Appendix C. Potential Management Approaches and Possible Actions

Table of Contents

List of Tables

Introduction

The 2012 planning rule requires land management plans to "…contain information reflecting proposed and possible actions that may occur on the plan area during the life of the plan, including: the planned timber sale program; timber harvesting levels; and the proportion of probable methods of forest vegetation management practices expected to be used" (16 United State Code (U.S.C.) 1604(e)(2) and (f)(2)). Such information is not a commitment to take any action and is not a 'proposal' as defined by the Council on Environmental Quality regulations for implementing the National Environmental Policy Act (40 CFR 1508.23, 42 U.S.C. 4322(2)(C)) (36 CFR 219.7(f)(1)). Management approaches and strategies presented may include suggestions for on-the-ground implementation, analysis, assessment, inventory or monitoring, and partnership and coordination opportunities the forest is proposing as helpful to make progress in achieving its desired conditions. The potential approaches and strategies are not all-inclusive, nor commitments to perform particular actions.

The revised HLC NF Plan employs a strategy of adaptive management in its decision making and achievement of forest plan desired conditions and objectives. An adaptive management strategy emphasizes the learning process. It involves using the best current knowledge to design and implement management actions, followed by monitoring and evaluating results and adjusting future actions on the basis of what has been learned. This is a reasonable and proactive approach to decision making considering the degree of uncertainty in future ecological, social and economic factors.

This appendix describes possible actions, potential management approaches, and strategies the HLC NF may undertake to make progress in achieving desired conditions and objectives. It includes a list of possible project types that may be undertaken. These include the possible timber sale program, timber-harvesting levels, and the probable methods of vegetation management practices expected to be used over the life of the plan. However, speculation about the specific amount or treatment types, frequency, location, magnitude, or numbers of actions during the plan period are not included. This appendix does not serve as a "to do" list of projects and expected dates. The potential management approaches may be used to inform future proposed and possible actions. These strategies and actions provide guidance for plan implementation, and represent possibilities, preferences, or opportunities, rather than obligatory actions. Under an adaptive management approach, proposed strategies and actions are dynamic. They are changeable, augmentable, or replaceable, so as to be responsive to results of new research, practical experience, and other information and observations.

This appendix also provides information intended to clarify and provide additional information that may help managers interpret and implement plan components. Not all plan components are addressed, but only those for which additional information is warranted. This approach recognizes the highly variable site conditions and management situations that are best addressed at the level of project analysis.

This appendix does not commit the HLC NF to perform or permit activities. Information included does not direct or compel processes such as analysis, assessment, consultation, planning, inventory, or monitoring.

Possible Forest Management Actions and Timber Harvest

As required by the 2012 planning rule, this section identifies the possible actions and proportion of probable methods of forest vegetation management practices expected to be used to achieve desired timber harvesting levels and outputs. The identification of possible actions includes an estimate of timber harvesting levels anticipated over the next 1 to 2 decades, but does not include speculation about the

specific amount, frequency, location, magnitude, or numbers of actions during the plan period. Estimated acres of treatment and associated timber product outputs [reported in million cubic feet (mmcf) and million board feet (mmbf)] were determined through use of the Spectrum model. This model is an analytical tool used to evaluate vegetation management scenarios that achieve resource objectives. Among other things, the model provides an estimate of the level of timber products expected and the management practices applied to achieve that level, given a set of inputs that includes existing and desired vegetation conditions, budget and resource constraints, and expected vegetation change.

Table 1 displays the acres and treatments expected for the first and second decades of the plan period by alternative. Production of sawtimber and other wood products is expected through commercial timber harvest, which includes even-aged regeneration harvests (such as clearcut, seedtree, shelterwood) and other harvests (such as thinning and uneven-aged harvests). The appropriate or optimum methods of harvest would be based upon site-specific determinations made during project planning and documented in a silvicultural prescription.

Table 1. Vegetation management practices for timber harvest, annual average acres for the first and second decades of the plan period

Type of Harvest	Decade	Alternative B/C	Alternative D	Alternative E
Even-aged Regeneration	1	3,326	3,199	1,955
	2	1,747	1,771	1,759
Other Harvest	1	766	876	381
	2	2,500	2,500	1,000
Total Harvest	1	4,091	4,075	2,336
	2	4,247	4,271	2,759

Table 2 displays the projected timber sale quantity (PTSQ), for products meeting utilization standards and the projected wood sale quantity (PWSQ), for all wood products including fuelwood or biomass that do not meet timber product utilization standards, by alternative. Volumes include harvest that occurs on lands suitable for timber production as well as lands that are not suitable. As required by the 2012 planning rule, the estimates take into account the fiscal capability of the planning unit and are consistent with all plan components. Timber outputs may be larger or smaller on an annual basis, or over the life of the plan, if budget or other constraining factors change in the future. The timber outputs are below the sustained yield limit, which is the volume that can be produced in perpetuity on lands that may be suitable for timber production. The calculation of the sustained yield limit is not limited by land management plan desired conditions, other plan components, or the planning unit's fiscal capability and organizational capacity. A sustained yield limit of 5.03 mmcf (26.68 mmbf) was calculated for the proclaimed Helena National Forest; and 4.02 mmcf (21.30 mmbf) for the proclaimed Lewis & Clark NF, totaling 9.05 mmcf (47.98 mmbf) for the administratively combined HLC NF.

Table 2. Projected timber sale program, annual average volume outputs for the first and second decades of the plan period, by alternative

Category and Decade	Decade 1 (mmcf)	Decade 1 (mmbf)	Decade 2 (mmcf)	Decade 2 (mmbf)
Alternatives B/C				
Timber Products[a] A1. Lands suitable for timber production	3.13	14.47	3.67	17.36
Timber Products[a] A2. Lands not suitable for timber production	1.12	4.71	2.05	9.41

Category and Decade	Decade 1 (mmcf)	Decade 1 (mmbf)	Decade 2 (mmcf)	Decade 2 (mmbf)
Projected Timber Sale Quantity (A1 + A2)	**4.25**	**19.18**	**5.72**	**26.77**
Other Wood Products[b] B. All lands	1.99	2.88	2.21	4.02
Projected Wood Sale Quantity[b] (A1 + A2 + B)	**6.24**	**22.06**	**7.93**	**30.78**
Alternative D				
Timber Products[a] A1. Lands suitable for timber production	3.15	14.57	3.71	17.56
Timber Products[a] A2. Lands not suitable for timber production	1.12	4.71	2.01	9.23
Projected Timber Sale Quantity (A1 + A2)	**4.26**	**19.28**	**5.73**	**26.79**
Other Wood Products[b] B. All lands	1.99	2.89	2.21	4.02
Projected Wood Sale Quantity[b] (A1 + A2 + B)	**6.25**	**22.17**	**7.94**	**30.81**
Alternative E				
Timber Products[a] A1. Lands suitable for timber production	4.69	22.78	4.53	21.92
Timber Products[a] A2. Lands not suitable for timber production	2.72	13.28	2.88	13.93
Projected Timber Sale Quantity (A1 + A2)	**7.41**	**36.06**	**7.41**	**35.84**
Other Wood Products[b] B. All lands	2.46	5.41	2.46	5.38
Projected Wood Sale Quantity[b] (A1 + A2 + B)	**9.87**	**41.46**	**9.87**	**41.22**

a. Potential Timber Sale Quantity (PTSQ) – Volume, other than from salvage or sanitation treatments, that meet timber product utilization standards, from lands suitable and not suitable for timber production.

b. Volume of all Other Wood Products - Fuelwood, biomass, and other volumes that do not meet timber product utilization standards (small diameter 3 -7 inches).

Source: SPECTRUM model analysis

Possible Management Strategies and Approaches

Aquatic Ecosystems

Watershed

- Improve and protect water quality by implementing “National Best Management Practices for Water Quality Management on National Forest System Lands”, “Montana Best Management Practices” and “Soil and Water Conservation Practices.”
- Manage towards reference conditions to maintain or restore the inherent resiliency of aquatic ecosystems to maintain native aquatic wildlife populations during and after stressor events such as; warming air temperatures, prolonged droughts, earlier season runoff, and higher intensity floods and wildfire.
- Develop species-specific plan components as specified in conservation strategies for individual species or groups of species (such as bull and west slope cutthroat trout). Through implementation of the plan components, including desired conditions, objectives, standards and guidelines, the species would be anticipated to trend toward recovery and subsequent delisting.
- Restore riparian habitats to aid in the reestablishment of beavers into stream segments where currently absent but where they historically occurred.
- Restore water quality and stream habitats by improving watershed scale processes and through direct riparian and in-channel treatments.

- Work toward the delisting of impaired water bodies in cooperation with Montana Department of Environmental Quality and Environmental Protection Agency through water quality assessment, total maximum daily loads, restoration plans, implementation of best management practices, and monitoring.
- Cooperate with private land owners and other agencies to improve water quality and restore aquatic ecosystems across multiple ownerships.
- Remove, reconstruct, or improve maintenance of roads located in riparian areas to improve watershed health and reduce sediment delivery to the aquatic ecosystem.
- Treat upland roads to reduce water interception and reduce landslide risk.
- Complete the development of watershed restoration action plans for all identified priority watersheds and its implementation. Identify essential projects in the watershed improvement tracking database.
- Consider the use of remote sensing surveys to provide more information about high priority watersheds.
- Evaluate condition of groundwater dependent ecosystems, emphasizing project areas and priority watersheds.

Fisheries and aquatic habitat/ conservation watershed network

The desired condition to work cooperatively to recover bull trout and westslope cutthroat trout sets the stage for management.

- Cooperate with USFWS, tribes, state agencies, other federal agencies, and interested groups to assist in bull and westslope cutthroat trout through the Bull Trout Conservation Strategy and the Bull Trout Recovery Plan.
- Follow direction within the *U.S. Forest Service Bull Trout Conservation Strategy* that would move the current baseline condition to an upward trend for each local bull trout population for indicators (temperature, barriers, pools, and sediment). Restoration activities such as barrier removal and road decommissioning are listed for each local population.
- Consult the *Recovery Plan for the Coterminous United States Population of Bull Trout (Salvelinus confluentus)* (also known as the Bull Trout Recovery Plan), which includes recovery goals, objectives and criteria that the Forest would cooperate with partners to achieve. By doing this, threats can be managed and a sufficient distribution and abundance of bull trout would be ensured across the forest.
- Refer to the *Columbia Headwaters Recovery Unit Implementation Plan for bull trout (Salvelinus confluentus)* (also known as the Recovery Unit Implementation Plan), which is a subset of the recovery plan that identifies threats and actions within each core area.
- Consider existing conditions, factors limiting aquatic species populations, resource risks, restoration options, and available recovery planning information when planning management activities.
- Consider basin, subbasin, watershed, and reach scale conditions including habitat conditions from the PACFISH/INFISH biological opinion and other stream surveys, factors limiting aquatic species (including non-native species), resource risks, management requirements, restoration opportunities, and interagency coordination with Montana Fish, Wildlife and Parks and the USFWS.

- Prioritize road maintenance and obliteration to travel routes that directly affect streams verses roads that are ecologically disconnected from streams.
- Reduce aquatic habitat fragmentation through removal of man-made, native fish migration barriers. Where appropriate, create barriers to prevent invasion of non-native species.

Riparian Management Zones

- Consider habitat conditions and the function and processes of riparian areas when proposing activities in order to provide shade, minimize nutrients and sediment and the potential impacts that may occur. Further, the analysis considers which species occur within the stream and the strength of that population.
- Maintain riparian resources by ensuring vegetation management only occur in the inner riparian management zone in order to restore or enhance aquatic and riparian-associated resources. Non-mechanical treatments, such as hand fuel treatments, prescribed fire, and sapling thinning, may be authorized with site-specific analysis as long as aquatic and riparian-associated resources are maintained.
- Ensure vegetation management occurs in the outer RMZs to meet desired conditions for fuel loading and silvicultural desired conditions, so long as those activities do not prevent attainment of desired conditions for wildlife and the inner RMZ.

Soil and Geology

- Improve soil quality by implementing “National Best Management Practices for Water Quality Management on National Forest System Lands”, “Montana Best Management Practices” and “Soil and Water Conservation Practices.” In geologically hazardous areas, limit ground disturbances to sensitive soils and geologically hazardous landscapes through analysis.
- Complete the development of watershed restoration action plans for all identified priority watersheds and continue WRAP implementation and identification of essential projects in the Watershed Improvement Tracking database.
- Collaborate with Natural Resources Conservation Service to complete soil inventory and ecological site descriptions.

Fire and fuels

Plan components recognize that fire has been and likely will remain a primary disturbance factor, particularly given the high proportion of the planning area that is designated wilderness or inventoried roadless areas. Fire can be expected to function at the upper end or even above the natural range of variation for acres burned. Given the importance of fire as a key ecosystem process, maintaining vegetation and forest diversity, sustaining fire adapted species and structures, and creating vegetation conditions at multiple scales that support and sustain native wildlife species in the short and long term are critical components of the Plan. Fire will play a role in all areas of the forest, whether natural or planned ignitions. The full range of fire management strategies will be used to achieve desired conditions, using appropriate response strategies based on potential resource benefits and risks.

Wildland fire objectives are based on factors such as movement of potential vegetation types toward desired conditions, fuel conditions, current and expected weather and fire behavior, topography, resource availability, and values to be protected. Social and economic considerations (e.g., smoke) may also affect objectives, as well as adjoining jurisdictions having similar or differing missions and directives.

Wildfires may be concurrently managed for one or more objectives (e.g., protection, resource enhancement) that can change as the fire spreads across the landscape. Strategies chosen for wildfires include interdisciplinary input to assess site-specific values to be protected. These strategies are used to develop incident objectives and courses of action to enhance or protect those values. Managers use a decision support process to guide and document wildfire management decisions that provide for firefighter and public safety, minimize costs and resource damage, and are consistent with values to be protected and management objectives. For prescribed fires, the decision document is the signed NEPA decision. To meet the plan's treatment objectives using prescribed fires, site-specific burn plans are developed which guide implementation. All prescribed fires are conducted in accordance with the Montana Department of Environmental Quality to comply with the Clean Air Act.

Wildland fire is one tool in the process of restoring the forests' fire-adapted ecosystems; in areas departed from desired conditions, the use of fire is often most effective when combined with mechanical treatments that further restore forest structure. Mechanical treatments are costly, so the capacity to implement such treatments across the landscape is limited. Strategic placement and design of mechanical treatments increases their effectiveness in protecting values to be protected.

Wildland fire may be the only viable tool in areas such as steep rugged terrain or remote areas where mechanical treatments are not feasible. Objectives in these areas may include higher fire intensities and higher levels of mortality to achieve vegetation structural changes that would not occur through other means to move toward desired conditions. Fuels specialists and silviculturists, along with other resource specialists, work to ensure land management objectives are met. Joint silviculture prescriptions and burn plans may be produced.

Management of wildland fire is coordinated across jurisdictional boundaries whenever there is potential for managing a wildfire or a prescribed fire on more than one jurisdiction (e.g., other national forests, tribal lands, State lands). This is done with the understanding that fire-adapted ecosystems transcend jurisdictional boundaries.

The following strategies related to air quality and fire management could be considered for application at a programmatic or project-level stage to support the maintenance or achievement of desired conditions, standards and guidelines.

- Improve and protect water quality by implementing "National Best Management Practices for Water Quality Management on National Forest System Lands", "Montana Best Management Practices" and "Soil and Water Conservation Practices."
- Complete effectiveness evaluations of fuel treatments to help understand how hazardous fuel treatments affect wildfire behavior, fire severity, and fire suppression effectiveness.
- Minimum impact suppression tactics (MIST) should be utilized in sensitive areas, such as designated wilderness areas, designated wild and scenic river corridors, research natural areas, botanical areas, riparian management areas, cultural and historic sites, developed recreation areas, special use permit areas that have structures, and historic and recreational trails. MIST techniques should also be used for post fire restoration activities.
- Integrate terrestrial ecosystem desired conditions into spatial patterns for fuel reduction treatments. Incorporate heterogeneity by increasing variation in tree spacing, enhancing tree clumps, creating canopy gaps, promoting fire resilient tree species, increasing the ratio of large to small trees, and using topographic variation (e.g., slope, aspect, and position) to guide treatment prescriptions.

Terrestrial Vegetation

General strategies for vegetation management and climate change

Climate change should be considered when designing vegetation management projects. For more information, refer to documents produced by the Northern Rockies Adaptation Partnership, the Reforestation-Revegetation Climate Change Primer for the Northern Region, and other publications as they become available. Relevant management strategies for terrestrial vegetation (Halofsky et al., in press)on the HLC NF include:

- Vegetation adaptation strategies should focus on conserving native tree, shrub, and grassland systems to increase resilience to low soil moisture and more frequent and extensive disturbances (such as wildfire, insects, and nonnative species). These strategies include managing landscapes to reduce the severity and patch size of disturbances, encouraging fire to play a natural role, and protecting refugia where fire-sensitive species can persist. Increase species, genetic, and landscape diversity (spatial pattern and structure). Use silvicultural prescriptions to reduce fuel continuity, reduce populations of non-native species, and use multiple genotypes in reforestation. Rare and disjunct species (such as whitebark pine and aspen) require strategies focused on regeneration, preventing damage from disturbance, and establishing refugia.
- Nonforested vegetation (rangeland) adaptation strategies should focus on increasing resilience through non-native species control and prevention. Use ecologically based non-native plant management to repair damaged ecological processes that facilitate invasion. Seeding of desired natives can be done where seed availability and dispersal of natives are low. Proactive management to prevent establishment of non-native species is critical (early detection-rapid response), including tactics such as weed-free policies, education of employees and the public, and collaboration among multiple agencies. Livestock grazing can also be managed through the development of site-specific indicators that allow for enhancement of plant health.

The framework to apply these strategies is provided by the suite of terrestrial vegetation plan components. Specific factors that should be considered in site specific prescriptions include:

- Consider future drought and site suitability when species, stock types, and densities for planting.
- Promote the development of large fire-resistant trees, especially ponderosa pine and Douglas-fir.
- Reduce stand densities and inter-tree competition to increase resilience to drought and meet desired conditions with respect to fire behavior.
- Provide for retention of biological legacies and connectivity with respect to the genetic flow of vegetation as well as wildlife.
- Focus improvement, restoration, or protection strategies on species or communities with that are vulnerable to climate change. The species or communities at risk to climate change impacts include ecotone areas (e.g. upper and lower treelines), ponderosa pine and dry Douglas-fir cover types, western larch, aspen, and whitebark pine.

General strategies for forested and nonforested vegetation management

The following strategies should be considered for application at a programmatic or project-level stage to support the achievement of desired conditions, standards, and guidelines for vegetation.

- Develop a set of integrated target stands for the HLC NF that provides a consistent basis for the development of site-specific treatment prescriptions for forested vegetation. Target stands should

integrate elements of vegetation composition and structure with wildlife habitat, fire and fuels management, soil and water resources, and socioeconomic aspects (such as recreation, scenic integrity, and timber production). The desired conditions and other plan components provide a framework for development of these target stands.

- The full suite of possible commercial and noncommercial management options should be considered to achieve desired conditions composition, structure, and function of vegetation. Consider utilizing authorities such as stewardship contracting as appropriate.
- Consider opportunities to utilize livestock grazing as a means to achieve desired conditions especially in nonforested vegetation communities. For example, grazing may provide a mechanism to achieve the reduction of fine fuels in the wildland urban interface.
- The need for noxious weed control should be considered in all vegetation treatments.
- Continue re-measurement and maintenance of the forest inventory and analysis intensified grid inventory across the HLC NF to provide the best available data for broad and mid-scale analyses and monitoring.

Table 3 describes plant species which are of particular management interest. These are not species of conservation concern, but hold importance at the local level. Choose strategies that address these species in stand and landscape level prescriptions, where treatment and site conditions are suitable.

Table 3. Considerations for tree and plant species of local management interest

Common Name	Description and Management Considerations
mountain big sagebrush	Sagebrush is of local interest because fire exclusion and grazing have altered its condition and abundance. It is often present on ecotones which are vulnerable to climate change. Managers should consider methods such as the removal of colonizing conifers to promote resilient sagebrush communities in a variety of age classes. Prescribed fire is also a valuable tool, although mountain big sagebrush is readily killed and does not re-sprout after fire. Strategies for burning may include maintaining unburned adjacent areas to supply a seed bank, burning during periods of high humidity, burning and/or mechanically treating areas with competing conifers to reduce competition, and maintaining low fire intensity to promote re-establishment following fire.
antelope bitterbrush	Bitterbrush is of local interest because of its limited extent, high wildlife value, and decline due to conifer encroachment. It is often present on ecotones which are vulnerable to climate change. The removal of colonizing conifers is beneficial to this species, but it has low resistance to fire. When conducting prescribed burning, areas should be evaluated to determine the typical frequency of fire. Areas that support bitterbrush as the dominant species and do not typically carry fire well (e.g. rocky soils, dry sites) should be avoided to the extent possible; however low intensity fire can be used to reinvigorate deteriorating sites and increase regeneration.
mountain mahogany	Mountain mahogany populations are limited in extent on the HLC but provide unique and valuable wildlife habitat. Maintaining the health and extent of these communities should be a priority when designing projects. Prolonged drought, invasive species and potential for increased fire severity can change the dynamics of mountain mahogany systems. Management strategies may include reducing the spread of invasive species, managing grazing allotments to maintain native bunchgrasses, and replanting or seeding in areas of high severity fire due to the slow recovery time. The removal of colonizing conifers is beneficial, but it has low resistance to fire. When conducting prescribed burning, this species should be avoided or protected.
willow	Salix spp. is of local management interest because it occurs in scattered and isolated locations, and is often in decline. It is an important component of riparian and wetland sites. Management strategies include preventing excessive grazing, browsing, and trampling by cattle and/or ungulates, maintaining hydrology characteristics at a riparian sites, reducing impacts of timber harvesting, and ecological restoration. Fire can be used to promote vigorous sprouting of most willow species, though management should aim to prevent extremely hot (high severity) fire events which may cause root crown mortality. The removal of colonizing conifers in areas with willow can be beneficial, since most riparian shrubs, including willows, are shade intolerant.

Common Name	Description and Management Considerations
Rocky mountain juniper	Juniper is of local interest because without frequent fire it encroaches into nonforested plant communities and savannas, reducing their health, resilience, and forage values. Juniper can also be a ladder fuel in forest stands. It is often a component of dry ecotones which are vulnerable to climate change, provides shelter habitat, and is an important component of the native ecosystem diversity. Even though it is generally within its natural abundance at the broad scale, site specific factors should be considered in determining the desired condition of this species at the project level. Consider that the density and location of juniper should be designed so as not to detract from the resilience of nonforested and forested communities.
ponderosa pine	Ponderosa pine is of local interest due to its habitat value, decline due to fire exclusion, and the recent mountain pine beetle outbreak. Individual trees are not particularly vulnerable to climate change, but structural conditions (high density) can reduce resilience. Promote the extent and resilience of ponderosa pine communities through actions such as removal of competing conifers and ladder fuels, re-introduction of fire, and planting on suitable sites.
limber pine	Limber pine is of local interest because of its habitat value and decline due to white pine blister rust, fire suppression, climate change, and mountain pine beetle. There is a risk of the loss of disjunct populations. Enhance the resilience of limber pine communities through actions such as removal of competing conifers and ladder fuels, re-introduction of fire, and developing a program of seed collection, storage, and planting where appropriate.
quaking aspen	Aspen is of local interest because of its value as wildlife habitat and declining trend due to fire exclusion and conifer encroachment. While it can be favored by increased disturbance, prolonged drought (as is expected with climate change) can cause mortality. Promote aspen expansion and resilience through a variety of restoration treatments such as cutting of competing or understory conifers, re-introducing fire, altering grazing practices, installing wildlife exclosures, root-cutting or burning to promote suckering, allowing beavers to flood area to maintain and regenerate riparian areas, and/or planting seedlings or cuttings.
western larch	Western larch is of local interest because it is rare on the HLC NF due to its natural range being limited to the Upper Blackfoot GA, and where it occurs is an important long-lived fire resilient species. It is especially vulnerable to climate change. In the Upper Blackfoot GA, promote the extent and health of western larch within its range by removal of competing conifers, re-introduction of fire, and planting on suitable sites.
grasslands, shrublands, and savannas	These communities are of interest due to the influences of grazing and fire exclusion. They are often present in ecotone areas which are vulnerable to climate change. Prescribed fire is an important management tool, although limiting the potential introduction or spread of noxious weeds should be incorporated into project design. Consider management actions such as removal of small conifers to maintain and increase extent and resilience.
camas; bitterroot; beargrass; chokecherry; huckleberry	Camas, bitterroot, and beargrass are plants of cultural importance. Bitterroot is also the state flower of Montana. Chokecherry and huckleberry are popular for berry gathering by the public. These values should be recognized and vigorous populations should be maintained.

Terrestrial Vegetation – Strategies for Specific Plan Components

Vegetation Management Treatments (FW-VEGT-OBJ-01)

The purpose of this objective is to encompass all vegetation treatments (with the exceptions of livestock grazing and weed management) that may be used to move vegetation towards desired conditions. The acres specified reflect a minimum level. Acreage treated in a given year may vary, especially given the uncertainty in conditions suitable for planned and unplanned ignitions. This objective is based on historic information as well as future activities that were modeled to move the Forest toward desired conditions., and encompasses activities conducted in both forested and nonforested plant communities.

Examples of possible actions to achieve the objective are shown in Table 4. Activities may be conducted mechanically or by hand, and may include both commercial and noncommercial methods. Authorities such as stewardship contracting may also provide the mechanism to achieve management. This list is not exhaustive, but represents actions that most likely positively contribute to the objective. Strategies could include the use of single methods or practices, or combinations thereof. The treatments listed may meet more than one objective; for example, restoration of whitebark pine (FW-PRISK-OBJ-01) or providing commercial timber products (FW-TIM-OBJ-01 and FW-TIM-OBJ-02).

Table 4. Examples of possible management actions for FW-VEGT-OBJ-01

Treatment type	Examples of possible management actions
Planned or unplanned fire ignitions	Fire can be designed to meet objectives such as reducing conifer encroachment, reducing surface fuels, reducing tree density, increasing size class, promoting composition of fire-resilient species, diversifying age classes, increasing forage, creating suitable seedbeds for tree regeneration, and stimulating suckering of aspen or sprouting of desirable grasses and shrubs. A variety of fire severities could be appropriate based on the conditions and natural fire regime of the site.
Fuel reduction such as thinning, piling, chipping, and mastication	Conduct treatments to alter forest composition or structure and/or reduce fuel loading and distribution to levels appropriate for site specific objectives.
Removal of encroaching trees in nonforested ecosystems	Cut conifer encroachment and/or manage fire to maintain or create grass/forb/shrub openings and stimulate sprouting. These treatments may also promote savannas with vigorous grasses and shrubs and widely spaced large-diameter conifers.
Timber harvest	Use regeneration silvicultural systems (i.e, clearcut, seed tree, shelterwood or group/single tree selection) and intermediate harvests (i.e, commercial thinning, improvement harvest, sanitation or salvage cut) to create desirable conditions and habitat structures in forested areas. Conduct salvage after epidemic insect infestations or wildland fire in areas where other resources can be protected.
Tree planting and re-vegetation of native plants	Plant conifers or native plants to reforest areas after harvest, fire, or other disturbance. Where needed, use mechanical methods or prescribed fire to prepare sites for natural reforestation and/or planting. Revegetate disturbed sites with locally adapted native grass/forb/shrub species, including riparian areas, to provide values such as proper watershed function and wildlife habitat.
Noncommercial thinning of forests	Thin immature stands to improve individual tree and stand growth rates, species diversity, and short and long-term stand resilience.
Other	Treat insects and disease using integrated pest management practices. Allow beavers to flood areas to maintain riparian vegetation and function. Fell trees or snags to restore woody debris habitat in riparian management zones or to provide erosion control on disturbed slopes.

Vegetation removal (FW-VEGT-GDL-01)

The intent of this guideline is to limit the unnecessary removal of native vegetation during other resource activities, while allowing that some vegetation removal is necessary to meet the purpose and need of "non-vegetation" projects. This is important for limiting the spread of noxious weeds and the need for rehabilitation and re-planting or seeding activities. Examples of resource activities to which this applies include but are not limited to trail or road construction and maintenance, installation of improvements such as fences or culverts, and permitted mining or recreation activities.

Reforestation/Revegetation (FW-VEGT-GDL-03 and FW-VEGT-GDL-04)

The intent of these guidelines is to ensure that appropriate stock and seed are used for reforestation and revegetation projects. Strategies to meet these guidelines include:

- Adhere to Regional seed transfer zones and seed collection procedures for cones and native plants; and
- Ensure that reforestation and revegetation prescriptions are developed or reviewed by a qualified silviculturist and/or botanist.

Forested Vegetation – Strategies for Specific Plan Components

GA context for cover type and size class (FW-VEGF-DC-01 and FW-VEGF-DC-03)

These desired conditions display the desired ranges of cover types and sizes classes forestwide by broad potential vegetation type, based in large part on the natural range of variation analysis. These ranges apply to the broad scale across the HLC NF. Trends between the existing condition and the desired condition in each GA can vary from the forestwide values. When the relationship between the existing and desired condition is contrary to the forestwide trend, a DC is included in Chapter 3 of the Plan. In other instances, the desired trend is similar but the exact values or context varies in the GA. These considerations are summarized in Table 5 and Table 6 to complement the plan components. This is intended to highlight the unique characteristics of the GA to help guide management at that scale. The existing condition refers to the conditions present at the time of plan development.

Table 5. Geographic area context for forestwide cover type desired conditions, FW-DC-VEGF-01

GA	GA-level Cover Type Considerations
Big Belts	The existing and desired trend for the aspen/hardwood cover type is similar to forestwide. While the existing condition is similar, the desired condition indicates a higher proportion of the ponderosa pine cover type than forestwide, indicating that a focus on ponderosa pine restoration is important. The Douglas-fir dominated cover types (dry Douglas-fir and mixed mesic conifer) represent a higher proportion than forestwide, and although the desired trend is similar (decreasing), Douglas-fir dominated cover types should represent a higher proportion of this GA than forestwide. There is less of the lodgepole pine cover type than forestwide, and although the desired trend is similar (maintain), the proportion of lodgepole pine present should be less than forestwide. Although there is relatively little of the spruce/fir cover type, the desired trend is similar to forestwide (maintain). The ranges for the whitebark pine cover type are similar to forestwide.
Castles	There is a higher proportion of aspen present than forestwide, indicating that aspen restoration opportunities may be provided here. There is none of the ponderosa pine cover type present, although ponderosa pine and limber pine are desired similar to the forestwide DC. Therefore, promoting these species should be emphasized. The existing proportions desired trend for the Douglas-fir dominated cover types (dry Douglas-fir and mixed mesic conifer) and lodgepole pine are similar to forestwide, indicating a desired decrease in Douglas-fir types and maintenance of the lodgepole pine. There is a smaller proportion spruce/fir in the existing condition than forestwide, and the desired trend is to maintain or slightly increase. The proportion of the whitebark pine cover type and desired trend is similar to forestwide.
Crazies	There is none of the aspen/hardwood or ponderosa pine cover type present, although increases are desired. Although the overall proportion of the landscape dominated by Douglas-fir cover types (mixed mesic conifer and dry Douglas-fir) is similar to the forestwide average, the desired range is lower, indicating that decreasing these types is particularly important in this GA. Although the existing proportion and desired range of the spruce/fir cover type is higher in this GA than forestwide, the desired trend (maintenance) is similar. The proportion and desired trend of the whitebark pine cover type is similar to forestwide.
Divide	Although the existing proportion of the aspen/hardwood cover type is similar to forestwide, the desired range is higher. Although currently there are no ponderosa pine cover types present, ponderosa pine occurs especially east of the continental divide. The desired range is higher than the forestwide DC. Promoting ponderosa pine particularly east of the continental divide is important to contribute to the forestwide DC. The Douglas-fir dominated cover types (dry Douglas-fir and mixed mesic conifer) represent a higher proportion of the landscape than forestwide, and the desired trend is similar to forestwide, indicates that decreasing these types in this GA is important. The existing level of the whitebark pine cover type is lower than forestwide, but the desired range is higher,

GA	GA-level Cover Type Considerations
	indicating that promoting/restoring this cover type may be particularly important in conjunction with decreasing the spruce/fir type.
Elkhorns	Although the existing proportion of the aspen/hardwood cover type is similar to forestwide, the desired range is slightly higher, indicating that aspen restoration is important. The existing proportion of the ponderosa pine cover type is lower than forestwide, although ponderosa pine and some limber pine components occur. The desired range is similar to forestwide, indicating that ponderosa pine restoration is an important focus. The existing proportions of the Douglas-fir dominated cover types (dry Douglas-fir and mixed mesic conifer) are higher than desired, but to a lesser degree than forestwide, indicating that the need to reduce these types is less pronounced in this GA. The lodgepole pine cover type existing proportion is lower than forestwide, while the desired range is slightly higher. The proportion and desired range of the whitebark pine cover type is similar to forestwide.
Highwoods	There is more aspen present and desired than forestwide, indicating maintaining and restoring the aspen/hardwood cover type in this GA is particularly important. There is little to none of the ponderosa pine cover type present even though the desired range suggests that it could be increased; promotion of this type through planting may be appropriate in some areas. There is no whitebark pine present or desired in the Highwoods, unlike the forestwide condition.
Little Belts	The existing and desired trends of all forested cover types are similar to the forestwide DCs.
Rocky Mountain Range	There is more of the aspen cover type present and desired than forestwide, indicating that maintenance this cover type is important to contribute to the forestwide DC. There is less of the ponderosa pine cover type present and desired than forestwide, and it is generally dominated by limber pine. Only modest increases in this type could be made in a few site specific locations. The existing and desired proportion of the spruce/fir cover type is much higher than forestwide, although the same desired trend of maintenance is appropriate. The existing proportion of whitebark pine is slightly higher than forestwide, indicating opportunities for maintenance and restoration.
Snowies	The existing and desired levels for the aspen/hardwood cover type are consistent with forestwide. There are much higher levels of the ponderosa pine cover type than forestwide, and this proportion overlaps the desired range which is higher than forestwide as well. This is due to the genetically unique ponderosa pine communities in the Little Snowies. Maintaining and enhancing these forests is important in this GA. There are higher proportions of the Douglas-fir dominated cover types (dry Douglas-fir and mixed mesic conifer) present than forestwide, and the desired ranges are lower, indicating a need to focus on decreasing these types. There is more of the spruce/fir cover type than forestwide (primarily in the Big Snowies), and the desired range is higher as well. There is no whitebark pine present or desired, unlike the forestwide condition.
Upper Blackfoot	There is very little aspen/hardwood cover type present, but the desired range indicates that increases are appropriate. There is little of the ponderosa pine cover type, although ponderosa pine and limber pine do occur and the desired range is similar to forestwide; therefore, promoting these species should be emphasized. The existing proportion and desired range of dry Douglas-fir is consistent with forestwide averages. However, the abundance of the mixed mesic conifer cover type is higher than forestwide, and the desired range is similar, indicating that focusing on decreasing this type (Douglas-fir on cool moist sites) is important. Western larch only occurs on this GA and should be promoted. The existing proportions and desired ranges for the lodgepole pine, spruce/fir, and whitebark pine cover types are similar to the forestwide levels and desired trends.

Table 6. Geographic area context for forestwide size class desired conditions, FW-DC-VEGF-03

GA	GA-level Size Class Considerations
Big Belts	The desired range indicates less of the small and medium classes is appropriate than forestwide, but the existing condition is similar, indicating a need to focus on reducing these classes in this GA.
Castles	There is less of the seedling/sapling class present and the desired range indicates that lower proportions are appropriate than forestwide. There is more of the small tree class present than the forestwide average, but the desired range is similar, indicating a need to reduce the small tree class in particular. There is slightly more of the large tree class present than forestwide, and the desired range is slightly higher than forestwide. There is more of the very large tree classes present than forestwide, and the desired range is lower; the existing condition is generally within this range.
Crazies	The existing condition contains a higher proportion of the large tree class than forestwide, and a

GA	GA-level Size Class Considerations
	similar desired range, indicating that opportunities to promote large trees may be highlighted.
Divide	There is more of the small class than forestwide, with a similar desired range, indicating that reducing this size class should be emphasized. There is more of the very large sizes class than forestwide, and a higher desired range, indicating the potential to focus on increasing this size class.
Elkhorns	The Elkhorns contain none of the very large tree class, but have a desired range similar to forestwide. Managing the resiliency of younger stands to promote development larger trees and species that grow to large sizes should be a focus in this GA.
Highwoods	The current condition is not diverse, with no seedling/sapling or very large classes, indicating that diversification of size class is important. The desired range for the large size class is higher than forestwide, and the current amount lower. Similarly, there is none of the very large tree size class but the desired range indicates a similar level as forestwide. Promoting individual tree growth or thinning smaller trees to increase the average size class should be emphasized.
Little Belts	The exact values vary, but both the existing condition and desired range for size class in this GA are consistent with the forestwide DCs.
Rocky Mountain Range	This GA has a higher proportion of the seedling/sapling class than the forestwide average, which is appropriate to maintain because the desired range is similar.
Snowies	The Snowies have more of the large and very large tree classes in the desired condition than forestwide, but essentially none in the existing condition. This GA also has a much higher amount of the small tree class than forestwide. Managing densities and compositions to develop large trees, especially in the ponderosa pine in the Little Snowies, should be emphasized.
Upper Blackfoot	The exact values vary, but generally both the existing condition and desired range for size class in this GA are consistent with the forestwide DCs.

Large/very large live trees and concentrations (FW-VEGF-DC-05, FW-VEGF-DC-06)

FW-VEGF-DC-05 and FW-VEGF-DC-06 emphasize the importance of large and very large live trees, in terms of the quantity of individual trees and the distribution of large/very large size concentrations. These components contribute to the long-term persistence of native species. Large live trees are important in creating and sustaining forests resilient to disturbances, in particular if they are fire-tolerant species. They have the potential to survive fires, providing seed to reforest burned areas, and provide live components in landscapes dominated by dead trees. They are often present at low densities, forming an overstory canopy in stands dominated by smaller trees. Large live trees can occur in any of the size classes, at varying densities but too few in numbers to offset the abundance of smaller trees to be classified into large size classes. It is likely that there has been a downward trend in the presence and/or density of large live trees over the past century due to harvest practices, fires, and insect and disease activity. Fire will continue to be a primary influence. Stand density is an important factor that influences the development of large trees. Reducing the density of young forests may help develop large tree components in the future.

Although vegetation management affects a relatively small proportion of the landscape compared to natural disturbances, providing for these components remains important at the project scale. A guideline for the retention of large and very large live trees at the project level was developed to help the HLC NF meet this desired condition, as described below (FW-GDL-VEGF-01).

FW-VEGF-GDL-01

The intent of this guideline is to help achieve the desired conditions by retaining large and very large trees at the project level. Large and very large trees are important to contribute to future snag resources, but also other ecosystem functions such as seed dispersal and wildlife habitat. Because the retention of live trees can generally be accomplished safely and feasibly within units, and because surveys of these components outside of treatment units would be prohibitive, the application of this guideline is an average

across all treatment units rather than an average across a larger landscape area (such as a project area). Additional clarifying information related to the exceptions stated is provided in Table 7.

Table 7. Considerations for FW-GDL-VEGF-01, large and very large live trees

Statement in FW-GDL-VEGF-01	Intent and Description
Standard applies as an average across all treatment units in a project. Retained trees need not be present on every acre and may be clumped.	The intent is to provide large and very large live trees across treated areas, distributed as appropriate for the site. Trees need not be retained on every acre. This applies as an average across the treatment units. All very large trees that occur in lodgepole pine forests or the cold broad potential vegetation group are to be retained due to their rarity, unless a stated exception applies.
If the minimum amount of large and very large live trees are not present, leave all that are available plus enough medium sized trees to achieve the standard. If insufficient medium sized trees are available, leave all that are available.	If the minimum numbers of large and very large trees are not available in treatment units, then medium trees may be substituted as needed to achieve the minimum numbers. If no suitable trees of any size are present, for example in severely burned areas, it is possible that minimums will not be met. In this case, as many live trees as possible should be retained.
Trees preferred for retention are the longest lived, healthiest, windfirm, most fire adapted species available on the site.	The intent is to leave trees that are most likely to survive in the long time and provide ecosystem functions such as forest resilience, future potential seed sources, wildlife habitat, etc.
Exceptions may occur when there are none (or fewer) desirable trees available due to insects, disease, lack of windfirmness, or unavoidable operational limitations.	The intent is to avoid dysgenic effects by allowing that if all or some of the available trees are undesirable due to insect or disease infestation, or if the likelihood of their persistence is very low (e.g. shallow rooted on an exposed windy site) they need not be retained. In this case, medium sized trees should be included if available to meet the minimum numbers. “Unavoidable operational limitations” are intended to cover specific circumstances that render the retention of particular trees impossible such as when they are located along fire lines, private property lines, or essential harvest corridors; or they are identified as a specific safety hazard that cannot be avoided. In the event that trees intended for retention are killed or damaged, they should be left onsite to provide woody debris and replacement trees identified if possible. If available, prescriptions should consider retaining extra trees to cover the possibility of tree mortality in units that will be prescribed burned.
If trees in excess of the minimums are available, site specific prescriptions may require either removal or retention based on project and stand objectives.	If more than the minimum levels are available, flexibility is granted to project prescriptions to specify retention. Integration of site conditions and objectives should determine leave tree density, patterns, species, and sizes. In general, large and very large trees are preferred to retain, but sometimes removal may be appropriate, e.g. to reduce insect problems or to establish desired densities and enhance the health of other large trees. Consideration of long-term conditions is important. For example, leaving smaller trees of desirable species and vigor that can persist indefinitely may be preferable to leaving larger trees of less desirable species or condition, because of the long-term potential to achieve desired conditions. The potential for development of late successional forest or old growth may also be a consideration.
Retained large and very large live trees may also function as replacement snags, and/or be mixed in clumps with snags, to meet FW-STD-VEGF-02.	Live trees to retain may be located on inoperable areas within treatment units, such as riparian/wetlands or rocky outcrops, and may be mixed with snags designed to achieve FW-GDL-VEGF-02. Such clumping is encouraged to the extent that it reflects natural disturbance patterns.
Exceptions may occur where there are issues of human safety in designated campgrounds and developed recreation sites, permitted ski areas, utility lines. See FW-DC-DEVREC 05, LB-GDL-SHOWSKI-02, and RM-DC-TETONSKI 02.	This exception allows that live tree retention does not apply in specific areas, primarily those developed for human uses, and that the desired conditions for these areas shall drive vegetation management and the determination of how many, if any, large and very large live trees are retained.

Old growth (FW-VEGF-DC-07)

Old growth forest is defined by specific characteristics described in *Old growth forest types of the Northern Region* (Green et al., 1992*)*. In the future, new best available science could become available and, if so, should be used to define old growth. The function of FW-VEGF-DC-07 is to highlight the importance of planning for long-term development and retention of old growth. The natural range of variation analysis concluded there is likely less old growth in the existing condition than there was historically. However, there is no quantitative desired minimum or maximum level of old growth specified because such a specification would be arbitrary given the lack of available data. The array of other desired conditions for forest vegetation should support appropriate levels of old growth over time and contribute to the needs of wildlife species associated with late successional forest. In rough terms, the desired condition calls for old growth levels that are similar to or greater than the existing amounts.

Old growth may be lost to disturbances and gained through natural succession. Although vegetation management affects a small proportion of the landscape compared to natural processes, old growth considerations are important at the project scale. Two guidelines were developed to help the HLC NF meet the desired condition. These components work together to contribute toward the desired old growth condition by 1) not removing existing old growth by actions within FS control except in limited cases; 2) allowing for treatments within old growth for specific purposes; and 3) promoting the development of future old growth.

FW-VEGF-GDL-04

The intent of this guideline is to specify the conditions under which vegetation management may occur in old growth to generally maintain or increase existing amounts of old growth.

It is the intent that old growth be managed at the stand scale, with larger stands or contiguous patches of old growth being more valuable than small, fragmented old growth stands. There is no known minimum patch size for old growth currently identified consistently in the literature; the minimum area needed to provide functional old growth habitat for wildlife species likely varies. The larger the old growth patch is, the more likely it is to provide desirable habitat conditions. For the purposes of stand management and mapping, it is infeasible to manage for patches smaller than 5 acres.

To meet this guideline, project analyses must identify at the stand level if proposed treatment areas include old growth, using a reasonable and accurate approach. Determining whether a stand is old growth requires some level of field data collection or validation. The definition and patch size of old growth should be determined at the project level using the best available science. Generally, stands should be delineated based on the FSH 2409.17, or other current direction. When determining if a stand is old growth, the current best available science should be used, which at the writing of the plan is *Old growth forest types of the Northern Region* (Green et al., 1992*)*. This publication includes not only minimum quantitative criteria, but also additional characteristics and qualitative descriptions. The minimum criteria and stand measurements should be a guide only, and the other qualitative factors should be considered when determining if a stand should be considered old growth.

Next, the project must determine if any of the appropriate purposes or exceptions listed in the guideline for treating in old growth apply. If none of these purposes or exceptions apply, then management would not occur in the old growth stand(s). If one or more of the allowable treatment purposes apply, then management could occur in the old growth stand(s) so long as the minimum quantitative old growth criteria can be maintained, as defined by Green and others (1992) or other best available science. If one or more of the exceptions apply, then treatment may occur in the old growth stand to remove its old growth characteristics. Additional information is provided in Table 8.

Fire is a key ecosystem process that influences the natural development of the desired natural array of vegetation conditions, including old growth. In the case of landscape-scale prescribed burns, old growth stands may be difficult to identify, and designing the burn to avoid or achieve desired results may be challenging. Tactics such as modifying the fuels in and adjacent to old growth stands, altering ignition patterns, or modifying unit boundaries may be needed to achieve the desired results in old growth.

Table 8. Considerations for FW-VEGF-GDL-04, old growth

FW-GDL-VEGF-04	Intent and Description
In old growth stands, vegetation management should not modify stand characteristics to the extent that the stand no longer meets the definition of old growth.	The intent is to ensure that vegetation management generally does not remove existing old growth. In addition to the minimum old growth criteria described by Green et al (1992), or other best available science, site specific prescriptions should strive to retain other habitat characteristics of old growth such as downed wood, snags, and broken tops.
Old growth should be identified at the project scale based on the best available science regarding its characteristics and patch size.	The best available science should be used at the project scale to inform the identification of old growth characteristics and patch size. The minimum functional patch size of old growth may vary by type and wildlife species of interest.
Identification and mapping of old growth should be dynamic through time.	It is not expected that the Forest maintain a comprehensive map of all old growth, as conducting such an inventory would be nearly impossible and subject to constant change. However, to the extent that old growth stands are identified through project design, the maintenance of a map may help ensure consistent management of them through time. Mapped polygons of old growth are not static; that is, an area identified as old growth is not necessarily designated for old growth management into perpetuity, as it may be impacted by natural mortality agents.
Vegetation management that occurs within old growth should be designed to achieve one or more of the following purposes:	This statement in the guideline acknowledges that management of old growth for specific purposes may be acceptable and, in some cases, encouraged. At the project level, the decision of whether to treat within old growth or not should consider the purpose and need of the project as well as the resources associated with old growth forest. In some cases, although treatment could be allowed, old growth stands may best meet wildlife and other goals in an untreated condition.
• *Maintain or restore old growth habitat characteristics and ecosystem processes.*	These purposes encourage management designed to retain and enhance old growth by maintaining or restoring conditions appropriate for the old growth type. Management actions that may meet these purposes could include but are not limited to hand slashing of ladder fuels, commercial removal of smaller diameter trees to restore resilient composition and structure, or burning piles or low severity prescribed burning especially in dry forest types. The desired condition and treatment methods should vary by old growth type.
• *Increase old growth forest resistance and resilience to disturbances or stressors that may have negative impacts on old growth characteristics (such as drought, wildfire, bark beetles).*	
• *Reduce fuel hazards adjacent to exceptional values at risk.*	This purpose covers the possibility that old growth may surround or be adjacent to specific values at risk (such as a cultural site or private inholding), and the modification of fuels may be needed to protect that value.
• *Address human safety.*	This purpose covers the possibility that human safety concerns, such as decadent trees in recreation areas or adjacent to a private dwelling, could occur. Actions taken should impact the overall old growth patch to the minimum degree needed to address the safety concern.
Exceptions to this guideline are allowed under the following circumstances. In these cases, old	This statement allows for specific exceptions under which an old growth stand may be substantially modified or removed from the

FW-GDL-VEGF-04	Intent and Description
growth stands may be modified to the extent that they no longer meet the definition of old growth. These exceptions should be applied to the minimum extent necessary.	landscape. It is expected that these circumstances would be relatively infrequent. When removals of old growth are deemed necessary, project design should consider opportunities to promote future old growth development in other stands and emphasize retention of other old growth stands.
• *Removal of old growth characteristics is necessary to provide for public safety in campgrounds and other designated recreation sites, administrative sites, utility corridors, permitted ski areas, and areas surrounding or immediately adjacent to infrastructure or privately owned improvements.*	This exception allows that the retention of old growth may not be feasible given the safety concerns within specific areas that are highly used by the public; for example, when old growth trees are structurally unsound within a recreation site or they are too close in proximity to utility lines or other infrastructure.
• *The old growth stand is expected to experience stand-replacing mortality in the short term (5-10 years) as indicated by progressing tree mortality (such as an ongoing insect infestation), and altering or removing the stand is crucial to meeting other project-level objectives and timeframes.*	This exception allows for the removal of old growth that is expected to die due to natural causes in the near term. It is intended to apply to stands that are clearly in the process of "unraveling" so that other resource objectives (such as hazardous fuel reduction) can be achieved in a timely manner. It is not intended to apply to stands that are simply decadent, declining, subject to minor mortality agents, or that are at risk to future wildfire or insects, because that is by definition the nature of many old growth stands.

FW-VEGF-GDL-05

The intent of this guideline is to guide vegetation project design to either encourage the future development of old growth or to protect existing old growth where appropriate. This reflects the dynamic nature of old growth in time and space, and helps ensure that the old growth desired condition can be met. At the landscape level, possible management strategies may include the following:

- Consider project objectives to develop future old growth in forested areas where existing old growth or late successional forest is uncommon; where shape of old growth patches is largely linear and narrow; where old growth patches are relatively small; where connectivity of old growth patches is poor; and/or where the existing old growth does not represent the diversity of forest types present on the landscape.
    - Consider improving younger stands adjacent to old growth with the purpose of hastening development of old growth and thus increasing the old growth patch size. For example, when harvesting in stands adjacent to small patches of old growth, consider increasing the potential for these stands to develop into old growth in the future by retaining the compositional and structural features that would contribute to old growth conditions (such as reserve trees, large downed wood, and long-lived species).
    - Consider treatments in younger forests to develop old growth characteristics, particularly in the warm dry broad potential vegetation group.
    - Stands that were identified as desirable future old growth or late successional habitat under previous project analyses should be considered for protection, maintenance, or treatments to promote old growth development.
    - The development of future old growth via retention or improvement of younger stands should be emphasized in riparian areas; areas away from open roads or where patch size is large enough to limit the impact of potential firewood cutting along roads; and areas important for wildlife species that prefer late successional forest habitat.

- Consider treatments near old growth to reduce fire hazard, alter potential fire spread or fire severity, or reduce potential insect or disease outbreak that may spread to old growth.
- Consider the spatial location of old growth as desired refugia patches when designing projects that have a purpose of altering fire behavior at the landscape scale.
- Consider retaining leave tree buffers of higher density in treatment units to limit windthrow damage in adjacent old growth (depending on the vegetation type).

Snags (FW-VEGF-DC-08)

This desired condition recognizes that an array of snag sizes is important across the landscape, and that quantities and spatial distribution are variable depending on disturbance regimes and vegetation types, as represented by snag analysis groups (see appendix D). Snags are primarily created through natural disturbance processes. The other forested vegetation plan components help ensure that the desired snags are present by providing a natural array of compositions and structures across the landscape. Larger diameter snags are particularly important, due to their relatively low contribution to fire hazard levels and their desirable contribution to soil function and wildlife habitat. Snag presence on managed lands is more dependent on human actions than in remote areas.

Desired snag conditions were not developed for each GA, due to a lack of data available to inform the natural range of variation with confidence at that scale. In addition, the application of GA-level desired conditions could be problematic in small GAs that may be subject to periodic disturbances that create a boom-and-bust situation for snags (i.e., the scale is too small to encompass the natural temporal variability of snag conditions). However, based on the abundance of snags at the writing of the plan, it may be appropriate to consider the following GA-level snag trends when designing projects:

- Promote large/very large tree growth and large/very large snag retention in the Divide, Highwoods and Snowies GAs, because these large snags are essentially absent.
- Promote snag retention of all sizes in the Highwoods, Little Belts, and Snowies, where overall quantities of snags are lower than other GAs and the Forest as a whole.
- A reduction of medium snags in the Rocky Mountain and Upper Blackfoot GAs would be acceptable because they are abundant at relatively high levels.

In managed areas, it is important to recognize opportunities to develop or retain snags of desired species and sizes. One guideline (FW-VEGF-GDL-02) is developed to ensure that vegetation management contributes to the snag desired conditions.

FW-GDL-VEGF-02

This guideline is written to ensure the snag desired condition can be met and applies to any vegetation management treatment, such as timber harvest and prescribed fire, based on concepts found in the best available science for the HLC NF, (Bollenbacher, Bush, Hahn, & Lundberg, 2008). The snag guideline applies as an average across a project area, so that the condition of snags may be considered at a scale larger than treatment units. This should allow projects to design snag retention requirements as needed to best meet the unique conditions of each project. Snags would not necessarily be required to be left in treatment units, depending on the landscape context. Additional information to clarify the guidance and exceptions for this standard is provided in Table 9.

Table 9. Considerations for FW-GDL-VEGF-02, snags

Statement in FW-GDL-VEGF-02	Intent and Description
Snags per acre and percent distribution apply as averages across the project area. Snags need not be present on every acre or within treatment units; they may be clumped on the landscape. However, snag retention within treatment units should be considered when it is safe and operationally feasible to do so, especially if the most desirable snags are present in those areas, and/or if the treatment unit is greater than 40 acres in size.	Snags should be unevenly distributed and clumpy. Snag retention is not required within treatment units, but should be considered if safe and operationally feasible, particularly in large units or where the best snags (type, size, or location) is found within treatment units, to ensure that the best snags are left well-distributed on the landscape. Snags are most desirable in riparian areas and near meadows or other wildlife foraging areas. Snags should be located away from open roads, when possible, to limit the losses to firewood cutting. Project design and prescriptions should consider these factors as well as the landscape condition of snags across the project area when determining if snag retention within treatment units is appropriate. Snag retention is likely to be unsafe or infeasible particularly along fire lines, private property lines, and essential harvest corridors.
Locate snags 300' or farther from a road that is open to firewood cutters, when possible.	
Due to their rarity, very large snags should be retained in treatment units unless operational or safety limitations are encountered. If these snags are felled, they should generally be left onsite as woody debris as long as the resulting condition is consistent with site-specific woody debris retention objectives.	Very large snags warrant special consideration due to their rarity. While retention within treatment units is not required, it should be strongly considered where safe and operationally feasible. If very large snags are felled, they should be left onsite as long as doing so does not elevate the average downed woody debris component above project objectives.
If fewer than the minimum snags are present across the project area, live trees shall be retained (or snags shall be created) in treatment units to meet the quantities above if available, with a preference for the largest and most decadent trees. Trees with rot or wildlife use are preferred. Live trees retained in this instance may also be used to meet FW-VEGF-GDL-01.	These statements allow that if the minimum number of snags are not present across the project area, the standard can be met by creating new snags, leaving live tree replacements, or a combination within treatment units. Snags could be created through methods such as girdling or prescribed fire. Residuals damaged by harvest could also be selected. It is encouraged to retain clumps of snags and live trees to meet both FW-GDL-VEGF-01 and 02 in desirable locations such as rocky outcrops, riparian areas, or near meadow and wildlife foraging areas. In the event that snags intended for retention are cut or toppled by fire, they should be left onsite to provide woody debris and replacement snags or live trees retained if possible. The species preferred for snags, and live tree replacements, reflects those that have the most longevity.
Snag species preference in order from highest to lowest is: ponderosa pine, western larch, whitebark pine, limber pine, Douglas-fir, hardwoods (aspen or cottonwood), Engelmann spruce, subalpine fir, lodgepole pine.	
Exceptions may occur where there are issues of human safety, especially in designated campgrounds and developed recreation sites, permitted ski areas, utility lines, prescribed burn control lines, areas adjacent to infrastructure or private ownerships. Also see FW-DC-DEVREC 05, LB-GDL-SHOWSKI-02, and RM-DC-TETONSKI 02.	This exception allows that snag retention does not apply in specific areas, primarily those developed for human uses, and that the desired conditions for these areas shall drive vegetation management and the determination of how many, if any, snags are desirable.
Additional snag retention requirements above these minimum levels may be specified and applied in project-level NEPA analyses to meet project-level objectives.	Project prescriptions may specify additional retention requirements if needed to meet other project objectives. The development of snag prescriptions should consider the following: - Safety and operational feasibility. - Existing distribution, abundance, location and characteristics of snags in the larger landscape and/or project area, relative to snag availability; - The proportion of area influenced by management activities relative to the proportion of area influenced primarily by natural disturbances; - Current disturbances in the project area or the broader landscape that may be providing snags of desired characteristics, either in the short term (for example,

Statement in FW-GDL-VEGF-02	Intent and Description
	fire) or longer term (such as, root disease, dwarf mistletoe). This may result in more focus on retaining live trees to meet future snag needs. - Snag characteristics (species, size, condition) within treatment units relative to availability of these characteristics across the landscape. - The long and short-term perspective that snags are a relatively short-term component (most become downed wood within a few years or decades). - The role of live trees that contribute in the far future to desired snag habitat. - Other resource desired conditions or associated plan components (social, economic).

Coarse woody debris (FW-VEGF-DC-09)

The desired conditions for coarse woody debris recognize that downed wood is important across the landscape, and that quantities and spatial distribution should be variable. While an overall average amount is specified at the broad scale, the desired condition recognizes the wide variability in the quantity and distribution, encompassing both areas with little to no downed wood and those with high amounts, driven primarily by natural disturbance processes but also management objectives. The desired condition is based on information developed by Brown and others (2003), which is the best available information to depict a natural range of woody debris for the ecosystems found on the HLC NF.

Coarse woody debris on managed lands is more dependent on human actions than in more remote areas. In managed areas, it is important to recognize opportunities maintain appropriate amounts of coarse wood. Therefore, one guideline (FW-VEGF-GDL-06) is developed to ensure that vegetation management contributes to the desired condition.

FW-GDL-VEGF-06

This guideline is written to ensure the coarse woody debris desired condition can be met and applies to any vegetation management treatment, such as timber harvest and prescribed fire, based on concepts developed by Graham and others (1994). The values presented in the guideline are different than the broader natural range of woody debris presented in FW-VEGF-DC-09 because it represents a specific threshold to ensure managed areas contribute toward to the overall desired condition. Additional information to clarify the guidance and exceptions for this guideline is provided in Table 10.

Table 10. Considerations for FW-VEGF-GDL-06, coarse woody debris

Statement in FW-GDL-VEGF-03	Intent and Description
The requirement should be met immediately following completion of all project activities.	The intent is that at least the minimum amount of downed wood be present after all project-related activities are completed. For example, a timber harvest unit may contain less downed wood at the completion of the logging activity if subsequent activities such as prescribed burning will result in the desired amount.
The guideline applies to any vegetation treatment in forested communities, including timber harvest and prescribed fire. This guideline does not apply in nonforested vegetation communities or in open forest savannas that may occur in the warm dry potential vegetation type.	The guideline is applicable only to forested sites and the quantities apply as averages across each treatment unit to ensure that soil nutrient cycling occurs to contribute to long term site productivity.
The guideline applies as an average across each	

Statement in FW-GDL-VEGF-03	Intent and Description
vegetation treatment unit; the downed wood may be irregularly distributed and not every acre in the unit needs to have the desired average.	
Downed wood should consist of intact pieces of a variety of species, sizes and stages of decay, depending on site conditions. Prescriptions should emphasize retaining larger debris (pieces 10" diameter and 10' in length or greater) where possible, which are higher value to wildlife.	While any wood greater than 3" diameter would be appropriate to meet the guideline, larger pieces are preferred where available due to their value to wildlife and low contribution to fire hazard.
If the minimum quantity cannot be met, live trees or excess snags should be felled, or dead wood added to the site if available.	Excess live trees or snags are those that are not identified for retention to meet FW-GDL-VEGF-01 or FW-GDL-VEGF-02. Slash from landing piles may be an example of a source of dead wood, if needed, to distribute across the site.
Exceptions to the guideline may occur where there is elevated concern with fire risk (recreation sites, areas adjacent to infrastructure or private ownerships, Wildland Urban Interface areas, utility lines, etc), or where sufficient live trees or snags are not available.	The exceptions are wide-reaching to reflect the importance of flexibility in managing downed wood. There may be a need to manage lower amounts of downed wood. In such instances, a site specific analysis and prescription may be developed to support an alternative minimum coarse woody debris guideline. This prescription should be developed through interdisciplinary interaction, at a minimum between silviculture, fuels, wildlife, and soils specialists, and consider the following factors: - The condition and abundance of coarse woody debris at the landscape scale. - The condition of snags, which represent the short term contribution to woody debris. - The proportion of area influenced by management relative to that influenced by natural disturbances. - Other resource desired conditions.
An upper threshold of desired wood may be specified in project-level NEPA analysis, considering all project objectives such as fuel loading, wildlife habitat, and riparian area considerations.	The guideline only specifies a minimum threshold. In most cases, it would be appropriate to specify an upper limit for downed wood in project-level NEPA as well to guide implementation. Design criteria for the upper limit of downed wood should be based on similar considerations as described above, including balancing all resource needs such as fire/fuel loading, wildlife habitat, and riparian functions.

Early successional forest patches (FW-VEGF-DC-10)

This desired condition addresses forest pattern related to early successional (seedling/sapling) forests, which are considered openings. Analyses of the natural range of variation indicates wide ranges in size of early successional forest patch sizes. Characteristics of forest patches and patterns related to early successional forest openings change relatively rapidly compared to mid and later successional forests. This is because seedling/sapling stands transition relatively quickly into mid-successional stands, after which they can remain in a closed canopy, densely forested condition for many decades if not altered by disturbance. Both fire and timber harvest can be possible management tools for maintaining the desired amount and distribution of early successional forest patches.

Managing for an array of average patch sizes within the natural range will contribute to habitat connectivity and resilience. The average patch size is an important monitoring indicator, but specific

projects should create patches across the natural array. For example, it may be desirable to manage for small patches in specific areas where the mature matrix forest is important for connectivity in the short term. Fire will continue to be the primary activity that creates large openings. Harvest is also a tool to create desired conditions including, but not limited to, in areas suitable for timber production, especially where the use of fire is limited (such as wildland urban interface areas). See also information for FW-TIM-STD-08, which address patch sizes specifically in relation to maximum openings created by harvest.

General Strategies for Plant Species at Risk

The following strategies related to plant species at risk could be considered for application at a programmatic or project-level stage to support the maintenance or achievement of desired conditions, standards and guidelines.

- Evaluate areas proposed for ground disturbing activities for the presence of occupied or suitable habitat for at-risk species, including conducting pre-field review and field surveys. Provide opportunities for mitigation and protection to maintain occurrences and habitats that are important for species sustainability.
- Focus botanical surveys on increasing known information about other plant species (Montana state species of concern, newly discovered species, etc) on the Forest, including information that may warrant changing their status to species of conservation concern in future species of conservation concern list revisions by the Regional Forester. If such information is found, the Forest should consider the species according to at-risk plant plan components until such time that the Regional Forester makes a determination on whether to designate it as a species of conservation concern.
- Monitor known occurrences of at-risk species within project areas and forestwide to determine trend data of individual occurrences, to contribute to trend data at the species-range level, and to document impacts of project activities (noxious weed treatments, vegetation treatments, restoration treatments, etc), prioritizing those project activities for which species specific data is currently lacking.

Whitebark pine (FW-PRISK-DC-02, FW-PRISK-OBJ-01)

Whitebark pine is currently the only known plant species which is considered under the Endangered Species Act, as a candidate species. Desired condition FW-PRISK-DC-02 is designed to sustain or restore whitebark pine and minimize potential threats. Objective FW-PRISK-OBJ-01 is included to acknowledge that restoration activities are needed to achieve the desired condition. Whitebark pine habitat is present in most of the GAs, often in unroaded areas. The contributions of whitebark pine communities includes habitat for wildlife species, scenic character, forest ecological resilience and health, maintenance of naturalness and natural processes, and trending forests towards natural range of variation for forest composition and structure. Vegetation treatments that contribute to this objective may also contribute toward FW-VEGT-OBJ-01. Possible restoration strategies and activities include:

- Prune and/or daylight thin whitebark pine to reduce incidence of blister rust and competition from other tree species.
- Plant rust-resistant white pine to reforest areas after harvest or fire.
- Conduct even-aged harvest or prescribed burning to create suitable sites for natural or artificial reforestation.
- Reduce fuels in whitebark pine stands to increase their resilience to fire.

- Protect high value trees, such as blister rust resistant trees and large healthy cone producing trees from bark beetle mortality during outbreaks, using pheromones or insecticide applications.
- Collect seed from whitebark pine trees exhibiting rust resistant traits. Participate in the Regional breeding program as necessary by collecting cones and scion as needed.

Restoration of whitebark pine within recommended wilderness areas requires special consideration. The plan explicitly allows for implementation of whitebark pine restoration within recommended wilderness so long as "the social and ecological characteristics that provide the basis for wilderness designation are maintained and protected." Site-specific analysis is needed prior to applying activities. The publication, "A Range-Wide Restoration Strategy for Whitebark Pine" (Keane et al., 2012) includes considerations when proposing restoration in recommended wilderness areas because of the need to maintain and protect wilderness characteristics. To provide additional analysis support, it is recommended that a white paper be developed that consolidates known information on whitebark pine specific to the HLC NF. This paper may include information such as:

- Conditions of whitebark pine on the HLC NF, why it is in its current condition (exotic disease, fire suppression, and mountain pine beetle) and the ecological consequences;
- Documentation of inventories, research, studies, professional and local knowledge, and publications or other information that supports the importance of restoration for local populations
- HLC NF whitebark pine restoration program goals, objectives, methods, strategies and priorities; and
- Present and future needs, expectations, and uncertainties.

General Strategies for Pollinators

When planning for vegetation management activities, consider impacts (positive, negative, or neutral) to pollinators when undertaking project design, analysis, and implementation. Apply the latest best available science and policy direction, such as the guidelines in the Pollinator Friendly Best Management Practices for Federal Lands, to provide habitat elements for pollinators. Actions can include the following:

- Design projects to maintain or improve pollinator habitat while still meeting resource objectives;
- Include local pollinator friendly native plant species in project seed mixtures;
- Include creation or maintenance of pollinator habitat in project rationale;
- Implement best management practices when managing roads.

General Strategies for Invasive Plants

Activities and strategies that may be used to meet the desired conditions, standards, and guidelines for invasive plant species include:

- Survey and inventory of portions of the Forest in a prioritized and systematic manner in order to document the distribution and abundance of target invasive species, identify un-infested areas, and locate and treat any new infestations. Strive to maintain an up-to-date map of known infestations and plant densities.
- Within heavily infested communities, consider shifting emphasis to rehabilitation of a portion of that community to a new desired plant community, rather than attempting to restore to a pre-invasion community.

- Prioritize areas designated for invasive plant management activities according to the criteria outlined within the HLC NF Invasive Plant Management Strategy or the latest guiding document for the Forest. Using guidance provided in the "HLC NF Noxious and Invasive Weed Control" Environmental Assessment and Decision Notice (2001) ("weed control decision notice").
- Exclude grazing when new invasive plant species infestations (specifically priority 1a and 1b species on the Montana State Noxious Weeds List) are found in allotments until eradication of the infestation is complete. Examples of economically damaging species include Dyer's woad, rush skeletonweed, yellow starthistle, etc.
- Prioritize weed treatments to follow guidance in the weed control decision notice, using an adaptive strategy to determine where, when, and how to treat weeds/weed-infested sites. This strategy and its implementation include consideration of such factors as:
    - Weed category – potential invader, new invader, widespread invader;
    - Relative invasive nature of the species and its potential to displace native vegetation;
    - Relative ecological importance or rarity of the site that could be damaged by the presence of the weed;
    - Potential for off-site movement of seeds;
    - Determination of control method, which is dependent on the species and site;
    - Site monitoring to determine the need to repeat or alter treatment; and
    - Available funding.
- Use weed management program strategies outlined in the weed control decision notice such as:
    - Use education as well as formal (schools, campgrounds, etc) and informal (such as, brochures, weed identification and prevention brochures) conservation education contacts.
    - Provide continuing education for forest field personnel in weed identification.
    - Pursue and coordinate cooperative multi-ownership weed control efforts, such as sharing resources and information, setting treatment priorities, and applying for and sharing grants.
    - Use prevention efforts, for example, use of weed seed-free hay and straw by users of NFS lands and for reseeding projects.
    - Use native plants to revegetate disturbed areas where appropriate.
    - Use contract provisions to require that off-road equipment be washed before entering and moving between sites on the forest.

Wildlife

General strategies

The plan components for terrestrial vegetation represent most of the coarse-filter components that will "support the persistence of native species within the plan area, subject to the extent of FS authority and the inherent capability of the plan area" (FSH 1909.12, Chapter 20, Section 23.1). Therefore, most of the possible management strategies and actions described in the previous section to manage for desired vegetation would provide for most of the habitat needs of wildlife species. Additional possible

management strategies and actions that could be used to achieve wildlife-related desired conditions are described here.

Goals

In order to move toward the goal described in FW-WL-GO-01 (interagency coordination in project planning), and FW-WL-GDL-15 (coordination of some habitats across NFS boundaries), the following actions could be taken:

- Update, maintain and share maps, databases, and other information regarding wildlife distribution, seasonal ranges, key habitats, etc. among the FS and other agencies responsible for managing wildlife and wildlife habitat on or adjacent to NFS lands.
- Schedule periodic meetings among FS and FWP biologists and, as needed, other staff to review upcoming projects and discuss potential wildlife and habitat issues and needs in proposed or potential project areas
- Work with FWP or other land or wildlife management agencies as appropriate to identify habitat needs on ungulate winter ranges that occur on adjoining FS and state-owned Wildlife Management Areas and jointly develop habitat improvement projects

In order to move toward the goal described in FW-WL-GO-02 (information about living and recreating in wildlife habitats), the following actions could be taken:

- Make information available to forest visitors, permittees, and contractors about the presence of wildlife species and how to avoid negative wildlife-human interactions. This information should emphasize how to work and recreate safely in bear habitat, and how to reduce the risk of bear-human encounters. Methods could include portal signs, kiosks, brochures, websites, social media messages, and collaboration on workshops and other public presentations and events.

Threatened, Endangered, Proposed and Candidate Wildlife Species

General strategies

- As required by law, regulation and policy adhere to recovery plans, and carry out consultation under section 7 of the Endangered Species Act for activities that may have an impact on federally listed species.
- Adhere to conservation strategies, or other guidance. Use any additional informal guidance, and work with USFWS to inform planning and implementation of management activities on NFS lands.
- Work with USFWS at a FS Regional level to develop and review consultation processes and guidance for analysis of FS projects.

Canada lynx habitat and/or critical habitat

Specific plan components regarding management of Canada lynx habitat are detailed in the Northern Rockies Lynx Management Direction, which is incorporated by reference into the Plan (Appendix H). A partial listing of possible management actions and strategies that could occur in lynx habitat and that are consistent with those plan components include, but may not be limited to the following:

- Use regeneration, group selection, or intermediate harvest methods in the stem exclusion structural stage of lynx habitat or in other forested stands that do not currently have a dense understory providing snowshoe hare habitat. Prescriptions may be designed to favor dense regrowth of coniferous tree species that provide food for snowshoe hares.

- Use pre-commercial thinning in some stands that have been recently harvested or burned, in order to promote development of future mature, multi-storied winter snowshoe hare habitat where it is lacking. The location, amount, and type of thinning would be based on analysis of vegetation at the scale of the lynx analysis unit, guided by the best available scientific information, and finalized through appropriate consultation with USFWS.

- Design additional vegetation management projects to specifically move forest composition and structure to achieve desired conditions for Canada lynx habitat, particularly the mature, multi-storied habitat preferred by snowshoe hares in winter.

Grizzly Bear

Specific plan components regarding management of grizzly bear habitat are detailed in the proposed grizzly bear amendment, which is incorporated by reference into the forest plan. A partial listing of possible management actions and strategies that could occur in grizzly bear habitat and that are consistent with those plan components include, but may not be limited to the following:

- Restrict vegetation management activities in time and space within the PCA and potentially in Zone 1, in order to reduce the potential for disturbance or displacement of grizzly bears, as determined by environmental analysis. This may include, where possible, restrictions on activities occurring during spring in mapped grizzly bear spring habitat.
- Use the best available scientific information, along with interagency recommendations as available, to manage mountain bike use so as to reduce the risk of grizzly bear-human conflicts. Actions may include designing trails where mountain bike use is allowed to facilitate maximum sight distances in areas where bike speed may be high, and eliminating or reducing design features that promote high speeds in areas without good sight distance.
- Work with other agencies and, where appropriate, with private organizations or landowners to provide for habitat connectivity in Zones 1 and 2 through purchases, management agreements, support for easements, and other means.

Wildlife Species of Conservation Concern

General strategies

- Consider potential impacts of management actions on SCC when planning, analyzing, and implementing management actions.

Flammulated owl

- Use vegetation management techniques that promote the growth and retention of large (greater than 15” diameter at breast height), old ponderosa pine and Douglas-fir trees in ponderosa pine habitat types. Use prescribed burning to maintain an open canopy structure and development of large snags in areas adjacent to closed-canopy forest and shrub-dominated openings.

Other Wildlife Species

General strategies

- Participate in cooperative efforts (USFWS, Montana Fish, Wildlife, and Parks, and others) to survey or monitor wildlife species and develop habitat improvement projects.

Desired condition FW-WL-DC-03 addresses habitat connectivity and movement between habitat patches and FW-WL-GO-03 addresses identifying linkage areas between NFS parcels. Specific management actions and strategies for maintaining connectivity may include:

- Restrict vegetation management or motorized use in important identified wildlife corridors.
- Work with other agencies and, where appropriate, with private organizations or landowners to purchase, develop cooperative management plans, support easements, or identify other means to maintain or improve habitat connectivity in areas identified through BASI as having value to wildlife for movement among separate parcels of NFS lands.

Elk and Other Big Game Species

Desired condition FW-FWL-DC-01 addresses the availability and distribution of elk and other big game species for harvest opportunity on NFS lands. A variety of methods may be used to achieve that desired condition, including maintaining or improving elk security. Generally, the guidance in the USDA FS and Montana Department of Fish, Wildlife and Parks Collaborative Overview and Recommendations for Elk Habitat Management on the Custer, Gallatin, Helena, and Lewis and Clark National Forests (2013 or subsequent versions), or other best available science, would be used to manage elk security at an elk herd unit scale. As determined necessary by site specific analysis, specific management actions and strategies for influencing elk distribution and use of NFS lands may include some of the following:

- Restrict the timing and use of motorized routes during the archery and rifle seasons, to minimize potential disturbance and displacement of elk or other big game species in specific areas.
- Retain hiding cover in specific areas in the form of tree or shrub cover or downed woody debris.
- Retain or promote dense vegetation adjacent to motorized routes open during the archery and rifle hunting seasons, to minimize potential disturbance and displacement of elk or other big game species in specific areas where possible without compromising public safety.

Harlequin duck

- Minimize human disturbance along nesting stream reaches during the breeding season, particularly when broods are young and may be easily separated (June-late July). Encourage recreational boating and floating use on streams other than harlequin duck breeding streams during this time period.
- Construct new trails, bridges and fords, campgrounds, or other facilities away from harlequin duck breeding streams or in areas not known to be used by harlequins.
- Where possible, maintain vegetation (dense tree and/or shrub cover) as a buffer between harlequin duck nesting stream reaches and potential sources of disturbance (such as, trails, campgrounds, dispersed campsites that are routinely used, etc.).
- Carry out surveys of known and potential breeding streams. Coordinate surveys, monitoring, and data with the Montana Natural Heritage Program or other entities that may be involved in harlequin duck monitoring or research.

Western toad

- Monitor known breeding sites at an appropriate interval to detect changes in use by breeding toads, and to detect site changes due to altered hydrology or disturbance. Coordinate surveys, monitoring, and data with the Montana Natural Heritage Program or other entities that may be involved in western toad monitoring or research.
- At western toad breeding sites that are heavily used by livestock and that show evidence of heavy trampling and/or significant loss of emergent vegetation, consider partial fencing, changes in timing of pasture use, or other measures to reduce impacts caused by livestock.

Northern bog lemming

- Around fens and other peatlands, maintain recommended buffer distances where vegetation management and ground-disturbance does not occur. Maintain vegetation structure in sub-watersheds that encompass peatlands, such that hydrologic flows are not impacted.
- Monitor peatlands for evidence of trampling and compaction by domestic livestock, and use fencing, pasture rotations, or other techniques to remove or eliminate these impacts from peatlands.

Bats

- Work cooperatively with other agencies, researchers, and recreational cavers to inventory caves for bats, and to monitor adjacent aquatic and riparian areas for bats (such as using mist nets, acoustic detectors, etc).
- Work cooperatively with other agencies, researchers, and recreational cavers to monitor bats for the presence of white-nose syndrome. Use recommended techniques, such as decontamination procedures, and bat-friendly cave and mine closures as appropriate to minimize the potential spread of white-nose syndrome.

Recreation Settings, Opportunities, Access, and Scenic Character

Potential management strategies are those that (1) assist in providing a range of recreation opportunities across the Forest, (2) minimize visitor impacts to natural resources and conflicts between user groups, and (3) construct and maintain facilities and trails to address capacity issues and meet visitor needs. Potential strategies include the following:

Settings – Recreation Opportunity Spectrum

- Develop a recreation niche and vision for the Forest.
- Develop a prioritization process that provides direction for maintenance of existing recreation facilities, construction of new facilities, and reconstruction of and/or additions to existing facilities. The prioritization process emphasizes the Forest's recreation niche and is in alignment with regional and national direction.
- Integrate recreation opportunity spectrum settings into project level designs and management decisions.

Opportunities – Developed Recreation Sites

- Address developed campgrounds that need improvements, by prioritizing improvements that address accessibility, health and safety, types of use, size of recreational vehicles, and reduction of bear-human interactions.

- Consider the protection/maintenance of historic character, while meeting public needs, when identifying cabins to place on the reservation system.

Opportunities – Dispersed Recreation

- Address dispersed campsites with erosion and/or sanitation issues. Prioritizing rehabilitation needs by focusing on dispersed campsites located near river or stream corridors.
- Develop closure orders for dispersed recreation areas where visitor safety is at risk or changes need to be made to avoid or rehabilitate environmental impacts.
- Inform and educate users about Leave No Trace techniques for responsible, outdoor activities with minimal impacts on NFS lands.

Opportunities – Recreation Special Uses

- Complete a needs assessment to determine new outfitter, guide, and livery services on the Forest, outside of designated wilderness areas.

Scenic Character

- Integrate scenic integrity objectives into project level designs and management decisions.

Designated Areas

Inventoried roadless areas

The Roadless Area Conservation Rule (USDA, 2001) establishes prohibitions on road construction, road reconstruction, and timber harvesting in inventoried roadless areas on National Forest System lands, with the intent to provide lasting protection for these areas in the context of multiple-use management. The desired conditions (FW-IRA-DC) are designed to promote the roadless area characteristics described 36 CFR Part 294.11, including:

- High quality or undisturbed soil, water and air;
- Sources of public drinking water;
- Diversity of plant an animal communities;
- Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land;
- Primitive, semi-primitive nonmotorized, and semi-primitive motorized classes of dispersed recreation;
- Reference landscapes;
- Natural appearing landscapes with high scenic quality;
- Traditional cultural properties and sacred sites; and
- Other locally identified unique characteristics

To ensure that the desired conditions can be met, FW-IRA-GDL-01 states that management activities should be consistent with the scenic integrity objective of high. FW-IRA-SUIT-01 specifies that these areas are not suitable for timber production.

The Forest should refer to 36 CFR Part 294 (USDA, 2001) as well as the latest National and Regional direction, including the need for review by the Regional Forester or Chief of the FS, when contemplating vegetation management activities in inventoried roadless areas. Planned and unplanned fire ignitions are not prohibited by the Roadless Area Conservation Rule. Timber cutting is prohibited except for the purposes as stated in 36 CFR Part 294.13 (b):

(1) *The cutting, sale, or removal of generally small diameter timber is needed for one of the following purposes and will maintain or improve one or more of the roadless area characteristics as defined in 294.11: (i) To improve threatened, endangered, proposed, or sensitive species habitat; or (ii) To maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period;*

(2) *The cutting, sale, or removal of timber is incidental to the implementation of a management activity not otherwise prohibited by this subpart;*

(3) *The cutting, sale, or removal of timber is needed and appropriate for personal or administrative use, as provided for in 36 CFR part 223; or*

(4) *Roadless characteristics have been substantially altered in a portion of an inventoried roadless area due to the construction of a classified road and subsequent timber harvest. Both the road construction and subsequent timber harvest must have occurred after the area was designated an inventoried roadless area and prior to January 12, 2001. Timber may be cut, sold, or removed only in the substantially altered portion of the inventoried roadless area.*

The following considerations may apply to vegetation management that is designed to meet one or both of the emphasized purposes in (36 CFR 294.13 (b)(1)(i) or (ii):

- Determine the natural range of variation for vegetation and habitat conditions at the scale of the inventoried roadless area or project area, and place it into the context of the broader landscape, geographic area, and forestwide scales.
- Consider the contribution of natural processes to achieving wildlife habitat, connectivity, and other vegetation or habitat desired characteristics within the inventoried roadless area.
- Consider that inventoried roadless areas may provide valuable vegetation components such as snags, old growth, and habitat connectivity, especially if surrounded by a more heavily managed or fragmented landscape.
- Emphasize tools such as prescribed fire and hand treatments (such as the cutting of small trees) where feasible to meet project objectives. Utilize mechanical (noncommercial or commercial) tree removal when it is the most effective and efficient method to meet project objectives, and can be conducted to preserve the desired roadless area characteristics.
- Each project should define the size of tree that constitutes “small diameter timber” and explain the rationale for that definition in the context of the landscape and associated vegetation communities. The definition of the seedling/sapling and small tree size classes in the R1 Vegetation Classification System (less than 10” diameter) is used for terrestrial vegetation plan components and can be a general guide. However, the definition of small timber for the purposes of complying with the Roadless Area Conservation Rule may vary, either smaller or larger, depending on the landscape and ecosystem context. For example, in an area dominated by large Douglas-fir growing on productive sites, to achieve desired conditions such as restoring the largest size classes and low stand densities, the smaller trees in a given area or stand could be

over 10” in diameter. Conversely, in areas where seedlings and saplings have encroached into meadows or in stands of naturally smaller diameters, (such as lodgepole pine) small trees may be appropriately limited to smaller diameters.

Wilderness

- Revise the existing wilderness management plan for the Bob Marshall Wilderness complex.
- Develop a wilderness management plan for the Gates of the Mountains Wilderness.
- Implement the national wilderness stewardship performance measures and wilderness character monitoring.

Continental Divide National Scenic Trail

- Allow hauling or skidding along the Continental Divide National Scenic Trail, where it is currently located on a road that has not yet been re-located, or to address hazard tree removal.
- Manage unplanned fires in the foreground of the Continental Divide National Scenic Trail using minimum impact tactics where they can be safely applied, as determined by the Incident Commander in consultation with the Agency Administrator. Agency Administrators should ensure Incident Commanders are aware of the status of the trail and the need to maintain its scenic integrity.
- Approve the use of heavy equipment for line construction on fires within the trail corridor only when other line construction techniques cannot be safely applied or the short and long-term risk to firefighter safety, public safety, and values at risk show its’ use to be the best course of action.
- Clearly identify fire suppression rehabilitation and long term recovery of the Continental Divide National Scenic Trail corridor as high priorities for Incident Commanders, Burn Area Emergency Rehabilitation Team Leaders and post Burn Area Emergency Rehabilitation post fire rehabilitation efforts.

Research Natural Areas

- Identify, prioritize, and designate potential additions to the research natural area network through the process that has been cooperatively developed by the FS and the Rocky Mountain Research Station.

Special Areas

- Identify, prioritize, and designate potential Special Areas through the designation process that has been set up by the Forest Service Northern Regional Office.
- Develop a recreation management plan for recreation special areas.

Lewis and Clark National Historic Trail Interpretive Center

- Develop a management plan for the Lewis and Clark National Historic Trail Interpretive Center that provides guidance for the center and outlines both short and long term plans for interpretive programming, educational programming, exhibitry, and maintenance needs.
- Ensure that interpretive and educational programming and exhibits at the Lewis and Clark National Historic Trail Interpretive Center accommodate current and anticipated changes to visitor use and changes in interpretation and education methods for message delivery.

Cultural and Historic Resources and Uses

Cultural Resources

- Develop and implement a program and schedule to complete an inventory of cultural resources on all NFS lands within the plan area which are likely to contain cultural resources in accordance with the National Historic Preservation Act, Archaeological Resource Protection Act, and Executive Order 11593.
- Develop, and annually review, a forestwide direction for the protection of cultural resources that are vulnerable to catastrophic fires or other natural or human-caused damage.
- Develop landscape-watershed plans that identify all known cultural resources within the area and identify their management potential (FSM 2363.3). The landscape-watershed plan will highlight the cultural resource data that contribute to the understanding of historic land use and vegetation patterns within the study area and to increase the scientific understanding of the evolution and condition of ecosystems, as well as benefit land management practices.
- Prepare historic property plans for highly significant historic properties with an emphasis on priority heritage assets. These plan documents will follow the guidance in FSM 2362.4.
- Annually update a forest heritage program plan that is tiered to the FS Heritage Program Managed to Standard measures. The Heritage Program Managed to Standard measures reflects the Agency's guidance for Heritage Program Management as outlined in Forest Service Manual 2360 and responsibilities in fulfillment of Section 110 of the National Historic Preservation Act. The forest heritage program plan includes a synthesis of known cultural resources, a synthesis of projected cultural resources (i.e. predictive modeling and site identification strategies), protocols for responding to unanticipated discovery of cultural resources or human remains as required by the Native American Graves Protection and Repatriation Act, protocols for responding to damage to or theft of cultural resources, and direction for the protection of cultural resources vulnerable to catastrophic fires or other natural or human-caused damaged.

Areas of Tribal Importance

- Manage traditional cultural areas through the development of management plans, in consultation with Native Americans.

Lands Status and Ownership, Land Uses, and Access Patterns

- Identify all lands suitable for utility right-of-way corridors within the HLC NF's plan area.
- Identify existing locations on the ground for all designated communication sites.

Infrastructure

- Improve and protect water quality by implementing "National Best Management Practices for Water Quality Management on National Forest System Lands", "Montana Best Management Practices" and "Soil and Water Conservation Practices."

Benefits to People: Multiple Uses and Ecosystem Services

Livestock Grazing

The general approach to grazing management implements resource management practices intended to maintain the health of occupied livestock grazing allotments and rangelands. Strategies for accomplishing this approach may include the following:

- Assess and update allotment management plans to ensure that sustainable stocking levels, forage utilization standards, mitigation measures, and appropriate grazing systems are used and that lands are still suitable for livestock grazing and other agricultural activities.
- Eliminate grazing allotments or pastures as they become vacant if there is no demand for grazing by potential permittees or if desired vegetation and aquatic conditions cannot be met.
- Improve and protect water quality by implementing "National Best Management Practices for Water Quality Management on National Forest System Lands", "Montana Best Management Practices" and "Soil and Water Conservation Practices."

Timber, Other Forest Products, and Wood for Fuel

General strategies

- In lands suitable for timber production, vegetation management activities are expected to be readily visible and play a dominant role in affecting vegetation conditions. This includes regeneration and intermediate harvest treatments, tree planting, non-commercial thinning, fuel reduction activities, cone collection, and prescribed fire.
- In lands unsuitable for timber production, vegetation management activities are less evident but harvest is used to achieve objectives other than timber production, and contributes towards vegetation desired conditions.
- The full range of applicable stewardship, contracting, and permitting authorities are considered to offer timber, other forest products, and wood for fuel, to meet the needs of the public and contribute to local economies.

Strategies for specific plan components

Timber volume offerings (FW-TIM-OBJ-01 and FW-TIM-OBJ-02)

Two objectives describe the timber volume offerings expected to occur in the revised forest plan. Treatments described in FW-VEGT-OBJ-01 can be used to meet these objectives. Harvest treatments may be designed to meet timber objectives as well as other resource objectives, such as forest restoration, fuel reduction, and wildlife habitat improvements. The projected timber sale quantity (PTSQ) includes only the volume that meets merchantable timber utilization standards. The projected wood sale quantity (PWSQ) includes merchantable timber as well as all other wood products. The possible actions and strategies to meet these objectives include:

- Offer timber sales with a variety of sizes and complexities.
- Explore opportunities to improve biomass utilization.
- Provide opportunities for commercial firewood sales, as well as other forest products such as post and poles.

- Integrate all resource objectives and utilize timber harvest as a tool where appropriate to achieve Forest Plan desired conditions.
- Utilize special authorities such as stewardship contracting as appropriate to achieve timber volume offerings and other resource objectives.

Utilization standards are specifications for merchantable forest products offered in a timber sale. They are regionally determined, but may vary by project due to current market conditions and site-specific considerations, with Regional approval (FSH 2409.12-2013-1). Generally minimum standards for sawtimber are 7.0” diameter at breast height, 8’ in length, and 5.6” diameter inside bark at the small end. A diameter at breast height of 6” and diameter inside bark of 4.6” may be used without Regional approval, and are generally used for lodgepole pine. Post and pole material usually consists of material 2 to 6” in diameter, with no minimum height.

Reforestation (FW-TIM-STD-02)

This standard, as required by the National Forest Management Act and the planning directives, ensures that forested sites where regeneration harvests occur are reforested in a timely manner to appropriate stocking levels. This applies regardless of whether the harvested area is suitable for timber production or not. The level of appropriate stocking would depend on site conditions and management objectives, but should not be lower than the definition of a forested site (ten percent occupied by trees). Sites can be reforested to lower levels than the original stand, if consistent with the other desired conditions, standards, guidelines, and project objectives applicable to the site. Reforestation prescriptions are at a minimum reviewed and approved by a certified silviculturist.

Areas that are being managed as nonforested plant communities are not included in this standard, even though it is possible that timber harvest could be used as a tool in these areas, for example to remove encroaching conifers.

Maximum opening size for timber harvest (FW-TIM-STD-08)

The National Forest Management Act (NFMA) is the foundation for this standard. This act limits clearcutting and other even-aged harvest to 40 acres except in situations where: “(iv) there are established according to geographic areas, forest types, or other suitable classifications the maximum size limits for areas to be cut in one harvest operation, including provision to exceed the established limits after appropriate public notice and review by the responsible FS officer one level above the FS officer who normally would approve the harvest proposal.” ("National forest management act of 1976," 1976). The 2012 planning rule provides for development of components that exceed opening size limits, where “larger harvest openings are necessary to help achieve desired ecological conditions” (36 CFR 219.11(d)(4)(i))”.

FW-TIM-STD-08 provides new maximum opening sizes consistent under these provisions and includes the particular conditions under which the larger size is permitted. Openings up to the maximum size in this standard do not need public review and Regional Forester approval. Exceptions to create openings greater than these sizes may occur in cases of natural catastrophic conditions, such as fire, insect and disease attack, or windstorm. Exceptions may also be granted as per handbook guidance, with Regional Forester approval and a 60-day public comment period.

- Warm dry and cold broad potential vegetation types: The natural range of variation indicated that the natural level of openings was not substantially greater than the 40 acre NFMA maximum; therefore, no adjustment was included.

- Cool moist broad potential vegetation type: The natural range of variation analysis supports an increase in the maximum opening size consistent with the mean patch size in the natural range of variation, 125 acres, which is also consistent with the natural fire regime and expected future disturbances. This larger patch size is needed to meet desired ecological conditions for the plan area, such as those associated with forest patterns resilience in the short and long term.

Potential strategies to apply during project-level analysis, at both the landscape and stand level, to maintain desired conditions for forest patterns and patch sizes include considering the creation of appropriate opening sizes across landscapes. Larger openings have less edge per unit area, which is desirable for wildlife species that avoid edge habitats or experience greater mortality near edge habitats. Management strategies to create larger patch sizes across the landscape may include:

- Retain additional forest structural components in larger regeneration harvest areas to provide greater short and long-term structural diversity and provide a more visually pleasing landscape. This strategy could include leaving patches of uncut forest or individual/small groups of live trees distributed throughout the harvest openings and also may include retaining more snags.
- Consider scenery in project design. To lessen the visual impact, larger harvest openings can have irregular shapes that are blended to the natural terrain. Retention of individual or patches of trees within the opening would also create a more visually pleasing appearance. Consideration for the natural patterns that might be produced by a mixed severity fire may be incorporated into the shape and size and design of openings. There may be an expectation of short-term visual impacts to achieve long-term benefits.
- Locate new harvest openings adjacent to existing patches of sapling trees. This initially creates a larger patch of early successional forest, where trees are of the same cohort (for example, ages are within 20 years of each other), while lessening potential concerns related to larger openings.
- Consider the location of larger units. When determining where a larger opening might be created, consider factors such as: wildlife security, visibility from areas with high level of public use, desired conditions related to potential fire behavior and fuel loadings, and watershed conditions related to water yields.
- Consider desired conditions for development of future late successional and old growth forests. Larger patches of young, seedling/sapling forests can eventually develop into larger patches of old growth or late successional forest over time, which is a desired long term condition.

Special forest and botanical products (FW-OFP-GDL-02)

This guideline specifics that special forest and botanical products should be collected in a sustainable manner when permits are issued. The intent of the guideline is to ensure that the collection of such material does not adversely impact resources or preclude future opportunities. The methods used to meet this guideline would vary depending on the specific product and resource conditions. For example, when living plants or plant parts are being gathered, do not remove or damage an entire local population.

Connecting People with Nature and History

The following management approaches are recommended to support plan components for connecting people with nature and history:

- Create a forestwide public information and communication plan that reviews and develops public communication measures to ensure communication methods and forums are reaching the appropriate audiences.

- Develop a forestwide education plan that is reviewed and updated to ensure relevancy with area schools and is in sync with national policies for conservation education and stewardship messages.
- Develop a forestwide interpretation plan to coordinate interpretive messages across the Forest and to provide an inventory of interpretive structures and facilities. The Plan should include the programming being offered at the Lewis and Clark National Historic Trail Interpretive Center.
- Ensure that visitor information is readily available for pre-visit information gathering in a variety of forums and kept up to date so that the public may be informed and educated through modern technology about current FS related policies, activities, services, and issues.
- Ensure that the Forest has an organized and consistent approach to working with all youth and young adults and aims to connect with underserved populations.
- Continue to offer programs already in place, such as the Youth Forest Monitoring Program (YFMP), that have established strong ties to the community.
- Work with partners to identify and widely-publicize grant programs for communities and local schools that connect youth with outdoor recreation. Explore avenues to match the interest and programming capacity of local partners and the unit's personnel with the resources available in local and national grant programs.
- Work with communities and partners to develop strategies for getting youth outside in nature. Coordinate efforts to ensure compliance with agency policies (e.g., outfitter/guide permits).
- Work with permittees and other partners to identify and remove existing obstacles for diverse and inclusive participation in recreation opportunities on the forest.
- Forge new partnerships with State, local, tribal, private, and non-profit partners to expand access to underserved populations, particularly those in the immediate vicinity of the forest.
- Explore opportunities to establish programs that preserve and protect the unit's natural and cultural resources, offer training and employment opportunities, develop future stewards of NFS lands, and leverage the unit's capacity to achieve priority work.

Carbon

The desired condition acknowledges the role of forest management in the carbon cycle. All plan components contribute to this by providing for the persistence of native vegetation. Maintaining landscapes with native vegetation– not converting them to other uses such as agriculture or urban development – maintain their ability to cycle carbon. Carbon sequestration will be increasingly difficult if wildfires, insect outbreaks, and diseases increase as expected (Halofsky et al., in press). Hazardous fuel treatments and treatments that increase forest resilience to disturbance can help limit disturbances that rapidly oxidize carbon and emit it to the atmosphere (ibid).

Energy and Minerals

- Improve and protect water quality by implementing "National Best Management Practices for Water Quality Management on National Forest System Lands", "Montana Best Management Practices" and "Soil and Water Conservation Practices."
- Develop compliance inspections for mineral operations to be commensurate with the complexity of the mineral activity.
- Provide guidance to claimants/operators for planning reclamation and minimizing environmental impacts.

Literature

Bollenbacher, B., Bush, R., Hahn, B., & Lundberg, R. (2008). *Estimates of snag densities for eastside forests in the northern region* (08-07 v2.0). Retrieved from Missoula, MT:

Brown, J. K., Reinhardt, E. D., & Kramer, K. A. (2003). *Coarse woody debris: Managing benefits and fire hazard in the recovering forest* (General Technical Report RMRS-GTR-105). Retrieved from Ogden, UT: https://www.fs.fed.us/rm/pubs/rmrs_gtr105.pdf

Graham, R. T., Harvey, A. E., Jurgensen, M. F., Jain, T. B., Tonn, J. R., & Pagedumroese, D. S. (1994). *Managing coarse woody debris in forests of the rocky mountains*. (0146-3551).

Green, P., Joy, J., Sirucek, D., Hann, W., Zack, A., & Naumann, B. (1992). *Old-growth forest types of the northern region (errata corrected 02/05,12/07,10/08/,12/11)* (R-1 SES 4/92). Retrieved from Missoula, MT:

Halofsky, J. E., Peterson, D. L., Dante-Wood, S. K., Hoang, L., Ho, J. J., & Joyce, L. A., editors (Eds.). (in press). *Climate change vulnerability and adaptation in the northern rocky mountains* (1 ed. Vol. RMRS-GTR-xxx). Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station.

Keane, R. E., Tomback, D. F., aubrey, C. A., Bower, A. D., Campbell, E. M., Cripps, C. L., . . . Smith, C. M. (2012). *A range-wide restoration strategy for whitebark pine (pinus albicaulis)*. Retrieved from Fort Collins, CO: https://www.treesearch.fs.fed.us/pubs/40884

National forest management act of 1976, 16 C.F.R. § 1600 (1976).

USDA. (2001). *36 cfr part 294 - special areas, roadless area conservation rule*. Washington, DC: USDA Forest Service Retrieved from https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5050459.pdf.

USDA. (2012). *36 cfr part 219, planning*. Washington, DC: USDA Forest Service.

USDA. (2015). *Forest service handbook (fsh) 1909.12, land management planning handbook*. Retrieved from Washington, DC: https://www.fs.fed.us/im/directives/

Page intentionally left blank