Appendix A: Proposed Management Approaches and Possible Actions

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Introduction

The 2012 planning rule requires land management plans to "…contain information reflecting proposed and possible actions that may occur 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 Custer Gallatin 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. Effects of climate change could figure heavily in adaptive management strategies as more information comes available regarding specific changes in temperature and precipitation regimes.

This appendix describes possible actions, potential management approaches, and strategies the Custer Gallatin 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 forest 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: the baseline and desired trend of selected desired conditions, the intent and suggested means to achieve specific direction and components, and 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 can occur across the Forest that are most appropriately addressed at the level of project analysis.

This appendix does not commit the Custer Gallatin NF to perform or permit activities, but provides descriptions of actions that would likely be consistent with plan components. Information included does not direct or compel processes such as analysis, assessment, consultation, planning, inventory, or monitoring.

Ecosystem Resources

Air Quality

Wildfires in the Western US are predicted to increase in size, severity, intensity, and frequency over the life of this plan. The type and amount of smoke emissions released from wildfires depends on the fuel loading, fuel moisture, and fire behavior. Smoke emissions contain hundreds of compounds that pose risk to human and ecosystem health. Smoke events also affect local economies. Management strategies that reduce fuel loading such as prescribed burns, thinning, or certain logging techniques in areas of concern may decrease the probability of severe smoke events from large wildfires. Prescribed burning can meet goals of forest restoration and air quality by aligning burn project characteristics with optimal atmospheric conditions to reduce smoke impacts.

The majority of atmospheric pollutants that deposit on or affect Forest resources come from off-Forest sources. Increasing nitrogen deposition is currently the biggest concern, but localized deposition of other pollutants are also a concern. Deposition of pollutants can adversely affect aquatic and terrestrial resources and ecosystems. Ozone and ozone precursors are also air pollutants of concern. Ozone is highly phototoxic to plants and can damage lung tissue and impact human and wildlife health. The Forest has the ability to reduce the impacts of air pollution on the Forest by working with State and Federal Agencies and participating in New Source Review including prevention of significant deterioration permit review, NEPA, and State or Federal Implementation Plans. Monitoring and modelling helps assess impacts of projects or pollutants to Forest ecosystems and resources. Because the Forest Service is not a regulatory agency, working partnerships with the regulatory agencies are import to communicate information to help protect National Forest lands.

Soils

Potential strategies that could be used to trend toward soil quality desired conditions and improved soil resource information include:

Restoration of Detrimental Soil Disturbance – General Concepts

- Direct restoration actions are generally not undertaken unless the level of management activity caused detrimental soil disturbance (DSD) within a treatment area approaches or exceeds the maximum 15% DSD standard for Region One or if existing condition threatens to create additional resource degradation in the future.
- Restoration actions, when needed, can be designed to address the specific type or types of DSD that are creating the non-compliance condition.
- Primary locations of new detrimental soil disturbance under present timber harvesting practices on the Custer Gallatin NF are along temporary roads and beneath burn piles at large landings associated with whole tree logging. Mechanized ground scarification and piling with bull dozers are no longer used on the Custer Gallatin NF.

Mitigations/Restoration at Landings

- The detrimental soil disturbance that occurs in the donut area surrounding burn piles at landing is primarily detrimental soil compaction or compaction and rutting, depending on whether the landing was used during wet soil conditions. These types of DSD can most often be readily mitigated by shallow ripping. Ripping generally can be restricted to just those areas of bare soil or where ruts are readily apparent.

- Burning large slash piles at landings currently occurs almost exclusively in the winter on the Custer Gallatin NF. The primary cause of DSD from winter burning of large slash piles is the accumulation of a thick wood ash layer that covers the burn pile area after burning. This ash layer does not allow for the establishment of a good soil-seed contact essential to the establishment of seeded native grass species. Instead it creates conditions that strongly favors the establishment of Canada thistle and houndstongue (noxious weed species). The ash layer once wet also tends to seal the underlying mineral soil surface reducing the movement of air and water into the soil.
- A management approach that has shown excellent results in test trials has been to create enough ground disturbance to expose mineral soil over at least 50% of the burned area. This can be accomplished in multiple ways using ground based equipment with attached rippers, a grapple hook, various tool bars with attached ripping shanks or any blade or bucket with ripping teeth that can be pulled backwards across the ground surface. Moving large pieces of unburned wood off of the burned area may be required in some cases but even that operation can be used to expose mineral soil.

Mitigations/Restoration along Temporary Roads

- The primary, long-term source of detrimental soil disturbance on temporary roads is loss of topsoil or upper soil horizons, i.e. detrimental soil displacement, during road construction. Soils vary tremendously in there susceptibility to degradation due to soil displacement based on inherent differences in soil properties. There are multiple ways the level of DSD created along temporary roads can be mitigated or reduced but no single approach is suitable for all conditions and all soil types.
- Based on existing soil and site conditions, options include re-contouring or in some instances simply ripping the temporary road surface, utilizing pre-existing road prisms, windrowing and re-spreading soil in low slope areas, and in all cases maintaining noxious weed control.
- Proper placement of temporary roads on linear or slightly concave areas where the underlying soil resource is deep can greatly simplify the restoration process in many instances. Even a moderate amount of soil displacement when a temporary road is placed along a convex ridge or knob where the soil resource is shallow could create permanent detrimental soil displacement.
- When pre-existing soil conditions along temporary roads cannot be completely restored, the overall level of DSD within treatment units served by the road can remain below the 15% DSD standard, including the total temporary road disturbance allocated to each treatment unit.

Use of Soil Disturbance as a Management Tool

- Soil disturbance can at times be used as a valuable management tool for resource benefit.
- Many plant species; rhizomatous species, some wetland species, aspens, will respond positively to moderate levels of soils disturbance.
- Disturbance on the contour can be used to capture water that would otherwise be flowing downslope. It can also shorten slope length, a primary factor in predicting overland flow and soil erosion. Even roughening the soil surface in a sloped area can capture water and create favorable microsites for plant establishment.
- Critical to the appropriate use of soil disturbance as a management tool is careful consideration of the type, extent, and orientation of soil disturbance that can be used based on target plant species and existing soil and site conditions.

Soil Moisture Restrictions

- The use of soil moisture restrictions to determine when conditions are suitable for ground based equipment to operate off temporary roads and skid trails, has proved to be quite effective in minimizing the level of dispersed DSD that occurs during timber harvest while having very little impact on timber harvest operations.
- Restrictions are based on soil texture, the amount of rock fragments in surface soil layers and NRCS guidelines for making field determinations of relative soil moisture content in the field. The Forest Soil Scientist can be consulted at any time if questions arise.

Detrimental Soil Disturbance Monitoring

Chapter 3 Detrimental soil disturbance (DSD) monitoring on the Custer Gallatin National Forest is based on best available science. This includes:

- Targeting DSD monitoring to those areas most likely to exceed the Region One maximum DSD standard of 15%.
- Adjusting the intensity of sampling required based on past and current management activities, in accordance with Region One guidance.
- Utilizing a pre-determined, representative sampling design to ensure all portions of the activity area are appropriately sampled.
- Utilizing more of a soil survey approach to field sampling where field sampling is a continuous process that includes observations between point sample locations as well as at sample locations.
- Understanding that the primary sources of DSD, at landings, along temporary roads, and, where present, areas of past ground scarification activities, exist in patterns on the landscape. Those patterns can be used to increase sampling effectiveness and improve the accuracy DSD monitoring results. Inherent assumptions of statistical inference that sample points are independent and identically distributed (IID) do not apply if patterns exist in the sample population.
- Collect auxiliary vegetation and site data at point sample locations that can be used to help explain why DSD exists where it does.
- Utilize quantitative field criteria that correlates to observed changes in soil productivity and/or soil function for the identification of DSD at sample locations.

Creating or Updating Available Forest Soil Inventories (Soil Surveys)

- The opportunity exists to use a combined approach that includes computer modelling, expert knowledge, existing soil profile and vegetation field data, and some additional field reconnaissance along with a limited amount of targeted field sampling to create a soil survey for the Custer Gallatin NF lands in the Absaroka-Beartooth Wilderness where no soils survey exists.
- The same basic approach can be used to update existing low quality soil surveys and create a single, continuous soil resource inventory covering the entire Forest. This resource inventory could be available to both Forest managers and the public.
- Areas to be mapped or updated can be prioritized on an as needed basis but a likely starting point could be areas where no current soil survey exists.

- The concept of soil-landscapes could be used as the basis for soil mapping and the development of map unit concepts.
- The final product, based on soil-landscapes, can be scaled both in and out on the basis of how the available soil and landscape information data is distributed between map unit and soil component concepts.

Management of Coarse Woody Debris

- The level of coarse woody debris (CWD) left behind in treatment units can exceed minimum soil coarse woody debris levels defined in guideline FW-GDL-SOIL-06 based on management needs and more specific plant community types. Guidance to consider when determining soil coarse woody debris levels is outlined below and is summarized in Table A-1.
- The minimum target levels are most appropriate where wildfire protection is the primary management concern and/or where the availability of CWD is limited.
- Multiple resource benefit levels may exceed the minimum average and are most appropriate where wildfire protection is not an overriding concern and multiple resource benefit objectives are desired, including the preservation of soil productivity.
- Optimum soil productivity levels of CWD are most appropriate for treatment areas where maintaining or improving soil productivity is the primary management concern.
- Greatest soil benefit can be retained when coarse woody debris material retained on the site consists of the largest pieces available and CWD have good contact with the ground surface.
- Target CWD levels above the minimum levels may be reduced proportionately in partial harvest units relative to the percentage of mature trees or basal area to be left standing after timber harvesting.
- If minimum desired levels may cannot be met, some low quality standing trees may be marked for retention and dropped after timber harvesting is complete or after log processing some of coarse would material may be moved from the burn pile back into the stand on a return trip.

Table A-1. Possible range of soil coarse woody debris levels after timber harvesting by forest habitat type class

Forest Habitat Type Description	Region 1 Habitat Type Group	Minimum Target Level (tons/acre)	Multiple Resource Benefit Target Level (tons/acre	Soil Productivity Optimum Target Level (tons/acre)	Minimum Distribution
Warm, dry ponderosa pine south tending aspects	Warm Dry	2	4	8	Maximum 40% area below target
Warm, moist ponderosa pine on north aspects	Warm Dry	2	6	10	Maximum 40% area below target
Warm, dry Douglas-fir with ponderosa pine as major seral species	Warm Dry	6	8	12	Maximum 40% area below target
Cool, dry Douglas-fir and cool Douglas-fir with lodgepole pine as major seral species	Moderately Warm Dry	8	10	14	Maximum 30% area below target
Moist Douglas-fir	Moderately Warm Moderately Dry	8	10	14	Maximum 30% area below target
Lower subalpine Engelmann spruce or subalpine fir with lodgepole pine as major seral species	Cool Moderately Dry to Moist	10	12	18	Maximum 50% area below target
Moist, lower subalpine Engelmann spruce and subalpine fir	Cool Moist	10	14	20	Maximum. 50% area below target
Cold, moist subalpine: Engelmann spruce, subalpine fir, and whitebark pine	Cold	10	12	18	Maximum 50% area below target

Watershed, Aquatic, and Riparian Resources

Watershed

Potential strategies that could be used to trend toward watershed desired conditions include:

- To support watershed quality and resiliency, beavers and their dams/complexes (including wetlands and riparian areas) could be enhanced or maintained. Introductions of beavers, in coordination with appropriate partners could be pursued. Where beavers are not socially or ecologically tolerable beaver dam analogue (BDA) structures could be installed to increase aquatic habitat and/or restore watersheds.
- Instream flow water rights on National Forest lands could be secured to support functioning riparian and aquatic habitats, stable and effective stream function, and maintain or enhance the ability of National Forest lands to produce clean water under Montana Code Annotated 2015, 85-20-1301; USDA-FS-Montana compact ratified.

- In order to restore normative stream flows and aquatic habitat, reservoirs could be deconstructed and stream channels could be reconfigured to represent natural ecological function and process prior to the anthropogenic disturbance. This would only happen where and when ecologically and socially tolerable.
- Riparian habitat, aquatic in-stream habitat (i.e., geomorphologic processes and attributes), and aquatic biota community reference condition for the Northern Great Plains Ecoregion of the Custer Gallatin NF is needed to inform monitoring and management of these rare aquatic/terrestrial ecotones. (Ashland and Sioux Geographic Areas) If funding becomes available 3-5 miles of stream and adjacent riparian areas could be fenced off in the Ashland and/or Sioux GA's, preferably within 5 years, as permanent exclosures to understand and monitor aquatic habitat and riparian reference condition. Within those exclosures disturbance treatments may be applied to understand the ecological response to various disturbances. Examples of those treatments could include vegetation treatments, fuels management, alternate grazing prescriptions (i.e.: high intensity/short duration), among other treatments.
- Where ecologically suitable and socially tolerable, dispersed camping sites falling within, or negatively impacting, RMZs could be removed and/or consolidated with a dispersed site, or new site, that is located outside the RMZ. This effort would decrease potential sediment delivery to waterbodies.
- All activities with potential to modify the bed or banks of any intermittent or perennial stream could be coordinated with a Forest fisheries biologist or hydrologist to ensure compliance with state and Federal permitting requirements and compliance with Forest Plan standards and guidelines.

Management activities having the potential to increase sediment delivery to waterbodies would be evaluated by contextualizing the effects of management-related sediment delivery on resource issues including, but not limited to, water quality and stream stability/morphology. A weight of evidence approach may be taken for evaluating sediment effects. Management approaches used for such evaluation may include, but not be limited to, the following:

- Compliance with Federal and State water quality requirements.
- Qualitative and quantitative data/observations from field reconnaissance.
- Application of known geology, soil, physiographic, stream type/condition, and/or vegetative data to inform relative site susceptibility and/or resilience to sediment delivery.
- Predicted effects of project-related changes in sediment delivery and/or yield upon resource indicators of concern.
- Past monitoring data and/or guidance from scientific literature for similar project activities.
- Data from appropriate reference watersheds.
- Analysis of sediment delivery and/or sediment yield using process- and/or empirically-based runoff and erosion models.

Analysis catchment scale could generally be the 6th Hydrologic Unit Code (HUC) scale, but a larger or smaller catchment scale may be designated based on the scope of the proposed activity, data availability, and/or perceived threat of increased sedimentation.

When the WATSED sediment model (Cline et al. 1981) is utilized to calculate sediment yield for analysis, sediment yield could be evaluated relative to the estimated mean annual reference sediment yield. This

reference sediment yield is that which is estimated to have occurred prior to anthropogenic forest management and is calculated by the WATSED model based on land types found within the analysis catchment. Project-affected sediment yield would be the sum of the reference yield, the yield associated with past management activities and natural disturbance, and the yield associated with proposed project activities. Standard allowable sediment yield and associated fine substrate sediment levels associated with project implementation are shown in Table A-2. These levels may be exceeded when other sediment evaluation approaches, such as those listed above, indicate that predicted effects of project-related changes in sediment yield upon resource indicators of concern is within the range allowed by Forest Plan standards.

Table A-2. Allowable sediment yield and associated fine substrate sediment levels for WATSED Model Analyses

Category	Management Objective (% of reference)	% Fine Substrate Sediment (<6.3mm)	Annual Sediment Yield % > Reference
A Species of Conservation Concern and/or Blue Ribbon fisheries	90%	0 – 26 %	30%
B All other streams	75%	0 – 30 %	50%

Fisheries and Aquatic Habitat/Conservation Watershed Network

Potential strategies that could be used to trend toward fisheries and aquatic habitat desired conditions include:

- 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 (acute and chronic) such as: warming air and water temperatures, prolonged droughts, earlier season runoff, and higher intensity floods and wildfire. Although some aquatic systems may not currently have aquatic SCC, or other aquatic species, the potential for changing climate could render these areas as refugia in the future.
- The Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana (MFWP, 2007) has goals, strategies, and actions that the Custer Gallatin NF would continue to follow (until and if a new Agreement is reached) over the life of the plan. The Custer Gallatin NF would work with partners to enhance and maintain habitat and/or re-introduce populations of WCT and YCT with a goal of increasing WCT and YCT presence in historically occupied watersheds.
- Arctic grayling habitat could be enhanced or maintained on Custer Gallatin NF. Custer Gallatin NF's current four populations of Arctic Grayling were considered part of the species' distinct population segment when the US Fish and Wildlife Servicer found the species not warranted for ESA listing in 2014. Custer Gallatin NF could work with MFWP to introduce Arctic Grayling when and where ecologically feasible.

Riparian and Wetland Areas

Activities and strategies that may be used to meet the desired conditions for riparian and wetland areas include the following:

- Refer to *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen et. al., 1995), Fire Effects Information System (USFS, online database), ecological site descriptions, or similar classifications applicable to the Forest for information on potential vegetation, succession, and response to disturbance in riparian/wetlands.
- Riparian area management: Proper Functioning Condition Assessment for Lotic Areas (Dickard et. al., 2015), A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lentic Areas (Prichard et. al., 2003), or equivalent method can be used when assessing riparian and groundwater dependent ecosystems.
- Place emphasis on maintaining riparian/wetlands that are in good condition. Prioritize functional—at risk areas for restoration. These areas may be near the threshold of degrading into a nonfunctional condition. Planned actions to begin recovery can usually be implemented at a much lower cost in these areas. Once an area is nonfunctional, the effort, cost, and time required for recovery dramatically increase. Restoration of nonfunctional systems ought to be reserved for those situations when recovery is possible, efforts are not at the expense of at-risk systems, or unique opportunities exist.

Terrestrial Vegetation

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.

Forested Vegetation

The following subsections describe potential management strategies and possible actions, at both the landscape and stand level, for plan components related to the terrestrial vegetation. These strategies and actions are intended to provide guidance for plan implementation, and represent possibilities, preferences or opportunities, rather than obligatory actions. Under an adaptive management approach, these strategies and actions may be dynamic in order to respond to monitoring results, new research, practical experience, emerging technology or other information and observations.

Perhaps the most significant change in the new generation of forest plans (under the 2012 planning rule) is the explicit focus on maintaining ecological integrity through restoration of natural resources and making National Forest lands more resilient, particularly to climate change. Ecological restoration focuses on reestablishing the composition, structure, pattern, and ecological processes necessary to facilitate terrestrial and aquatic ecosystems sustainability, resilience, and health under current and future conditions (36 CFR 219.19). Thus, implementation of the new plan necessarily requires focusing on all aspects of ecosystem structure and function and analyzing systems at a landscape scale. This contrasts with a land management approach primarily focused on outputs or with vegetation projects focused on a singular objective such as the treatment of fuels or improving habitat for a single species. The following elements could be important to consider when managing for ecological integrity:

- **Plan and implement at the landscape scale.** Managing for ecological integrity (i.e. the full suite of desired conditions) can be, at times, both complementary and conflicting. Working at larger scales allows managers the flexibility to meet multiple objectives. Consider focusing attention in key geographic, topographic, and edaphic locations that because of soils, aspect, elevation, and site climate are not likely to sustain dense, drought- and disturbance-intolerant conditions. Likewise consider reestablishing the inherent landscape heterogeneity, using topography as the underlying template.

- **Natural disturbance processes, particularly fire and bark beetle outbreaks, as primary agents of change.** For a variety of reasons, including land allocations (i.e. the proportion of the Custer Gallatin NF that is unavailable for timber harvest) as well as limited access and resources, conventional stand-level vegetation management may not achieve forestwide ecosystem restoration and landscape pattern modification. Moreover, mechanical treatments alone may not be able to fully restore the suite of ecological functions performed by natural disturbances such as fire and insects (e.g. nutrient cycling, snag creation, surface fuel reduction, mineral seedbed preparation, and regenerating associated shrub and herb vegetation). In reality, natural disturbances could continue to be the dominant force of change across the Custer Gallatin NF landscapes. The judicious use of managed wildfire over large areas and prescribed burning, in association with mechanical treatments where high certainly in outcome is required, could lead to the most ecologically desirable outcomes. The application of these tools at a spatial scale several orders of magnitude greater than their current use is required to restore patterns of vegetation structure and composition at a scale that successfully synchronizes successional patterns, disturbances and climate dynamics. Where feasible and compatible with other management priorities, create management conditions that enable natural processes to do important work on the ground that is otherwise expensive and less effective to emulate with direct management. Doing this could be economically beneficial, contribute to fire and climate resiliency, and improve diversity of wildlife habitat conditions. Repeated treatments overtime could be required to achieve such goals given the century's worth of successional inertia and fuel accumulation that has occurred in many areas.
- **Natural range of variation (NRV) is useful as a guide but look to the future.** Knowledge of historic structure, composition and disturbance regimes is critical to understanding ecologically functional and sustainable states. These insights form the basis of an ecological-processes oriented approach to land management. However, vegetation managers must also recognize that restoring historical conditions will not always be possible or even desirable in all situations. As such, while understanding the historic link between climate, disturbance, ecosystem conditions, and biological consequences is critical, vegetation managers must also be prepared to manage for vegetation conditions without a historical analog when necessary to create a resilient and sustainable forest under future conditions.

Desired Conditions: General Information

The desired conditions (DC) in the plan for vegetation components describe, to the best of our ability, what is desired for maintaining ecosystem integrity, while contributing to social and economic sustainability (as required by the 2012 planning rule). Analysis of natural range of variation is the underpinning for the desired conditions, with integration of additional factors, such as habitat needs for at-risk wildlife species; existing or anticipated human use patterns; consideration of changing climate; and ecosystem services that may be desired or expected of the forest (such as reduction of fire hazard or production of forest products).

The Forest Inventory and Analysis (FIA) data (R1 Summary Database) is the source for most of the quantified existing conditions for vegetation components (e.g., vegetation dominance types, species presence, forest size class, old growth, snag and downed wood, large live trees). The one exception to this is forest density. Here, we relied on VMAP data as it is a more direct and accurate measurement of canopy cover. FIA data provides information and estimates appropriate for use at the broad scale of analysis, such as the Forest or a Geographic Area, but is not spatially explicit and is generally not sufficient for use at the project level due to the small sample size as smaller scales. Field verification of

vegetation conditions and components is expected to occur at the project level using a variety of methods, including field surveys.

Many desired conditions for vegetation characteristics are described in the plan but there is no implied priority. Individual vegetation management projects could focus on contributing to the forestwide conditions related to one or more vegetation DCs but not all DCs would need to be the focus of a particular project. In fact, given the nature of forest ecosystem dynamics, progress towards one DC may result in a short-term or localized movement away from another DC. However, implementation of treatments that achieve one or more DCs at the project level would not foreclose the opportunity to maintain or achieve any other DC over the long term. The particular vegetation DCs that might be a focus for a project could be determined based on the unique ecological opportunities and capabilities of each project area as well as other resource considerations and direction provided by the deciding official.

Ranges in vegetation conditions are expressed for some DCs. Maintaining vegetation conditions anywhere within this range would be considered acceptable to meet the desired condition. Fluctuations in vegetation conditions over time are expected. Managing a particular vegetation characteristic at the upper, lower or mid-point of the desired range may be determined to be appropriate, as influenced by other ecological, social or economic objectives. Monitoring assists in evaluation of vegetation change over time, and supports an adaptive management approach to forest management (36 CFR 219.12).

Project-Level Considerations

Temporal and spatial scale are important factors to consider when interpreting and applying desired conditions at the project level. Desired conditions for vegetation could can be viewed and interpreted from both short-term and long-term perspectives. It may take substantially longer than one forest plan period to achieve desired conditions for some vegetation components, and monitoring of the trend over time could be key to assess whether conditions are moving in the desired direction. Vegetation change can be rapid (such as with fire) or slow and gradual (such as with succession). Direction and degree of change in vegetation can vary substantially over the short term (i.e., a few decades), but over the long term would be trending in the right direction. This is due not only to the nature of change due to succession and disturbances, but also because of the discrete classifications we apply to vegetation (such as the four forest size classes) when in reality vegetation conditions and change over time on a continuum. Ecological, social and economic sustainability concepts require a relatively long-term perspective for appropriate interpretation and evaluation but also requires consideration of short-term factors such as market demands.

Spatial scale is also important to acknowledge in the application of desired conditions at the project level. Vegetation desired conditions are designed to describe conditions desired at the forestwide or Geographic Area scale, not at the scale of the individual project, and are not necessarily appropriate to apply at these smaller scales. Stand level decisions and treatments are made at the site specific level, and would be designed to contribute to forest-wide desired conditions and/or not preclude their achievement.

Natural disturbance processes, such as fire and succession, as opposed to vegetation management treatments, are the primary drivers of vegetation change on the Custer Gallatin NF. Forestwide, this means there is limited ability for management actions to influence vegetation change. However, there are portions of the forest (such as the WUI, municipal watersheds or suitable timber base), and some PVTs (such as the warm dry PVT) where the effects of management actions have greater potential and opportunity of influencing vegetation conditions.

Focusing on a particular desired vegetation condition for a project may appear to conflict with another desired condition. For example, large diameter shade tolerant trees may be removed from a high density forest by regeneration harvest and the site planted to a desired, shade intolerant species. The primary intent is to increase early seral species, reduce high density forests, lower risk and loss of trees to insect/disease, and increase forest resilience, as well as provide timber outputs and contribute to economic sustainability. To meet these DCs, removal of larger trees is required, which might appear to conflict with FW-DC-07. However, forestwide, tree growth through vegetation succession is the primary means by which very large trees develop, and natural disturbances (mainly insect, disease and fire) the primary means of their removal. Management actions that promote forest densities, species and structures that are resilient to these disturbances and are of moderate and lower densities that facilitate more rapid growth rates are the primary means by which large trees can be developed and sustained over the long term in the ecosystems of the Custer Gallatin NF. Harvest of larger trees addresses and achieves DCs listed above but does not preclude the attainment of DCs related to large tree sizes, and may even facilitate or improve the probability of their persistence over the long term.

Climate Change

Consider climate change when developing site-specific silvicultural prescriptions. For example, in determining residual density or when choosing species to plant and determining planting densities, it may be appropriate to consider recommended stocking levels for a habitat type that is one notch warmer and drier than the current. For information on forest conditions and management strategies related to potential climate change that are relevant to landscape and stand level prescriptions, 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 are available.

Snags and Coarse Woody Debris (CWD)

The desired conditions for snags (FW-DC-VEGF-03) and coarse woody debris (FW-DC-SOILS-06) recognize that on lands suitable for timber production and within the wildland-urban interface, snag and coarse woody debris presence is generally more dependent on human actions than in other, more remote, areas. Expectations are for lower overall snag/coarse woody debris densities in these areas than in areas unsuitable for timber production or outside the wildland-urban interface, with greater emphasis on larger diameter material of desired species, to provide for desired distribution of important wildlife habitat. Additionally it is important to recognize opportunities to develop future snag habitat, of desired species and large sizes, by managing forests in the present to achieve desired composition, tree sizes, and forest densities. While coarse woody debris densities may be lower overall in lands suitable for timber production due to harvest and salvage activities, FW-GDL-SOIL-06 insures that coarse woody debris contributes to nutrient cycling and maintenance of site productivity.

At the project level, analysis would consider forest-wide monitoring data for snags within the Geographic Area where the project is proposed. If forest-wide data show that snags are within or above the desired range for the GA, and analysis can demonstrate that the proposed treatment would not create a snag deficit within the GA, then snags need not be retained in project treatment units. This analysis may include the following techniques:

- Snag levels within the GA are within or above the desired range for the GA, and proposed treatment is at a scale that would not affect, or would not reduce snag levels below the desired range in the GA.
- Snag levels within the GA are within, but at the low end of the desired range for the GA, but ground validation shows that snags are abundant within the project analysis area such that proposed treatment would not create a deficit within the GA.

To meet the intent of FW-GDL-VEGF-03, site-specific analysis may occur at the project level that support an alternative prescription for snags or coarse woody debris. The following factors may be considered in development of alternative prescriptions:

- Analyze snag habitat at the broader scale than the harvest unit, and evaluate existing distribution, abundance, location and characteristics of snags within the larger landscape and/or project area, relative to snag availability and retention needs within harvest units.
- Recognize that snags (and coarse woody debris) are unevenly distributed/clumpy at the landscape scale, and snag characteristics are also highly variable across the landscape.
- Consider the proportion of area influenced by harvest activities relative to the proportion of area influenced primarily by natural disturbances.
- Consider current disturbances within the project area or across the broader landscape that may be providing abundant snags of desired characteristics, either in the short term (for example, 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 and leaving high stumps to provide wildlife feeding habitat.
- Consider snag characteristics (species, size, condition) within harvest units relative to availability of these characteristics across the landscape.
- Consider achievement of snag retention standards across all units, rather than each unit individually. This approach allows for incorporating and retaining the naturally clumpy distribution of snags, leaving greater numbers of higher quality snags where they exist.
- Consider the long and short-term perspective that snags are a relatively short-term component (most become downed wood within a few years or decades).
- Consider the role of live trees in the present that contribute in the far future to desired snag habitat (composition, size), especially in the event of natural disturbance, such as fire.
- Promote larger trees of fire resistant species to meet multiple forest plan desired conditions, including future desirable snag/downed wood habitat.
- Consider other resource desired conditions or associated plan components (social, economic) that may influence stand or landscape-level snag prescription including a desire to reduce fuels to lower probability of high severity fire. Lower densities of smaller snags and coarse woody debris may be determined an appropriate prescription for portions of the wildland-urban interface. Larger diameter snags and coarse woody debris may be determined appropriate to retain, due to their relatively low contribution to fire hazard levels and their desirable contribution to soil function and wildlife habitat.

Old Growth Forests and Habitat

Old growth stands are defined by specific structural attributes and other characteristics as described in the Forest Service publication, Old growth forest types of the Northern Region (Green et al., 2011), with correction notices dated 2005, 2007 and 2008. The publication is available at http://fsweb.r1.fs.fed.us/forest/inv/project/old_growth.shtml. If that document is revised or replaced by the Northern Region, the updated version would be used. In general, old growth stands are in the late stages of stand development and are distinguished by old trees and related structural attributes. These old growth stands are typically distinguished from earlier developmental stages by combinations of characteristics such as tree age, tree size, number of large old trees per acre, and stand density expressed as basal area). Specific values for these attributes vary by local ecological type and forest type.

Other characteristics sometimes associated with old growth stands (canopy layers, snags, down wood, etc.) are not part of the minimum criteria needed to meet the definition of an old growth stand because those other characteristics can vary greatly even in stands that are clearly old growth.

Old growth habitat includes stands that meet the definitions for old growth forest, in addition to stands that may have some of the structural or other characteristics that provide habitat for wildlife species associated with old growth but do not fully meet the definitions for old growth. For example, old growth habitat may include stands that contain large diameter trees but these trees are younger than required to meet old growth forest definitions.

The primary function of FW-GDL-VEGF-01 is to highlight the dynamic nature of this forest structure class and the importance of planning for long-term development of old growth, as much as protecting existing old growth. It is understood that old growth may be lost to disturbances and gained through natural succession. Forest plan direction for old growth acknowledges and supports the enhancement of the successional process towards old growth that could be achieved through management. In addition, other desired conditions (FW-DC-VEGF-07, and FW-DC-VEGF-03) related to large live trees and size class are intended to contribute to the needs of wildlife species associated with old growth.

The intent of FW-GDL-VEGF-01 is to (1) increase the resilience of old growth to potential future disturbance, which may result in loss of old growth characteristics (for example, high severity wildfire or epidemic insect outbreaks); and (2) promote the long-term (such as, beyond the plan period) development of future old growth forest or old growth habitat.

At the landscape or watershed level, areas where it is desirable to alter old growth conditions (for example, the size, shape, structure and connectivity of old growth forest patches), a possible management strategy may include the following considerations:

- When planning harvest, retain stands adjacent to existing old growth that would provide future old growth in the shortest time frame possible. Selection of stands for development of future old growth may be emphasized in watersheds where existing old growth forest or habitat acres are less than the desired conditions at the forestwide scale; where shape of old growth forest or habitat patches is largely linear and narrow; where individual patches are relatively small (average less than 100 acres); and/or where connectivity of patches is poor.
- At the project level, assess old growth patch size by analyzing the amount of high contrast edge between old growth habitat and openings
- Consider treatment of forest adjacent or near old growth stands to result in reduced fire hazard, alter potential fire spread or fire severity, or reduce potential insect or disease outbreak that may spread to old growth forest.

Other Vegetation

Activities and strategies that may be used to meet the desired conditions for grasslands, shrublands, and deciduous woodlands include the following:

Grasslands/Shrublands

- Refer to The Vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: A Habitat Type Classification (Hansen and Hoffman, 1988), Grassland and Shrubland Habitat Types of Western Montana (Mueggler and Stewart, 1980), Fire Effects Information System (USFS, online database), available ecological site descriptions, state and

transition models, or similar classifications applicable to the Forest for information on potential vegetation, succession, and response to disturbance in grasslands/shrublands.

- *Interpreting Indicators of Rangeland Health* (Pellant, et. al., 2000) or equivalent methods can be used when assessing upland rangeland vegetation.
- Conifer species that are encroaching upon rangelands may be removed to maintain shrubland/grassland potential vegetation types. Habitat types typically include, but are not limited to, Ponderosa pine (PP)/bluebunch wheatgrass, PP/bluestems, PP/Idaho fescue, and Douglas-fir/Idaho fescue. The same situation may occur where a series or phase includes western wheat-grass and the needle grasses. Consider other resource values during project analysis when determining removal of the conifer component. A silvicultural prescription is encouraged, but is optional. In rangelands where the encroaching trees are less than 3-feet high, prescribed fire may be the preferred treatment. Mechanical methods may be the preferred treatment in areas where trees are over 3-feet high.
- Pollinators (honey bees and native pollinators) enhance biodiversity and support stronger and more resilient ecosystems. While pollinators pollinate more than 80% of wild flowering plants (such as those found in grasslands and shrublands), they are also important to other habitats. Refer to Pollinator-Friendly Best Management Practices for Federal Lands (2015), Pollinators and Roadsides: Best Management Practices for Managers and Decision Makers (2015), or similar references for information on best practices for pollinators.

Green Ash Draws

- Refer to The Vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: A Habitat Type Classification (Hansen and Hoffman, 1988), Classification and Management of Montana's Riparian and Wetland Sites (Hansen et. al., 1995), Fire Effects Information System (USFS, online database), available ecological site descriptions, or similar classifications applicable to the Forest for information on potential vegetation, succession, and response to disturbance in green ash draws.
- Monitoring Seral Stages in Green ash-Prunus Ecological Type (Uresk, 2000), Woody Draw Inventory and Health Assessment for Range Allotment Plan Revision, Sioux and Ashland Ranger Districts, Custer National Forest (DiBenedetto, 2001), or equivalent method can be used when assessing green ash draws.
- Place emphasis on maintaining green ash draws that are in good condition. Functional—at risk areas can be considered for restoration. These areas may be near the threshold of degrading into a nonfunctional condition. Planned actions to begin recovery can usually be implemented at a much lower cost in these areas than in non-functional areas. Once an area is nonfunctional, the effort, cost, and time required for recovery dramatically increase. Only reserve restoration of nonfunctional systems for those situations when recovery is possible, efforts are not at the expense of at-risk systems, or unique opportunities exist.
- Where practicable, suitable management techniques can be employed to restore woody draws. The frequency of seedling-, sapling- and pole-size green ash has been positively associated with the canopy cover of chokecherry in many woodlands in the northwestern Great Plains and this association suggests that recruitment of green ash from seed may be enhanced by a tall shrub understory. Recruitment of green ash seedlings might be possible by first establishing a chokecherry understory to act as nurse plants. Reduced vigor of sod grasses associated with shading by a healthy shrub layer would likely mean more suitable sites for tree seedlings

(Marlow and Lesica, 2013). Herbicide-treated areas to lower perennial grass cover followed by supplemental seeding to chokecherry or other applicable shrub planting are plausible techniques but consider testing it first before it is widely applied. Control livestock and deer access to minimize browsing.

- Stump sprouting may have been the dominant form of reproduction for green ash in the northwestern Great Plains even in the absence of livestock grazing, woodcutting or exotic grasses. The last major recruitment event for green ash across eastern Montana occurred as a result of stump sprouting during a time when deer populations were low (Lesica and Marlow, 2013). Coppicing, or pruning to ground level, have not been shown to produce more trees but it can increase tree canopy cover by replacing diseased or weakened trees with new and more vigorous trunks and branches. Successful coppicing would require controlling livestock to minimize browsing and may not be possible in areas with high densities of white-tailed deer (Lesica and Marlow, 2013).
- Where feasible and when budgets allow, consider relocating existing allotment infrastructure to minimize livestock impacts in green ash draws.

Aspen

- Options to help aspen stands persist or expand on the landscape include prescribed fire, aspen cutting, conifer reduction, and/or temporary exclusion from browsing. Where feasible, consider relocating existing allotment infrastructure to minimize livestock impacts in aspen stands. When possible, treat a large enough area to help distribute wildlife and livestock use across numerous stands. Harvest or thinning of aspen or encroaching conifers can be equally effective for aspen restoration. Cutting may also prevent root damage from severe burning. Consider treating large areas over multiple years, further diffusing ungulate use and maintaining a mosaic of aspen age classes and the values associated with different successional stages.

At Risk Plant Species

- Whitebark pine (*Pinus albicaulis*) has been declining across much of its range in North America because of the combined effects of mountain pine beetle epidemics, fire exclusion policies, and widespread exotic blister rust infections. Whitebark pine seed is dispersed by a bird, the Clark's nutcracker, which caches seed in open, pattern-rich landscapes created by fire.

  On July 19, 2011, the U.S. Fish and Wildlife Service (FWS) published in the Federal Register its 12-month status review finding on a petition to list whitebark pine under the Endangered Species Act (ESA). After a review of all available scientific and commercial information, the FWS concluded that listing the species as threatened or endangered is warranted, but precluded by higher priority actions. Detailed information about the assessment of threats to the species is provided in the finding, which is available at http://www.gpo.gov/fdsys/pkg/FR-2011-07-19/pdf/2011-17943.pdf. This finding results in whitebark pine being a FWS candidate for listing under ESA.

  In the 2011 findings, the U.S. Fish and Wildlife Service identified several risks and threats to whitebark pine. They include forest insects and disease (blister rust and pine beetle), fire exclusion, and climate change factors. Timber harvest is not among the threats to whitebark pine identified by the U.S. Fish and Wildlife Service.

  In general, there is a high degree of spatial separation between timber harvest locations and where whitebark pine exists, as whitebark pine tends to occur outside suitable timber ground.

Accordingly, whitebark pine tends to be only an incidental species where it does occur in association with a timber sale (i.e. not at levels where impacts could adversely affect the viability of the species) (Regional Forester Letter to Forest and Grassland Supervisors and Staff Directors, October 20, 2011). However, targeted restoration treatments may be desirable in whitebark pine stands where disturbance is determined to benefit the species. For example, removing shade-tolerant conifers may aid in the persistence of mature whitebark pine, increase the potential for nutcracker caching, and to open up areas for planting of rust-resistant trees. All projects should be evaluated to assess their potential impacts to the species, especially in cases where there are healthy cone-producing trees present.

Conservation and restoration of whitebark pine is not dependent upon mitigating ongoing actions, but rather a shift of focus that proactively and programmatically targets whitebark pine habitats at landscape scales. Specific conservation and restoration treatments would typically be designed to create openings in sites that are advantageous for re-establishing whitebark pine.

Chapter 3 For information based on the most up-to-date understanding and documentation of whitebark physiology, ecology, genetics, distribution, mortality, and regeneration on the Forest, refer to Whitebark Pine Strategy for the Greater Yellowstone Area and Adaptive Action Plan prepared by the Greater Yellowstone Coordinating Committee (2011 and 2015, respectively) and any new best available science for possible whitebark pine restoration strategies and activities.

Chapter 4 In designated wilderness areas, allow, wherever possible, the natural recovery process of disturbed communities. Consider vegetative assistance only as a last resort. When considering any whitebark pine restoration action in designated wilderness areas, a Minimum Tool Analysis is needed.

Fire and Fuels

Plan components recognize that fire has been and likely could remain the primary disturbance factor on the Forest. 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 could play a role in all areas of the forest, whether unplanned (wildfires) or planned (prescribed fires). Along with mechanical fuels treatments, these approaches can also create fuel conditions to mitigate the risk of wildfire to values at risk. A variety of management strategies could be used to meet desired vegetation conditions based on feasibility, economics, access, and successful implementation. These approaches would also support the three objectives of the National Cohesive Wildland Fire Management Strategy: restore resilient landscapes, maintain fire adapted communities, and provide for effective, safe fire response.

Site specific analysis is conducted for planned ignitions and mechanical fuels treatments and for any unplanned ignition that extends beyond initial attack. For planned ignitions and mechanical fuels treatments, the decision document is the signed NEPA decision. For unplanned ignitions, a Wildland Fire Decision Support System (WFDSS) analysis is performed, and signed by the appropriate line officer.

Unplanned Ignitions

For unplanned ignitions, the full range of fire management strategies may be used to achieve desired conditions, using appropriate response strategies based on potential resource benefits and risks. These are driven by fuel conditions, current and expected weather, current and expected fire behavior, topography, resource availability, and values at risk and could include risk assessments that can occur at

multiple scales, both spatial and temporal. These assessments are grounded in experience and analyzed with data and models appropriate to the scale of analysis. The approach is to look at risk in three tiers: long-term (5–10 yrs), annual, and incident:

- Long-term: analyzing the existing conditions that change typically in the 5–10 year time frame, informing broad questions and decisions for programmatic risk assessments. Items may include Highly Values Resources and Assets (HVRA) such as structures, infrastructure, commercial timber, and wildlife habitat.
- Annual: analyzing factors such as seasonal weather, fuel conditions, and drought impacts to inform decisions pre-season to identify areas that with reduced large fire/long-duration risk may have the opportunity for short-term fire management.
- Incident: when the ignition occurs utilizing the now known specific condition, location, etc., to specifically analyze the situation for incident risk assessments.

Utilization of this three tiered risk analysis would allow managers to make informed decisions that respond to our various desired conditions where they could utilize one or more of the following strategies and options for any one fire (list not inclusive): monitoring the fire from a distance; monitoring on-site; point-protection or confinement; monitoring with limited contingency actions; monitoring with mitigation actions; suppression with multiple strategies; control and extinguish; or any combination of some or all of the above as well as other options.

To develop practical strategies and tactics that meet agency administrator and incident objectives and to avoid, minimize, or mitigate impacts to natural, cultural, wilderness and other resources during and after wildfires, Resource Advisors can be assigned to work on small local responses or with Incident Management Teams.

In wilderness and WSAs, naturally-caused wildfire may be allowed to play, as nearly as possible, its natural ecological role on the landscape and may be allowed to move into and out of wilderness boundaries as necessary based on the historic burning patterns, ecological health, and impacts to abiotic and biotic components of the forest.

In Research Natural Areas (RNAs) and Special Areas (SAs), naturally-caused wildfire may be used to achieve and maintain vegetative conditions and desired fuel levels if appropriate for meeting the area objectives. If a naturally ignited, unplanned wildland fire does not meet management prescriptions such that allowing it to burn would not meet identified resource objectives, the fire may be suppressed.

These strategies are similar to the fire management strategies already in-place on most Greater Yellowstone Area (GYA) national forests and national parks and would maintain the coordination, collaboration and management of wildland fire (both unplanned and planned ignitions) occurring along the administrative boundaries with GYA partners.

Planned Ignitions

Planned ignitions (prescribed fire) may be used forestwide to achieve desired conditions where necessary and appropriate. Planned ignitions may also be used in Research Natural Areas (RNAs) and Special Areas (SAs) to perpetuate the natural diversity of plant communities. Concurrence of the Research Station director is required for planned ignitions and other management actions proposed in RNAs.

In wilderness and WSAs, planned ignitions may be used to achieve desired conditions and reduce the risk to these protected areas. Where wilderness management objectives and conditions are met,

planned ignitions may be conducted outside of wilderness boundaries, within wilderness boundaries, outside of wilderness boundaries that burn into wilderness, and inside of wilderness boundaries that burn out of the boundary.

Mechanical Fuels Treatments

A suite of mechanical fuels reduction treatments may also be used, including commercial timber sales and noncommercial treatments.

Fuels Reduction and Wildland-Urban Interface

It is anticipated that there are areas in the wildland urban interface where forest conditions would be created and maintained at densities that are lower than what would occur under natural disturbance regimes. Decisions to create and maintain very low forest densities, where needed to protect community assets, may occur as determined through site specific project analysis, and these conditions would meet desired conditions in the plan for wildland fuel management (FW-DC-FIRE-02).

If these areas are on lands suitable for timber production, maintaining very low densities of trees over the long term would typically not be optimal from the timber production perspective. However, this would not be inconsistent with plan direction, which recognizes that there are multiple resource objectives and desired conditions to be considered at all scales of management, from the stand to the landscape, and project specific conditions would determine the site-specific treatments that would be applied. Project proposals and stand-level treatments do not need to address all forestwide desired conditions but they must not preclude the achievement of plan desired conditions.

Invasive Species

Use Forest Service Strategic Framework for Invasive Species (Forest Service National Strategic Framework 2013 or subsequent strategic frameworks) to help prioritize and guide the prevention, detection, and control of invasive insects, pathogens, plants, wildlife, and fish that threaten terrestrial and aquatic ecosystems. The 2013 Framework describes how National and Regional Invasive Species Issue Teams (NISIT and RISITs, respectively) could coordinate activities within the Forest Service and with Federal, State, and local partners.

Activities and strategies that may be used to meet the desired conditions for invasive species include the following.

All Invasive Species

- Integrate invasive species management funding broadly across a variety of National Forest System programs, while associating the funding with the specific aquatic or terrestrial invasive species that is being prioritized for management, as well as the purpose and need of the project, program objective, or by program creating the disturbance with high risk of invasion.
- Coordinate and cooperate with State and county agencies and adjacent landowners in invasive species prevention, early detection and rapid response, control and containment, restoration and rehabilitation, and inventory and monitoring activities.

Terrestrial and Aquatic Invasive Plants

- An integrated pest management approach to noxious weed treatment typically have eradication emphasized on smaller priority areas and new species, with control emphasized on new starts and areas of minor infestations, and with containment actions applied to areas of existing large

infestations. Noxious weed infestations could be inventoried periodically to monitor the existing and new infestations.

- Noxious weed species listed by the States of Montana and South Dakota have priority for integrated pest management.
- Use protection measures outlined in applicable weed management NEPA decisions ("Custer National Forest Noxious Weed Management" Environmental Impact Statement and Record of Decision (2006) and the "Gallatin National Forest Noxious and Invasive Weed Treatment Project" Environmental Impact Statement and Record of Decision (2005)) or subsequent NEPA decisions.
- Prioritize noxious weed prevention and treatment activities with emphasis on all Forest Service administrative sites and high use sites such as trailheads, campgrounds, interpretive or historic sites, and road corridors. In addition, emphasize areas of high botanical value such as known populations of at-risk-plant species, traditional cultural plant collection areas identified by tribal traditional users, research natural areas, and botanical special areas.
- Where tribal plant collection areas have been identified by traditional practitioners, follow the protection measures outlined for sensitive plant populations (now termed as "at-risk plants") in 2006 Custer National Forest Weed Management EIS decision and 2005 Gallatin National Forest Noxious and Invasive Weed Treatment Project EIS decision or subsequent NEPA decisions. When tribal traditional users identify plant gathering areas, other protection measures may be designed to minimize effects to various aspects of the activity. These could include, but are not limited to, adjusting the timing of the treatment, adjusting the type of treatment, adjusting the treatment method (i.e. spot spraying, wick application), and/or adjusting the priority of the treatment.
- Consider the following factors when prioritizing weed treatment: 1) weed category – potential invader, new invader, widespread invader; 2) relative invasive nature of the species and its potential to displace native vegetation; 3) relative ecological importance or rarity of the site that could be damaged by the presence of the weed; 4) potential for off-site movement of seeds; 5) determination of control method, which is dependent on the species and site; 6) site monitoring to determine the need to repeat or alter treatment; and 7) available funding.
- Determine the risk of introducing, establishing, or spreading invasive species associated with any proposed action, as an integral component of project planning and analysis, and where necessary provide for alternatives or mitigation measures to reduce or eliminate that risk prior to project approval. The Northern Region Risk Assessment method or similar method can determine the risk of weed spread for projects, needed prevention and protection measures, and monitoring needs.
- Restore soil disturbed surfaces with certified weed seed free native plants as quickly as possible when moisture conditions are suitable for germination and monitor for weed invasion and restoration success which may take up to three to five years. Place monitoring emphasis during the growing season after the disturbance activity for early detection and rapid response to potential invasions. When revegetating disturbed sites, soil testing, use of stockpiled soil or fertilizer may be needed.
- To minimize spread and/or new invasions, manage priority areas for pre-treatment of noxious weeds in any defined project or use area, as needed (i.e., fuels treatment, timber harvest, or fire camp areas).

- Use the following prevention measures and best management practices: Best Management Practices for Weed Control by Resource Area (FSM 2080); Best Management Practices - Soil and Water Conservation Practices (FSH 2509.22); Forest Service Timber Sale Contract Provisions; Special Use Supplemental Clause; USDA-Forest Service, Northern Region; Pit and Stockpile Guidelines; and enforce Weed Free Feed Special Orders for all National Forests in Montana and the South Dakota portion of the Sioux Ranger District.
- Ensure that contracts and permits contain clauses and specifications requiring the implementation of measures to prevent, control, and/or contain aquatic or terrestrial invasive species (including noxious weeds). Oversee contract and permit administration to ensure compliance with the provisions.
- Educational prevention materials provided at District offices and at trailheads or other recreational areas, need to communicate requirements of local, state, and National Forest certified weed seed free hay or pelletized feed orders and to encourage removal of weed seeds/burs from treads of mountain bikes, ATVs or other motorized vehicles, in the socks, shoelaces or gear of hikers and hunters, and in the hair or fur of pets, riding or pack animals.
- Provide continuing education for forest field personnel in weed identification.

Aquatic Invasive Species

- Refer to the Guide to Preventing Aquatic Invasive Species (AIS) Transport by Wildland Fire Operations (Invasive Species Subcommittee of the Equipment Technology Committee/ National Wildfire Coordination Group, 2017) or similar guidance documents which provides best management practices to help wildland firefighters prevent contact with and spread of aquatic invasive species, best procedures for decontaminating ground and aviation equipment, AIS prevention recommendations for resource advisors, and AIS of concern to firefighters and disinfection methods.

Wildlife

Grizzly Bears

The Custer Gallatin Forest Plan formally adopts habitat standards for grizzly bears from the 2016 Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem (USFWS 2016). This document is intended to be dynamic and responsive to changes in science, technology and ecological conditions. The Forest Plan can be adapted to incorporate substantive changes made in the Conservation Strategy over time.

Habitat standards adopted from the Conservation Strategy were developed with the overall goal of maintaining or improving habitat conditions relative to those present in 1998; i.e. refer to the “1998 baseline”. The US Fish and Wildlife Service selected 1998 as a baseline year because it was demonstrated that habitat conditions (e.g. amounts of secure habitat, number and capacity of developed sites, and number and acreage of domestic livestock allotments) in 1998 were compatible with an increasing grizzly bear population throughout the 1990s (USFWS 2017).

Management of human access is a primary factor with potential to influence the suitability of grizzly bear habitat. The Conservation Strategy addresses human access parameters, including open motorized access route density (OMARD), total motorized access route density (TMARD) and secure habitat, as useful metrics for long-term monitoring of potential effects to grizzly bears and their habitats. The

appropriate scale for calculating OMARD, TMARD and secure habitat include the bear management subunit inside the primary conservation area, and the bear analysis unit outside the primary conservation area. The Greater Yellowstone Ecosystem Grizzly Bear Motorized Access Model and associated database maintained by the Greater Yellowstone Ecosystem Grizzly Bear Database Coordinator, is the appropriate tool for calculating human access metrics for effects analyses as well as long-term monitoring.

While the three different motorized access parameters remain useful for monitoring purposes, the only habitat standard in the Conservation Strategy relative to motorized human access is to maintain the proportion of secure habitat inside the primary conservation area at or above baseline levels. In the development of the Conservation Strategy it was determined that maintaining habitat standards for all three access parameters (OMARD, TMARD and secure habitat) was unnecessary and somewhat redundant in meeting grizzly bear habitat management goals. OMARD and TMARD are calculated using GIS with a moving window application to determine the percent of a Bear Management Subunit in a defined motorized route density category. Route densities of particular concern with respect to grizzly bear habitat management are OMARD > 1mi/mi2 and TMARD > 2 mi/mi2. Secure habitat is calculated as the proportion of area at least ten acres in size, that is at least 0.31 miles (500 meters) from an open or gated motorized route. Constructing a new motorized route or reopening a previously closed motorized route would typically affect secure habitat. The only way a new or reopened motorized route would not affect secure habitat is if it were located in close proximity (within one-third mile) of existing motorized routes on both sides. Such an event would be rare, and would not likely have a notable effect on the proportion of OMARD or TMARD at or above established threshold levels, so there are consequently no plan components associated with OMARD or TMARD levels, but rather these metrics are included in the monitoring section of the Custer Gallatin Forest Plan.

Grizzly bear movement within and between Custer Gallatin NF administrative units (or Geographic Areas), as well as grizzly bear movement between the Custer Gallatin NF and other parts of the Greater Yellowstone Ecosystem, or ultimately, to other grizzly bear ecosystems, is an integral factor in maintaining/enhancing genetic diversity and conserving the species. Custer Gallatin NF personnel can work cooperatively with state and federal agencies (e.g. Montana Fish Wildlife and Parks, Montana Department of Transportation, Interagency Grizzly Bear Study Team, Yellowstone National Park, and adjacent National Forest System administrative units), plus private land owners and other entities (e.g. universities, non-governmental organizations) to collect information that may help identify important grizzly bear travel routes, as well as areas with relatively high levels of human-caused grizzly bear mortality, in order to manage for habitat connectivity that could facilitate successful grizzly bear movement and dispersal.

Wolverine

Management activities that require motorized access (wheeled vehicles or snowmobiles) can have disturbance impacts if conducted in suitable reproductive habitat for wolverines during the denning season of mid-February through mid-May. Non-motorized activities such as skiing, snowshoeing or hiking can also disturb and/or displace wolverines if conducted in close proximity (within one-half mile) to known, occupied reproductive wolverine den sites during the same time period. These types of activities can be evaluated at the project level to determine whether a proposed action meets the intent of FW-GDL-WLWV).

Bison

Management of Yellowstone bison and their habitat is primarily conducted under the auspices of the Interagency Bison Management Plan (www.ibmp.info). The purpose of the IBMP is to maintain a wild

population of Yellowstone bison while also addressing the risk of brucellosis transmission from bison to domestic livestock in order to protect the economic interest and viability of the livestock industry in the state of Montana. As a result, the presence, abundance and distribution of wild bison on the Custer Gallatin National Forest is dictated by state-delineated bison tolerance zones. Within these tolerance zones, management actions can be designed to favor bison expansion into unoccupied habitat. For example, design criteria can be applied if bison approach active livestock allotments inside the tolerance zones. Such management options include, but are not limited to the following: strategically-placed fencing may be used to create physical separation between bison and domestic livestock, livestock use dates may be adjusted, non-use for resource protection may be authorized, changing the kind/class of livestock from cows to horses or steers may be authorized, or livestock may be relocated to vacant allotments outside of tolerance zones.

As with any wild animal, bison can pose a threat to humans that approach too closely. Because of their relative rarity on public lands, bison sightings are highly valued by many forest visitors, but their behavior patterns may not be well understood, while their speed and agility are often underestimated. To address potential concerns, educational information can be made available to the public, including signage at trailhead and campground portals that describe potential risks of being around bison, and identify appropriate human behavior in areas frequented by bison.

Prairie Dogs

Prairie dogs are keystone species that contribute important ecological conditions for a variety of prairie-associated wildlife species, and colony expansion may be desirable in some locations. However, prairie dogs can also have unwanted impacts such as loss of vegetation and potential travel hazards to domestic livestock, so colony expansion may not be desired in other locations. Habitat needs differ between white-tailed and black-tailed prairie dogs, so management approaches could vary accordingly. White-tailed prairie dogs occur in habitats of greater topographic and vegetative diversity, and have a higher tolerance for shrubs and tall vegetation than do black-tailed prairie dogs (Nistler 2009). Livestock grazing, mowing, and/or prescribed fire may be used to reduce vegetative structure and thereby enhance habitat suitability for prairie dogs where colony expansion is desired, either adjacent to existing prairie dog colonies or within or near abandoned colony sites. If black-tailed prairie dog colonies expand into areas where they are undesirable; e.g. encroaching onto adjacent private lands, non-lethal measures to control movement include increasing vegetative structure through planting of tall shrubs, and/or creating visual impairment by piling slash or building artificial structures to restrict prairie dog expansion into areas where their presence is not desired.

Greater Sage-Grouse

Potential strategies that could be used to trend toward greater Sage-Grouse desired conditions include:

- New recreation facility development could occur in priority or general sage-grouse habitat where such development serves to consolidate and reduce existing dispersed facilities, leading to less overall impact on sage-grouse habitat.
- Where new energy development activities cannot be avoided in priority or general sage-grouse habitat due to pre-existing rights, development can be located in non-habitat inclusions (e.g. non-vegetated areas) or in the least suitable habitat possible. New structures can be consolidated where possible to minimize impact of infrastructure.
- Where new energy development activities cannot be avoided in priority sage-grouse habitat, the Forest Service may attempt to negotiate minimum impact techniques for surface use and occupation in areas with outstanding mineral rights.

- Where new energy development could impinge on sage-grouse priority habitat, options such as Administratively Un-Available, No Lease, or Leasing with a No Surface Occupancy stipulation, could be considered and evaluated.
- Fence markers can reduce grouse collisions on flat or gently rolling terrain near leks. Consider marking fence wires within a half a mile of leks with flagging or durable vinyl markers since it makes them more visible, and can minimize grouse collisions without disrupting fences needed for livestock. When planning new fence projects, avoid building fences in these high-risk areas where possible. These concepts can be applied to other seasonal habitats where grouse are known to concentrate and where they could collide with fences, such as brood-rearing habitat and wintering sites.

Bats

Multiple bat species are known to occur on the Forest on either a seasonal or year-round basis. A variety of management approaches can help protect and enhance bat roosting habitat, proximate foraging and drinking habitat, and/or reduce the spread of disease. Detailed methods and additional scientific information can be found on the Bat Conservation International website: www.batcon.org.

- Maintaining and recruiting clusters of large diameter snags and live trees in the early to middle stages of decay may provide suitable roosting structures, especially when located near water, foraging habitat and night roosts.
- Bats often roost in artificial structures such as buildings and bridges. Removal, reconstruction or heavy maintenance of such facilities can disturb or displace roosting bats. Such activities can be scheduled to occur before early summer occupancy (late May) or after the late summer dispersal (late August to early September) to avoid impacts to bats.
- If known bat roosts occur in buildings or bridges that are scheduled for removal or maintenance, artificial bat roosts may provide supplemental opportunities for bats. In colder areas, bat houses can be painted black and positioned for maximum solar exposure to make them more hospitable.
- Abandoned mines that provide suitable roosting habitat can be fitted with bat friendly gates to restrict human access to dangerous mines, but also to limit human disturbance while allowing free passage for roosting bats. Bat friendly gates can be permanent, or can be fitted with locks so that they may be opened to facilitate monitoring of bat use.
- At known or suspected roost sites, external and acoustic surveys may provide insight about the significance of bat use. For example, a large number of bats exiting during mid-summer may indicate the presence of a maternal colony, which may warrant seasonal use restrictions in the area or gate installation if the roost site is near a proposed project or is in an area regularly frequented by human traffic (e.g. near a road, trail or developed site).
- Bats typically drink on the fly and are vulnerable to obstructions such as barbed wire across natural water sources (e.g. ponds, or pools in creeks) and artificial water sources (e.g. stock tanks). Barbed wire can be placed away from water openings, and escape ramps can be placed in stock tanks to reduce incidences of bats drowning. Tall structures can be placed away from stock tanks or natural water sources, to avoid creating potential perches for bat predators.
- Many bat species are susceptible to a fungal infection known as “white-nose syndrome”. Human use can spread the white-nose pathogen between and among bat habitats, particularly winter hibernacula, such as caves. Education materials could be made available to cavers and

other members of the public regarding decontamination procedures and other precautionary measures that can be used to prevent or curtail the spread of diseases such as white-nose syndrome, as well as to limit disturbance of bats at hibernacula and roost sites.

All Wildlife Species

Potential strategies that could be used to trend toward desired conditions for all wildlife include:

- Wildlife habitat management and improvement projects can take a multi-species approach, with biological diversity a goal at the landscape scale to provide habitat and connectivity for a wide range of native and desired non-native species.
- Fences, where needed, can be made "wildlife friendly" by using smooth wire (as opposed to barbed wire) for the top and bottom strands so that wildlife can pass over or under the fences without being trapped or injured by barbed wire. Also, adding brightly colored flags or tags that move in the breeze can make fences more visible to animals and birds, which may help reduce wildlife collisions with fences.
- Special Orders for proper food storage can be issued and enforced where needed to reduce or remove unnatural food sources for wildlife, avoid human food conditioning of wild animals, and minimize food-related wildlife-human conflicts. Food storage and related sanitation efforts can achieve better consistency through coordination with adjacent jurisdictions and state wildlife management agencies.
- Integrated resource projects can be designed to avoid disturbance of wildlife during key timeframes when energy demands are highest. Long-term or permanent habitat alterations are generally not desirable, but where such alterations are needed to meet the purpose and need of a project, mitigation measures can be used to minimize negative impacts to wildlife. Mitigation measures may include but are not limited to: timing restrictions, project feature designs (e.g. minimum distance to cover), artificial wildlife structures to replace structure lost, and habitat acquisitions, protections, or improvements in other areas.
- Forest Service personnel can work cooperatively with state (Montana and South Dakota), federal (US Fish and Wildlife Service, Yellowstone National Park, Bureau of Land Management, Interagency Grizzly Bear Study Team) and tribal entities, to share knowledge, coordinate activities, and collaborate on data gathering and other scientific endeavors.
- State (Montana or South Dakota) Wildlife Management agencies can be consulted for current information about the spatial and temporal use and definitions of key wildlife habitats.
- Forest Service personnel can participate in cooperative efforts with universities, research entities and non-governmental organizations to gain and distribute information, and to utilize partnerships and/or volunteer resources for educational purposes, wildlife or habitat surveys, and habitat improvement projects.
- A variety of approaches to managing habitat for elk and other big game species outlined in the 2013 document co-authored by the US Forest Service and Montana Fish Wildlife and Parks can be utilized, which provides a collaborative overview and recommendations for elk habitat management specific to the Custer Gallatin National Forest (USDA, MFWP 2013).
- Big game winter range in the Montane Ecosystem can vary considerably depending on the species using it (e.g., white-tailed deer versus elk), topography, elevation, average snow depth, climate, and local disturbance factors. Accordingly, site-specific big game winter range is best

identified through coordination with Montana Fish, Wildlife, and Parks biologists at the project level.

- Mature conifer stands (generally 10 inches or greater tree size class with at least 40 percent canopy cover) provide snow intercept, hiding, and thermal cover attributes for most big game species.
- Younger (generally less than 10 inches size class), dense (at least 40 percent canopy cover) conifer stands can provide hiding and thermal cover, but may not provide adequate snow intercept function. Hiding and thermal functionality typically improves with higher density of trees in younger stands.
- Topography (e.g., hills, swales), non-vegetative components (e.g., large rock features), deciduous trees and/or shrubs, and dead trees (standing, leaning or down) can also contribute to hiding cover, and somewhat to thermoregulation, but typically do not contribute to snow intercept function.
- Cover features (as described above) that are contiguous, or in reasonably close proximity to one another, allow big game animals to move through an area with lower energy demands than required to move long distances through deep and/or crusted snow.
- A combination of tree sizes and densities may be desirable to achieve optimal cover and forage conditions on big game winter range.
- Wind energy turbines can cause displacement, injury or fatality of birds and bats through changes in air pressure as well as animal collisions with wind turbine blades. Such impacts can be mitigated by locating wind turbines away from known migratory routes of flying species. Increasing rotor start-up wind speeds, changing the pitch angle of turbine blades, and lowering the required generator speed for electricity production are additional methods that can be used to reduce potential collisions of airborne wildlife with wind turbine structures. More information about these methods can be found in: Baerwald, E.F., J. Edworthy, M. Holder, and R.M. R. Barclay. 2009. A large-scale mitigation experiment to reduce bat fatalities at wind energy facilities. Journal of Wildlife Management 73(7): 1077-1081.

Threatened, Endangered, Proposed and Candidate Wildlife Species

Potential strategies that could be used to trend toward desired conditions for all federally listed wildlife include:

- Management strategies are shaped by recovery plans, conservation strategies, and other applicable guiding documents for federally listed species. Forest personnel are engaged in interagency efforts to protect and restore listed species and their habitats.
- Forest Service personnel can work with the US Fish and Wildlife Service in the planning and analysis of management activities, including consultation under Section 7 of the Endangered Species Act for all management actions that may affect any federally listed species.
- Forest Service personnel can participate in the development of conservation strategies for at risk species.

Benefits to People: Multiple Uses and Ecosystem Services

General Contributions to Society and Economic Sustainability

Potential strategies that could be used to trend toward desired conditions for contributions to social and economic sustainability include:

- The Forest could analyze impacts of potential management actions on contributions to well-being, quality of life and the health and safety of the public.
- The Forest could work closely with youth and underserved populations to design and implement projects that contribute to their well-being, quality of life and health and safety.

Existing local and regional economic conditions, and potential changes to direct and indirect economic contributions from the Forest, are accounted for and could help inform project planning and management of land, ecosystems and usable resources including public access.

Cultural and Historic Resources and Uses

Areas of Tribal Importance

Potential strategies that could be used to trend toward desired conditions for areas of tribal importance include:

- The Forest may coordinate with Tribes in managing traditional cultural properties, resources and sacred sites where historic preservation laws alone may not adequately protect the resources or values.
- The Forest Service may accommodate and facilitate the use of areas of Tribal importance such as sacred sites and traditional use areas (trails, campsites, plant collection locations, springs, etc.) that are essential in maintaining the cultural identity and cultural practices of Tribal communities.
- A government to government Tribal consultation protocol may be developed for each Indian Tribe that has treaty rights and/or historical ties to the Forest.
- Tribal perspectives, needs, and concerns, as well as traditional knowledge, may be incorporated into project design and decisions, as appropriate.
- The Forest Service may develop a Forest policy, in consultation with the treaty Tribes for the collection of forest products for traditional cultural and purposes.
- The Forest Service may consult with Tribes to identify sacred sites and traditional cultural locations and develop a strategy for appropriate recognition and management.
- The Forest Service may accommodate and facilitate the use of areas of Tribal importance such as sacred sites and traditional use areas (trails, campsites, plant collection locations, springs, etc.) that are essential in maintaining the cultural identity and cultural practices of tribal communities.
- In consultation with the Tribes , the Forest may undertake protective measures for areas of scenic, cultural, traditional values, and natural resources (such as plants and wildlife, minerals, fossils) identified by Tribes and traditional practitioners that occur on the Forest.

- Areas of Tribal importance including the Chalk Buttes, Crazy Mountains, Pryor Mountains, Tongue River Breaks, Chalk Buttes and North Cave Hills may be managed in close consultation with the Tribes to protect and honor Tribal reserved rights, traditional uses and sacred land.
- Where traditional cultural plant collection areas have been identified by tribal traditional users, follow the protection measures outlined for sensitive plant populations in 2006 Custer National Forest Weed Management EIS decision and 2005 Gallatin National Forest Noxious and Invasive Weed Treatment Project EIS decision or subsequent NEPA decisions. When tribal traditional users identify plant gathering areas, other protection measures may be designed to minimize effects to various aspects of the activity. These could include, but are not limited to, adjusting the timing of the treatment, adjusting the type of treatment, adjusting the treatment method (i.e. spot spraying, wick application), and/or adjusting the priority of the treatment.

Cultural and Historic Resources

Potential strategies that could be used to trend toward cultural and historic resource desired conditions include:

- A comprehensive strategy for cultural resource management may be developed to preserve and enhance significant cultural resource values and provide a structure for implementation of the Forest Plan. This historic preservation plan (HPP) may be updated as needed to reflect accomplishments and new direction.
- The Forest Service may complete or update the cultural resource overviews that include Prehistory, History and ethnographic studies for the Forest to provide a context for the cultural resources sites. These overviews may be updated at 10 year intervals to include new information and discoveries.
- The Forest Service may focus inventory efforts on the generation and refinement of site predictive and distributional models.
- The Forest Service may encourage scientific research by universities and colleges through partnership agreements as a means of acquiring additional inventory, interpretive data, and cultural resource synthesis.
- Artifacts and records may be stored in appropriate curation facilities and available for academic research, interpretation, and public education.
- Multiple property nominations, contextual nominations and Historic Districts could be emphasized for management efficiency.
- Restored historic buildings, such as cabin rental and administrative sites, could be maintained to reflect agency history, identity, and function.
- Volunteers may have opportunities to participate in cultural resource conservation activities such as research, site stabilization, protection, conservation and interpretation.
- The Forest Service could enhance and interpret significant cultural resource sites for education and enjoyment of the public when such development does not degrade the cultural resource property or conflict with other resource considerations.

Permitted Livestock Grazing

Activities and strategies that may be used to meet the desired conditions for permitted livestock grazing include:

Allotment Planning and Management

- As part of the terms and conditions of permitted grazing, the Allotment Management Plan and/or annual operating instructions are the tools used to implement Forest Plan direction.
- Allotment management plans or plan revisions are to be completed on a scheduled priority basis. Allotment management plans or permit terms and conditions are to be reviewed/updated or modified as identified through the allotment inspection process.
- Forest Service coordination with the applicable agencies is to continue on those allotments that contain State or BLM lands.
- Timing, duration, and intensity of livestock grazing are to be controlled to move toward and achieve desired conditions.
- Montana Best Management Practices for Grazing (1999) can be utilized. This publication was developed by a working group with representation from: Montana State University, Society of American Fisheries, Montana Stockgrowers Association, Montana Woolgrowers Association, USDI Bureau of Land Management, USDA Forest Service, USDA Natural Resources Conservation Service, Montana Farm Bureau, and Montana Department of Natural Resource and Conservation. It describes best management practices for livestock grazing designed to protect and enhance water quality, soils, plant communities, and other rangeland resources. It explains how and why to use best management practices to manage upland rangeland, forested rangeland, and riparian areas. Although developed for Montana, these practices also apply to the South Dakota portion of the Custer Gallatin National Forest.
- Utilization levels, stubble height, streambank disturbance, and woody stem use, etc., are all short-term indicators of grazing effects on meeting long-term upland and riparian desired conditions (i.e., vegetation composition, streambank stability). Each can be used in the appropriate situation.
    - Upland utilization criteria is to be informed from best available science, the dominant habitat type, functional groups, ecological sites (or equivalent) within the allotment pasture and local rangeland conditions (relative to site potential and capability).
    - Riparian utilization, stubble height, or streambank alteration criteria is to be informed from best available science applicable to the site. Only those indicators and numeric values that are appropriate to the site and necessary for maintaining or moving towards desired conditions are to be applied.
    - It is not appropriate to use end of season stubble height method on Rosgen channel types A, G, and woody dominated B or C end of season stubble height method is appropriate on low gradient herbaceous Rosgen channel types C and E. It is only appropriate to measure hydrophilic vegetation when using end of season riparian greenline stubble height indicators (University of Idaho Stubble Height Review Team 2005). Obligate wetland or facultative wetland species are considered as hydrophilic species appropriate for end of season stubble height measurement. Obligate wetland or facultative wetland species provide root mass needed for streambank stability. A species wetland indicator status can be determined using USDA PLANTS online database.
    - Utilization Studies and Residual Measurements Technical Reference (USDI-BLM 1996) provides an interagency approved method for measuring stubble height.

- When using streambank alteration criteria, identify the protocol being used since different protocols can produce different results. Northern Region streambank alteration protocol is a recommended protocol.
- Specific indicators and indicator values can be prescribed and adjusted, if needed, in a manner applicable to site conditions for the specific geo-climatic, hydrologic and vegetative setting in which they are being applied. Indicator values can be adapted over time based on long-term monitoring and evaluation of conditions and trends.

- Project planners for project activities in allotments (i.e., timber harvest, aspen regeneration treatments, prescribed fire) are to coordinate with rangeland managers in case adjustments are needed to grazing management or applicable techniques used to minimize resource concerns.
- Existing grazing allotments in Wilderness Areas are to be managed in accordance with wilderness values. Applicable grazing direction is found in FSM 2323.2 which includes direction from H.R. Report No. 96-1126, dated June 24, 1981. Similarly, existing grazing allotments in Forest Service recommended wilderness or backcountry areas are to be managed in accordance with concepts from this same grazing direction listed above. Designations should not prevent the maintenance of existing fences or development of other livestock management improvements necessary for the protection of the range. Where practical alternatives do not exist, maintenance or other activities may be accomplished through the occasional use of motorized equipment. Such occasional use of motorized equipment should be based on a rule of practical necessity and reasonableness, and be expressly authorized in the grazing permit.
- Combining or dividing existing allotments inside the grizzly bear recovery zone could be allowed as long as the net acreage and number of active allotments does not exceed 1998 levels. Table A-3 displays allotments and acres that are tracked as part of the 1998 Grizzly Bear Recovery Zone baseline.

Table A-3. Grizzly bear recovery zone (RZ) 1998 allotment baseline

Allotment	Status in 1998	2017 Allotment Status	Allotment Acres in RZ	Allotment Acres out of RZ	Total Allotment Acres	Percent of Allotment Acres in RZ
Green Lake	Active Cattle	Active Cattle	3557	0	3557	100
Horse Creek / Reeder Creek	Active Cattle	Active Cattle	4826	0	4826	100
Sixmile North	Active Cattle	Active Cattle	1840	2288	4128	45
Slip & Slide	Active Cattle	Active Cattle	6794	0	6794	100
South Fork	Active Cattle	Active Cattle	154	0	154	100
Tom Miner / Ramshorn	Active Cattle	Active Cattle	14602	7	14609	100
Watkins Creek	Active Cattle	Active Cattle	3496	0	3496	100
Wigwam	Active Cattle	Active Cattle	2762	0	2762	100
Cinnamon North	Active Horse	Active Horse	1378	0	1378	100
Cinnamon South	Active Horse	Active Horse	2120	0	2120	100
Grayling Creek	Active Horse	Active Horse	115	0	115	100
Moose	Active Horse	Active Horse	18	0	18	100

Allotment	Status in 1998	2017 Allotment Status	Allotment Acres in RZ	Allotment Acres out of RZ	Total Allotment Acres	Percent of Allotment Acres in RZ
Sage Creek	Active Horse	Active Horse	14650	0	14650	100
Taylor Fork	Active Horse	Active Horse	932	0	932	100
Current Active Allotment Subtotal			**57244**	**2295**	**59539**	
Percent of Total			**21%**			
Cottonwood	Vacant Cattle	Vacant Cattle	2199	0	2199	100
Lion Creek	Vacant Cattle	Vacant Cattle	6999	0	6999	100
Mill Creek	Active Cattle	Vacant Cattle	800	0	800	100
Section 22	Active Cattle	Vacant Cattle	586	0	586	100
Sixmile South	Vacant Cattle	Vacant Cattle	6456	0	6456	100
Current Vacant Allotment Subtotal			**17040**	**0**	**17040**	
Percent of Total			**6%**			
Basin	Active Cattle	2015 Closure - Cattle*	59	0	59	100
Beaver Creek	Active Cattle	2016 Closure - Cattle	713	6350	7063	10
Cache / Eldridge	Active Cattle	2015 Closure - Cattle	7606	0	7606	100
Canyon	Vacant Cattle	2007 Closure - Cattle	4105	365	4470	92
Cedar Creek	Vacant Cattle	2007 Closure - Cattle	8233	0	8233	100
Dry Gulch	Vacant Cattle	2008 Closure - Cattle	1421	0	1421	100
Duck Creek	Vacant Cattle	2008 Closure - Cattle	930	0	930	100
Horse Butte	Active Cattle	2009 Closure - Cattle	2200	0	2200	100
Little Trail Creek	Vacant Cattle	2007 Closure - Cattle	2683	0	2683	100
Ousel Falls	Vacant Cattle	2016 Closure - Cattle	8170	11576	19746	41
Park	Active Cattle	2007 Closure - Cattle	14647	0	14647	100
Red Canyon	Vacant Cattle	2015 Closure - Cattle	5227	0	5227	100
Sentinel Butte	Active Cattle	2007 Closure - Cattle	570	0	570	100
Sulphur Springs	Active Cattle	2015 Closure - Cattle	257	0	257	100
Wapiti	Active Cattle	2015 Closure - Cattle	7376	0	7376	100

Allotment	Status in 1998	2017 Allotment Status	Allotment Acres in RZ	Allotment Acres out of RZ	Total Allotment Acres	Percent of Allotment Acres in RZ
Ash / Iron Mountain	Active Sheep	2006 Closure - Sheep	75002	0	75002	100
Haystack	Active Sheep	2009 Closure - Sheep	16568	0	16568	100
Lionhead	Vacant Sheep	2008 Closure - Sheep	5730	0	5730	100
Meatrack/Carbonate	Vacant Sheep	2009 Closure - Sheep	18202	6778	24980	73
Two Top	Vacant Sheep	2008 Closure - Sheep	3710	1004	4713	79
University	Vacant Sheep	2008 Closure - Sheep	15074	0	15074	100
Current Closed Allotment Subtotals			**198483**	**26073**	**224555**	
Percent of Total			**73%**			
Grand Total			**272767**	**28368**	**301135**	

* Basin cattle allotment on the Hebgen Lake District consisted of two units, West and East. When the allotment was closed, 34 acres of the West Unit was closed to permitted livestock grazing, and the 25 acres of the East Unit was added to the Basin Administrative site to be used as administrative pasture for minor periodic government stock use.

Allotment Inspections

- Rangeland inspections are to be conducted annually on selected allotments to determine the degree of compliance with NEPA decisions, grazing permits, allotment management plans, and/or annual operating instructions, and could provide monitoring information for initiating changes or improvements, as applicable.
- National Forest permittees are to be encouraged to participate in allotment inspections to help resolve problems on the ground.
- It is recognized that in some of the smaller pastures that salt and/or supplement placement one-quarter (1/4) mile away from groundwater-dependent ecosystems, streams, water developments, aspen stands, green ash draws, special habitats and/or populations of at-risk plant species may not be feasible. In these instances, placement needs to be as far away from these areas as possible in order to minimize livestock impacts. In some instances, limited salting within ¼ mile from some of these resources may be necessary to achieve resource goals and objectives.
- Consider removing excess salt or mineral blocks in areas of human concentration to minimize conflicts with wildlife, such as bison, bears and cougars which may be attracted to livestock supplements.

Allotment Infrastructure

- A continuing three-five year program of range improvement project needs are to be identified by each managing district.

- The highest priority for allocation of funding for wells and pipelines are for those that improve livestock distribution, that provide stock water to the largest area, or that provide offsite water developments to reduce impacts to riparian/wetland areas.
- The highest priorities for the allocation of funding for nonstructural range improvements are for projects which reduce the percent composition of undesirable plant species and to improve desirable species over the long-term.
- To help with livestock management and rotation integrity, consider placing signs near gates instructing visitors on proper gate management, especially in areas of high visitor use.
- Consider screening new grazing infrastructure by use of terrain or vegetation to minimize visual impacts, where feasible.
- Consider decommissioning stock water impoundments that are no longer needed to restore the hydrologic conditions of those drainages.
- Grazing permit holders could continue to be required to maintain structural range improvements assigned to them by their permit.
- If an improvement is found to be damaged or deteriorated through lack of assigned maintenance and care, it is the permittee's sole responsibility to reconstruct to Forest Service specifications.
- Rangeland improvement reconstruction required for the management of the rangeland resource may be cost-shared between the Forest Service and grazing permittees when:
    - A determination has been made that the improvement is necessary for the management of the rangeland resource.
    - The improvement is damaged by: 1) an unforeseen incident due to natural causes, 2) theft, or 3) vandalism.
    - The improvement has been properly maintained, but has exceeded its life expectancy.

Energy and Minerals

When attempting to portray proposed and possible mineral and energy actions which may take place over the life span of the Custer Gallatin National Forest Plan, it is important to note that much of this type of activity is driven by the minerals industry. Via existing law, regulation, and policy, the task of the Forest Service is to accept, review, approve, administer, and ensure site reclamation in places where these types of activities take place.

The portrayal of proposed and possible actions related to mineral and energy cannot be precise. The timing, amount and scope of proposed and possible actions could be determined based on commodity prices, environmental constraints, societal demand and generally, the “cost of doing business”. The Forest has discretion pertaining to geologic resources and geologic hazards management.

Potential strategies that could be used to trend toward desired conditions for energy and mineral use include:

- The Forest Service could process and administer a variety of mineral and energy proposals during the life span of the Forest Plan. Locatable mineral proposals are anticipated to be principally located in the Absaroka-Beartooth Geographic Area. Additionally, the Forest could

process and administer some leasable mineral (oil/gas/coal) proposals principally located in the eastern portions of the Forest.

- The Forest could make available for public use and enjoyment a number of geologic resources and opportunities such as personal us mineral material collection and geological interpretive opportunities.
- The Forest could assess and manage geologic hazards such as abandoned mine lands, naturally occurring hazardous fibers and radio-active particulates.
- Abandoned Mine Lands could be identified, assessed and reclaimed in order to protect the natural and human environments surrounding them comparable to adjacent lands and/or pre-mining site conditions.
- Cave and karst resources could be managed to perpetuate existing natural features, characteristics, and values in conformance with the Federal Cave Resource Protection Act.
- Paleontological resources could be managed in conformance with the Paleontological Resource Preservation Act

Recreation Settings, Opportunities, Access, and Scenic Character

Potential management approaches 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 that could be used to trend toward desired recreation conditions include:

Sustainable Recreation

- Integrated resource planning during projects to respond to changing conditions in recreation settings.
- Management strategies to mitigate recreation use and resource conflicts.
- Where administrative boundaries meet, coordinate trail construction, rerouting, improvement and maintenance with cooperating or affected agencies.
- Encouraging mass transit opportunities to major recreational destinations or events where feasible.
- Collaborating with local communities, partner organizations, and federal, state, local and tribal agencies to restore, maintain and enhance recreation settings impacted by climate change, declining ecosystem health, wildfire and inappropriate use, in order to improve the quality of outdoor experiences and to promote citizen stewardship of public lands.
- Effectively managing concentrated recreation use; provide a quality visitor experience while managing ecosystem effects within sustainable levels.
- Collaborating with neighboring communities, partner organizations, state and local agencies, tribes and adjacent Forest Service and National Park Service units to provide recreation opportunities that are economically, socially and environmentally sustainable. Work to harmonize direction that affects users to the extent practical in order to minimize confusion when crossing administrative boundaries.

- Actively engaging urban populations, youth and underserved communities in outreach programs, such as conservation education, recreation and volunteer programs, to help people connect to the benefits of national forests and develop stewardship of public lands.
- Exploring partnership opportunities with user groups and seek reliable information sources outside of the agency to improve data collection and data management on recreation use and demand.
- Strategically engaging volunteers and partners to prioritize and complete deferred maintenance and to engage in resource stewardship and restoration.
- Making determinations about how increasing human populations and associated levels and types of use are affecting the Forest. Noting changes in trends of desired recreation opportunities and managing opportunities responsively, which may or may not mean increasing capacity to accommodate growth.

Settings – Recreation Opportunity Spectrum

- Developing 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.
- Integrating recreation opportunity spectrum settings into project level designs and management decisions.

Developed Recreation Sites

- Resolving recreation and wildlife conflicts within developed sites through proper food storage facilities, signage, education, timing and/or use restrictions, location (or re-location) of developed sites, wildlife habitat alteration to discourage wildlife use within/near developed sites and/or to encourage wildlife use in areas away from developed sites.
- Addressing 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.
- Modifying existing developed recreation facilities, and developing new facilities to accommodate the diversity of cultures, abilities, family structures and preferred activities of current populations who could benefit from recreation opportunities.

Dispersed Recreation

- Where visitor use is accommodated, seeking opportunities to proactively rehabilitate, design, reconstruct, and harden the site; locate new facilities and areas for redistributing human use away from sensitive resources.
- Where visitor use is restricted, limiting or controlling use at developed recreation sites and areas through permit system (e.g., group campgrounds). When other actions are ineffective, enacting and enforcing forest orders to protect sensitive resource areas through use of seasonal or temporary closures of developed recreation sites and areas. Seeking opportunities to proactively design and locate new facilities and areas for re-distributing human use away from sensitive resources.
- Where visitor use is prohibited when seasonal or temporary closures are ineffective, enacting and enforcing forest orders to close recreation sites or areas. If monitoring and evaluation

indicate that closure is ineffective, taking steps to decommission facilities and permanently discontinue visitor use.

- Emphasizing sustainable alternatives for refuse management that protect the recreation experience in all settings including messages of visitor responsibility and pack-in, pack-out guidance in lightly used developed recreation areas and dispersed recreation areas.
- Addressing dispersed campsites with erosion and/or sanitation issues. Prioritizing rehabilitation needs by focusing on dispersed campsites located near river or stream corridors.
- Developing closure orders for dispersed recreation areas where visitor safety is at risk or changes need to be made to avoid or rehabilitate environmental impacts.
- Informing and educating users about Leave No Trace techniques for responsible, outdoor activities with minimal impacts on National Forest lands.
- Close and rehabilitate, or otherwise mitigate, dispersed recreation sites when conditions deteriorate to an unacceptable level and cannot be managed to Forest Service standards. Conditions could include unacceptable environmental damage, visitor conflicts and overcrowding.
- Seasonally provided sanitation facilities, such as portable toilets, could be provided in areas where available service makes them a valid type of facility to provide, especially to protect riparian areas from the impacts of human waste.

Opportunities – Recreation Special Uses

- An Open Season system could be implemented to resolve capacity to facilitate permits. Also due to the lack of resource capacity to accommodate all requests.

Recreation Residences

- An easily available public format, with recreation residence-specific information and forms, could be maintained for use by permit holders, real estate agents and potential buyers.
- Administration of recreation residence permits is reasonably consistent across the Forest and is guided by the Custer Gallatin National Forest Handbook Supplement which is updated regularly.

Visitor Education/Interpretation

- Education programming promotes conservation, stewardship, and understanding of natural resources and ecological processes (such as watershed, fisheries, native plants, fire ecology, and wildlife) as well as cultural resources on public lands. Conservation education efforts are experiential, contemporary, and culturally and generationally-relevant.
- Educational media focused on wildlife safety could be available for visitors with little previous experience.
- The Forest could use a variety of media to seasonally focus educational messages to hunters on what to expect and how to interact with permittee activities on active range allotments, such as closing gates and not shooting near livestock.
- Interpretive and educational materials could be published in a variety of languages likely used by visitors.
- Developing interpretive and environmental education programs about sensitive resources and habitats for the public, Forest Service personnel, concessionaires, other special-use

authorization holders, and volunteers. Engaging the services of special-use authorization holders that provide services to the public (i.e., concessionaires, organization camps, outfitter guides) to assist in the development and delivery of these programs. Providing authorization holders with messages about sensitive resources and management issues so that they can use them to educate people. Ensuring that the methods chosen do not result in unacceptable effects to sensitive resources. Coordinating efforts between national forests for maximum results and cost efficiencies. Using existing visitor centers where appropriate.

Emerging Recreational Technologies

- New technology and recreational products could be evaluated and reviewed by the agency and public to consider if and where to incorporated them into the National Forest landscape.

Scenic Character

Potential strategies that could be used to trend toward desired conditions for scenery include:

- Consult the National Forest Landscape Management Chapter 2 volumes for project-specific ideas to meet or exceed Forest Plan SIOs. These include: Chapter 2 “Utilities”, Chapter 3 “Range”, Chapter 4 “Roads”, Chapter 5 “Timber”, Chapter 6 “Fire”, Chapter 7 “Ski Areas”; Chapter 8 “Recreation”. While these chapters date from the 1970s and 1980s, many of the suggested approaches to scenery management and mitigation of impacts to the scenery are still useful.
- Tailor application of the SIOs for Moderate, Low or Very Low to each new project by conducting a project-specific visibility analysis from the applicable mapped Concern Level 1 and 2 travel ways and viewpoints, considering each area’s respective scenic character, the distance zones, each landscape’s inherent scenic attractiveness and the visual absorption capability of the area relative to each specific proposal.
- Review visual elements, such as line, form, color, texture and visual magnitude which all affect the discernibility and visual dominance of landscape modifications from the applicable mapped Concern Level 1 and 2 travel ways to determine whether a completed project has met the assigned SIO.
- Consider opportunities to improve the scenery as part of vegetation treatment and fuels reduction projects, especially in areas that do not meet established scenic integrity objectives.
- Use integrated resource planning during projects to respond to changing scenery conditions that affect scenic character and integrity. Improve and perpetuate valued scenic attributes through ecological restoration activities that lead to scenic stability and integrity.
- Consider a variety of approaches to meet or exceed the scenic integrity objectives.
- Use examples of naturally-occurring line, form, color, texture and patterns from surrounding landscapes to reduce the discernibility of landscape modifications resulting from management actions.
- Reduce the long-term discernibility of timber harvest or fuel reduction work by shaping the edges to avoid unnatural-appearing geometric shapes or lines; transitioning the edges by decreasing or increasing amount of removal along unit edges; reducing the vertical wall-of-trunks effect by leaving younger trees along unit edges; aiming for treatment over a larger mosaic area vs smaller intensely-treated units; and linking created openings to natural openings wherever possible.

- Aim to reduce the visual contrast of new facilities with their surroundings by carefully choosing colors, non-reflective, textured materials, facing inherently shiny, reflective or lit-up elements (such as windows or lights) away from viewers.
- Incorporate the tools of visual absorption capability and visual magnitude into project work.
- Refer to the Management Approaches section in this document on “Soils” to reduce the visual dominance of roads and landings that are visible in the foreground.

Designated Areas

Potential strategies that could be used to trend toward desired conditions and the nature and purposes for which areas were designated include:

Designated Wilderness

- Management solutions to address eroding wilderness character could use holistic approaches and the minimum tools necessary to stabilize, or improve wilderness character. When resources are limited, priority may be given to stabilizing or improving wilderness character in the most pristine zones of the wilderness and places where impacts are expanding, over addressing concentrated use areas where longstanding effects of human influence are apparent (transition zones).
- Zone/Opportunity Class I (PRISTINE)-More heavy-handed, formal rules and regulations may be necessary to achieve management objectives, but are only considered when less restrictive measures have consistently failed to achieve management objectives. Permanent signs are used only at trail junctions. Temporary Regulatory signs may be necessary to protect the resource or public safety. Trails are managed to accommodate low to moderate traffic.
- Campsites or user created routes that adversely affect water quality or exceed established density or disturbed area standards could receive treatments that promote passive restoration to natural conditions.
- The Forest Service could weigh effects to opportunities for unconfined recreation when developing new regulations that restrict recreation.

Continental Divide National Scenic Trail

- Encouraging trail partners and volunteers to assist in the planning, development, maintenance, and management of the trail, where appropriate and as consistent with the CDNST Comprehensive Plan.
- Evaluating proposed trail relocations or new trail segment locations using CDNST optimal location criteria.
- Identifying and pursuing opportunities to acquire lands or rights-of-way within or adjacent to the CDNST corridor.
- Considering how activities outside the visible foreground may affect CDNST viewsheds and user experiences, and mitigating potential impacts to the extent possible.
- Providing consistent signage along the trail corridor at road and trail crossings to adequately identify the trail, and providing interpretive signs at key trail entry points and limited historic and/or cultural sites to orient visitors and enhance the visitor experience.

- Ensuring Incident Commanders are aware of the CDNST as a resource to be protected during wildfire suppression activities, and clearly identifying fire suppression rehabilitation and long term recovery of the CDNST corridor as high priorities for Incident Commanders, BAER Team Leaders and post-fire rehabilitation efforts.
- Establishing appropriate carrying capacities for specific segments of the CDNST, monitoring use and conditions, and taking appropriate management actions to maintain or restore the nature and purposes of the CDNST if the results of monitoring or other information indicate a trend away from the desired condition.

National Recreation Trails

- The Forest could evaluate all currently listed National Recreation Trails to ensure they are being managed under the correct designation.

Research Natural Areas

An objective of the Forest Service's research natural area program is to maintain a representative array of all significant natural ecosystems as baseline areas for research and monitoring. The Custer Gallatin National Forest has ten established Research Natural Areas. The Region 1 Natural Areas Assessment recommended new research national area targets for each forest based on plant community type and priority and its likelihood of occurring on a particular forest. (Chadde, S.W., S.F. Kimball and A.G. Evenden. 1996. Research Natural Areas of the Northern Region: Status and Needs Assessment. USDA Forest Service, Missoula, Montana (unpublished). 179 pp. Although *Pinus ponderosa* / *Agropyron spicatum* and *Pinus ponderosa* / *Prunus virginiana* show up as a target in Chadde, et. al., they are represented in Poker Jim RNA.)

Potential strategies that could be used to trend toward desired conditions for Research Natural Areas include:

- Field inventories are needed to identify whether these plant community types occur and, if so, where they are located on the Custer Gallatin National Forest. As opportunities arise, inventories could be conducted and the process for establishing additional research natural areas could be pursued. Potential strategies to conduct inventories may include partnering with non-agency groups or organizations to locate and inventory rare plant communities.
- Table A-4 and Table A-5 display the unfilled plant community type research natural area target recommendations and the associated priority ranking for the Custer Gallatin National Forest resulting from the Region 1 assessment.

Table A-4. Unfilled community type target recommendations for Custer portion of Custer Gallatin NF and priority ranking

Class	Community Type	Likelihood of Occurring	Priority
Forest and Woodland	*Fraxinus pennsylvanica-(Ulmus americana) / Prunus virginiana series*	Ashland & Sioux Districts	Moderate
Forest and Woodland	*Fraxinus pennsylvanica/Prunus virginiana*	Ashland & Sioux Districts	High
Forest and Woodland	*Fraxinus pennsylvanica / Symphoricarpos occidentalis*	Ashland & Sioux Districts	Moderate
Forest and Woodland	*Juniperus scopulorum / Agropyron spicatum*	Beartooth, Ashland, & Sioux Districts	Moderate

Class	Community Type	Likelihood of Occurring	Priority
Forest and Woodland	*Pinus ponderosa / Carex heliophila*	Sioux District	High
Forest and Woodland	*Pinus ponderosa / Festuca idahoensis*	Ashland District	High
Forest and Woodland	*Pinus ponderosa/ Juniperus communis*	Ashland & Sioux Districts	Moderate
Forest and Woodland	*Populus angustifolia / Cornus stolonifera*	Beartooth District	Moderate
Forest and Woodland	*Populus deltoides/Cornus stolonifera*	Beartooth, Ashland, & Sioux Districts	Moderate
Forest and Woodland	*Populus tremuloides communities*	Beartooth, Ashland, & Sioux Districts	Moderate
Shrubland	*Artemisia cana/Agropyron smithii*	Ashland & Sioux Districts	Moderate
Shrubland	*Artemisia cana/Festuca idahoensis*	Ashland District	Moderate
Shrubland	*Artemisia tridentata/Agropyron smithii*	Beartooth, Ashland, & Sioux Districts	Moderate
Shrubland	*Artemisia tridentata/Agropyron spicatum*	Beartooth, Ashland, & Sioux Districts	Moderate
Shrubland	*Artemisia tridentata - Atriplex confertifolia*	Beartooth District	Moderate
Shrubland	*Potentilla fruticosa/Andropogon scoparius*	Ashland District	High
Shrubland	*Rhus aromatica/Agropyron spicatum*	Beartooth, Ashland, & Sioux Districts	Moderate
Shrubland	*Rhus aromatica/Festuca idahoensis*	Beartooth &Ashland Districts	Moderate
Shrubland	*Rhus aromatica/Muhlenbergia cuspidata*	Ashland & Sioux Districts	Moderate
Shrubland	*Sarcobatus vermiculatus/Agropyron smithii*	Sioux District	Moderate
Shrubland	*Sarcobatus vermiculatus/Agropyron spicatum*	Sioux District	Moderate
Shrubland	*Shepherdia argentea*	Ashland & Sioux Districts	Moderate
Shrubland	*Symphoricarpos occidentalis*	Beartooth, Ashland, & Sioux Districts	Moderate
Dwarf Shrubland	*Artemisia arbuscula/Agropyron smithii*	Beartooth District	Moderate
Dwarf Shrubland	*Artemisia arbuscula/Agropyron spicatum*	Beartooth District	Moderate
Dwarf Shrubland	*Juniperus horizontalis/Andropogon scoparius*	Ashland & Sioux Districts	Moderate
Dwarf Shrubland	*Juniperus horizontalis/Carex heliophila*	Sioux District	Moderate
Herbaceous Vegetation	*Agropyron smithii - Carex filifolia*	Sioux District	Moderate

Class	Community Type	Likelihood of Occurring	Priority
Herbaceous Vegetation	*Agropyron spicatum - Agropyron smithii*	Ashland District	High
Herbaceous Vegetation	*Agropyron spicatum - Bouteloua curtipendula*	Ashland District	High
Herbaceous Vegetation	*Agropyron spicatum - Carex filifolia*	Ashland District	High
Herbaceous Vegetation	*Carex scopulorum*	Beartooth District	Moderate
Herbaceous Vegetation	*Distichlis spicata*	Sioux and Ashland Districts	Moderate
Herbaceous Vegetation	*Festuca idahoensis - Carex heliophila*	Ashland District	High
Herbaceous Vegetation	*Scirpus acutus*	Sioux and Ashland Districts	Moderate
Herbaceous Vegetation	*Spartina pectinata*	Sioux and Ashland Districts	Moderate
Herbaceous Vegetation	*Stipa comata - Carex filifolia*	Sioux and Ashland Districts	Moderate
Herbaceous Vegetation	*Scirpus acutus*	Sioux and Ashland Districts	Moderate
Herbaceous Vegetation	*Typha latifolia*	Sioux and Ashland Districts	Moderate

Note: Chapter 10 (Chadde et al, 1996 pp 145-147 and pers. Comm. Steve Shelly, 2016 to sort out non-applicable Dakota Prairie National Grassland types.)

Table A-5. Unfilled community type target recommendations for Gallatin portion of Custer Gallatin NF and priority ranking

Class	Community Type	Likelihood of Occurring	Priority
Dwarf Shrubland	*Artemisia arbuscular / Agropyron smithii*	Gardiner & Hebgen Districts	Moderate
Dwarf Shrubland	*Artemisia arbuscular / Agropyron spicatum*	Gardiner & Hebgen Districts	Moderate
Dwarf Shrubland	*Artemisia arbuscular / Festuca idahoensis*	Gardiner & Hebgen Districts	Moderate
Shrubland	*Potentilla fruticosa / Festuca idahoensis*	All Districts	High
Herbaceous Vegetation	*Agropyron spicatum-Bouteloua gracilis*	All Districts	High
Herbaceous Vegetation	*Festuca idahoensis - Stipa richardsonii*	All Districts	High

Note: Chapter 11 Chadde et al, 1996 pp 148-149 and pers. Comm. Steve Shelly, 2016; *Carex scopulorum* may be present in Line Creek Plateau and Lost Water Canyon RNAs.

Chapter 12 The overall approach for management of research natural areas is expressed by a cooperative relationship between the Forest Service and the Rocky Mountain Research Station (see the work of Evenden and others for additional information on research natural areas). The Research Station Director, with the concurrence of the Forest Supervisor, may authorize management practices that are necessary for invasive weed control or to preserve the vegetation for which the research natural area was created (Forest Service Manual 4063.3). As stated in the manual, limited use of vegetation management may occur within research natural areas, in situations where the vegetative type would be lost or degraded without management. The criterion is that management practices provide a closer approximation of the naturally occurring vegetation and the natural processes governing the vegetation than would be possible without management. These practices may include prescribed burning. (Evenden, A.G., M. Moeur, J.S. Shelly, S.F. Kimball and C.A. Wellner. 2001. Research Natural Areas on National Forest System Lands in Idaho, Montana, Nevada, Utah, and Western Wyoming: A Guidebook for Scientists, Managers, and Educators. Gen. Tech. Rep. RMRS-GTR-69. USDA, Forest Service, Rocky Mountain Research Station. Ogden, Utah. 84 pp.)

- In the case of unplanned ignitions that occur in or near research natural areas, consider that natural process of fire is desirable in research natural areas, but may also have potential impacts on plant communities at risk. These impacts would generally be considered acceptable (unless the fire severity is considered outside natural range of variation), but it is recommended to consult research natural area establishment records, manual direction (i.e., Forest Service Manual 4063) and Rocky Mountain Research Station personnel for additional guidance with fire management.
- Past fire suppression has affected ecological conditions in Poker Jim RNA. Colonization of forest vegetation into openings and meadows has occurred. Fencing may be needed to keep livestock use as only incidental to no use. Poker Jim RNA likely does not provide optimum conditions for which it was set aside and further review is warranted to determine whether management can restore the features for which the area was established.
- Management actions such as identifying the RNA on maps distributed to the general public or signing the areas as RNAs would typically not be done so as to not encourage recreational use.

Special Areas

Potential strategies that could be used to trend toward desired conditions for Special Areas include:

- Black Sand Springs and Bangtail Special Areas. Due to the high value for biological integrity of these two designated areas, invasive species control in and around these areas could be a high priority.
- New candidate Special Areas could be considered based upon local knowledge of vegetation types or identified rare elements and features. Field surveys would be needed to identify candidate sites.

Pryor Mountain Wild Horse Territory

Potential strategies that could be used to trend toward desired conditions for the Wild Horse Territory include:

- The interagency herd management area and territory plan provides operational decisions and direction for management of the Pryor Mountain wild horses and range.
- The north boundary buck and rail fence is to be maintained to keep wild horses within their designated lands and prevent wild horse access into the Lost Water Canyon Research Natural Area and Lost Water Canyon recommended wilderness.
- Burnt Timber Road #2849 and the two long-term rangeland study exclosures are important to retain for wild horse management. The historic horse trap adjacent to the Burnt Timber Road are important to retain for cultural/historical purposes.
- Drone use can be allowed for administrative purposes or in approved research projects. If recreational or commercial drone use harasses wild horses, consider issuing a citation under 36 CFR 261.23(b) which prohibits harassment or inhumane treatment of wild horses.

Lands Status and Ownership, Land Uses, and Access Patterns

The strategy for lands management could include the following elements:

- Adjust land ownership through purchase, exchange or other authority, to protect resources and improve efficiency of management.
- Consider the following criteria when evaluating land acquisition:
    - Lands that can contribute to recovery of threatened or endangered species.
    - Lands important for wildlife connectivity and big game winter range.
    - Lands needed for the protection of important historical or cultural resources.
    - Lands that enhance recreation, public access, and protection of aesthetic values.
    - Lands within designated Wilderness.
    - Lands that contain rivers with potential for Wild and Scenic designation.
    - Other environmentally sensitive lands.
    - Lands that reduce expenses and support logical and efficient management.
- Consider the following criteria when evaluating lands for conveyance:
    - Lands and administrative buildings adjacent to communities that are chiefly valuable for non National Forest uses.
    - Lands with low resource value.
    - Inaccessible, isolated, or intermingled ownership parcels.
    - Lands with long-term, special use permits that are not consistent with national forest purposes and character.
    - Lands not logical or efficient to manage.
    - Lands eligible under the Small Tracts Act.
    - Prioritize National Forest land boundary surveys to areas where trespass is most likely.
    - New communication uses (cellular, FM radio, internet service provider, etc.) should be co-located in an existing site that has an approved communication site management plan.

- Tools to help minimize effects of authorized facilities or improvements to fish, water and riparian resources may include requirements for screens, headgates, diversion monitoring devices, or fish-bypass systems in the authorization.

Infrastructure

Potential strategies that could be used to trend toward desired conditions for infrastructure include:

- The road system is routinely evaluated for the most appropriate road agency jurisdiction. Mechanisms are in place to adjust jurisdictions as identified or needed.
- Road Management Objectives (RMO's) are established for each road and Trail Management Objectives (TMO's) are established for each trail to guide the operation and maintenance activities on the road or trail.