and that over 85 percent of the existing habitat would be unaffected, suitable hairy woodpecker habitat would continue to be available to support local populations and use.

Irreversible and Irretrievable Commitments

There are no irreversible commitments anticipated. Irretrievable commitments include a reduction in nesting habitat, and altered structure and quality of foraging habitat, although habitat conditions would be restored on all sites treated.

Alternative 2 and 3 Determination

The action alternatives would affect up to 2,577 acres of existing hairy woodpecker habitat. Suitable habitat would continue to be available within all affected watersheds, and proposed treatments would maintain or improve hairy woodpecker habitat over the long term. Based on the above analysis and the following rationale, implementation of alternatives 2 or 3 are **not likely to cause a local or regional change in habitat quality or population status** for the hairy woodpecker.

- Over 90 percent of the existing habitat would be maintained.
- Over the long term, treatment would promote stand and landscape diversity and maintain or improve hairy woodpecker habitat across the landscape, while providing for the long-term sustainability of preferred nesting and foraging habitat.
- The risk of large stand-replacing wildfire would be reduced.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Suitable habitat would be maintained in the short term under alternative 1 and reduced under alternatives 2 and 3. The likelihood of mortality is low under both action alternatives. Abundant suitable habitat would continue to be available; habitat would be improved over time and the risk of stand-replacing wildfire would be reduced. All alternatives meet Forest Plan (USDA Forest Service 1986) direction to provide habitat for small game, furbearers and other wildlife species (p. II/4), and to ensure that viable populations of existing native and desired nonnative species are maintained (p. II/17) . All alternatives are consistent with Forest Plan direction (p. II/20 to II-21and with National Forest Management Act requirements to provide for a diversity of animal communities (16 USC 1604((g)(3)(B)); also see 36 CFR 219.10(b): and FSM 2670.12.

American Marten

Alternative 1

Direct and Indirect Effects

There are no treatments proposed under this alternative, so there would be no direct effects to the American marten. Marten utilize closed-canopy forests with large amounts of snags and DWD and large-diameter trees, all of which have been modified by recent MPB infestation. While the project area may continue to develop late-successional forest conditions and have an abundance of DWD, canopy mortality has reduced suitable marten habitat. Some stands contain predominantly closed forest conditions with large amounts of DWD and provide suitable marten habitat, whereas stands with more open-canopy conditions provide marginal or unsuitable habitat. While the project area does not provide the closed-canopy landscape conditions preferred by marten (Powell et al 2003), the availability of snags and downed wood and understory structural conditions preferred by marten will continue to increase. Due to continued fire suppression and increased fuel loading, the risk of large-scale wildfire is highest under this alternative.

Cumulative Effects

Past, ongoing and future cumulative effects are in volume 2, appendix C. While all activities could result in short-term disturbance during treatment, grazing, and NNIS treatment would not affect marten habitat. Stream restoration and trail work would affect approximately 50 acres, so suitable marten habitat would remain largely unchanged. Ongoing and future activities that could affect marten habitat that could result in long-term changes in habitat include:

Prescribed fire

A total of 62 acres of low-intensity prescribed fire would occur within suitable marten habitat. Effects would be similar to those described in section 4.3 for low-intensity burning and include a reduction of smaller diameter downed wood and some individual tree mortality. Overall effects to habitat would be short term (less than10 years) and suitable habitat would be maintained.

Off-forest harvest

A total of 69 acres of off-forest harvest would occur between the project area boundary and Highway 200. While the type of harvest is not known, it is assumed that treatment would reduce marten habitat over the long-term.

Hazard tree removal

While some snags would be retained, due to the reduction in snags and future downed wood, it is assumed that marten habitat would be reduced on 169 acres of suitable marten habitat affected by hazard tree removal treatment.

Recent wildfire

Since 2011, a total 183 acres of suitable marten habitat have been affected by wildfire. Effects vary depending on the intensity of burning. Intensively burned areas (60 percent of the acres burned) would result in mortality on much of the overstory, which would reduce marten habitat on approximately 110 acres. Areas that burned with low to moderate intensity would result in pockets of reduced canopy cover, as well as an increase in snags (including large diameter.

Firewood collection

Firewood collection would generally occur within 100 ft. of open roads and would result in a long-term reduction in large-diameter downed wood along these road corridors, although overstory conditions would be unchanged.

Conclusions

Collectively, approximately 500 acres of suitable marten habitat would be affected. Effects include a reduction quality on all of the affected acres, as well as along open road corridors affected by firewood collection and a long-term reduction in habitat on approximately 350 acres. Approximately 95 percent of the existing habitat would be unaffected.

Alternative 1 Determination

While alternative 1 may increase the risk of catastrophic wildfire, American marten habitat would be largely unchanged in the short and long term, and implementation is **not likely to cause a local or regional change in habitat quality or population status** for this species.

Action Alternatives

Proposed treatment could result in harm or disturbance to marten during treatment. The likelihood that an animal would be directly affected is low when you consider the project area does not provide landscape conditions preferred by marten, and that marten are largely restricted to higher elevations with deep snow (Ruggiero et al. 1994), whereas most of the treatment sites occur at lower elevations with less snowpack. Between 68 and 80 percent of the existing habitat would be unaffected, and suitable habitat would continue to be available to accommodate any temporarily displaced animals.

Timber harvest would alter marten habitat, although effects would vary by treatment. Intermediate harvest would reduce habitat quality because of reduced stand structure and canopy, although stands would retain some features of marten habitat such as requisite canopy cover (i.e., greater than 25 percent), stand size, snags and downed woody debris. Due to the reduction in canopy cover, as well as reduced stand structure marten habitat would be reduced over the long-term on sites affected by regeneration harvest or in fire created openings. Effects of fire would also vary and marten habitat would be reduced on lands affected by high severity fire, whereas structure and habitat quality would be reduced by low severity fire. Because prescribed burn lands would provide a mosaic of burned and unburned lands, suitable marten habitat would continue to be available within burn units

Table 119 displays existing American marten habitat proposed for treatment under the action alternatives, where as these treatments by alternative are summarized in table 120.

Table 119. Alternative treatments in American marten habitat

Treatments	Alternative 2		Alternative 3	
	Acres	Percent[1]	Acres	Percent[1]
Intermediate Harvest	914	13	335	5
Regeneration Harvest	143	2	133	2
Low Severity Fire	152	2	531	8
Mixed Severity Fire	1,265	19	598	9
Total	**2,474**	**36**	**1,597**	**24**

[1]-Percent of available habitat

Table 120. Post-treatment effects to marten habitat by alternative

Treatments	Alternative 2		Alternative 3	
	Acres	Percent[1]	Acres	Percent[1]
Acres Treated	2,474	36	1,716	25
Habitat Reduced[2]	459	7	283	4
Reduction in habitat quality[3]	1,731	26	1,088	16
Unaffected Habitat	4,313	64	5,071	75

1-Percent of available habitat
2-includes regeneration harvest and acreage of openings created by mixed-severity fire
3-includes underburning, intermediate harvest, and lands affected by low severity burning.

Alternative 2

Under alternative 2, suitable marten habitat would be reduced by 7 percent due to proposed regeneration harvest and openings created by mixed-severity burning. Habitat quality would be reduced on approximately 26 percent of the available marten habitat from proposed low-severity burning and intermediate treatments.

Habitat connectivity at lower elevations in the Lincoln Gulch and Beaver creek drainage, although 96 percent of the harvest would occur in ponderosa pine/dry Douglas-fir forests that provide less preferred marten habitat (Buskirk and Ruggiero 1994). While mixed severity burning will increase fragmentation of preferred mid to upper elevations, openings created would be widely scattered, unburned lands would be retained in all units and marten habitat connectivity on these lands would be maintained.

Alternative 3

Approximately 80 percent of the existing habitat would be unaffected and effects would be similar to those of alternative 1. Under alternative 3, suitable marten habitat would be reduced by 4 percent due to proposed regeneration harvest and openings created by mixed-severity burning. Habitat quality would be reduced on another 16 percent of the available marten habitat from proposed low-severity burning and intermediate treatments. Like alternative 2, most harvest would occur in less preferred ponderosa pine/dry Douglas fire (Buskirk and Ruggiero 1994), and habitat connectivity at mid- to upper elevations would be maintained.

Alternatives 2 and 3

Cumulative Effects

Past, ongoing and future activities are discussed under alternative 1 and a total 500 acres of suitable marten habitat would be affected, including a reduction in suitable habitat on approximately 350 acres. In addition to this, alternative 2 would affect up to another 2,474 acres. Of this there would be a reduction in habitat quality on 1,731 acres and a long-term reduction in habitat on 459 acres.

Cumulatively during the analysis period, a total of almost 3,000 acres or 16 percent of the available habitat would be affected. Of this, habitat quality would be reduced for approximately 10 years on up to approximately 1,800 acres and there would be a long-term reduction in habitat on 809 acres. Approximately 84 of the existing habitat would be unaffected, connectivity of preferred mid to upper elevation habitat would be maintained and habitat will continue to be available to support local use by marten.

Irreversible and Irretrievable Commitments

There are no irreversible commitments anticipated. Irretrievable commitments include a reduction in the amount and quality of suitable habitat. Habitat conditions would be restored on all sites treated in the long term.

Alternative 2 and 3 Determination

The action alternatives would reduce existing marten habitat. Suitable habitat would continue to be available and based on the above analysis and the following rationale, implementation of alternatives 2 and 3 are **not likely to cause a local or regional change in habitat quality or population status** for the American marten.

- The project area does not provide landscape conditions preferred by marten and the likelihood of direct effects are low.
- Treatments are concentrated in low elevation open canopy habitat, preferred mid to upper elevation habitat would be maintained and snag.
- Snags and DWD would continue to be available across the landscape.
- Treatments would reduce the risk of wildfire.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Marten habitat would be relatively unchanged under alternative 1. While the action alternatives would reduce suitable marten habitat, the likelyhood of mortality is low. Roads built then obliterated immediately following timber removal would be used for administrative purposes and remain closed to general use. Habitat would continue to be available within all affected watersheds. All alternatives are consistent with Plan direction (USDA Forest Service 1986) to provide habitat for small game, furbearers and other wildlife species (p. II/4), to ensure that viable populations of existing native and desired nonnative species are maintained (p. II/17), to develop and implement a road management program with road use and travel restrictions that are responsive to resource protection needs (p. II/2) and to manage 5 percent of each 3rd order drainage for old growth (p. II/20). All alternatives are consistent with Forest Plan (p. II/20 to II-21) snag and dead wood management guidelines and with National Forest Management Act requirements to provide for a diversity of animal communities (16 USC 1604((g)(3)(B)); also see 36 CFR 219.10(b): and FSM 2670.12.

Commonly Hunted Species

Elk

Elk are evaluated using the following criteria:

- Summer Range Hiding Cover and compliance with Plan standard 3. This requires maintaining 50 percent or more of each elk herd unit as hiding cover.
- Winter Range Thermal Cover and compliance with Plan standard 3. This requires maintaining 25 percent or more thermal cover on winter range in each elk herd unit.
- Open Road Density and compliance with Plan standard 4a. This requires that that the ratio of hiding cover to open road density be within guidelines identified by the Forest Plan during hunting season (October 15 to December 1.
- Summer Range Habitat Effectiveness Recommendations are to maintain 50 percent habitat effectiveness where elk are a primary resource consideration and 70 percent habitat effectiveness in

areas intended to benefit elk summer habitat (Christensen et al. 1993). This is based on open road density within the summer period (May 16 to October 14).

- Elk Security and consistency with recommendations in Hillis et al. (1991). This includes providing 30 percent of each elk herd unit in patches 250 acres or larger in size that are more than 0.50 mile from an open road.
- Elk Forage – this involves a qualitative assessment of changes in elk forage on summer, transition and winter ranges.
- Calving Areas/Transition Range
- Management Area Statndards for MAT-2, T-3, and W-1

Alternative Summary

Information presented in these tables is used in the alternative analysis presented below.

Table 121 displays values for hiding cover, thermal cover and big game security and whether the herd unit conditions comply with the Forest Plan.

Table 122 displays habitat effectiveness and elk security and whether the herd unit conditions are consistent with recommendations in the pertinent literature. Information presented in these tables is used in the alternative analysis presented below.

Table 121. Alternative Elk herd unit summary and Forest Plan compliance

Habitat/Plan Compliance	Alternative 1		Alternative 2		Alternative 3	
	Beaver Creek	Keep Cool Creek	Beaver Creek	Keep Cool Creek	Beaver Creek	Keep Cool Creek
Elk Hiding Cover						
Elk Hiding Cover acres (%)	18,257 (56)	15,725 (36)	15,507 (48)	14,365 (35)	16,657 (51)	15,365 (35)
Meets Plan Standard 3	Yes	No	No	No	No	No
Elk Winter Range Thermal Cover						
Winter Range Thermal Cover acres (%)	938 (5.3)	527 (3.8)	583 (3.3)	527 (3.8)	664 (3.7)	527 (3.8)
Meet Plan Standard 3	No	No	No	No	No	No
Open Road Density						
Open Road Density mi/mi[2]	1.4	1.3	1.4[1] (1.7)[2]	1.3[1] (1.3)[2]	1.4[1] (1.6)[2]	1.3[1] (1.3)[2]
Percent Hiding Cover	55	36	40	30	43	32
Meets Plan Standard 4a	No	No	No	No	No	No

[1]-Post-implementation road density
[2]-Density during implementation

Table 122. Alternative elk herd unit summary of habitat effectiveness and elk security

Condition/Compliance with Recommendation	Alternative 1		Alternative 2		Alternative 3	
	Beaver Creek	Keep Cool Creek	Beaver Creek	Keep Cool Creek	Beaver Creek	Keep Cool Creek
Habitat Effectiveness						
Road Miles	159.9	189.6	159.9[1] (174.2)[2]	189.6[1] (189.6)[2]	159.9[1] (174.2)[2]	189.6[1] (189.6)[2]
Square Miles	50.6	69.3	50.6	69.3	50.6	69.3
Open Road Density in mi/mi^2	3.2	2.7	3.2[1] (3.4)[2]	2.7[1] (2.7)[2]	3.2[1] (3.4)[2]	2.7[1] (2.7)[2]
Habitat Effectiveness	37	41	37[1] (35)[2]	41[1] (41)[2]	37[1] (35)[2]	41[1] (41)[2]
Meets 50 percent Recommendation	No	No	No[1] (No)[2]	No[1] (No)[2]	No[1] (No)[2]	No[1] (No)[2]
Hunting Season Elk Security						
Security Habitat Post Implementation acres (%)	8,493 (26)	11,828 (27)	8,493 (26)	11,828 (27)	8,493 (26)	11,828 (27)
Meets 30 percent recommendation (Hillis et al.1991)	No	No	No	No	No	No
Security Habitat During Implementation (%)			6,449 (20)	11,169 (25)	7,124 (22)	11,385 (26)
Meets 30 percent recommendation	No	No	No	No	No	No

[1]-Post implementation

[2]-During implementation

Alternative 1

Direct and Indirect Effects

Summer Range Hiding Cover

Because there are no treatments proposed, there would be no immediate change in hiding cover. As shown in table 67, hiding cover would continue to occur on 56 percent of the Beaver Creek HU, which is in compliance with Plan Standard 3, and 36 percent of the Keep Cool Creek HU, which falls below the Plan threshold.

Because summer range occurs on the entire herd unit, a variety of conditions exist and the availability of future summer range hiding cover under this alternative would vary spatially and temporally. On more mesic sites that don't contain a lodgepole component, there would be little change in cover in the short term. Over the long term hiding cover would increase as stands become denser and transition from even-aged to uneven-aged conditions. Cover would also develop over time on lands affected by the 2003 Snow Talon fire, increasing cover on summer range in the Keep Cool Creek HU. The availability of cover on lands affected by MPB mortality would vary. Where mortality is scattered, cover would be largely retained in the short and long-term. In areas with concentrated mortality, hiding cover would decline in the next five to ten years as dead trees created by pine beetle mortality fall to the ground, reducing both screening and accessibility for elk. Overall, summer range hiding cover would be relatively unchanged, except in lower elevation summer range with concentrated MPB mortality, where cover would decline.

Summer Range Habitat Effectiveness

Habitat effectiveness is a function of suitable habitat components (cover, forage, wet sites, and travel routes) and reduced human disturbance (generally measured in terms of open roads and motorized trails) (Christensen et al. 1993). Because there would be no change in road access, habitat effectiveness would be unchanged. Anticipated changes in summer range cover are discussed above. Summer range forage availability, which is discussed in more detail below, would be relatively unchanged on upper elevation summer range. Forage on lower elevation summer range would continue to be low or decline due to continued conifer encroachment into grass and shrub communities and reduced access into lands with concentrated MPB mortality.

Winter Range Thermal Cover

Currently both herd units fall well below Forest Plan standard 3 related to winter range thermal cover (table 121). While thermal cover on more mesic sites that don't contain a lodgepole component would be relatively unchanged, because most of the winter range on both units is characterized by open canopy forest and non-forest, both units would continue to fall below Plan standards. Where MPB mortality is concentrated, thermal cover would be further reduced in the next five to ten years as trees fall to the ground, reducing snow intercept, as well as elk access.

Research indicates that cover conditions preferred and utilized by wintering elk vary and often include more open canopy stands (Cook et al 1998, MFWP 2011b). On more mesic sites with higher levels of snow, elk utilize denser stands throughout the winter (Thompson et al 2005, MFWP 2011b), although the canopy closure in stands utilized were lower (48 percent) than those identified in the Forest Plan (70 percent) (Thompson et al. 2005). On winter range that receive less snow fall and which are characterized by dryer sites similar to those found in the project area, open canopy forest with understory shrubs and bunchgrasses were preferred for much of the winter (MFWP 2011b). Research indicates that overall conditions on elk winter ranges should contain a diversity of conditions including more open forested stands with understory shrubs, bunchgrass communities, and patches of closed canopy forest containing arboreal forage.

While neither herd unit meets the Forest Plan standard definition of thermal cover, project area winter ranges do contain a mix of open and closed canopy forest utilized by elk, including a predominance of denser stands with greater than 40 percent canopy closure, as well as more open canopy (25 to 39 percent canopy closure) forest. Currently, winter habitat is provided in the Beaver Creek HU by 16 percent open canopy and 43 percent closed canopy forest. In the Keep Cool Creek HU winter habitat is provided by 18 percent open-canopy forest and 49 percent closed-canopy forest (table 124). Figure 90 displays existing winter range conditions, including Forest Plan thermal cover, as well as forest canopy cover conditions that are similar to those with documented elk use (Thompson et al. 2005, MFWP 2011b).

Open Road Density (Hunting Season)

While hiding cover on National Forest would be relatively unchanged in the short term, because of the large non-forest and open canopy forest component on private lands, total herd unit hiding cover would remain low and neither herd unit would comply with Forest Plan standard 4a (see table 121). Open road density and hunter access would be unchanged.

Hunting Season Elk Security

Security habitat for elk is important during the hunting season relative to elk vulnerability, population structure, and hunter success and alternative elk security is displayed in table 122. Under alternative 1, elk security would remain at its present level with security areas comprising approximately 26 percent the Beaver Creek HU and 27 percent of the Keep Cool Creek HU. While this is below the 30 percent

recommended by Hillis et al. (1991) elk security and walk in hunting opportunities will be maintained, which is consistent with objectives for this EMU (MFWP 2005).

Forage

Forage availability for elk is variable across the project area. Due to the lack of disturbance, remote wilderness and roadless lands don't contain vegetative conditions that are conducive to producing abundant forage (MFWP 2005). In the absence of future disturbances and as conifer encroachment continues, forage availability on these lands will remain low or decline. The 2003 Snow Talon fire increased forage on summer range in the Keep Cool Creek HU. Due to the large reduction in cover, elk accessibility and use has been reduced on these lands, although as cover develops, elk use of forage will increase.

Forage availability on lower elevation dry forest communities (ponderosa pine and Douglas-fir), that characterize herd unit winter and transition range will be variable, and is largely dependent on the level of disturbance. For example Makela (1991) and Hillis and Applegate (1998) (in MFWP 2011b) found that high shrub forage productivity is strongly tied to frequent fires. They concluded that shrub communities that had high fire return intervals and had not burned for many decades only produced 5 percent to 20 percent as much forage as stands that had been recently burned, although this varied by habitat type. Because the predominance of winter range forest types had relatively frequent fires historically and have missed several fire return intervals (Buhl 2015), forage availability on many of these lands has been reduced. An exception to this would be on lands affected by recent MPB mortality, where opening up of the canopy would promote understory development and increase available forage. While forage would continue to be available for the next few years, as trees fall to the ground, the reduction in cover combined with the increase in jackstrawed down wood will reduce access and forage availability for elk. So overall, in the absence of future disturbance, forage availability on summer range would be relatively unchanged, whereas forage availability on winter ranges would remain low or decline.

Calving Areas

While there may be localized changes in cover and forage associated with ongoing MPB mortality, because there are no treatments proposed, there are no direct or indirect effects to elk calving areas under this alternative.

Management Areas

There will be no changes to the existing conditions, as described in Section 3.5.1, for the Plan standards in MAs T-2, T-3, and W-1.

Cumulative Effects

The combined boundaries of the Beaver Creek and Keep Cool Creek herd units make up the cumulative effects boundary. This area was selected because it includes all areas affected by treatment as well as lands affected by recent wildfires and MPB mortality. As a result both stand and landscape level habitat can be assessed. Past, ongoing and future activities are in volume 2, appendix C. Activities that affect elk include grazing, wildfire, timber harvest, firewood collection and hazard tree removal, as well as recreational activities associated with mining, hunting and other dispersed use. Because there is no change in public access, dispersed recreational use is expected to remain relatively unchanged. Potential ongoing and future long-term effects that could occur during the analysis period and affect elk habitat include grazing, hazard tree removal, firewood collection, invasive plants treatment, recent wildfire, prescribed burning and timber harvest, which are summarized by herd unit in table 123 and discussed below.

Table 123. Alternative 1, summary of ongoing and future effects that may impact elk habitat

Activity	Beaver Creek			Keep Cool		
	Total Acres Affected	Hiding Cover Affected (acres)	Thermal Cover[1] Affected (acres)	Total Acres Affected	Hiding Cover Affected (acres)	Thermal Cover[1] Affected (acres)
Grazing	5,945	2,730	294	8,694	5,663	103
Hazard Tree Removal	251	184	8[2]	169	112[2]	0
NNIS Treatment	2,564	872	4	475	186	3
Timber Harvest	126	96[2]	18[2]	60	43[2]	0
Prescribed Fire	0	0	0	17	13	0
Recent Wildfire	3	3[3]	0	145	21[3]	0

1 – Forest Plan winter range thermal cover

2 – Results in a reduction in Forest Plan hiding and thermal cover on the acres affected

3 – Reduction in Forest Plan hiding cover on 60 percent of the acres affected.

Summer Range Hiding Cover

Alternative 1 would not directly effect summer range hiding cover. Indirectly, hiding cover will increase over time in most areas, although lower elevation areas with high MPB mortality hiding cover is expected to decrease in the short term. Although grazing and invasive species treatment occur within acres identified as hiding cover, these activities will not remove hiding cover. Prescribed fire effects would be similar to those described under treatment effects for low severity fire, and the overstory would remain largely intact. Hazard tree removal, timber harvest off-Forest, and wildfire would result in reductions in hiding cover in addition to those in low elevation areas with MPB mortality. These actions therefore result in 282 less acres of hiding cover in the Beaver Creek HU and 168 less acres in the Keep Cool Creek HU. The no-action alternative, taken cumulatively with other activities, results in 55 percent hiding cover in the Beaver Creek HU and 35 percent hiding cover in the Keep Cool Creek HU. While the Hazard Tree Removal reduced habitat along road corridors, the analysis for the hazard tree removal project concluded that even though both herd units were below Forest Plan standards for hiding and thermal cover, and a site-specific amendment was developed, that elk numbers should not be altered. This was disclosed in a site-specific Forest Plan amendment for that project.

Summer Range Habitat Effectiveness

As alternative 1 will have no direct or indirect effects on habitat effectiveness, there will be no cumulative effects.

Winter Range Thermal Cover

Alternative 1 would not directly alter thermal cover, however, over time thermal cover will decrease where MPB mortality is concentrated as dead trees fall in the next 5 to 10 years. Thermal cover will not be altered by grazing, invasive species treatment, or prescribed fire. Twenty-six acres of thermal cover in Beaver Creek HU has been removed by hazard tree removal and timber harvest off National Forest System lands, resulting in a cumulative effect of 5.1 percent thermal cover in the Beaver Creek HU. There are no changes to thermal cover in the Keep Cool Creek HU.

Open Road Density (Hunting Season)

Alternative 1 will have no changes to the miles of open roads, therefore there are no cumulative effect.

Hunting Season Elk Security

Alternative 1 will have no changes to acres of elk security, therefore there are no cumulative effect.

Forage

Alternative 1 results in a relatively unchanged forage availability on summer range and a low or decline forage availability on winter range. Activities that reduce cover (hazard tree removal, timber harvest, wildfire) would result in increases in forage availability, while reduction of invasive species and prescribed fire can increase the quantity and quality of available forage. Properly managed cattle grazing can increase the productivity, diversity and nutritive quality of forage, however elk tend to use areas that don't contain cattle (Rapp 2006). Under existing allotment management plans continued use is expected to be moderate to light, whereas cattle/elk interactions are not expected to increase and habitat that is largely unaffected by livestock would continue to be available. In all, forage quality and quantity would be expected to increase on 2,944 acres (9 percent) of the Beaver Creek HU and 866 acres (2 percent) of the Keep Cool Creek HU.

Summary

Cumulatively, approximately 450 acres of hiding cover and 26 acres of thermal cover would be removed under alternative 1. There would be localized reductions in cover due to MPB mortality; although, landscape-level forage and cover conditions would remain largely unchanged. Ongoing and future uses are not expected to change, many activities would result in short-term effects, and human access and elk security would be maintained.

Irreversible and Irretrievable Commitments

There are no irreversible or irretrievable commitments of resources anticipated under the no-action alternative

Alternative 1 Determination and Conclusions

Under alternative 1, Forest Plan summer range hiding cover would be unchanged and in the Beaver Creek HU would meet Plan standard 3, while the Keep Cool Creek HU would continue to fall below Forest Plan direction. Thermal cover would be reduced on elk winter range in both units due to MPB mortality and would not meet Plan standard 3. The open road density (hunting season) standard (plan standard 4) would not be met in either HU due to the lack of hiding cover present. Neither HU would meet the 50 percent habitat effectiveness rating recommended by Christensen et al. (1993) due to private road miles in the HU, and the HU would remain just below the 30 percent security habitat recommended by Hillis et al. (1991). Forage availability would decerase due to continued conifer encroachment, but would increase with loss of cover. Thermal cover on winter range in management area T-2, hiding cover in management area T-3, and thermal cover on management area W-1 would all remain below plan standards. Despite this, habitat would continue to be available to support desired levels of elk, as identified in the Elk Plan (MFWP 2005) and evidenced by elk numbers being at or near objectives for the past five years (J. Kolbe, pers. comm. January 27, 2015). Due to increased fuel loading, the risk of stand-replacing wildfire is greatest under this alternative.

Alternatives 2 and 3

Alternative changes in hiding cover, thermal cover, security and habitat effectiveness are displayed in table 121 and table 122.

Direct Effects and Indirect Effects

Elk are highly mobile, therefore, direct mortality from burning or harvest is unlikely. Elk would avoid treatment sites during treatment and following treatment, which will alter movement and use of the project area by elk (Wisdom et al 2005). Harvest would be implemented over five years and displacement would be reduced with implementation of pdfs that restrict the number of watersheds that that can operated at a time (project design feature WL-14 ELK). Similarly, because burning would occur over 10 years, is spread out over multiple watersheds and would leave unburned lands in all units, suitable habitat would continue to be available for animals temporarily displaced during treatment..

Intermediate Harvest

Harvest in combination with burning would remove live trees, dead and dying trees and smaller diameter downed wood, which would reduce elk cover on the site. Because canopy closure would be reduced to 25 to 40 percent under alternative 2, these stands would no longer meet the plan definition of hiding cover. An exception to this would be lands within the INFISH buffer, where live trees and increased levels of standing and down wood would be retained. Under alternative 3 canopy closure would be reduced to 25 to 40 percent on precommercial thinning units and approximately a third of the improvement cutting, whereas 40 percent or more canopy and Plan hiding cover would be retained on most of the proposed improvement cutting. Openings created in the canopy would promote development of herbaceous and woody vegetation within a few years of treatment, resulting in an increase in forage that may last for 10 years (Rapp 2006, Wisdom et al. 2005), although they would vary by canopy closure.

Regeneration Harvest

Because most live trees as well as snags and smaller diameter downed wood will be removed, sites would no longer provide elk cover. The reduction in canopy cover combined with site preparation would increase herbaceous and woody vegetation and elk forage for 10 to 20 years, although this will decline over time (Rapp 2006, Wisdom et al 2005, Hayden et al 2008). The availability of forage for elk would depend on its proximity to cover and generally the highest elk use would occur within approximately 300 to 500 feet of cover, with use decreasing with increasing distance from edges/cover (Thompson 1988, Wisdom et al. 2005).

Low-Severity Burning and Underburning

Low- severity burning would reduce down woody debris, some tree seedlings/saplings and understory cover. There would be some overstory mortality, although this would be scattered and stands would continue to meet the Forest Plan definition of hiding and thermal cover. Approximately 20 percent of all sites would remain unburned and unaffected hiding and thermal cover would be interspersed with treated areas.

Prescribed fire is routinely used to create or enhance elk habitat and has been shown to encourage early spring green-up, improve transition range, reduce conifer encroachment, increase palatability, and stimulate regeneration of aspen (Leege 1979 in USDA Forest Service 2011b, Sachro et al. 2005, Hillis and Applegate 1998, Van Dyke and Darragh 2007, Long et al. 2008a, Long et al. 2008b, Canon et al. 1987). Forage would increase within a few years of treatment and would remain high for 10 to 12 years (USDA FS 2011b). Year-round forage species that would be expected to increase include shrubs such as ceanothus (Crotteau et al. 2012), Rocky Mountain maple, and serviceberry (Lentile et al. 2007).

Burning in shrub and grasslands has also been shown to increases both production and nutritional quality that benefit elk (Van Dyke and Darragh 2007) and low severity fire generally has the greatest benefit to

elk when a mosaic of burned and unburned lands is available (USDA Forest Service 2011b, Long et al. 2008a).

Mixed Severity Burning

Sites proposed for mixed-severity burning that experience a low-severity burn would be similar to that described previously. Those portions of the site that experience moderate to severe burning would have a long-term reduction in overstory cover, although the response of the understory would vary over time. Grasses and forbs would become established within one to two years of treatment whereas shrubs and tree seedlings would become established within five years (Hirsh 2012, Collins and Stephens 2012, Crotteau et al. 2012). While there would be a stand level reduction in cover in fire created openings, the interspersion of burned and unburned land would enhance landscape level habitat by providing a mosaic of forage and cover (USDA Forest Service 2011b). For summer ranges, Thomas (1979) suggests openings from 10 to 40 acres are used by elk, whereas use is greatly reduced on larger openings. While it is difficult to determine the size and spatial arrangement of openings, because cover would be retained on 70 percent or more of the site, it is expected that many of the openings created by mixed-severity burning would be within 300 to 500 feet of hiding cover and provide forage for elk within a few years of treatment (Thompson 1979, Thompson 1988, Wisdom et al. 2005).

Summer Range Hiding Cover

Approximately 78 percent of the summer range hiding cover under alternative 2 and 84 percent under alternative 3 would be unaffected by treatment and hiding cover on these lands would be similar to those described under alternative 1.

Hiding cover will be reduced on lands affected by treatment and table 121 summarizes the changes to elk hiding cover on summer range under the action alternatives. Under alternative 2, harvest and mixed severity burning would reduce hiding cover in the Beaver Creek HU from 56 percent to 48 percent, and reduce cover to 51 percent under alternative 3. Within the Keep Cool Creek HU, mixed severity fire would reduce hiding cover from 36 percent to 35 percent under both action alternatives. Neither herd unit would meet Forest Plan standard 3 for summer range hiding cover under alternative 2, while the Keep Cool Creek HU would not meet Forest Plan standard 3 for summer range hiding cover under alternative 3. Elk use of the landscape would change as elk seek out places where hiding cover remains post-treatment.

Summer Range Habitat Effectiveness

Alternative changes in habitat effectiveness are displayed in table 122. With construction of roads built and then obliterated after use, and use of closed roads for haul and administrative use between May 16th and October 14th, open road densities would increase during implementation and habitat effectiveness would be reduced within the Beaver Creek herd unit under both alternatives. Open road density during this period would increase to 3.4 miles per square mile under both alternatives (less than 50 percent habitat effectiveness). There are no changes to the open road densities in the Keep Cool Creek HU during implementation (2.7 miles per square mile).

Project operations during implementation are likely to redistribute elk on summer range. Project design features would serve to minimize some of the impacts. For example, logging activities would be confined to a single drainage at a time (pdf WL-14 ELK), which would increase the probability of immediate return by displaced elk. Also, roads built and then obliterated after use would be closed to the public which should reduce some of the displacement of elk.

Because all roads constructed would be obliterated following use and roads used for haul would return to their pre-project conditions, habitat effectiveness would be restored to the existing condition following

implementation. Both herd units would remain below the 50 percent habitat effectiveness recommendation post-implementation..

Winter Range Thermal Cover

Alternative changes in Forest Plan thermal cover resulting from treatment are displayed in table 121. There are no changes in amount of thermal cover in the Keep Cool Creek HU in any alternative. In the Beaver Creek HU, alternative 2 results in a loss of 355 acres of existing thermal cover, while alternative 3 removes 274 acres of thermal cover. As the total available thermal cover is already low, these reductions amount to a loss of 38 percent of the available thermal cover under alternative 2 and 29 percent under alternative 3. As in alternative 1, neither herd unit would meet standard 3 under the action alternatives.

Project area winter range conditions under alternatives 1 through 3, including Plan thermal cover, as well as open- and closed-canopy forest (see alternative 1 discussion) are displayed in figure 90 (alternative 1), Figure 91 (alternative 2), and Figure 92 (alternative 3) and summarized in table 124. Conditions under alternative 1 serve as a baseline from which to compare the action alternatives. In the Keep Cool Creek HU there is very little change (1 percent) in the amounts of open and closed canopy forest, and conditions will continue to provide winter range for elk. More acres will move from closed canopy forest to open canopy forest in the Beaver Creek HU under the action alternatives and larger blocks of open canopy forest would be created, however winter habitat will continue to be available. Patch size and connectivity of closed-canopy forest would be reduced, particularly in the Beaver Creek and Lincoln Gulch drainages.

Table 124. Alternative winter range cover on project area elk herd units

Cover/Habitat	Beaver Creek			Keep Cool Creek		
	Alternative 1	Alternative 2	Alternative 3	Alternative 1	Alternative 2	Alternative 3
	%	%	%	%	%	%
Plan Thermal Cover	5.3	3.3	3.7	3.8	3.8	3.8
Open Canopy Forest	16	23	20	18	19	19
Closed Canopy Forest	43	33	37	49	48	48

Open Road Densities (Hunting Season)

Within the Beaver Creek HU, alternative 2 proposes to construct 2.6 miles of road for project use that will be obliterated after implementation. Alternative 3 proposes 0.4 miles of road construction. These roads would be closed to public use. Closed roads that would be used for administrative use (i.e. haul) would occur on 14.3 miles under alternative 2 and 11 miles under alternative 3. Changes in road density during implementation are displayed in table 121. While open road density would increase, because these roads are not available to the public and activity would be confined to a single drainage at a time, impacts to elk would be reduced. Post implementation within the Beaver Creek herd unit, road densities would return to their pre-project level (see table 121). Within the Keep Cool HU, there would be a no increase in open road density during implementation (see table 121). As shown in table 121, Plan standard 4a would not be met in the existing condition, during project implementation, or post-implementation.

Allowable open road densities are dependent on the amount of hiding cover in the herd unit. A reduction in cover has been shown to increase the vulnerability of elk to harvest and there would be a possibility of a short-term increase in hunting mortality, although this would be reduced by restricting public access during and post implementation (Wisdom et al. 2005, Rapp 2006).

Hunting Season Elk Security

Effects to elk security are displayed in table 122. Both alternatives would utilize currently closed roads during harvest and construct roads to be obliterated after use, therefore elk security would be reduced during implementation. Under alternative 2 security is reduced in Beaver Creek HU by 2044 acres, while Keep Cool Creek HU is reduced by 659 acres. Under alternative 3 reductions amount to 1367 acres in the Beaver Creek HU and 443 acres in the Keep Cool Creek HU. Post treatment, project roads built would be obliterated, all existing roads would be returned to their pre-project status and elk security would be restored to 26 percent of the Beaver Creek HU and 27 percent of the Keep Cool Creek HU. Neither alternative would meet the 30 percent recommended security by Hillis et al. (1991) either during or post implementation.

Elk would be displaced from areas of management activity to more secure areas during implementation. Because harvest and road use would be restricted to one drainage at a time, the amount of security habitat reduced across the herd units during any one year would be reduced. Seventy-six percent or more of the existing security habitat would be maintained, there would be no change in public access and security habitat would continue to be available within both herd units. Also, elk security and walk-in hunting opportunity objectives identified for this EMU (MFWP 2005) would be maintained.

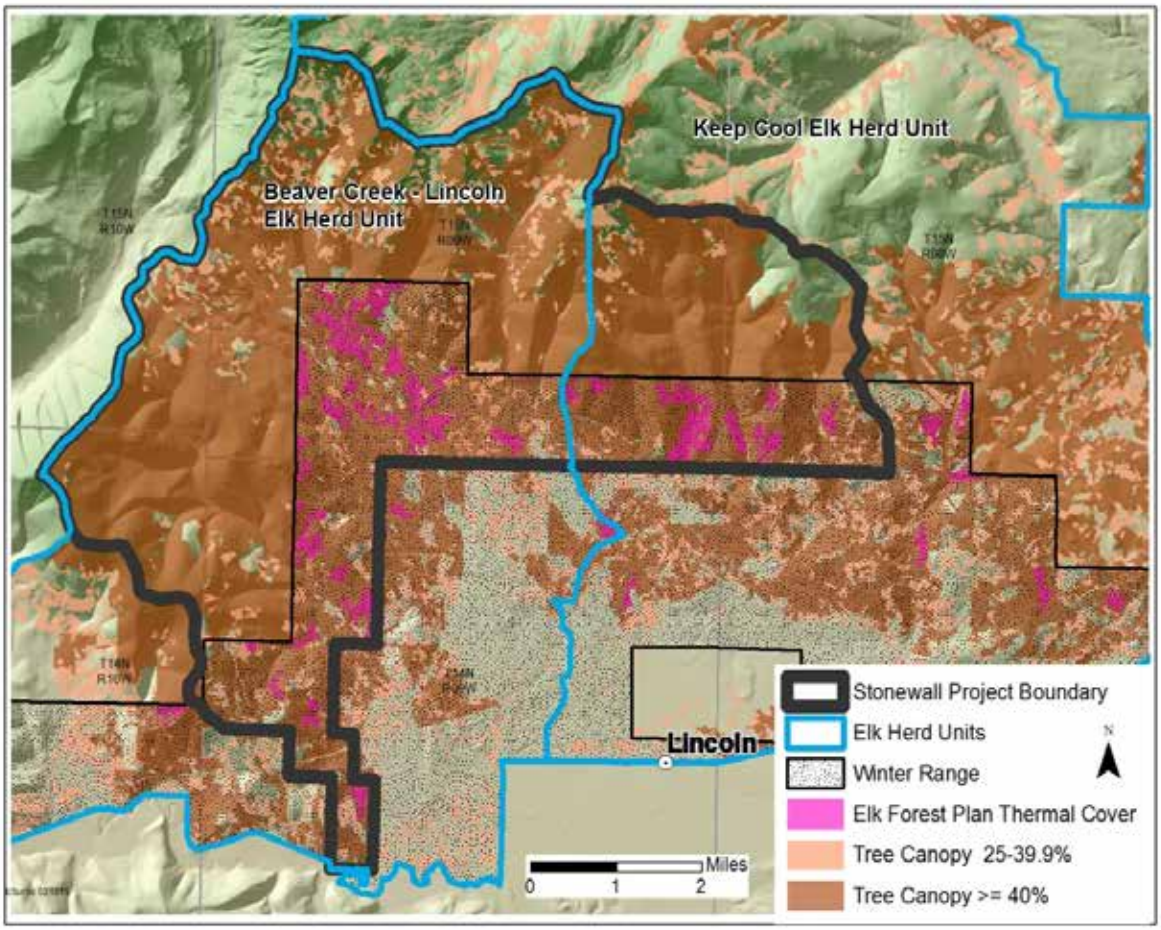

Figure 90. Alternative 1 elk winter range cover conditions

Forage

Both alternatives would reduce summer range cover and increase forage diversity and availability, which would modify elk use of the project area. Under alternative 2, 860 acres of regeneration harvest in Beaver Creek HU would increase available forage habitat and 3,073 acres of prescribed fire would increase forage quality on all burned acres and available forage habitat on approximately 30 percent of the acres with mixed severity burning. In the Keep Cool Creek HU alternative 2 proposes 108 acres of regeneration harvest and 2,390 acres of prescribed fire. Proposed treatment acres under alternative 3 are reduced, with Beaver Creek HU having 708 acres of regeneration harvest to increase forage habitat and 2,535 acres of prescribed fire to increase forage quality and availability. In Keep Cool Creek HU alternative 3 proposed the same acres of regeneration harvest and a lesser amount of prescribed burning (1,729 acres). While cover would be reduced, landscape conditions provided would be closer to those that occurred historically and suitable elk habitat would continue to be available. Because proposed treatments would promote forage within roadless areas and upper elevation summer range, they are consistent with objectives for this EMU (MFWP 2005). Alternative 2 would provide for increases in forage on more acres than alternative 3, as there is more regeneraton harvest and resulting open canopy stands under this alternative.

Calving Areas/Transition Range

The potential for project activities to negatively impact elk calving is relatively low. The overlap of project activities with the elk calving period is typically limited due to wet conditions during the spring. Harvest activities would be suspended during the spring break-up period which is typically occurs from late-March/early-April to mid to late June in most years. Similarly, wet spring conditions limit suitable spring burn windows reducing the potential of prescribed burn activities occurring during the elk calving period. To minimize the potential for project activities to displace elk from suitable birthing areas the following project design feature (WL-13 Elk) was developed to apply to all management activities:

> "If elk calving (late May through mid-June) or nursery areas (late June through July) are identified prior to or during project implementation, management activities will be delayed during active periods."

In the long term it is anticipated that harvest and prescribed burning will result in an increased abundance of succulent and nutritious vegetation that will enhance habitat suitability for elk calving within the project area. This type of response has been observed in the Copper Creek drainage to the east of the project area where following the 2003 Snow Talon fire elk have made extensive use of the burn area for calving. Because both the amount and the nutritional value of forage would be increased, prescribed fire would improve spring forage habitat (Long et al. 2008a, Long et al. 2008b) on transition range and benefit elk during calving and nursing periods.

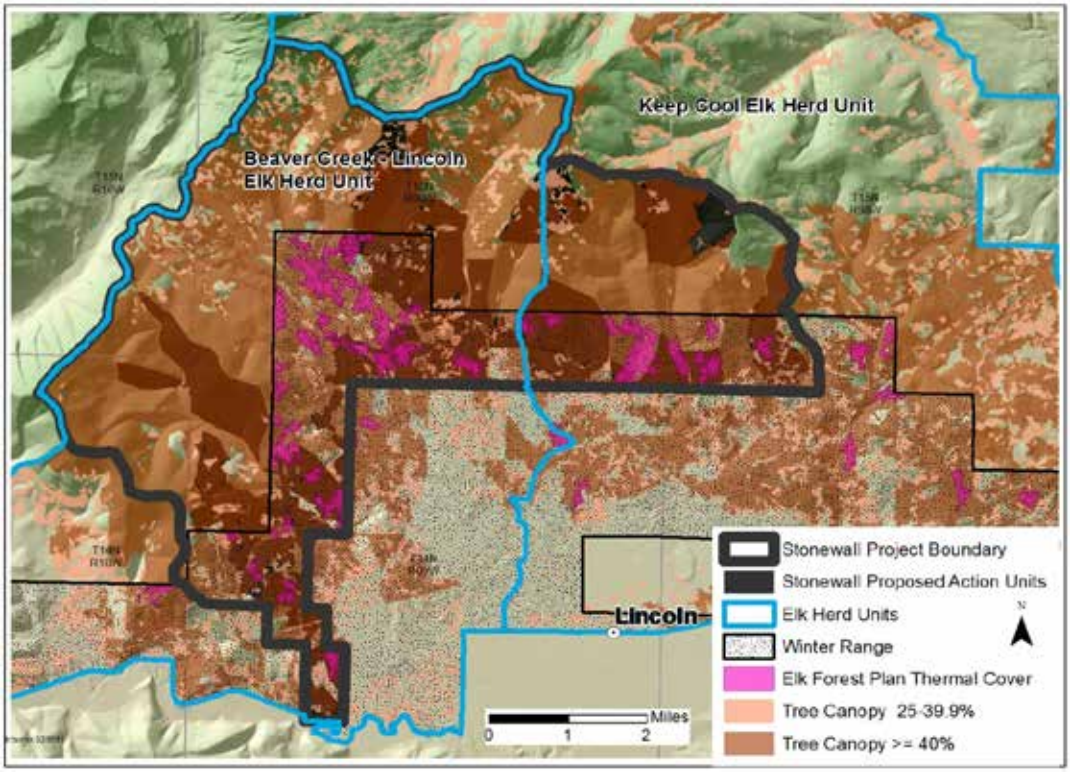

Figure 91. Alternative 2 elk winter range conditions

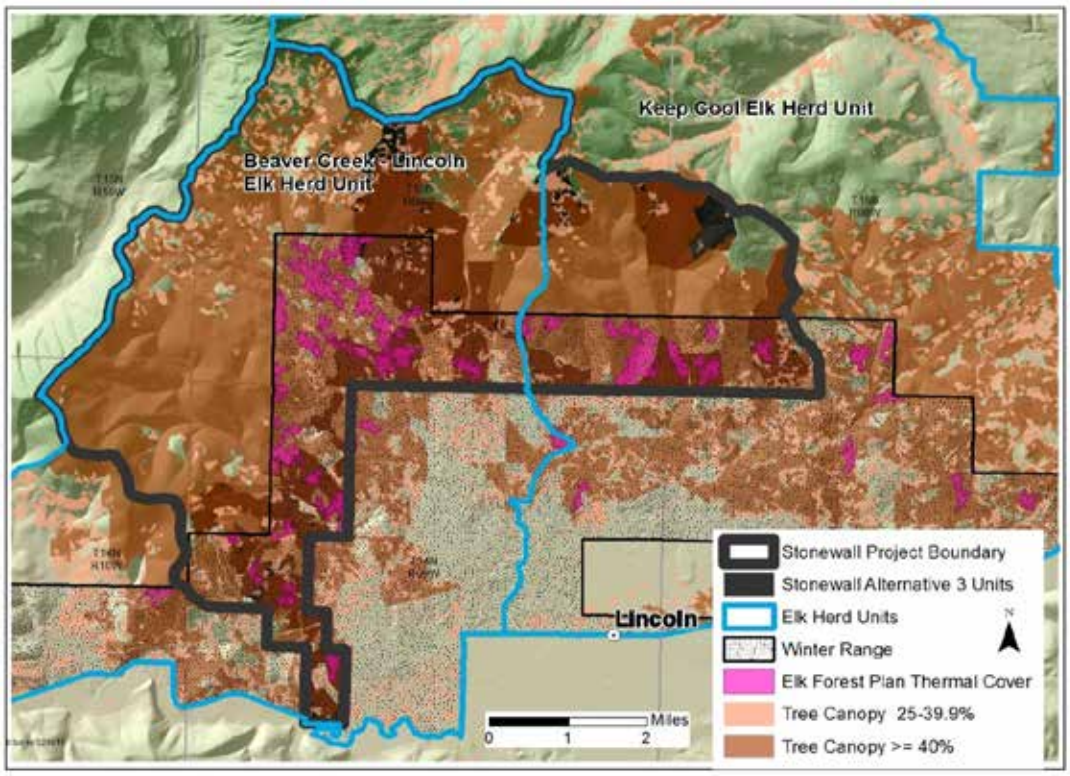

Figure 92. Alternative 3 elk winter range conditions

Management Area T-2

Wildlife habitat improvement practices, including road management, prescribed fire and other techniques, may be used to maintain and/or enhance the quality of big game winter habitat – All roads to be constructed would be closed to public use and obliterated following implementation. Prescribed fire goals include improving forage diversity and production in big game winter ranges.

Maintain adequate thermal cover and hiding cover adjacent to forage areas. Generally this means providing 25 percent thermal cover on identified winter range – Alternative 2 would reduce hiding cover by 971 acres, leaving hiding cover on 49 percent of the management area. Alternative 3 would reduce hiding cover by 463 acres, with 72 percent of the area remaining in hiding cover post-implementation. Table 124 displays the effects on thermal cover by alternative. Both alternatives 2 and 3 reduce thermal cover by 162.5 acres, leaving 6 percent thermal cover on the 2083 acres of winter range in this management area. Treatment areas and alternative cover are displayed in figure 93 (alternative 2) and figure 94 (alternative 3). Because of reduced harvest, alternative 3 provides a better distribution of closed canopy habitat. Management area T-2 winter range does not currently provide 25 percent thermal cover. Both action alternatives would move further away from Management Area T-2 Forest Plan thermal cover thresholds. This situation will be addressed in a separate site-specific Forest Plan amendment

Openings created by timber harvest should meet hiding cover requirements of big game before adjacent areas can be harvested – Figure 93 and figure 94 display past harvest units that do not meet hiding cover requirements. For alternative 2 adjacent areas include units 46, 47, 49, and 72. For alternative 3, adjacent units include units 46a, 47a, 47c, and 72. In order to meet this requirement, a minimum of 22 acres of treatment under alternative 2 and 12 acres of treatment under alternative 3 would have to be dropped from the proposed harvest. This situation is addressed with a site-specific Forest Plan amendment.

Schedule sale activities outside the winter periods (December 1 to May 15) – Winter logging will not be allowed in elk winter range.

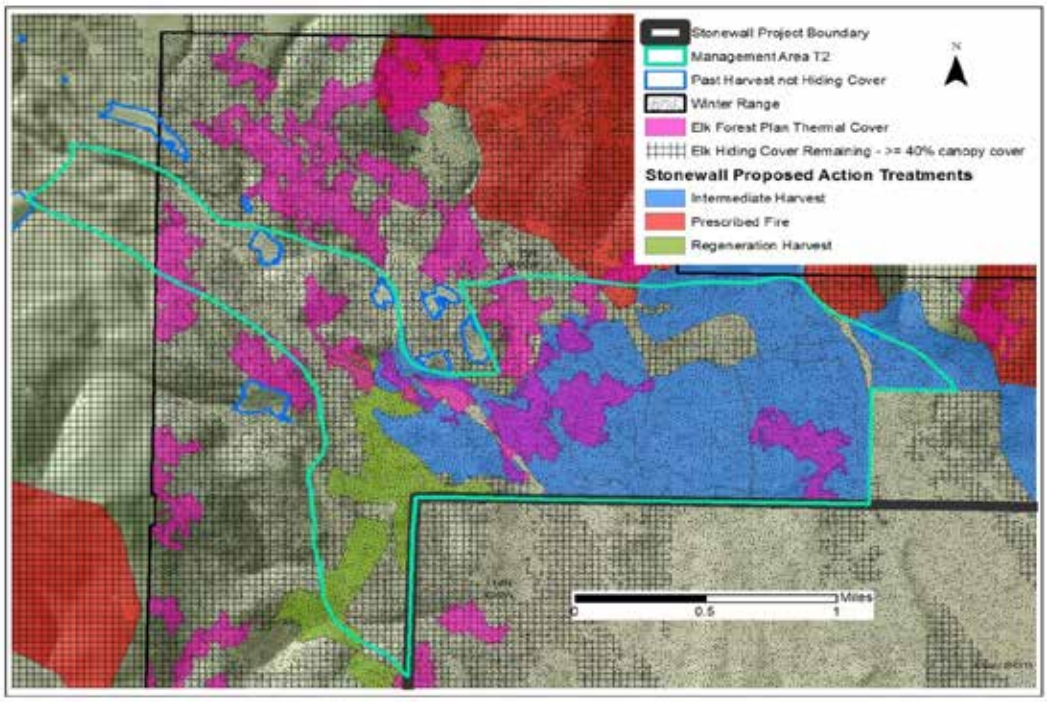

Figure 93. Alternative 2, treatments and cover in management area T-2

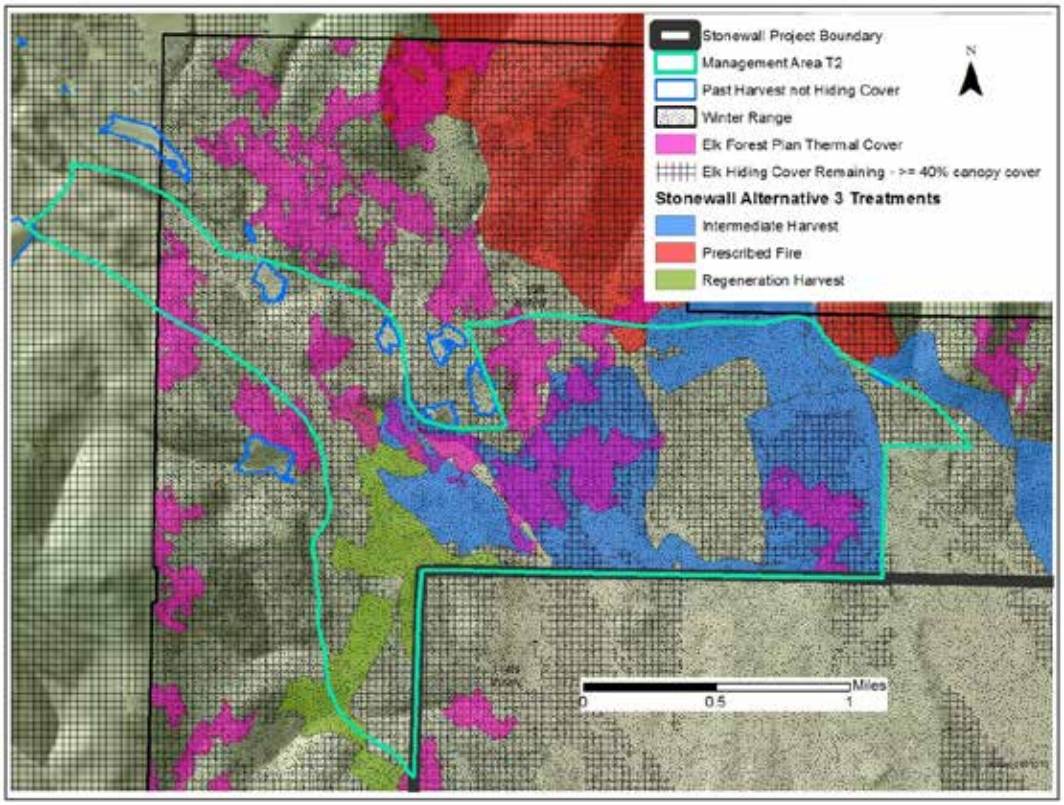

Figure 94. Alternative 3 treatments and cover in Management Area T-2

In addition to the effects on the management area plan standards, forage would be increased on up to 972 acres of Management Area T-2. Disturbance is expected during project implementation, and is reduced by limiting activities to specific portions of the project area at a time.

Management Area T-3

Wildlife habitat improvement practices, including road management, prescribed fire and other techniques, may be used to maintain or enhance the quality of big game summer habitat – All new roads would be closed to public use and decommissioned following implementation. Prescribed burning goals include improving forage diversity and production in big game summer ranges.

Maintain 50 percent hiding cover (MFWP definition) for big game – Alternative 2 would reduce hiding cover by 891 acres, leaving hiding cover on 41 percent of the management area. Alternative 3 would reduce hiding cover by 606 acres, with 44 percent of the area remaining in hiding cover post-implementation. Table 124 displays the effects on hiding cover by alternative. Figure 95 displays the treatment units and remaining hiding cover for alternative 2 while figure 96 displays the treatment units and remaining hiding cover for alternative 3 Both action alternatives would move further away from Management Area T-3 Forest Plan hiding cover thresholds. This situation is addressed in a separate site-specific Forest Plan amendment.

Maintain thermal cover adjacent to forage areas – Figure 95 and figure 96 display the remaining hiding cover in relation to regeneration harvest units that will provide forage and past activity areas that do not yet provide hiding cover, and therefore currently are assumed to provide forage, for each of the

action alternatives. Thermal cover is adjacent to forage areas and will be slightly reduced (from 7 percent to 6 percent) by both alternatives on the Beaver Creek HU.

Openings created by timber harvest should meet hiding cover requirements of big game before adjacent areas can be harvested – Figure 95 and figure 96 display past harvest units that do not meet hiding cover requirements. For alternative 2 adjacent areas include units 25, 26, 33, 36, 37, 38, 54, 55, 59, 65 and 68. For alternative 3, adjacent units include units 25, 36, 37, 38, 59, and 68. In order to meet this requirement, a minimum of 95 acres of treatment under alternative 2 and 39 acres of treatment under alternative 3 would have to be dropped from the proposed harvest. This situation is addressed with a site-specific Forest Plan amendment.

Table 125. Alternative effects to Management Area Plan standards

Habitat/Plan Compliance	Alternative 1	Alternative 2	Alternative 3
Management Area T-2 Winter Range Thermal Cover (Beaver Creek HU only)			
Winter Range Thermal Cover Acres (%)	276.4 (13)	113.9 (6)	113.9 (6)
Meets Plan Standard	No	No	No
Management Area T-3 Hiding Cover			
Elk Hiding Cover acres (%)	5930.9 (49)	5039.7 (41)	5325.4 (44)
Meets Plan Standard	No	No	No
Management Area W-1 Hiding Cover			
Elk Hiding Cover Acres (%)	4163.4 (44)	4163.4 (44)	4163.4 (44)
Management Area W-1 Thermal Cover (Keep Cool Creek HU only)			
Winter Range Thermal Cover Acres (%)	43.2 (22)	43.2 (22)	43.2 (22)
Meets Plan Standard	No	No	No

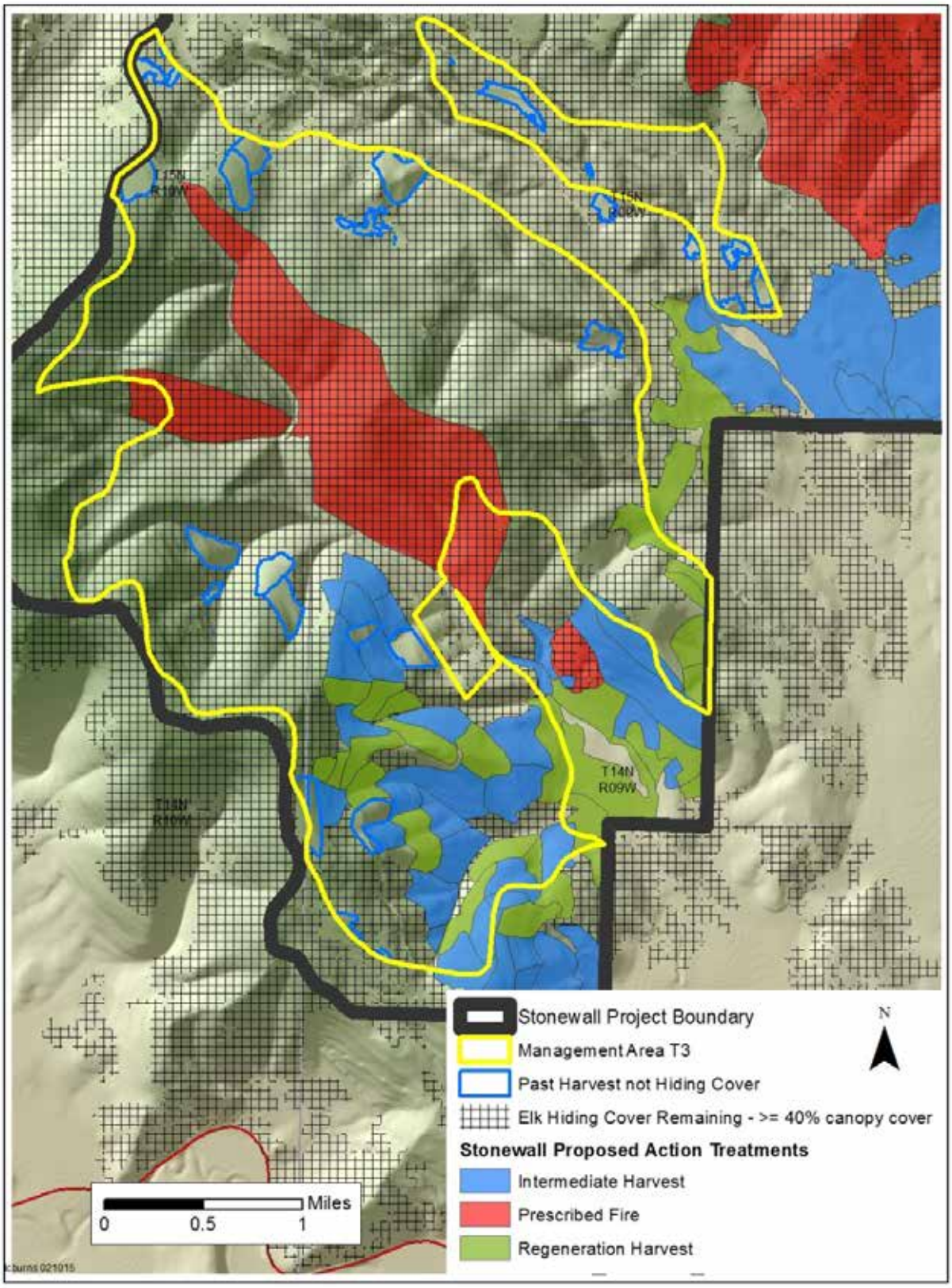

Figure 95. Alternative 2 Treatments and Cover in Management Area T-3

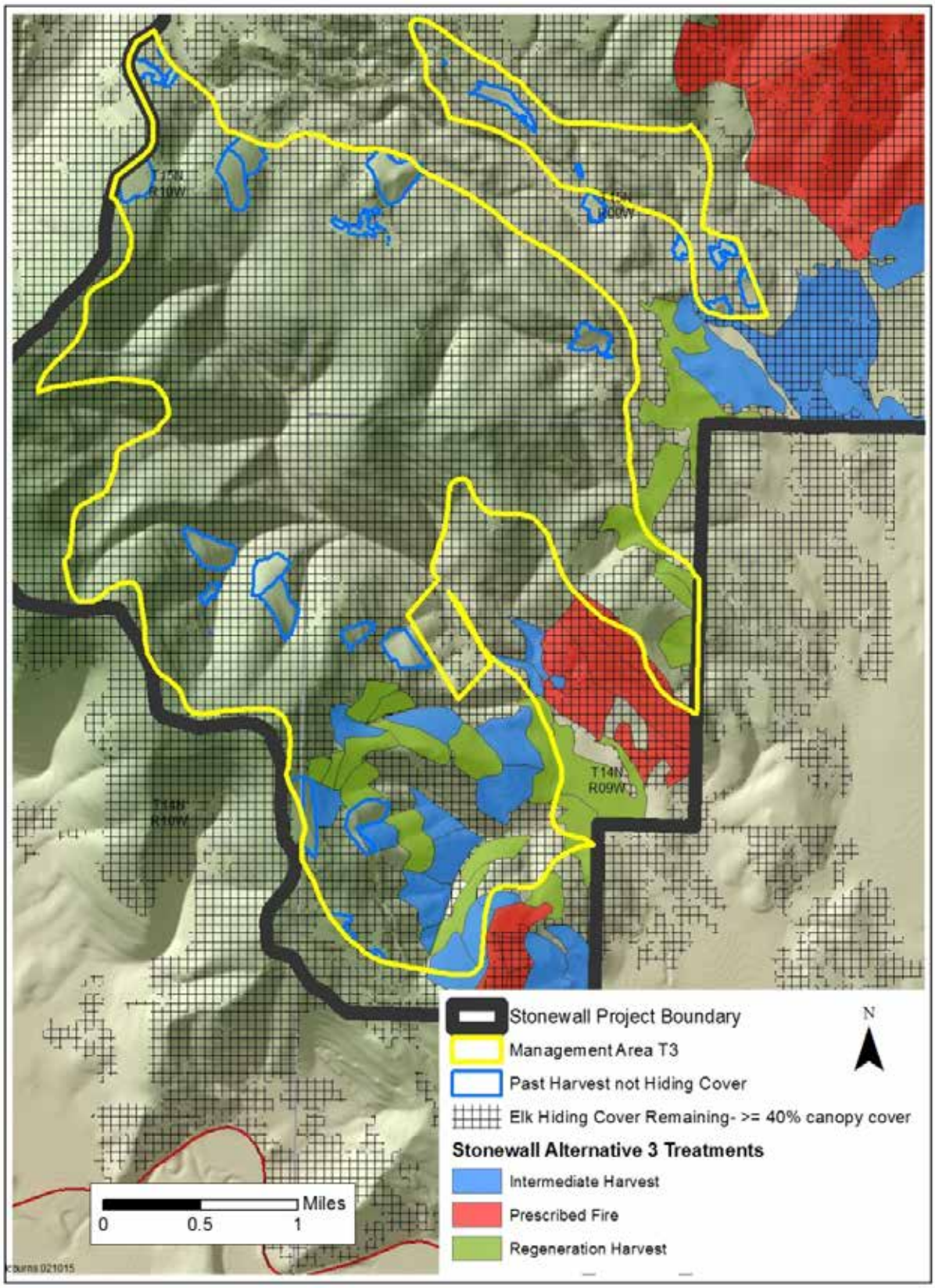

Figure 96. Alternative 3 Treatments and Cover in Management Area T-3

Management Area W-1

Wildlife habitat improvement practices, including road management, prescribed fire and other techniques, may be used to maintain and/or enhance the quality of big game winter habitat – All roads to be constructed would be closed to public use and obliterated following implementation. Prescribed fire goals include improving forage diversity and production in big game winter ranges.

Maintain adequate thermal cover and hiding cover adjacent to forage areas. **Generally this means providing 25 percent thermal cover, where available, on identified winter range** – Table 125 displays the amount of hiding and thermal cover , by alternative, in management area W-1. Hiding cover is not altered under any alternative. Although thermal cover is below the Foret plan standard of 25 percent for management area W-1, none of the action alternative will alter the existing level of thermal cover.

Cumulative Effects

As described for alternative 1, past, ongoing and future activities are summarized in volume 2, appendix C. The decision for the Blackfoot Non-winter Travel Plan (2014), which effects summer range habitat effectiveness, open road density, and hunting season elk security is not yet made; analysis will be based on the preferred alternative for that project (Blackfoot Non-winter alternative 4).

Summer Range Hiding Cover

Reductions in hiding cover from Hazard Tree Removal, timber harvest off-forest, and wildfire would add cumulatively to the reductions under alternatives 2 and 3. Indirectly, hiding cover will increase over time in most areas, although lower elevation areas with high MPB mortality hiding cover is expected to decrease in the short term. Although grazing and invasive species treatment occur within acres identified as hiding cover, these activities will not remove hiding cover. Prescribed fire effects would be similar to those described under treatment effects for low severity fire, and the overstory would remain largely intact. While the Hazard Tree Removal reduced habitat along road corridors, the analysis for the hazard tree removal project concluded that even though both herd units were below Forest Plan Standards for hiding and thermal cover, and a site-specific amendment was developed, that elk numbers should not be altered. This was disclosed in a site-specific Forest Plan amendment for that project. Under alternative 2, an additional loss of 282 acres of hiding cover in the Beaver Creek HU results in 47 percent hiding cover while in the Keep Cool Creek HUan additional reduction of 168 acres results in 34 percent hiding cover. Under alternative 3, Beaver Creek HU would maintain 51 percent hiding cover, while Keep Cool Creek HU would amontain 34 percent hiding cover. Cumulatively, these additional reductions account for 1 percent of less of the hiding cover in the herd units. It is unlikely such a small cumulative change would impact elk population numbers in the affected herd units.

Summer Range Habitat Effectiveness

Although the Stonewall Project will not alter habitat effectiveness post-implementation, there are reductions in habitat effectiveness during project implementation. The Blackfoot Non-winter Travel Plan would make decisions regarding road and trail management, and therefore alters the miles of routes open during the summer. Upon implementation of the preferred alternative in the Blackfoot Non-winter Travel Plan, existing open road miles would be reduced to 151.8 miles in the Beaver Creek HU and 170.3 miles in the Keep Cool Creek HU. These reductions will result in density of open routes of 3.0 miles per square mile in the Beaver Creek HU and 2.5 miles per square mile in the Keep Cool Creek HU. If the travel plan decision is made prior to implementation of the Stonewall project, then density of open routes during implementation in the Beaver Creek HU would be 3.3 miles per square mile under alternative 2 and 3.2 miles per square mile under alternative 3. There would be no change to the open route density in the Keep Cool Creek HU during project implementation. Despite these lower route densities, habitat effectiveness would remain below 50 percent in both herd units under both action alternatives.

Winter Range Thermal Cover

Alternative 2 and 3 result in reductions in thermal cover in the Beaver Creek HU. Hazard Tree Removal and timber harvest off National Forest lands resulted in a reduction of 26 acres of thermal cover in the Beaver Creek HU. This results in thermal cover of 3.1 percent under alternative 2 and 3.6 percent under alternative 3. It is unlikely such a small cumulative change would impact elk population numbers in the Beaver Creek HU. There are no changes to thermal cover in the Keep Cool Creek HU.

Open Road Density (Hunting Season)

Although the open road density during the fall hunting season is unchanged from the existing condition post-implementation, the action alternatives result in a temporary increase in the density of open routes during implementation in the Beaver Creek HU. Upon implementation, the Blackfoot Non-winter Travel Plan preferred alternative would reduce hunting period density of open routes to 1.2 miles per square mile in the Beaver Creek HU and 1.0 mile per square mile in the Keep Cool Creek HU. If implemented before the Stonewall decision, then during project implementation alternatives 2 and 3 both result in a route density of 1.5 miles per square mile. Despite the reduction from the cumulative effect of the travel plan, Plan standard 4a continues to not be met due to the low hiding cover values in the project area.

Hunting Season Elk Security

The Blackfoot Non-winter Travel Plan preferred alternative includes a Forest Plan Amendment that changes the way big game security during the hunting season is calculated (Standard 4a). If implemented, this Forest Plan Amendment would only analyze the security habitat within the Forest administrative boundary and security areas would be at least 1000 acres in size greater than or equal to 0.50 mile from routes open to the public. The definition of a security area in the Blackfoot Non-winter Travel Plan Amendment is not synonymous with the security area definition used in the Stonewall analysis in which security areas are greater than or equal to 250 acres. Because of the difference in the methodologies between the two projects, the security percentages are not necessarily comparable btween projects. However, regardless of the security area definition, big game security would improve in the Travel Plan and would remain the same in the Stonewall Project post-implementation.

Forage/Calving Areas

Alternative 2, taken with activities that increase forage quality and quantity, results in forage improvement on 6,877 acres (21 percent) of the Beaver Creek HU and 3,364 acres (8 percent) of the Keep Cool Creek HU. Alternative 3 results in 6,187 acres (19 percent) forage improvement in the Beaver Creek HU and 2,703 acres (6 percent) in the Keep Cool Creek HU. Increased forage would result in improved and more widespread forage and calving opportunities in this landscape.

Summary

Cumulatively, approximately 3,559 acres of hiding cover and 381 acres of thermal cover would be removed under alternative 2. Under alternative 3 changes would be less than alternative 2. Hiding cover would be reduced by 2,410 acres, while thermal cover would decrease by 300 acres. With implementation of the Blackfoot Non-winter Travel Plan open road density (hunting season) would be reduced from the existing condition both during and post-implementation,although due to lack of hiding cover plan standard 4a would not be met and elk security would increase above the recommended 30 percent post implementation.

Irreversible and Irretrievable Commitments

The action altenatives do not result in the loss of future options for the project area or the loss of production, harvest, or use of natural resources, therefore there are no irreversible or irretrieveable commitments anticipated.

Alternatives 2 and 3 Conclusions and Determination

Alternative 2

Treatments proposed under alternative 2 would reduce elk hiding in both herd units, and thermal cover in Keep Cool Creek HU, whereas treatments would increase forage on summer, winter and transition range. Neither unit would meet Forest Plan standard 3 or 4a. Hunting opportunities would be maintained and based on the analysis presented above and the following rationale, adequate elk habitat would continue to be available within both units to support desired levels of elk..

- Implementation would increase elk forage on 10,241 acres (13 percent) of summer, transition and winter range, maintain 90 percent of the existing summer range hiding cover, 74 percent of the existing winter range thermal cover and meet elk management unit objectives of using prescribed fire to improve elk habitat and maintain elk security (MFWP 2005 page 117).
- There would be no increase in public access during or post-implementation.
- While there would be short-term changes in elk security during implementation, 87 percent of the existing security habitat would be unaffected and there would be no long-term changes in elk security. The short-term changes in elk security would be mitigated by restricting operations to only one drainage at a time (project design feature WL-14 Elk). Cumulatively there would be an increase in elk security from the Blackfoot non-winter travel plan due to a reduction in miles of open road.
- Past wildfires have reduced project area elk habitat and much of the remaining habitat is at risk. Implementation of alternative 2 would reduce future wildfire risk.
- It is believed that active management is necessary to address fuel loading, species diversity and insect and disease concerns. Collectively, the treatments proposed under this alternative are designed to address these concerns and the long-term benefits associated with the increased diversity and reduced wildfire risk, are believed to outweigh the risks associated with the anticipated reduction in cover.
- Despite habitat effectiveness numbers less than 50 percent, elk population numbers are at objective within hunting district 281.

Alternative 3

Treatments proposed under alternative 3 would reduce elk hiding and thermal cover in both herd units, whereas the amount and distribution of forage would increase. Neither unit would meet Forest Plan standard 3 for thermal cover, or 4a, and Keep Cool Creek HU would not meet Plan standard 3 for hiding cover. Nor would the HUs meet elk security recommendations provided by Hillis et al. (1991). Hunting opportunities would be maintained and based on the analysis presented above and the following rationale, adequate elk habitat would continue to be available within both units to support desired levels of elk.

- Implementation would increase elk forage on 8,890 acres (12 percent) of summer, transition and winter range; maintain 93 percent of the existing hiding cover, 80 percent of the existing thermal cover and meet elk management unit objectives as described for alternative 2 (MFWP 2005).
- There would be no increase in public access during or post-implementation.
- While there would be short-term changes in elk security during implementation, 91 percent of the existing security habitat would be unaffected and there would be no long-term changes in elk security.

Cumulatively there would be an increase in elk security from the Blackfoot non-winter travel plan due to a reduction in miles of open road.

- Past wildfires have greatly reduced project area elk habitat and existing habitat is at risk. Implementation of alternative 3 would reduce future wildfire risk.
- It is believed that active management is necessary to address fuel loading, species diversity and insect and disease concerns. Collectively, the treatments proposed under this alternative are designed to address these concerns and the long-term benefits associated with the increased diversity and reduced wildfire risk, are believed to outweigh the risks associated with the anticipated reduction in cover
- Elk population numbers are at objective within hunting district 281.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Elk are a management indicator for commonly hunted species; as such they are intended to be a bellwether of the effects of management activities on representative wildlife habitats with the objective of ensuring that viable populations of existing native and desirable nonnative animal species are maintained.

Federal laws and direction applicable to management indicator species include the National Forest Management Act (NFMA), the Forest Service Manual, and the Helena National Forest Plan. The NFMA requires the Forest Service to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" [16 USC 1604(g)(3)(B)]. All alternatives are consistent with this requirement. Elk habitat would continue to be abundant and well-distributed and species' viability would be maintained across the Forest.

Forest Plan Consistency

Forest Plan Standard 3: Using the MFWP definition**,** Forest Plan Standard 3 (Forest Plan II/17) requires that elk summer range will be maintained at 50 percent or greater hiding cover. Under alternative 1, the Beaver Creek unit would meet plan standard 3 and the Keep Cool Unit would continue to fall below plan thresholds. Both action alternatives would remove additional hiding cover. Under alternative 2 neither the Beaver Creek HU nor the Keep Cool Creek HU would meet standard 3 for hiding cover. Under alternative 3 the Beaver Creek HU will retain 51 percent hiding cover, whereas and Keep Cool Creek HU would continue to fall below 50 percent cover. This situation will be addressed in a separate site-specific Forest Plan amendment.

Plan standard 3 requires that elk thermal cover be provided on 25 percent of the winter range within each herd unit. Both the Beaver Creek and Keep Cool Creek herd units would remain below this threshold under all alternatives and thermal cover would be removed under alternatives 2 and 3. This situation will be addressed in a separate site-specific Forest Plan amendment.

Forest Plan Standard 4(a): Forest Plan Standard 4(a) (Forest Plan II/17-18) requires that an aggressive road management program be implemented to maintain or improve big game security. Specifically, road management will be implemented to at least maintain big game habitat capability and hunting opportunity, which is measured by the relationship between hiding cover and open road densities. Due to existing high open road densities and reduced levels of hiding cover, alternative 1 would not meet Standard 4(a). While open road densities would be unchanged, due to reductions in hiding cover, both action alternatives would move further away from the plan threshold. This situation is addressed in a separate site-specific Forest Plan amendment.

Forest Plan Standard 4(b): Forest Plan standard 4(b) requires that elk calving grounds and nursery areas be closed to motorized vehicles during peak use by elk. This is usually from late May through July. If elk

calving and nursery areas are identified prior to or during project implementation, these areas would be protected under all alternatives (project design feature WL-13 ELK).

Forest Plan Standard 4(c): Forest Plan standard 4(c) (Forest Plan II/18) requires that all winter ranges be closed to vehicles between December 1 and May 15, with the exception of access through winter range to facilitate land management on other lands. Logging activities would be scheduled outside of the winter on winter range to address this standard, although hauling on roads through winter range may occur. All alternatives comply with Standard 4(c).

Forest Plan Standard 5: On elk summer range the minimum size area for hiding cover will be 40 acres and the minimum size area on winter range for thermal cover will be 15 acres. All analysis of hiding and thermal cover complied with these minimum size limits, as described in methodology. All alternatives comply with Standard 5

Forest Plan Standard 6: Forest Plan standard 6 (Forest Plan II/19 and C/1 - 11) requires the recommendations embodied in the Montana Cooperative Elk-Logging study (appendix C of the Forest Plan) be followed during timber sale and road construction projects. There are a total of eleven recommendations some of which have been incorporated as project design features. The following describes the project's consistency with each of the eleven recommendations.

1. *Security during logging operations* – All action alternatives are consistent with this recommendation. Design features have been incorporated that confine logging to a single drainage at a time to minimize disturbance to elk (WL-14 Elk). Also, logging activities would be completed in the shortest time frame possible. Use of firearms would be prohibited for anyone working within an area closed to the general public (WL-18 Elk).
2. *Redistribution of elk* –This recommendation is intended to plan timber sales in a manner that does not redistribute elk onto adjacent or nearby property. While elk movement will change during treatment, both action alternatives restrict timber harvest to a single drainage at a time to reduce displacement of elk and continue to restrict public access. It is not expected that changes in elk movement would result in impacts to private land.
3. *Traditional home range use by elk* – This recommendation is intended to ensure that timber harvest and road construction are planned to minimize impacts to elk and elk hunting. All action alternatives are consistent with this recommendation since all constructed roads would be closed to the public during logging operations and decommissioned post-implementation. Also there would be no changes in public access during or post implementation.
4. *Road construction and design* – This recommendation is intended to maintain the integrity of elk movement patterns and provide security for unimpeded movement. There are slight decreases in elk security during treatment and there would be no reduction in security following implementation. All constructed roads would be closed to the public during implementation and decommissioned afterwards.
5. *Road management* – This recommendation is also intended to maintain elk security through management of road densities. Implementation of Alternatives 2 and 3 would result in a short-term (5 years or less) increase in road density during implementation. New roads would not be opened to the public. Elk security would be maintained over the long-term and both alternatives are consistent with this recommendation.
6. *Area closures during the hunting season* – This recommendation is intended to ensure that travel restrictions are carefully considered relative to elk management objectives so that hunting

opportunities aren't unnecessarily impacted. There would be no changes in travel restrictions under any alternative and secure areas will continue to be available.

7. *Clearcuts* – This recommendation is intended to ensure that forage produced through clear-cutting is available to elk. The action alternatives are consistent with these considerations since slash be no taller than 1.5 feet in regeneration havest units (project design feature WL-19 Elk), and there would be no change in public access. Opening size limitations of 100 acres will be met.
8. *Cover type* – This recommendation is intended to ensure that cover types, important to elk, are considered during planning and implementation of silvicultural practices. The action alternatives are consistent with this recommendation since cover type data is available Forestwide (via R1-VMap) and was used to identify and assess cover and forage.
9. *Moist sites* – This recommendation is intended to ensure that the integrity of moist sites is maintained since these areas comprise important components of elk habitat. All action alternatives are consistent with this recommendation and wetlands, riparian areas, and elk wallows would be buffered and protected during implementation (project design feature WL-15 Elk).
10. *Elk/cattle relationships* – This recommendation is intended to ensure that forage may be created as a result of timber harvest remain available to elk. All action alternatives are consistent with this as grazing patterns or use would be modified if necessary to protect highly preferred forage species (project design feature WL-11 Vegetative Diversity).
11. *Winter range* – This recommendation states that timbered areas adjacent to primary winter foraging areas should be managed to maintain the integrity of cover, and timber harvest should be scheduled outside of the winter period. All action alternatives are consistent with this recommendation since there would be no winter logging in elk winter range and forested areas would remain adjacent to forage areas following treatment (figure 95 and figure 96).

Management Area T-2 Standards. *Maintain adequate thermal cover and hiding cover adjacent to forage areas. Generally this means providing 25 percent thermal cover on identified winter range.* Both alternatives 2 and 3 reduce the existing thermal cover from 13 percent to 6 percent. Both action alternatives would move further away from Management Area T-2 Forest Plan thermal cover thresholds. This situation is addressed in a separate site-specific Forest Plan amendment.

Openings created by timber harvest should meet hiding cover requirements of big game before adjacent areas can be harvested. As described under the effects section, several units in each alternative are adjacent to openings that do not provide hiding cover. This situation is addressed with a site-specific Forest Plan amendment.

Schedule sale activities outside the winter periods (December 1 to May 15). Winter logging will not be allowed in elk winter range and all alternatives comply with this standard.

Management Area T-3 Standards. *Wildlife habitat improvement practices, including road management, prescribed fire and other techniques, may be used to maintain and/or enhance the quality of big game summer habitat.* All alternatives comply with this standard as new roads would be closed to public use and decommissioned following implementation and prescribed fire would improve forage diversity and production in big game summer ranges.

Maintain 50 percent hiding cover (MFWP definition) for big game. Alternative 2 would reduce hiding cover to 41 percent of the management area. Alternative 3 would reduce hiding to 44 percent of the management area. Both action alternatives would move further away from Management Area T-3 Forest

Plan hiding cover thresholds. This situation is addressed in a separate site-specific Forest Plan amendment.

Maintain thermal cover adjacent to forage areas. Thermal cover is adjacent to forage areas and will be slightly reduced by both alternatives on the Beaver Creek HU. The action alternatives comply with standard.

Openings created by timber harvest should meet hiding cover requirements of big game before adjacent areas can be harvested. As described under the effects section, several units in each alternative are adjacent to openings that do not provide hiding cover. This situation is addressed with a site-specific Forest Plan amendment.

Management Area W-1 Standards. *Wildlife habitat improvement practices, including road management, prescribed fire and other techniques, may be used to maintain and/or enhance the quality of big game summer habitat.* All alternatives comply with this standard as new roads would be closed to public use and decommissioned following implementation and prescribed fire would improve forage diversity and production in big game summer ranges

Maintain adequate thermal and hiding cover adjacent to forage areas. Generally this means providing 25 percent thermal cover, where available, on identified winter range. Existing thermal cover in this management area is 22 percent . Although thermal cover is below the Foret plan standard of 25 percent for management area W-1, none of the action alternative will alter the existing level of thermal cover.

Mule Deer

Effects Common to All Alternatives

Untreated portions of the project area would continue to progress through succession regardless of the alternative. Disturbance processes including climate change, insect infestations, disease, and fire would continue to influence the project area. At any given time, the project area would comprise a variety of successional stages. Hiding and thermal cover would continue to be reduced by mountain pine beetle-related mortality, whereas forage would increase.

Old-growth stands provide both thermal benefits and snow interception because of their structure and canopy cover (Kirchhoff and Schoen 1987). As a result, deer expend less energy travelling through shallower snow in these stands and they find more rooted forage that remains snow free (Parker et al. 1984). No designated old growth would be affected under any action alternative.

Alternative 1

Direct and Indirect Effects

There are no activities proposed under this alternative, so there are no direct effects anticipated to mule deer. Indirect effects are similar to those described for elk. Decades of fire suppression have resulted in increased stocking and closed canopied mature forest with reduced levels of forage and increased cover (Hayden et al. 2008). With the exception of areas affected by MPB mortality, these cover and forage conditions would be unchanged. Forage would increase on lands affected by MPB mortality, although cover would decline as trees fall to the ground. Within shrub and grassland habitats, continued conifer encroachment would increase cover and decrease forage.

Overall there would be little change in existing mule deer habitat under this alternative during the analysis period. Hiding cover would continue to be available across the project area and Plan defined thermal

cover would remain low. While thermal cover in stands affected by MPB mortality would continue to decline, as described under elk, closed canopy mixed conifer stand would continue to be available. There would be no change in roads or public access and vulnerability to hunting would be unchanged. Due to continued fire suppression and elevated levels of fuels, the risk of larger, high intensity wildfire would be greatest under this alternative.

Cumulative Effects

Cumulative effects to mule deer are evaluated across the project area. Anticipated cumulative effects are in volume 2, appendix C. Past activities have shaped the age class, density and species composition of mule deer habitat that makes up the project area today and effects of these activities are reflected in the existing condition. Ongoing and future effects include continued grazing on approximately 5,100 acres, campground rehabilitation, almost 300 acres of NNIS treatment, 309 acres of hazard tree removal, fire wood collection, stream habitat improvement, and approximately 5 miles of trail maintenance/reconstruction. In total, approximately 4,100 acres or 17 percent of the analysis area would be affected. Streamside improvement, campground rehabilitation and trail work is expected to result in short-term disturbance during treatment and localized changes in habitat, although overall mule deer habitat would remain largely unchanged. Treatments that might result in habitat changes that include invasive plants treatment, hazard tree removal, firewood collection and wildfire (since 2011), which are displayed in the following table.

Table 126. Alternative 1 mule deer cumulative effects

Activity	Total Acres Affected	Hiding Cover Affected (acres)	Thermal Cover Affected (acres)
Grazing	5,172	4,204	805
Hazard Tree Removal	309	232	8
NNIS Treatment	292	189	20
Wildfire	10	9	0

Effects on grazing and NNIS treatment are expected to be similar to those described under elk, and while there would be localized reductions in forage, existing cover and forage would be maintained on sites affected by grazing. Disturbance associated with invasive plants treatment would be short term, and treatment would be expected to help maintain native mule deer forage.

Mule deer hiding and thermal cover would be reduced on 241 acres and 8 acres, respectively, due to hazard tree removal and wildfire and there would also be a localized reduction in cover in areas with concentrated MPB mortality. Firewood collection along open roads would continue. Deer cover would be reduced on sites affected by MPB mortality within the next five to ten years, whereas forage on many of the affected sites would increase. Over 98 percent of the existing hiding/winter range thermal cover would be maintained under this alternative.

Irreversible and Irretrievable Commitments

There are no irreversible commitments anticipated. Irretrievable commitments include a continued reduction in deer forage.

Alternative 1 Determination and Conclusions

Although there would be continued mountain pine beetle mortality, generally cover would be maintained or increase and forage would remain low. Public access and hunting pressure would be unchanged, and the risk of stand-replacing wildfire would remain high.

Alternatives 2 and 3

As described under affected environment, the entire project area is considered deer habitat. Hiding cover occurs on approximately 19,000 acres or 79 percent of the project area, whereas winter range thermal cover occurs on approximately 500 acres. Deer cover affected by treatment is displayed in table 127.

Table 127. Treatments within deer hiding cover by alternative

Treatment	Deer Hiding Cover Treated				Deer Winter Range Thermal Cover Treated			
	Alternative 2		Alternative 3		Alternative 2		Alternative 3	
	Acres	%[1]	Acres	%[1]	Acres	%[1]	Acres	%[1]
Intermediate Harvest[5]	1,711	9	806	4	56	11	59	12
Regeneration Harvest[3]	847	4	723	3	0	0	0	0
Low Intensity Burn[2]	314	3	734	5	20	4	20	4
Jackpot Burn	0	0	321	2	0	0	0	0
Mixed Severity Burn[2,4]	3,351	22	1,999	13	144	29	75	15
Total	**6,223**	**33**	**4,583**	**24**	**220**	**44**	**154**	**31**
Reduction in Cover	**3,538**	**15**	**1,980**	**8**	**92**	**19**	**78**	**16**
Post-Treatment Cover	**15,501**	**81**	**17,058**	**90**	**400**	**81**	**414**	**84**

[1] – percent of available cover.
[2] – Assumes 20 percent of the site would be unburned
[3] – Cover would be reduced
[4] – Cover would be reduced on lands affected by high intensity fire or 25 percent of acres affected
[5] – Reduction in thermal cover, hiding cover reduction variable

Direct and Indirect Effects

Effects are expected to be similar to those described for elk, although deer are evaluated across the project area. Deer are highly mobile and there is no mortality anticipated. Treatment would displace deer during implementation and changes in cover and forage would continue to alter movements following treatment. Project design features would reduce effects during implementation by limiting harvest to specific portions of the project area at a time and restricting public access.

Effective mule deer reproductive habitat (fawning and lactation periods) generally is located at intermediate elevations in diverse, mesic montane forests with dependable sources of succulent, high quality forage. Timber harvest and burning in all action alternatives would reduce cover rendering some areas unsuitable as fawning habitat until the understory regenerates. Unaffected uneven-aged stands would continue to be available at mid to lower elevations to provide a mosaic of high quality forage and security for fawn rearing, whereas the mosaic of cover and forage created through burning would improve habitat.

Indirect effects and changes in habitat conditions would be similar to those discussed for elk. Deer hiding cover would be reduced by 3,538 acres under alternative 2 and 1,980 acres under alternative 3, whereas winter range thermal cover would be reduced by 92 acres and 78 acres under alternatives 2 and 3 respectively. Effects on cover and forage would vary by treatment type. There would be a long-term loss of cover on lands affected by regeneration harvest and openings created by mixed severity fire. Effects of intermediate treatment would be variable. All sites would have a reduction in thermal cover, whereas cover would only be reduced on sites where the residual canopy cover is reduced below 40 percent. Because most intermediate treatments under alternative 3 would maintain 40 percent canopy closure and mixed severity burning is reduced, alternative 3 maintains more hiding cover. Currently hiding cover

exists on 19,039 acres of 78 percent of the project area. Under alternative 2, cover would be reduced to 15,501 acres (65 percent) whereas hiding cover would be retained on 17,058 acres (71 percent) under alternative 3. While scattered overstory mortality would occur during low severity burning, canopy and hiding cover would be maintained. Burning would reduce understory cover, although treatment sites would have a mosaic of burned and unburned lands.

As described under treatment effects, proposed regeneration harvest, intermediate treatments and burning are expected to increase available deer forage (Regelin and Wallamo 1978), although this increase would by over time and by treatment. While intermediate harvest and burning would increase forage for up to 10 or 12 years, regeneration harvest can maintain elevated levels of forage for over 20 years (Wallmo et al. 1972; Collins and Urness 1983 in Hayden et al. 2008). Like elk, forage availability for deer depends on the proximity of the created forage to cover, and Hayden et al. (2008) suggests that deer forage should be within 600 feet of cover. Because burn units would have a mosaic of treated and unburned lands and with retention of cover on lands adjacent to recent clearcuts, it is likely that most of the forage created would be close enough to cover to be utilized. Proposed burning can also increase palatability and use. While preferences vary seasonally, increased deer use has been documented in burned areas and prescribed fir can improve winter habitat (Gruell 1986 in USDA Forest Service 2011b, Hobbs and Spoward 1984).

The size of openings created by burning is also a consideration. Hayden et al. (2008) recommends maintaining or improving a matrix of forage conditions across the landscape with emphasis on increasing the variety of forage plants available and a mixture of shrub age classes. They also recommend that small openings of less than 50 acres on summer range and less than 10 acres of winter range be encouraged or maintained. Because most of the burning would be low-severity burning or mixed-severity burning that creates openings less than 10 acres in size, forage created would be available.

In summary, while there would be changes in deer cover and forage, both action alternatives would maintain over 80 percent of existing hiding, increase stand and landscape level forage and create a mosaic of cover and forage conditions preferred by deer.

Impacts of roads on mule deer, especially during the hunting season have been well-documented (Thomas 1979, Hayden et al. 2008). Both alternatives propose roads to be built then obliterated immediately following timber removal. While they would increase walk in hunter access, roads would be closed during implementation and unroaded areas would not be affected. As a result there are no long-term changes in hunter access or road disturbance is anticipated and security during the hunting season will continue to be provided by well-distributed patches of cover and limited road access.

Cumulative Effects

Proposed treatments would contribute to past, on-going and future activities discussed under alternative 1 and include 309 acres of hazard tree removal, 292 acres of invasive weed treatment, 10 acres of recent wildfire and up to (alternative 2) 3,099 acres of timber harvest and 5,463 acres of prescribed burning.

Cumulatively treatments would affect approximately 6,223 acres of hiding cover and 220 acres of winter range thermal cover, and the changes in cover and forage would affect deer distribution and use. There would be no change in public access, new roads would be obliterated following treatment and there are no long-term changes in hunter access or security habitat. While forage would be increased on sites treated, the project area would become more open while stands regenerate and understories develop. Hiding cover could be reduced from 78 percent to 64 percent of the project area, whereas approximately 80 percent of the existing thermal cover would be maintained.

As described under alternative 1, changes resulting from MPB mortality would continue including a reduction in cover and increase in forage on sites affected. While cattle would be attracted to treatment

sites, use is not expected to change and with implementation of PDF's grazing modifications would be made if necessary to reduce impacts. Disturbance associated with recreational activity would continue, although use is not expected to change.

Irreversible and Irretrievable Commitments

There are no irreversible commitments anticipated. Irretrievable commitments include a reduction in hiding and thermal cover, as well as reduced forage greater than 500 feet from cover; however, forage would be improved both in the short and long term, and hiding and thermal cover would be restored on all sites treated.

Determination and Conclusions

Treatments proposed under alternatives 2 and 3 would reduce deer hiding and thermal cover and increase deer forage. Based on the analysis presented and the following rationale, cover and forage would continue to be available to support existing populations.

- Implementation would increase the amount, diversity and quality of forage on summer, transition and winter range.
- Mule deer cover would be maintained across the project area and a mosaic of cover and forage conditions would be provided across the landscape.
- Existing hunter access would be unchanged, old growth and security areas would be maintained.
- Implementation would reduce wildfire risk and restore fire to the landscape.

Compliance with Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

Mule deer habitat would remain relatively unchanged under alternative 1. While deer use may be altered by treatment under the action alternatives, cover and forage would be maintained in the short term and improved over. All alternatives are in compliance with Forest Plan (USDA Forest Service 1986) direction to maintain and improve habitat over time to support big game and other wildlife (II-1), develop and implement a road management program with road use and travel restrictions that are responsive to resource protection needs (p. II/2), and ensure that viable populations of existing native and desired nonnative species are maintained (p. II/17). All alternatives are consistent with National Forest Management Act requirements to provide for a diversity of animal communities (16 USC 1604((g)(3)(B)); also see 36 CFR 219.10(b): and FSM 2670.12.

Compliance with Forest Plan Standard 8

Forest Plan standard 8 (Forest Plan II/19) requires that any proposed sagebrush reduction programs will be analyzed on a case-by-case basis for possible impacts on big game winter range. The action alternatives have been analyzed to determine the impacts of prescribed burning in sagebrush. The analysis has indicated that although some sagebrush would be removed through burning, a sagebrush component would be retained on all sites. Also, over time sagebrush vigor and forage quality would be improved and, as such, be beneficial to mule deer.

Management Areas

There are six Management Areas within the project area; of those, three Management Areas contain direction relevant to mule deer habitat:

Management Area T-1

Wildlife habitat improvement practices, including road management, prescribed fire and other techniques, may be used to maintain and/or enhance the quality of big game winter habitat - All roads to be constructed would be closed to public use and obliterated following implementation. Prescribed fire goals include improving forage diversity and production in big game winter ranges.

Maintain adequate thermal cover and hiding cover adjacent to forage areas – Both alternatives would increase forage and remove cover. Considering that 80 percent or more of the existing management area cover would be maintained, that unaffected lands would occur in all burn units, and that cover would be maintained adjacent to regeneration harvest, adequate cover will be maintained adjacent to forage and both alternatives comply with this standard.

Management Area T-2

Wildlife habitat improvement practices, including road management, prescribed fire and other techniques, may be used to maintain and/or enhance the quality of big game winter habitat – All new roads would be closed to public use and decommissioned following implementation. Prescribed fire goals include improving forage diversity and production in big game winter ranges.

Maintain adequate thermal cover and hiding cover adjacent to forage areas. Generally this means providing 25 percent thermal cover on identified winter range – Winter range thermal cover is provided on 78 acres of 12 percent of the management area winter range. Due to the open stand conditions that characterize the project area, management area T-2 winter range does not currently provide 25 percent thermal cover. Both action alternatives would reduce winter range thermal cover by up to 56 acres and move further away from Forest Plan thresholds. This situation will be addressed in a separate site-specific Forest Plan amendment.

Openings created by timber harvest should meet hiding cover requirements of big game before adjacent areas can be harvested – There are treatment units next to existing plantations that currently do not provide hiding cover. . These units and adjacent plantations have been surveyed and where necessary buffers will be retained between those areas in order to provide some level of cover between past and proposed treatment units. Buffers would be at least 200 feet wide, although they may be wider if field data indicates that this is necessary.

Management Area T-3

Maintain 50 percent hiding cover (MFWP definition) for big game – There are currently 4,840 acres (74 percent of the management area) of big game hiding cover. While the action alternatives would reduce existing hiding cover by up to 853 acres, hiding cover would be retained on over 82 percent of the lands within management area T-3.

Wildlife habitat improvement practices, including road management, prescribed fire and other techniques, may be used to maintain and/or enhance the quality of big game winter habitat – All new roads would be closed to public use and decommissioned following implementation. Prescribed fire goals include improving forage diversity and production in big game winter ranges.

Maintain adequate thermal cover and hiding cover adjacent to forage areas – Both alternatives would increase forage and remove cover. Considering that 85 percent or more of the existing management area cover would be maintained, that unaffected lands would occur in all burn units, and that cover would be maintained adjacent to regeneration harvest, adequate cover will be maintained adjacent to forage and both alternatives comply with this standard.

Openings created by timber harvest should meet hiding cover requirements of big game before adjacent areas can be harvested – There are treatment units next to existing plantations that currently do not provide hiding cover. These units and adjacent plantations have been surveyed and where necessary buffers will be retained between those areas in order to provide some level of cover between past and proposed treatment units. Buffers would be at least 200 feet wide, although they may be wider if field data indicate that this is necessary.

Management Area W-1

Wildlife habitat improvement practices, including road management, prescribed fire and other techniques, may be used to maintain and/or enhance the quality of big game winter habitat – All new roads would be closed to public use and decommissioned following implementation. Prescribed fire goals include improving forage diversity and production in big game winter ranges.

Maintain adequate thermal cover and hiding cover adjacent to forage areas – Both alternatives would increase forage and remove cover. Approximately 85 percent or more of the existing management area cover would be maintained, unaffected lands would occur in all burn units, and project design features will retain cover adjacent to regeneration harvest. As a result, adequate cover will be maintained adjacent to forage and both alternatives comply with this standard.

Migratory Birds

As described under methodology, effects to migratory birds are addressed in the species and habitat sections of this analysis, in combination with analysis of threatened, endangered, sensitive birds and bird species of conservation concern. The memorandum of understanding (MOU) with the USDI Fish and Wildlife Service on the Migratory Bird Treaty Act identifies key principles and directs the Forest Service to (1) focus on bird populations; (2) focus on habitat restoration and enhancement where actions can benefit specific ecosystems and migratory birds dependent on them; (3) recognize that actions taken to benefit some migratory bird populations may adversely affect other migratory bird populations; and (4) recognize that actions that may provide long-term benefits to migratory birds may have short-term impacts on individual birds. The parties agreed that through the NEPA process, the Forest Service would evaluate the effects of agency actions on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors.

Migratory birds and their habitats including species with viability concern (TES) and priority species are evaluated in the habitat and species-specific sections. Alternative 1 would maintain habitat over the short term, whereas alternatives 2 and 3 would help to restore declining habitats while maintaining diverse habitat conditions across the landscape. As a result, habitat for migratory birds would be maintained or improved under all alternatives. Also, local populations of all species that currently utilize the project area are expected to be maintained. The action alternatives focus on habitat restoration, and include project design features that are expected to reduce impacts to migratory birds, therefore, all alternatives are in compliance with the Migratory Bird Treaty Act.

Plants

Introduction

There are no threatened, endangered or proposed plant species known to occur on the Helena National Forest (USDI Fish and Wildlife Service 2011b). Therefore, this section is limited to analyzing Region 1(R1) sensitive species and their habitats.