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Appendices for the Land Management Plan

Custer Gallatin National Forest

Custer Gallatin National Forest Title Page: Photo Credit Top left to right – Custer Gallatin National Forest Title Page: Photo Credit – Mariah Leuschen-Lonergan. Top left, going clockwise – Coneflower, Echinacea, native wildflowers, Sioux Ranger District; American Flag and U.S. Forest Service Flag displayed in winter on the Hebgen Lake Ranger District; Packing trip in the Absaroka-Beartooth Wilderness, Yellowstone, Gardiner and Beartooth Ranger Districts, photo by Terry Jones; Elk grazing on the Gardiner Ranger District with sagebrush in background, foreground; Bison grazing in the Greater Yellowstone Ecosystem with Arrowleaf Balsamroot in background, Gardiner and Hebgen Lake Ranger Districts; Center - Close up of Indian Paintbrush, Bozeman Ranger District; View looking into the Rock Creek drainage and Absaroka-Beartooth Wilderness atop Beartooth Pass, Beartooth Ranger District; Rafting on the Gallatin Wild and Scenic River, Gallatin Canyon, Bozeman Ranger District, Calf nursing from Mother (Cow), Multiple use grazing allotments are a critical economic and social fabric of the Ashland and Sioux Ranger Districts; Holiday Christmas Tree gathering is a long-standing tradition for many Montana families, passed down from generation to generation, Bozeman Ranger District, Custer Gallatin National Forest.

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Appendices for the Land Management Plan

Custer Gallatin National Forest

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Appendix A: Potential Management Approaches and Possible Actions

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 Custer Gallatin National Forest is proposing as helpful to make progress in achieving its desired conditions. The potential strategies and approaches are not all-inclusive, nor are they commitments to perform particular actions.

The land management plan for the Custer Gallatin National Forest employs a strategy of adaptive management in its decision making and achievement of 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 based on 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 strategies, and approaches the Custer Gallatin National Forest 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, to be responsive to results of new research, practical experience, and other information and observations.

This appendix also provides information intended to clarify the intent underlying plan direction 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 national forest that are most appropriately addressed at the level of project analysis.

This appendix does not commit the Custer Gallatin National Forest 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.

Possible Forest Management Actions and Timber Harvest

As required by the 2012 Planning Rule, this section identifies the possible actions and proportion of probable methods of forest vegetation management practices expected to be used to achieve desired timber harvesting levels and outputs. The identification of possible actions includes an estimate of timber harvesting levels anticipated over the next 1 to 2 decades, but does not include speculation about the specific amount, frequency, location, magnitude, or numbers of actions during the plan period. Estimated acres of treatment and associated timber product outputs [reported in million cubic feet (mmcf) and million board feet (mmbf)] were determined through use of the PRISM model. This model is an analytical tool used to evaluate vegetation management scenarios that achieve resource objectives. Among other things, the model provides an estimate of the level of timber products expected and the management practices applied to achieve that level, given a set of inputs that includes existing and desired vegetation conditions, budget and resource constraints, and expected vegetation change.

Table 1 displays the acres of harvest expected for the first and second decades of the plan period. Production of sawtimber and other wood products is expected through commercial timber harvest, which includes even-aged regeneration harvests (such as clearcut, seedtree, shelterwood) and other harvests (such as thinning and uneven-aged harvests). The appropriate harvest methods would be based upon site-specific determinations made during project planning and documented in a silvicultural prescription. Expected harvest levels are shown with and without a constraint based on reasonably foreseeable budget levels. The revised plan will provide guidance for project and activity-level decision making on the forest for approximately the next 15 years.

Table 1. Projected acres of vegetation treatments, average annual over the first two decades

Activity	With Budget Constraint	Without Budget Constraint
Even-aged Regeneration Harvest	322	564
Intermediate Harvest	757	1,453
Other Mechanical Treatments (such as, precommercial thinning and fuels treatments)	2,477	3,929
Prescribed Fire	2,828	3,030
Total Acres Treated	6,386	8,977

Table 2 displays the projected timber sale quantity (PTSQ), for products meeting utilization standards and the projected wood sale quantity (PWSQ), for all wood products including fuelwood or biomass that do not meet timber product utilization standards. Volumes include harvest that occurs on lands suitable for timber production as well as lands that are not suitable. As required by the 2012 Planning Rule, the estimates consider the fiscal capability of the planning unit and are consistent with all plan components. Timber outputs may be larger or smaller on an annual basis, or over the life of the plan, if budget or other constraining factors change in the future. To provide context for the levels that may be possible if budgets increase in the future, Table 3 displays the potential timber quantities that may be possible without a reasonably foreseeable budget constraint, but still consistent with all plan components.

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

Category and Decade	Decade 1 (mmcf)	Decade 1 (mmbf)	Decade 2 (mmcf)	Decade 2 (mmbf)
Timber Products (A1). Lands suitable for timber production	1.86	9.5	1.87	9.5
Timber Products (A2) Lands not suitable for timber production	0.1	0.5	0.1	0.5
Projected Timber Sale Quantity[1] (A1 plus A2)	1.96	10	1.97	10
Other Wood Products (B). All lands	1.57	8	1.57	8
Projected Wood Sale Quantity[2] (A1 plus A2 plus B)	3.53	18	3.54	18

Note: mmcf = million cubic feet; mmbf = million board feet.

1. Potential Timber Sale Quantity (PTSQ) – Volume, other than from salvage or sanitation treatments, that meet timber product utilization standards, from lands suitable and not suitable for timber production.
2. Volume of all Other Wood Products – Fuelwood, biomass, and other volumes that do not meet timber product utilization standards.

Table 3. Projected timber sale program, annual average volume outputs for the first and second decades of the plan period, unconstrained by reasonably foreseeable budget

Category and Decade	Decade 1 (mmcf)	Decade 1 (mmbf)	Decade 2 (mmcf)	Decade 2 (mmbf)
Timber Products (A1). Lands suitable for timber production	4.19	20.64	3.98	20.16
Timber Products (A2) Lands not suitable for timber production	0.41	2.06	0.5	2.54
Projected Timber Sale Quantity[1] (A1 plus A2)	4.6	22.7	4.49	22.7
Other Wood Products (B). All lands	2.17	11.8	2.28	11.8
Projected Wood Sale Quantity[2] (A1 plus A2 plus B)	6.77	34.5	6.77	34.5

Note: mmcf = million cubic feet; mmbf = million board feet.

1. Potential Timber Sale Quantity (PTSQ) – Volume, other than from salvage or sanitation treatments, that meet timber product utilization standards, from lands suitable and not suitable for timber production.
2. Volume of all Other Wood Products – Fuelwood, biomass, and other volumes that do not meet timber product utilization standards.

All projected timber outputs are below the sustained-yield limit, which is the volume that can be produced in perpetuity on lands that may be suitable for timber production. The calculation of the sustained-yield limit is not limited by land management plan desired conditions, other plan components, or the planning unit's fiscal capability and organizational capacity. The sustained-yield limit was calculated using the PRISM model for each proclaimed national forest separately and was determined to be 3.16 million cubic feet (15.3 million board feet) annually on the Custer National Forest and be 4.92 million cubic feet (22.95 million board feet) annually on the Gallatin National Forest.

Potential Management Strategies and Approaches for Ecosystem Resources

Air Quality

Wildfires in the Western United States 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.

Most atmospheric pollutants that deposit on or affect national 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 Custer Gallatin has the ability to reduce the impacts of air pollution on the national forest by working with State and Federal agencies and participating in New Source Review including prevention of significant deterioration permit review, National Environmental Policy Act, 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 important to communicate information to help protect National Forest System lands.

Planned Fires

Participation in the Montana/Idaho Airshed Management Group. The objective of this interagency group partnership is to manage and limit the impacts of smoke generated from necessary prescribed burning through the region. Participation in this group includes processes for proper permitting to conduct operations, and coordination at a regional scale to assess and avoid cumulative impacts to air quality to the extent possible.

Conduct and utilize fuel condition assessments prior to ignition, if and when appropriate to do so. Information about fuel type, fuel loading, and moisture content is valuable to air quality emissions forecasting and assessments of potential effects.

Unplanned Fires

All unplanned wildland fires, whether managed for full suppression objectives, confine and contain objectives, multiple objectives including resource benefit, or other operational approaches, should consider utilizing an Air Resource Advisor or Public Information Officer on incidents when warranted by the Incident Management Team.

Soils

Potential Strategies and Approaches – Standards and Guidelines

Potential strategies that could be used to trend toward soils desired conditions include the following.

Application of Detrimental Soil Disturbance – Standard FW-STD-SOIL-01

Detrimental soil disturbance standards were established in the Northern Region to meet legal “direction in the National Forest Management Act of 1976 and other legal mandates” (FSM 2550-2014-1) pertaining to how the nation’s national forests are to be managed. Soil standard FW-STD-SOIL-01 incorporates the region-wide policy direction to “Design and implement management practices that maintain or improve soil quality.” Detrimental soil disturbance (DSD) is the metric used to assess the relative success or failure in limiting “detrimental” ground disturbance. The maximum allowable 15 percent detrimental soil disturbance standard provides a threshold level used to judge compliance with existing national laws. This standard assumes that ground disturbance created is for the most part equally distributed across the area of analysis and that permanent soil disturbance has not been created.

The soil standard can be applied to timber sales, grazing pastures or allotments, wildlife habitat, and riparian areas. The standard does not apply to intensively developed sites such as mines, developed recreation sites, administrative sites, or rock quarries.

The application of the detrimental soil disturbance for livestock grazing would be applied during the site-specific allotment. NEPA analysis, and the activity area, would be determined at that time in order to capture all the potential grazing effects across that area (that is, trailing through timber, bedding areas, supplement/mineral locations, infrastructure, areas of concentrated use, etc.). Long term monitoring and evaluation would be defined in the site-specific allotment analysis.

Some of the management approaches in the "Permitted Livestock Grazing" and "Grassland/Shrublands" sections may be helpful in considering Best Management Practices and potential use of rangeland health methods and the application to soil health.

Field Identification of Detrimental Soil Disturbance

The Northern Region Soil Manual (FSM 2550-2014-1) defines the primary types of ground disturbance and thresholds for detrimental soil disturbance (DSD). The methods described could be difficult to consistently apply in the field under variable soil and landscape conditions. To augment these methods, the Custer Gallatin has applied National Cooperative Soil Survey field sampling criteria along with observing vegetation response, and representative soil profile sampling. These combined methods have enhanced the consistency of soil monitoring results on the Custer Gallatin.

Defining the Activity Area for the Soil Quality Standard

As defined in the Northern Region Soil Manual (FSM 2550-2014-1), an activity area is, "a land area affected by a management activity to which soil quality standards are applied." An activity area includes harvest units within timber sale areas, prescribed burn areas, and grazing areas or pastures within livestock allotments, riparian areas, recreation areas, and alpine areas. Temporary roads, skid trails, and landings are part of an activity area. For the purposes of calculating detrimental soil disturbance levels when applying FW-STD-SOILS-01, soil disturbance caused by natural events (such as a flood) is not included in the detrimental soil disturbance calculations.

Activity areas must be feasible to monitor. Although soil monitoring can potentially be conducted on almost any parcel of land, the 15 percent detrimental soil disturbance standard is quite sensitive to the size and scale of the analysis areas. Thus, the area of analysis cannot be confined to an individual area of ground disturbance, such as a single test pit, water development or landing area. A critical step in all applications of the standard is to appropriately define the activity area for analysis. For timber harvesting areas, the activity area can be as simple as an individual timber harvest unit or grouped as several adjoining harvest units with a uniform soil type. There needs to be a repeating pattern of disturbed and non-disturbed land that occurs over a defined portion of the landscape.

Soil Monitoring Procedures and Probability Modelling Assumptions

Soil resources occur in patterns across the Custer Gallatin that relate to geologic materials, topography, climate, plant communities, and landscape stability. The type, extent, and severity soil disturbance also occur as patterns across the landscape. Stratifying the sampling for soil type and considering the pattern of disturbance may be needed to capture the variability and accurately estimate the extent of disturbance.

Reconnaissance Sampling

Many potential sampling strategies can be used to assess detrimental soil disturbance levels. Sampling may be done by measuring disturbance directly to ascertain areal extent, subsampling using transects, and a combination of walk through reconnaissance with strategic measures to characterize the soil setting and disturbance.

The first step in detrimental soil disturbance analyses is to obtain the available FACTS data, a database of record for vegetation management activities, to assess past levels of ground disturbing management activities that occurred within the proposed activity area. Data from the FACTS database may be checked against available archived aerial photography to ensure accuracy, and which may highlight the intensity and location of past disturbance. In general, current satellite imagery does a less satisfactory job of showing past ground disturbance than archived aerial photographs due to forest regrowth and less resolution. Most of the past disturbance is expected to be from historic timber harvest prior to 1990. The quality of all imagery can be verified in the field before being used to interpolate field sampling results.

Reconnaissance sampling in conjunction with the FACTS data and aerial imagery may be sufficient for those treatment units where low levels of detrimental soil disturbance are expected. Reconnaissance consists of walking through the units, observing soil condition and characterizing the soil type. A reasonable cutoff for reconnaissance only field sampling would be 4 percent or less for pre-existing detrimental soil disturbance and a maximum projected level of 8 percent detrimental soil disturbance for cumulative effects of past and proposed disturbance. Above those levels more rigorous field sampling is recommended.

Transect Sampling

The Forest Soil Disturbance Monitoring Protocol outlines transect sampling to estimate the level of soil disturbance (Page-Dumroese et al. 2009). Keck (2012) has augmented this protocol to include parameters that capture soil condition based on Custer Gallatin observations. The transect strategy involves sampling at points with fixed spacing at random directions. The regional technical guide (U.S. Department of Agriculture 2011b) gives further information on how to structure the sampling.

The transect sampling, random orientation, and sufficient sample size are conditions to use parametric statistics to summarize the disturbance data (Page-Dumroese et al. 2009). It follows that as more disturbance is found, then sampling intensity will increase. Inherent to most statistical inference procedures is the assumption that underlying data are independent and identically distributed. Spatial data that clearly shows patterns of ground disturbance or patterns in the distribution soils, however, are neither spatially independent nor identically distributed. Distinct pattern observable on a map or in the field to a casual observer clearly indicates spatial correlations exist. In those cases, the implicit assumption of data independence needed for statistical inference are not met.

For the above reason, interpretations from detailed transect or grid sampling may be augmented with professional judgment of the patterns of the soil and the disturbance footprint to interpret detrimental conditions. This does not imply transect sampling is inherently inaccurate but indicates that the source of that accuracy likely has as much to do with the amount of field time required to collect those data as the actual sample results. The observations of soil type, vegetation, climate, and disturbance history weigh heavily on interpretation.

Using a representative sampling approach during the initial layout of transects can account for the disturbance pattern rather than relying on random transect directions. A layout design to capture the full range of variability within each analysis area could entail pre-determined sampling directions laid out in advance on a map that cross major sources of ground disturbance, skid trails, temporary or jammer roads, and landing areas at right angles based on either initial reconnaissance sampling or observable patterns on archived aerial photographs.

For post-harvest soil monitoring, patterns of disturbance are obvious in the field. Either transect or traverse data can be collected. For efficiency, however, traverse data may comprise much of the sampling conducted. In this traverse approach, distances between primary disturbance features are measured by pacing while direct measurements are made of each disturbance feature crossed. A tape or measuring wheel is used when crossing skid trails, landings, and temporary roads. The disturbance is tallied as a proportion of their occurrence compared to the distance traversed.

Along the way, periodic estimates are made of dispersed ground disturbance levels outside of the primary soil disturbance features crossed. Additional data are collected of either the distance or the proportion of each disturbance feature, along the traverse path that is detrimentally disturbed. Data can be compiled on a per traverse segment or per treatment unit basis as the total feet of detrimental soil disturbance per total distance traversed, expressed as a percent plus the average level of dispersed disturbance estimates.

Restoration of Detrimental Soil Disturbance – Guideline FW-GDL-SOIL-03

Precepts for restoration include: 1) direct restoration activities at the primary type of management caused ground disturbance present; 2) since restoration actions have the potential to create additional ground disturbance, design restoration activities to minimize the creation of any additional ground disturbance to the extent possible; 3) consider the no action option for instances where natural recovery might be the best option; and 4) consider properties of the soil resource when designing restoration actions as well as estimating the expected time period for site recovery.

Targeting Restoration Actions

Different management activities create different types and severities of ground disturbance. Thus, restoration actions should be targeted at the specific type of ground disturbance present. For example, soil compaction and rutting will be primary sources of detrimental soil conditions in timber processing areas and along portions of skid trails. Design restoration actions in those areas to disrupt obvious surface or near surface compacted soil by shallow ripping the ground surface. On sloping ground, water diversion features may also be required. Spreading slash over the compacted areas can benefit as soil cover, although not directly address the primary source of detrimental soil conditions. As such the slash would be a secondary mitigation step that would achieve only a minor credit or benefit towards site recovery.

For large burn pile footprints after pile burning, the volume and depth of accumulated wood ash covering the mineral soil surface presents the greatest obstacle to site recovery. Thus, exposing mineral soil or at least reducing the thickness of wood ash covering the original ground surface over a portion of the large burn pile footprint can increase recovery. Shallow ripping, which is often inaccurately referred to as scarification, may have positive effects but adds to overall ground disturbance. Thus, shallow ripping is not the preferred restoration action in most instances.

In instances of rutting, the orientation of ruts will affect treatment prescriptions. On sloping ground ruts oriented parallel to the primary slope direction can lead to gully erosion that further degrades soil condition. On the contour, the rutting has less potential for adverse effects.

Soil Resource Properties

Restoration often requires new ground disturbance that can be minimized by considering soil properties. Soil depth or depth to restrictive soil conditions such as extremely rocky subsoil or substrate materials could be factored into restoration plans that use ripping. The depth of ripping can be adjusted to not pull up bedrock or unsuitable soil materials.

Soil Disturbance Recovery

In some instances, the best restoration option available may be the passage of time. Natural recovery varies according to the disturbance intensity. Soil compaction in many instances may gradually recover over time due to freezing and thawing, wetting and drying, the action of plant roots, and biological activity in the soil. However, bared compact areas could continue to erode if not stabilized. Thus, although both soil compaction and soil erosion are detrimental soil conditions, gully erosion that forms could form a chronic condition that continues to degrade soil from annual rainfall runoff. Site recovery also depends on the soil setting. Sites with a longer growing season can recovery more quickly with sufficient moisture for growth and recolonization of soil microbes and plants.

Reclaiming Burn Pile Scars – Guideline FW-GDL-SOIL-08

Burn pile restoration should match post-burning edaphic (soil) conditions to the preferences of the target conifer species. Given that burn piles raise the alkalinity, species more tolerant of alkaline conditions on the pine savannas and lower elevations may have less issue recolonizing burn scars than trees conditioned for higher elevation cool and moist acidic forest environments.

Of particular concern is the restoration of large burn pile footprints greater than 32-feet in diameter (800 square feet) after pile burning. These larger burn scars do not readily recover naturally. The most difficult issues relate primarily to the volume of wood ash created, physical and chemical properties of the wood ash and underlying mineral soil. Addressing these issues with burn piles can be difficult when access along temporary roads has been closed s before restoration activities can be conducted.

The burning of large quantities of wood results in strongly alkaline pH levels in the ash layer, effectively mimicking highly caustic lye. The strong alkali layer creates an environment that resists regrowth since native plants are adapted to more acidic soil conditions. When wet, the wood ash layer at the surface restricts the movement of air and water into the underlying soil, creating dry and possibly anaerobic conditions in the buried soil that resists site restoration and the re-establishment of native vegetation adapted to a different edaphic environment.

Restoration of Large Burn Pile Impacts in Areas where Equipment Access is Limited

Timber harvest units not located along system roads may not be accessible to mechanical equipment after temporary roads are decommissioned and slash piles are burned. For these sites, the beachhead or island approach for restoring harsh sites may be used. The underlying restoration strategy is to initially treat selected portions (islands) that are well distributed throughout the overall area. In that manner, initial treatments are tested over a smaller area and allow greater attention to detail. Once the desired native species become well established in island areas, the vegetation itself does much of the work, provided the right native species are used to fill in gaps in native vegetation cover between islands. Knowledge learned during the initial stage may then be applied to the grow-out phase.

The restoration approach proposed for these areas has several components. Step one is to remove the wood ash layer over portions of the burn pile footprint thereby creating a patchwork of exposed mineral soil within the burn pile footprints. These are the areas where native vegetation will initially re-establish, creating the beachheads for vegetation to spread. Step two is to treat that patchwork of restoration islands using either gypsum pellets or sulfuric acid to bring down the soil pH to reasonable levels in active restoration areas, while also increasing surface roughness of exposed mineral. If a masticator were available, a 2 to 3 inches deep wood chip mulch could also be applied in these areas to both modify soil temperature extremes and retain soil moisture in surface soil layers. Use of a relatively thin wood chip mulch has been shown to be effective for the re-establishment of native vegetation (Rhoades and Fornwalt 2015). The outside (3 to 4 feet) perimeter of large burn pile footprints can be excluded from treatment. Accumulated wood ash is thinner on these portions of large burn pile footprints and edge effects should provide a ready source of native propagules from the adjacent unburned or partially burned areas. Seeded native species in burn pile areas compatible with the surrounding native vegetation but need to tolerate residual alkaline soil conditions. Douglas-fir and native understory vegetation found in limestone areas associated with Douglas-fir are proposed for use rather than lodgepole pine and native, understory vegetation associated with lodgepole.

Restoration of Large Burn Pile Footprints Where Post-Burning Access Exists

For burn pile areas adjacent to existing system roads, the same basic strategy could be used with modifications. In these instances, the availability of ground based mechanical equipment increases the capacity to remove accumulated wood ash covering mineral soil surface after burning. In this instance, underlying mineral soil can be mechanically exposed over 50 to 60 percent of the burn pile footprint, still focusing on interior portions of large burn pile footprints. The initial beachhead areas may equal or be slightly larger than residual areas not initially treated.

Restoration of Small Burn Pile Footprints

For small burn pile footprints, generally hand piles or small machine-built piles 16-feet in diameter (200 square feet or less in diameter), only limited site preparation is needed prior to seed or plant native species. Site preparation can reduce the burn residue impact by hand raking the ash and removing larger pieces of wood out of the burn scar; it’s important not to mix the ash with the topsoil. Prepping should target at least 30 percent of the burn pile area. These sites can then be seeded with an appropriate native seed mix using a hand seeder.

Retention of Coarse Woody Debris in Timber Harvest Units – Guideline FW-GDL-SOILS-07

The management of coarse woody debris (down wood greater than 3 inches in diameter) is critical for maintaining functioning ecosystems in the Northern Rocky Mountains (Graham et al. 1994). There are many benefits derived from having adequate amounts of coarse woody debris buried in the ground or in contact with the ground surface in conifer stands woodlands and along riparian corridors as well. Benefits of coarse woody debris in these areas range across multiple disciplines from soil resource benefits to the sustainability of conifer stands, hydrologic conditions at both local and watershed scales, and benefits for numerous wildlife species.

For much of the Custer Gallatin, adequate amounts and in places too much coarse woody debris exists. Wildfires often leave pulses of coarse woody debris behind, both on the ground and as standing dead for future recruitment. Prescribed burning, if done correctly, also leaves adequate coarse woody debris behind. The lack of natural fire regimes can stagnate conifer stands with too much woody material of all sizes both standing and down. Though coarse woody debris may be adequate from a forest-wide scale, amounts may be sparse in the lands suitable for timber production due to past vegetation management where site preparation cleared most of the residual slash. On these lands, the need to retain adequate amounts of coarse woody debris is critical, yet must be balanced with fuels and other resource concerns. Avenues to manage for sufficient coarse woody debris include retention or accounting as standing future recruitment.

Methods for Coarse Woody Debris Retention

The coarse woody debris guideline (FW-GDL-SOILS-07) provides minimum target levels for the amount of coarse woody debris to leave behind after timber harvesting in conifer stands. Target levels are based on Northern Region broad potential vegetation types and represent minimum acceptable levels based on data provided by Graham et.al. (1994) and Brown et al. (2003) and observed trends on the Custer Gallatin. Greater amounts can be retained if available and if consistent with other vegetation management objectives on a treatment unit basis.

There are two means by which adequate amounts of coarse woody debris can be retained in timber harvest units. First, enough material is available on ground, allowing sufficient material to be left on the ground after timber harvesting to meet or exceed the minimum levels recommended. Exceptions may be allowed where there is elevated concern with fire risk (Brown et al. 2003). Second, when sufficient coarse woody debris is not available to meet the minimum guideline, the silvicultural prescription may account for sufficient future recruitment of coarse woody debris. For example, a clearcut with leave trees in lodgepole pine stands retains small groups of mature trees that could blow down and account for future coarse woody debris. The snag requirements can also approximate coarse woody debris recruitment. However, the timeframe for this recruitment could be decades and hard to predict since site factors such as forest species, wind events and soil wetness vary.

Techniques for Assessing Coarse Woody Debris Levels within Timber Harvest Units

There are multiple means coarse woody debris can be assessed. In many instances, the photo load protocol (Keane and Dickinson 2007) is sufficient to assess coarse woody debris. The protocol uses synthetic pipe to represent different fuel loading levels. The approach provides a clean image of what certain coarse woody debris levels look like on the ground and by diameter class.

More intensive methods include using techniques from the Fire Effects Monitoring and Inventory System (Lutes et al. 2006) which is a modified protocol from the methods used by Brown and See (1981). The plot measurement involves a tally of material over a 50 feet transect and converts recorded diameters into tonnage. This classic fuel plot shows the variability of distribution and can be used to fine tune fire effects estimates.

More certainty may be required for reference sampling. Variations exist among different conifer species as well as relative to the degree of decomposition in regard to the density of coarse woody debris left behind. In addition, stand-level differences in disturbance history and harvest methods may impact coarse woody debris levels. As a result, it may be necessary on occasion to take direct measurements of coarse woody debris along transects through timber harvest units. These measurements can help refine the estimates of coarse woody debris in project areas. Use of a completely random sampling approach is not warranted. Transect segments can be laid out on a map or aerial imagery ahead of time as well as on the ground.

Avoidance of High Landslide Potential – Guideline FW-GDL-SOILS-05

Young, geologically active mountain ranges such as the Northern Rocky Mountains, by their very nature, are prone to landslides. Numerous tell-tale signs exist in areas of past slumping that identify where future landslides most likely to occur. Local geology, relatively steep slopes, and moving water all play major role in the occurrence of slumps, the prominent type of mass failure on the Custer Gallatin. By understanding these factors, land managers can design management to avoid and reduce the threat of landslides. The approach below first defines the mechanisms and types of landslides found on the Custer Gallatin to outline the risk, and then describes avoidance measures.

On the Custer Gallatin, the most common type of mass failure to occur and impact management activity areas are slumps, also known as "rotational slumps." Other types of mass movements exist on the Custer Gallatin include incoherent rock or debris slides, rock fall, various types of debris, earth, and mud flows, as well as debris avalanches that represent potential threats to infrastructure, management activities, and public safety. In general, these types of mass movement are of less concern, either because of rarity or the remote location away from management activity areas and infrastructure.

While most slumps on the Custer Gallatin are limited in extent there have been some extremely large slumps. Extremely large slumps when viewed in the field are often difficult to comprehend in terms of size and magnitude. Aerial photography, remote imagery, or digital ortho-imagery may be needed to discern these features.

Field Identification of Future Slump-Landslide Activity

Past slumps predict future instability since the inherent factors for instability persist. One approach is to map these features at a known site and then map out these tell-tale signs in surrounding areas. Signs of instability observed on the Custer Gallatin include:

- Evidence of past slump type landslides in the immediate area.
- Hummocky, irregular terrain.
- The presence of mixed sedimentary rock formations with shale found in swales and other low spots on the landscape, while most of the exposed bedrock is hard sandstone or limestone.
- Concave headscarp, and convex runout zones with irregular shaped ground on moderately steep to steep slopes; approximately in the 20 percent to 50 percent slope range.
- Pocket wetlands and/or wetland vegetation, including aspen and alders, associated with low spots in the landscape.
- Ponds or wetlands at the base of hillslopes.
- Undercut slopes from streams of rivers with signs of instability above.

Relevant Spatial Coverages and Maps

The bare earth image from LiDAR or standard 10-meter digital elevation models provide terrain features to identify slump features. The LiDAR provides finer resolution that often shows hummocks, headscarps and irregularity from earthflow. As with any land resource model, however, those predictions need field verification for accuracy and local environmental conditions.

Local geology is foundational for instability. In Montana, the Montana Bureau of Mines and Geology Geologic Maps have proven to the best source of accurate geologic map data. Although these maps are created at a 1:100,000 scale, the mapping can be inferred to other map products and interpolated readily. In some areas actual landslide deposits have been mapped but more important from a potential slump-landslide perspective would be the delineations of mixed sandstone and shale geologic formations.

Topographic maps at 1:24,000 scale provide an invaluable source for mapping landslides. Topographic lines can show the irregularity of terrain, with hummocks and sag ponds, as opposed to the smooth lines that represent most hillsides. Springs are often detailed in the topographic maps that help explain instability.

Any imagery that shows areas where extra soil moisture exists can also be extremely valuable for the identification of slump prone areas as well as wetlands in general. Although color infrared imagery is no longer routinely flown, archived versions of color infrared imagery provide a valuable resource for mapping slump prone areas. Remotely sensed imagery using Sentinel and Landsat satellites have bands that can bring out green-ness such as using a normalized difference vegetation index to show wet areas.

At this time, the mapped soil inventory, though including soil components with hydric series, does not spatially depict soils at resolution for direct mapping.

Watershed, Aquatic, and Riparian Resources

Watershed

Potential strategies that could be used to trend toward watershed, aquatic habitat, and riparian management zone desired conditions include:

General

- To support watershed quality and resiliency, beaver and their dams and dam complexes (including wetlands and riparian areas) could be enhanced or maintained. Introductions of beavers could be pursued, in coordination with appropriate partners (Montana Fish, Wildlife and Parks and the South Dakota Department of Game, Fish and Parks have management purview over species introductions and re-introductions). Where beavers are not socially or ecologically tolerable, beaver dam analogue structures could be installed to increase aquatic habitat or restore watersheds.
- Instream flow water rights on National Forest System 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 System 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 (for example, geomorphologic processes and attributes), and aquatic biota community reference condition for the Northern Great Plains Ecoregion of the Custer Gallatin National Forest is needed to inform monitoring and management of these rare aquatic/terrestrial ecotones (Ashland and Sioux Geographic Areas). If funding becomes available, three to five miles of stream and adjacent riparian areas could be fenced off in the Ashland or Sioux

Geographic Areas, preferably within five 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, and alternate grazing prescriptions (for example high intensity and short duration), among other treatments.

- The multiple indicator monitoring (MIM) protocol (Burton et al. 2011) could be used as a tool, similar to PIBO, to assess stream and riparian condition in the pine savanna aquatic ecosystems.
- Where ecologically suitable and socially tolerable, dispersed camping sites falling within, or negatively impacting, riparian management zones could be removed or consolidated with a dispersed site, or new site, that is located outside the riparian management zone. This effort would decrease potential sediment delivery to waterbodies.
- In order to understand the trends in glacier size and their future on the landscape and in the context of other North American and worldwide glacier monitoring, an inventory and monitoring program could be started. This would involve setting up permanent benchmarks and stream gauges or using remote sensing (LIDAR, aerial photography, etc.) in the wilderness areas and other areas where glaciers are found, in coordination with partners.
- All activities with potential to modify the bed or banks of any intermittent or perennial stream could be coordinated with a national forest fisheries biologist or hydrologist to ensure compliance with State and Federal permitting requirements and compliance with plan standards and guidelines.

Sediment Delivery Evaluation

Management activities having the potential to increase sediment delivery to waterbodies could 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 could 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 vegetative data to inform relative site susceptibility and resilience to sediment delivery.
- Predicted effects of project-related changes in sediment delivery and yield upon resource indicators of concern.
- Past monitoring data and guidance from scientific literature for similar project activities.
- Data from appropriate reference watersheds.
- Analysis of sediment delivery and sediment yield using process- 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, or perceived threat of increased sedimentation.
- When the WATSED sediment model (Cline et al. 1981) is used 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 landtypes 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 4. 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 plan standards.

Table 4. Allowable sediment yield and associated fine substrate sediment levels for WATSED model analyses

Category	Management Objective Percentage of Reference	Percentage Fine Substrate Sediment (under 6.3 mm)	Annual Sediment Yield Percentage over Reference
A—Species of Conservation Concern and Blue Ribbon fisheries	90	0–26	30
B—All other streams	75	0–30	50

Water Yield Analysis

Large forest vegetation removal projects have been linked to changes in stream flow (Bosch and Hewlett 1982, Stednick 1996, MacDonald and Stednick 2003, Grant et al. 2008, Troendle et al. 2010). Altered water yield and peak flow patterns have the potential to alter channel stability (Tonina et al. 2008). All forest vegetation management projects could undertake an analysis of potential change in water yield.

The longest-standing quantitative method for characterizing prospective water yield change associated with forest harvest is the equivalent clearcut area method (U.S. Department of Agriculture 1974i) which collates the amount of cleared forested area in a watershed and then calculates change in water yield associated with the cleared area. Traditional equivalent clearcut area application has commonly consisted of computing change in average annual acre-feet of runoff. This is not a direct estimate of change in peak flow, although change in average annual runoff is likely to manifest as change in peak flows and/or seasonal base flows. The elevated stream energies associated with peak flows, however, are more likely to influence channel change than a minor increase in seasonal base flow.

In some instances, change in acre-feet of water yield is not computed; rather, the estimated percent change in canopy cover is compared with observed thresholds at which change in canopy cover has been documented to create a detectable change in water yield. This evaluation may be done in absence of other data when deciding as to whether change in water yield/peak flows is of concern. Also, equivalent clearcut area cannot account for spatial redistribution of snow in openings and associated changes in sublimation and/or forest canopy interception, only changes in evapotranspiration related to change in canopy cover.

Despite model limitations and inconsistencies in past applications, the equivalent clearcut area method is still a relatively simple and efficient means of evaluating change in evapotranspiration associated with tree harvest. At the time of plan revision, all process-based or empirically-based models capable of providing more detailed evaluations of hydrograph response were either too complex to run on a project-by-project basis or do not provide accurate outputs at relevant scales for management. Although more sophisticated prediction tools are likely to become available in the future, the equivalent clearcut area method remains the most useful and commonly applied tool available. The following describes an updated methodology for determining watershed-scale water change resulting from timber harvest.

- The analysis could consist of a weight-of-evidence approach that couples estimation of change in canopy cover extent with other ancillary data to inform whether water yield, in particular peak flows, may detectably change as a result of proposed forest management activities and whether that change may be of concern from a water quality and aquatic habitat perspective.
- When conducted, water yield/peak flow analysis could be assessed at no greater than the HUC12 (such as 6th level HUC) scale, if not also at a finer resolution as deemed appropriate by the scope of the proposed project and potential risks downstream (e.g., water intake, Endangered Species Act species present). Analysis may not be required if there are no resources at risk or where average annual precipitation is less than 18 inches across most of the watershed in question (Troendle et al. 2010). Equivalent clearcut area summation could account for past harvest activities while adjusting for evapotranspiration recovery over time using Callahan's (1996) recovery curves or a more site relevant and recent alternative.

Fisheries and Aquatic Habitat and 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 species of conservation concern, or other aquatic species, the potential for changing climate could render these areas as refugia in the future.
- Continue to follow the goals, strategies, and actions outlined in the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana (Montana Department of Fish and U.S. Department of Agriculture 2007) until and if a new agreement is reached, such as working with partners to enhance and maintain habitat or re-introduce populations of westslope cutthroat trout and Yellowstone cutthroat trout with a goal of increasing westslope cutthroat trout and Yellowstone cutthroat trout presence in historically occupied watersheds.
- Enhance or maintain Arctic grayling habitat on Custer Gallatin National Forest. Custer Gallatin National Forest's current four populations of Arctic Grayling were considered part of the species' distinct population segment when the U.S. Fish and Wildlife Servicer found the species not warranted for Endangered Species Act listing in 2014. Custer Gallatin National Forest could work with Montana Fish, Wildlife and Parks to introduce Arctic Grayling when and where ecologically feasible.

Riparian and Wetland Areas

See the Riparian and Wetland portion of the Terrestrial Vegetation section of this appendix for activities and strategies that may be used to meet the desired conditions for riparian and wetland areas.

Terrestrial Vegetation

The following sections 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 and recommendations 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.

In addition to at-risk plant species, certain plant communities warrant emphasis for conservation measures (for example, Montana State Wildlife Action Plan identified sagebrush steppe-grasslands communities, deciduous hardwoods such as aspen and woody draws, riparian areas and wetlands, and old growth forest as areas of greatest conservation need). Plan components and management approaches have been developed with that in mind. Refer to various state conservation plans, other conservation strategies, and research natural area targeted community types for inclusion into the national research natural area network (table 7 and table 8) which may provide additional information relative to plant communities that may warrant additional conservation needs.

At-Risk Plant Species

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

General

- Evaluate areas proposed for ground disturbing activities for the presence of occupied or suitable habitat for at-risk plant species, including conducting pre-field review and field surveys. Provide mitigation and protection measures to maintain occurrences and habitats that are important for species sustainability.
- Focus botanical surveys on increasing known information about other plant species (Montana and South Dakota state species of concern, newly discovered species, etc.) on the national forest, including information that may warrant changing their status to species of conservation concern list. If such information is found, the national forest could consider the species according to at-risk plan components until such time that the regional forester decides on whether to designate it as a species of conservation concern.
- Monitor known occurrences of at-risk species within project areas and forestwide to determine trend data of individual occurrences, to contribute to trend data at the species-range level, and to document impacts of project activities, prioritizing those project activities for which species-specific data is currently lacking.

Whitebark Pine

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.

In December (2020), the U.S. Fish and Wildlife Service (Service) proposed to list whitebark pine as a threatened species. The Service identified several risks and threats to whitebark pine, including forest insects and disease (blister rust and pine beetle), altered fire regimes, and climate change factors. Timber harvest is not among the threats to whitebark pine identified by the 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 lands suitable for timber production. Accordingly, whitebark pine tends to be only an incidental species where it does occur in association with a timber harvest is for example not at levels where) impacts could adversely affect the viability of the species (Weldon 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 whitebark pine restoration projects could consider potential impacts to healthy cone-producing trees.

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.

For information based on the current regional understanding and documentation of whitebark physiology, ecology, genetics, distribution, mortality, and regeneration on the national forest, refer to Whitebark Pine Strategy for the Greater Yellowstone Area (Greater Yellowstone Coordinating Committee Whitebark Pine Subcommittee 2011) and Adaptive Action Plan prepared by the Greater Yellowstone Coordinating Committee (Greater Yellowstone Whitebark Pine Subcommittee 2015). The Custer Gallatin National Forest may cooperate with the Greater Yellowstone Coordinating Committee Whitebark Pine Subcommittee to continually update these documents to reflect best available scientific information to guide management activities and generally work together on whitebark pine conservation strategies and adaptive management of habitat (FW-GO-PRISK-01).

Complex ecological interactions could multiply over time to make a short-term plan for habitat restoration become ineffective under long-term climate change. An ecosystem approach that balances all ecological processes and characteristics is needed to have a successful restoration program, especially for whitebark pine (Keane et al. 2012, Keane et al. 2017b, Keane 2018). Recent research has shown that active restoration of whitebark pine ecosystems can be successful and highlighted a suite of possible tactics and strategies (Keane et al. 2012, Keane et al. 2017b). Possible tactics to facilitate the restoration of whitebark pine ecosystems on the Custer Gallatin National Forest include:

- Add biophysical descriptors to inventory and monitoring protocols; use potential vegetation site classifications to describe climate in context of vegetation; include spatial data layers of climate change predictions; use climate change projections to identify those areas that will experience the greatest warming and drying.
- Prioritize areas for restoration that are in the upper elevational range of local seral whitebark pine types; prioritize areas on the cooler aspects from northwest to northeast; select landscapes that have abundant seral and climax whitebark pine stands; consider wilderness restoration (see below).
- Create heterogeneous landscapes; use a landscape approach to planning and prioritizing; emphasize whitebark pine ecology and avoid treatments designed only to reduce disturbance agents, such fuel treatments.

- Balance wildfires, prescribed fires, and fire suppression; manage fire to balance losses in rust-resistant trees with gains in competition-free burned areas.
- Remove competition using fire and silvicultural cuttings; create landscape diversity of age classes.
- Promote rust resistance through planting or direct sowing; promote natural rust resistance by providing regeneration opportunities where seed sources are intact.
- Collect from many different seed sources; create seed libraries and central storage areas.
- Grow seedlings to outplant burned areas; inoculate seedlings with mycorrhizae to facilitate establishment on harsh sites.
- Conduct proactive fuel treatments around living individual trees; widen the treated area around protected trees in anticipation of future disturbances; allow wildfires to burn in moderate years (wildland fire use); modify suppression tactics that include protecting living whitebark pine trees during a wildfire event.
- *Formulate cutting and burning prescriptions to support whitebark pine establishment*: burn under hotter conditions; cut or burn seedlings and saplings of shade-tolerant species; reduce fuels in treated stands to ensure seed source survival after wildfire; augment fuel bed to widen prescribed burn window; create ground conditions that facilitate the planting of rust-resistant seedlings (for example, do not leave slash).
- Plant at the highest elevations of the treated areas first; plant in favorable microsites and create these microsites if missing from a planting site; make sure mycorrhizae are available; focus on areas within the current range of whitebark pine (that is, do not attempt assisted migration as “restoration”).
- Conduct monitoring over long timespans; always include a control unit; measure additional variables at the sample site to understand and mitigate climate warming effects in future treatments; increase sampling intensity; improve sampling design to accommodate increasing variabilities caused by climate change; create centralized databases and standardized protocols.
- Support research on the efficacy of these different treatment approaches.
- Possible approaches to planning, analysis and implementation of whitebark pine restoration within recommended and designated wilderness areas include the following
  - ♦ Activities associated with whitebark pine restoration are allowed to occur within recommended wilderness areas, where determined to be appropriate and supported by a project-level analysis. These activities may include prescribed burning, planting, insect and disease protection measures, fuel reduction around cone-collection trees, caging cones, and collection of seed and scion. Site-specific environmental assessment and analysis would occur prior to applying activities related to the restoration of whitebark pine. Tools to help consider protection of wilderness characteristics can be found in the Evaluation Framework for Proposed Ecological Intervention in wilderness (Landres et al. 2020b) and the Minimum Requirements Decision Guide.

To account for the great variability in climate change, species response, and plant genetics, it may be important to also consider opportunities for whitebark pine restoration in designated wilderness areas (Keane 2000;2012, Keane et al. 2017a). Depending on the specific elements of the restoration proposal, the authority to approve this type of work is retained by the Regional Forester or the Chief of the Forest

Service. Currently, Forest Service policy does not allow for broad-scale restoration actions in wilderness except where the objectives cannot be met outside of wilderness, the loss is due to human influence, and there is no reasonable expectation that natural reforestation will occur (Keane 2012). If considering restoration activities in designated wilderness areas, refer to the scientific, legal, and ethical questions presented in the Evaluation Framework for Proposed Ecological Intervention in Wilderness (Landres et al. 2020b) as well as the Minimum Requirements Decision Guide.

Forested Vegetation

Perhaps the most significant change in the new generation of land management 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 (for example 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 plan land allocations (for example the proportion of the Custer Gallatin National Forest 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 (such as nutrient cycling, snag creation, surface fuel reduction, mineral seedbed preparation, and regenerating associated shrub and herb vegetation). Natural disturbances could continue to be the dominant force of change across the Custer Gallatin National Forest landscapes. The judicious use of managed wildfire over large areas and prescribed burning, in association with mechanical treatments where high certainty 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, creating 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, 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 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 the desired conditions and an ecological-processes oriented approach to land management. However, vegetation managers may need to 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 may need to 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 in the plan for vegetation components describe 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 plan used two primary sources of data to quantify existing conditions: Forest Inventory and Analysis data (Northern Region Summary Database) (Bush 2014, Bush and Reyes 2014), and VMap (Brown 2016). National forest inventory and analysis data provides information and estimates appropriate for use at the broad scale of analysis, such as the national 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 and 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 desired conditions but not all desired conditions would need to be the focus of a particular project. In fact, given the nature of forest ecosystem dynamics, progress towards one desired condition may result in a short-term or localized movement away from another desired condition. However, implementation of treatments that achieve one or more desired conditions at the project level would not foreclose the opportunity to maintain or achieve any other desired condition over the long term. The particular vegetation desired conditions 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 desired conditions. 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 can be viewed and interpreted from both short-term and long-term perspectives. It may take substantially longer than one planning 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 (for example, a few decades), but over the long term would be trending in the right direction. This is not only due to the nature of change from succession and disturbances, but also because of the discrete classifications applied to vegetation (such as the four forest size classes). 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 would be designed to contribute to desired conditions at the larger scale and not necessarily to try to make each project area within the bounds of the desired conditions found in the plan.

For example, consider a hypothetical project area in the Cool Moist potential vegetation type of the Bridger, Bangtail, and Crazy Mountains Geographic Area. As of 2020, this geographic area contained over 70 percent medium size trees (10 to 15 inches diameter at breast height). Assume the project area within the geographic area contained only 30 percent medium size class—below the geographic area-level desired condition of 35 to 60 percent. Depending on specific objectives of the project, it may still be appropriate to reduce the amount of medium tree size class in the project area in order to contribute to the geographic area-level desired condition. In this situation, perhaps a thin-from-below treatment that targets trees in smaller size classes could simultaneously reduce medium-sized stands while increasing the large tree size class. Similarly, if this project area consisted of 30 percent large tree size class—above the desired condition for the geographic area—it would not necessarily be appropriate to reduce the amount of large trees in the project area given that, at the geographic area scale, the cool moist potential vegetation type is deficit in large size class (see appendix B of final environmental impact statement). In short, the relative abundance of each ecosystem characteristic within each project area must be considered in the broader context of geographic area or forest-level desired conditions as well as local concerns or constraints on management.

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. Forestwide, this means there is limited ability for management actions to influence vegetation change. However, there are portions of the forest (such as the wildland-urban interface, municipal watersheds or suitable timber base), and some potential vegetation types (such as the warm dry potential vegetation type) 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 or disease, and increase forest resilience, as well as provide timber outputs and contribute to economic sustainability. To meet these desired conditions, removal of larger trees is required, which might appear to conflict with FW-DC-VEGF-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 National Forest. Harvest of larger trees addresses and achieves desired conditions related to density and composition, but does not preclude the attainment of desired conditions related to large tree sizes, and may even facilitate or improve the probability of their persistence over the long term.

The primary intent of using the desired conditions to help guide project development is to promote resilience at both the stand and landscape scales over the long term. It is important to recognize that silvicultural treatments that promote stand-level resistance to some disturbances, such as spruce beetle or mountain pine beetle attacks, are important but will likely fall short at providing resilience at the landscape-scale once beetles reach epidemic levels. While intermediate treatments may enhance resistance to some disturbances, building long-term resilience may often require proactive implementation of appropriate regeneration methods to provide desirable post-disturbance conditions (Long et al. 2018). For example, silvicultural regeneration methods could be used to regenerate stands of “over-represented” and highly vulnerable size classes, thereby increasing resilience to future disturbances (DeRose and Long 2014). In many cases, achieving the desired condition (for example resilience) may require the establishment of a new cohort of desirable species ahead of the disturbance. Waiting until after a large disturbance may forego valuable opportunities and could result in significant restoration challenges. The proactive use of regeneration treatments that take advantage of currently existing vegetation to create desirable age and species diversity is key to building resilience to inevitable large-scale disturbances. FW-STD-TIM-06 requires that even-aged stands shall generally reach a minimum of 95 percent of culmination of mean annual increment prior to regeneration harvest, unless certain conditions are met. Table 5 displays average culmination of mean annual increment for primary species on the Custer Gallatin National Forest. A site-specific assessment of growth rates may also be used to determine culmination of mean annual increment.

Table 5 Average culmination of mean annual increment for primary species on the Custer Gallatin National Forest

Timber Type	Culmination Age (years)
Lodgepole Pine	90
Douglas Fir	110
Spruce-Subalpine Fir	120
Ponderosa pine	120

Climate Change

Considering climate change when developing site-specific silvicultural prescriptions is critical to promoting ecological integrity and resilience over the long term. 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 specific information on climate change vulnerabilities and recommended 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 (Halofsky et al. 2018a;b), the Reforestation-Revegetation Climate Change Primer for the Northern Region (Scott et al. 2013a) and other publications as they are available.

Relevant strategies may include managing landscapes to reduce the severity and size of disturbances, encouraging fire to play a natural role, and protecting refugia where fire-sensitive species can persist. Consider increasing species, genetic, and landscape diversity. Consider reducing fuel continuity and populations of non-native species; and using multiple genotypes in reforestation. Rare and disjunct species (such as whitebark pine and aspen) may require strategies focused on regeneration, preventing damage, and establishing refugia. Additional factors that may be considered in the development of prescriptions include:

- Considering drought and site suitability when selecting planting species, stock type, and density.
- Promoting the development of large fire-resistant trees.
- Reducing stand densities and inter-tree competition.
- Providing for retention of biological legacies and connectivity with respect to the genetic flow.
- Focusing improvement, restoration, or protection of species or areas that are vulnerable to climate change (such as ecotones, ponderosa pine, Douglas-fir, aspen, and whitebark pine).

Snags

The desired conditions for snags are expressed as an average density and distribution across broad geographic areas and it is recognized that there will be significant variability around this average. For example, on lands managed for timber production and within the wildland-urban interface, fewer snags are likely than in more remote areas where vegetation is less actively managed. This variability in snag density and distribution is expected and desirable.

The guideline (FW-GDL-VEGF-03) for snag retention in treatment areas is intended to help retain snag conditions that contribute to wildlife habitat and other ecosystem benefits not just within wilderness and roadless areas but also within areas that are more intensively managed and where snag-producing natural disturbances (fire and insects and disease) are expected to be more limited (for example, lands suitable for timber production). The following factors may be considered in development of direction for snag management in project areas:

- The guideline requires the largest snags always be prioritized for retention. Larger diameter snags are particularly important due to their rarity and high contribution to soil function and wildlife habitat.
- The snag guideline applies as an average of all treatment units across a project area, so that the condition of snags may be considered at a scale larger than individual treatment units. This should allow projects to design snag requirements as needed to best meet the unique conditions of each project. Snags would not necessarily be required to be left in each treatment unit, depending on the landscape context.
- If fewer than the minimum snags are present across treatment units, or it is not safe or operationally feasible to retain them, retain the snags that are available as well as live tree replacements to achieve the guideline. When selecting live replacement trees, retain the largest and most decadent trees; those with rot or wildlife use are preferred. Live tree replacements may consist of trees

retained for other purposes, or damaged by harvest could also be selected. These trees may also be used to meet FW-GDL-VEGF-05.

- Consider retaining more than the minimum number of snags or replacement trees to provide snag habitat in both the short and long term, particularly in areas adjacent to past harvest areas with few or no snags or live reserve trees.

Old Growth

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. As stated in FW-DC-VEGF-09, if that document or the definition of old growth is revised or replaced based on best available scientific information, the updated guidance 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.

The presence or absence of old growth within a project area is intended to be assessed at the stand level. In other words, the minimum old growth criteria presented in Green and others (2011) is intended to be applied as a stand-level average. As such, an inclusion of large and old trees found within a stand dominated by younger and/or smaller trees is not intended to be considered a patch of old growth in and of itself. Although FW-GDL-VEGF-01 would not apply to such remnant inclusions of large and/or old trees, these biological legacies are highly desirable to maintain on the landscape for purposes of promoting resilience, landscape heterogeneity, wildlife habitat, ecosystem functioning, and aesthetic values. Where inclusions of large and/or old trees occur, managers may consider design criteria that seek to maintain and protect them.

Old growth habitat includes 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. Or, the trees are old enough, but they do not meet the minimum size criteria (such as small, old trees). Part of the intent of FW-GDL-VEGF-01 is to explicitly recognize the ecological importance of all the characteristics of old growth, not just the minimum criteria presented in Green and others (2011). To promote biodiversity and maintain ecological legacies of old stands and forests, managers may consider maintaining or restoring the full suite of attributes that characterize old growth where appropriate.

The primary functions of FW-GDL-VEGF-01, FW-GDL-VEGF-02, and FW-DC-VEGF-09 are to highlight the ecological importance and dynamic nature of old growth and underscore the importance of planning for long-term development while also protecting existing old growth. It is understood that old growth may be lost to disturbances and gained through natural succession. 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 intentions of the plan are to (1) increase the resilience of old growth to potential future disturbance (for example, high severity wildfire or epidemic insect outbreaks), which may result in loss of old growth characteristics; 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, consider retaining stands adjacent to existing old growth that would provide future old growth in the shortest timeframe 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); or where connectivity of patches is poor.
- At the project level, consider assessing old growth patch size by analyzing the amount of high contrast edge between old growth forest 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.

In dry forest types, particularly in the pine-savanna ecosystem, old trees often occur as individuals or clumps scattered across the landscape, rather than homogenous, well-defined stands of old growth. As noted by Franklin and others (2013), old trees (more than 150 years old) regardless of their size offer important ecological functions. For this reason, managers may want to consider promoting and restoring old trees regardless of their size or whether they occur inside or outside of stands that qualify as old growth based on Green and others (2011). Old trees, including small old trees, have the following:

- A significant percentage of heartwood, which exhibits different patterns of decay than sapwood, in live trees, snags, and logs. Young trees have relatively little and poorly developed heartwood. Snags from old trees persist for a longer time than snags from younger trees of comparable or even larger diameter, and down wood (either bole or branches) decays differently than that of young trees.
- Distinctive complex crowns, platy or deeply fissured bark, and large, often horizontal branches that differ from those found on younger trees and that often have developed various defects (for example, forks, brooms, and cavities) not present in younger trees.
- Greater value for wildlife than young trees of comparable or even larger diameter because of the preceding points—complex and distinctive crowns, platy or deeply fissured bark, and significant heartwood content, which is reflected in quality wildlife habitat in both living and dead trees.

- Bark that is thicker and fire resistant relative to the tree's diameter, making the trees more resistant to fire than younger trees of comparable diameter. Since these small old trees exhibit many of the attributes of larger old trees, albeit it on a smaller scale, their retention is part of ecologically-focused restoration treatments.

The scattered nature of individuals and clumps of old trees is typical for functioning dry forest systems and reflects a heterogeneous spatial pattern driven largely by the low-severity, high-frequency historical fire regime. In these situations, removing fuels and competitive vegetation around old trees typically contributes to the desired spatially heterogeneous restoration outcome. When provided with a choice, try to place skips (areas with no harvest) to avoid including a significant number of old trees within the skip because this would make it impossible to treat the fuels and competing vegetation surrounding the included trees. However, when faced with situations where large old trees are apparently competing with small old trees, consider leaving all old trees for the reasons listed above. After more than 150 years of growing in proximity, clusters of old trees are more likely to be mutually supportive rather than competitive (such as significant root grafting and shared mycorrhizal masses).

Grassland, Shrubland, Woodland, Riparian, Alpine, and Sparse Vegetation

For these vegetation communities, refer to documents produced by the Northern Rockies Adaptation Partnership and other similar publications as they are available to help assess vulnerability of natural resources and ecosystem services to climate change; and science-based adaptation strategies that might be used mitigate the negative effects of warming trends.

Activities and strategies that could be used to meet the desired conditions for grassland, shrubland, woodland, riparian/wetlands, alpine and sparse vegetation 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), Classification of the Grasslands, Shrublands, Woodlands, Forests, and Alpine Vegetation Associations of the Custer National Forest Portion of the Beartooth Mountains in Southcentral Montana (Williams 2012), Fire Effects Information System (U.S. Forest Service, online database), available ecological site descriptions, state and transition models, or similar classifications applicable to the national forest for information on potential vegetation, succession, and response to disturbance in grasslands/shrublands.
- Interpreting Indicators of Rangeland Health (Pellant et al. 2005) or equivalent methods can be used when assessing upland rangeland vegetation. This publication and Rangeland Health (National Research Council of the National Academies 1994) highlight the integration of soil, vegetation, and hydrologic attributes and indicators as important elements in assessing rangeland ecosystem health. They provide an ecological framework for identifying, assessing, and discussing the importance and interdependence of soils, biotic communities, and hydrologic elements to a functioning and resilient ecosystem. Soil condition has historically been included along with vegetation condition as an integrated approach for assessing the condition of rangeland ecosystems.
- Utilization Studies and Residual Measurements Technical Reference (Coulloudon et al. 1996) provides an interagency approved method for monitoring. Other available methods include the modified Robel pole (Benkobi et al. 2000, Uresk and Benzon 2007).

- Conifer species that are encroaching upon rangelands may be removed to maintain shrubland/grassland potential vegetation types. Consider other resource values during project analysis when determining removal of the conifer component. 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 (honeybees and native pollinators) enhance biodiversity and support stronger and more resilient ecosystems. While pollinators pollinate more than 80 percent 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 (U.S. Department of Agriculture 2015), Pollinators and Roadsides: Best Management Practices for Managers and Decision Makers (Hopwood et al. 2016), An Overview of the Potential Impacts of Honey Bees to Native Bees, Plant Communities, and Ecosystems in Wild Landscapes: Recommendations for Land Managers (Hatfield et al. 2018), or similar references for information on best practices for pollinators and apiary placement.

Deciduous Broadleaf Woodlands

Woody 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 (USDA Forest Service, online database), available ecological site descriptions, or similar classifications applicable to the national forest for information on potential vegetation, succession, and response to disturbance in woody draws.
- Refer to Green Ash Woodlands, A Review, by Lesica and Marlow (2013) or other applicable publications for information on physical environment, composition, values and for management considerations for these important habitats.
- Model for classification and monitoring green ash- ecological type in the northern Great Plains (Uresk et al. 2015), 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 woody draws. Place monitoring emphasis on recruitment of green ash seedlings and saplings.
- Place emphasis on maintaining woody 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. Reserve restoration of nonfunctional systems for those situations when recovery is possible, efforts are not at the expense of functional-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 may mean more suitable sites for tree seedlings (Lesica and Marlow 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.

- 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 and stands were being less impacted by browsing (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).
- Livestock and wildlife browsing access and trailing by livestock, wildlife or recreationists can impact regeneration of stands. To achieve protection of regeneration in stand, fence construction and maintenance is a useful method but is often impractical because of sparse funding or inaccessibility to areas. Slash treatment barriers can be considered to impede access by livestock and wildlife. One slash treatment consists of stacking and piling downed trees and brush among patches of suckers, seedlings, and saplings. Small-diameter (under six-inches diameter breast height) conifer or deciduous trees, where available, can create the slash barriers. Another slash treatment consists of felling trees at approximately three to four feet above the ground while maintaining stem connection to the stump (hinge treatment). The resulting barrier consists of the lateral bole and full canopy of the downed tree. In areas with mostly dead deciduous trees, another method is to mimic the "hinging" by using the boles that are completely detached and propped onto the stump in a v-shaped notch. Refer to (M. Kota and L. Bartos 2010), for more detail on timing and effectiveness considerations.
- Where feasible and when budgets allow, consider relocating existing allotment infrastructure to minimize livestock impacts in woody draws.
- See management approaches for the emerald ash borer in the invasive species section of this appendix.

Aspen

- Options to help aspen stands persist or expand on the landscape include prescribed fire, aspen cutting, conifer reduction, and 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.
- Livestock and wildlife browsing access and trailing by livestock, wildlife or recreationists can impact regeneration of stands. To achieve protection of regeneration in stand, fence construction and maintenance is a useful method but is often impractical because of sparse funding or inaccessibility to areas. Slash treatment barriers can be considered to impede access by livestock and wildlife. One

slash treatment consists of stacking and piling downed trees and brush among patches of suckers. Small-diameter (under six-inches diameter breast height) conifer or deciduous trees, where available, can create the slash barriers. Another slash treatment consists of felling trees at approximately three to four feet above the ground while maintaining stem connection to the stump (hinge treatment). The resulting barrier consists of the lateral bole and full canopy of the downed tree. In areas with mostly dead deciduous trees, another method is to mimic the “hinging” by using the boles that are completely detached and propped onto the stump in a v-shaped notch. Refer to M. Kota and L. Bartos (2010) for more detail on timing and effectiveness considerations.

Xeric Woodlands

Juniper

- 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), Plant Community Classification for Vegetation on Bureau of Land Management Lands, Pryor Mountains, Carbon County, Montana (DeVelice and Lesica 1993) Classification and Management of Montana's Riparian and Wetland Sites (Hansen et al. 1995), Holocene Vegetation and Climate History of the Northern Bighorn Basin, Southern Montana (Lyford et al. 2002),Influence of Landscape Structure and Climate Variability on a Late Holocene Plant Migration (Lyford et al. 2003), Fire Effects Information System (USDA Forest Service, online database), available ecological site descriptions, state and transition models, or similar classifications applicable to the national forest for information on ecology, succession, and response to disturbance in juniper woodlands.

Limber Pine

- Refer to Current Status of Limber Pine in Montana (Jackson et al. 2010), Plant Community Classification for Vegetation on Bureau of Land Management Lands, Pryor Mountains, Carbon County, Montana (DeVelice and Lesica 1993), Fire Effects Information System (USDA Forest Service, online database) or similar publications for information on ecology, succession, response to disturbance, and management implications in limber pine woodlands.

Riparian, Wetland, and Groundwater Dependent Ecosystems

- Refer to Classification and Management of Montana's Riparian and Wetland Sites (Hansen et al. 1995), Fire Effects Information System (USDA Forest Service, online database), ecological site descriptions, or similar classifications applicable to the national 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 2003), Groundwater-Dependent Ecosystems: Level I and Level II Inventory Field Guides (U.S. Department of Agriculture 2012a;b), Technical Guide to Managing Ground Water Resources (Glasser et al. 2007) or equivalent method can be used when assessing riparian, wetlands, and groundwater dependent ecosystems.
- The National Wetland Plant List (Lichvar et al. 2016) or subsequent update can be used in assessing riparian and wetland vegetation, such as when evaluating composition shifts between upland, mesic or hydric species. The National Wetland Plant List is a list of wetland plants, by geographic area, and their assigned indicator statuses that reflects the likelihood that a particular plant occurs in a

wetland or upland. Ratings for the Sioux and Ashland Geographic Areas apply from the Great Plains wetland region list. Ratings for the Pryor Mountains; Absaroka Beartooth Mountains; Bridger, Bangtail, and Crazy Mountains; and Madison, Henrys Lake, and Gallatin Mountains Geographic Areas apply from the western mountains, valleys, and coast wetland region list. The National Wetland Plant List is available through the Army Corp of Engineers web application (http://wetland-plants.usace.army.mil/nwpl_static/v33/home/home.html#) or USDA Plants web application (https://plants.sc.egov.usda.gov/core/wetlandSearch).

- USDA Forest Service National Riparian Vegetation Monitoring Core Protocol and associated Technical Guide (Merritt et al. 2017); Effectiveness Monitoring Sampling Methods for Riparian Vegetation Parameters (Archer et al. 2009); Modified PIBO – Custer Gallatin National Forest Riparian Framework, 2018; Multiple Indicator Monitoring (MIM) (Burton et al. 2011); Photo Points (Hall and Farrell 2002) or similar methods can be used for evaluating long term trends.
- Place emphasis on maintaining or improving riparian/wetlands that are in functional 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. Reserve restoration of nonfunctional systems for those situations when recovery is possible, efforts are not at the expense of functional-at-risk systems, or unique opportunities exist.
- When identifying category 4 riparian management zone ephemeral streams, specialists could follow Montana State streamside management zone guidance: to be classified as an ephemeral stream, reaches at least 50 percent (50 feet or more) of a 100-foot segment must meet the definition of an ephemeral stream. Specialists could also classify longer stream reaches based on professional judgement. For example, when working in an area with a category 4 ephemeral stream, a specialist may determine there are sections of that drainage (100 feet or greater) that do not meet the definition of an ephemeral stream and, therefore, riparian management zone plan components should not apply to that particular section.

Alpine

- Refer to The Alpine Vegetation of the Beartooth Plateau in relation to cryopedogenic processes and patterns (Johnson and Billings 1962), Vegetation and Flora of the Line Creek Plateau Area (Lesica 1993), Classification of the Grasslands, Shrublands, Woodlands, Forests, and Alpine Vegetation Associations of the Custer National Forest Portion of the Beartooth Mountains in Southcentral Montana (Williams 2012), Montana Natural Heritage Program's description of Alpine Dwarf-Shrubland, Turf, Bedrock and Scree, Fell-Field, and Glacier and Ice Field ecological systems, Fire Effects Information System (U.S. Forest Service, online database) ecological site descriptions, or similar classifications applicable to the plan area for information on potential vegetation, succession, and response to disturbance in alpine. Refer to Plant Community Classification for Alpine Vegetation on the Beaverhead National Forest, Montana (Cooper et al. 1997) or similar publications for other concepts and insights to alpine processes and management implications.
- The harsh environmental conditions in alpine make growth and the accumulation of biomass a slow process. Furthermore, soil formation takes much longer at high elevations because of the slow pace of biological processes. As a result, recovery from disturbance is generally slow. Although most of the alpine vegetation on the national forest is provided considerable protection from impacts through wilderness area designation or research natural area designation, there remain some areas

that may need revegetation attention. Refer to Rehabilitation Problems in Alpine and Arctic Regions (Ballard et al. 1987), and Bioassay of Alpine Mine Spoils for Plant Growth and Development (Brown and Johnston 1980), or similar publications for management implications.

Sparse Vegetation

- Western Great Plains badland sparse vegetation communities are adapted to soils that are dry throughout the growing season. Typically, soils are easily erodible and can be strongly influenced by infrequent but often torrential rains. Refer to The Distribution of Plant Communities in Southeastern Montana Badlands (Brown 1971), Montana Natural Heritage Program's description of Great Plains Badlands ecological system or similar publications for information and management implications.
- Wyoming Basin cliff and canyon sparse vegetation communities are found in the Pryor Mountains. Vegetation inhabiting this ecological system is typically sparse and may include conifers and woody shrubs adapted to limited soil moisture and soil development. Herbaceous cover is typically very sparse and limited to species adapted to inhabiting cliff faces and unstable talus slides. Refer to Montana Natural Heritage Program's description of Wyoming Basin Cliff and Canyon ecological system or similar publications for management implications.
- Rocky Mountain cliff, canyon and bedrock sparse vegetation communities are found on steep cliff faces, narrow canyons, on smaller rock outcrops and on unstable scree and talus slopes. Limited soil availability, harsh weather extremes, and water stress impose constraints on plant communities leading to plant species that are uniquely adapted to these conditions. These ecosystems are fragile due to extremely limited soil development and plant colonization. Because they are typically difficult to access these habitats are relatively free of anthropogenic disturbance, however climbing recreation and mining have been known to impact this system. Refer to Montana Natural Heritage Program's description of Rocky Mountain Cliff, Canyon and Massive Bedrock ecological system or similar publications for management implications.

Fire and Fuels

Plan components recognize that fire has been and will likely remain the primary disturbance factor on the national 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. See the Terrestrial Vegetation section of this document for additional information on potential management strategies and actions. 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 analysis is recorded in a decision document. For unplanned ignitions a decision support process is used to guide and document wildfire management decisions that provide for firefighter and public safety, minimize costs and resource damage, and are consistent with values to be protected, resource benefits, and management objectives.

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 as documented in the decision support process. These strategies 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 to 10 years), annual, and incident:

- Long term: analyzing the existing conditions that change typically in the 5- to 10-year time frame, informing broad questions and decisions for programmatic risk assessments. Items may include highly valued resources and assets such as structures, infrastructure, commercial timber, and wildlife habitat. See below for further information on wildfire risk assessments.
- 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 and long-duration risk may have the opportunity for short-term fire management. Fire danger operating plans, which include preparedness, response and staffing plans, are used for fire-season analyses.
- 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 the 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. Coordination with other agencies and affected individuals, such as national forest users and permittees, could occur at any scale but most often takes place at the incident level.

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.

Naturally caused wildfire may be allowed to play, as nearly as possible, its natural ecological role on the landscape. However, if a naturally ignited, unplanned wildland fire does not meet identified resource objectives, the fire may be suppressed. In research natural areas and special areas, naturally caused wildfire may be used to achieve and maintain vegetative conditions and desired fuel levels if appropriate for meeting the area objectives.

These strategies are similar to the fire management strategies already in place on most Greater Yellowstone Area 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 Greater Yellowstone Area partners.

Planned Ignitions and Mechanical Fuels Treatments

Planned ignitions (prescribed fire) may be used forest wide to achieve desired conditions where necessary and appropriate. Planned ignitions may also be used in research natural areas and special areas to perpetuate the natural diversity of plant communities. Concurrence of the appropriate Forest Service research station director is required for planned ignitions and other management actions proposed in research natural areas.

A suite of mechanical fuels reduction treatments may also be used, including commercial timber sales and noncommercial treatments such as thinning, mowing, mastication, and herbicide application (list is not inclusive).

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 in areas that are addressed in community wildfire protection plans and determined through site-specific project analysis. These conditions would meet plan desired conditions 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 foreclose the opportunity to maintain or achieve any other desired condition over the long term.

In terms of fire risk, minimum coarse woody debris levels, as stated in FW-GDL-SOIL-07, are low enough that fire intensity resulting from their ignition would generally not pose a significant threat to firefighters and values at risk. However, in some instances, even lower amounts of coarse woody debris could be needed to further decrease resistance to control and make it easier and safer for firefighters to engage a fire near values at risk and along control lines (for planned prescribed fires or along fuel breaks for future control of wildfires). In these instances, a lower coarse woody debris amount would reduce the amount of energy being produced by the fire and would lower flame lengths, which are both measures of fire intensity, thereby decreasing both resistance to control and the probability of negative impacts to values at risk. This is also applicable to FW-GDL-VEGF-04.

Wildfire Risk Assessment

A wildfire risk assessment for the Custer Gallatin National Forest is used for fuels and wildfire planning and follows the methods outlined in the publication titled A Wildfire Risk Assessment Framework for Land and Resource Management (Scott et al. 2013b). The identified areas of risk and the spatial data used in the assessment analyzes where resource objectives and protection objectives can be met.

For this analysis, FSim, a computer program for large-fire simulation, was used to quantify wildfire hazard across the landscape. FSim is a comprehensive fire occurrence, growth, behavior, and suppression simulation system that uses locally relevant fuel, weather, topography, and historical fire occurrence information to estimate the contemporary likelihood and intensity of wildfire across the landscape

(Finney et al. 2011). A geographic information systems model combines the FSim outputs and highly valued resources and assets to identify areas of risk.

A major part of a wildfire risk assessment is to have a good indication of where potential damages and benefits can occur. This is more than just locating the highly valued resources and assets; it is locating where they have the potential to be positively or negatively affected considering the likelihood of a wildfire occurring and the intensity at which it would likely burn. The two main indicators are location (where the potential damages and benefits to highly valued resources and assets are located) and source (where the wildfire ignitions of these potential damages and benefits start).

The technical measure of the potential damages and benefits is determined by the conditional net value change. The conditional net value change is how the landscape would change if a fire were to burn with expected fire intensity, considering the values at risk, how important those values are, and how those values would respond to fire. It is the net effect of damaging and beneficial effects to the value of a resource or asset. Negative values indicate net loss while positive numbers indicate net benefit (Thompson et al. 2016).

The results from the wildfire risk assessment provide another science-based tool for achieving the three goals for the National Cohesive Wildland Fire Management Strategy.

- Goal 1: Restoring and Maintaining Landscapes: the assessment identifies areas of low risk and high chance of obtaining resource objectives, or positive net value change.
- Goal 2: Creating Fire Adapted Communities: areas of high risk, or negative net value change, are identified, which could help prioritize fuels treatments.
- Goal 3: Wildfire Response: wildfire response can be prioritized by assessing the risk and benefit up front, based on a conditional net value change.

FSim outputs may also be used to design efficient fuel management strategies (Scott et al. 2016) and along with wildfire risk assessment results, define Potential Wildland Fire Operational Delineations (PODs) for strategic wildfire response (Thompson et al. 2016).

Invasive Species

Forest Service invasive species management policy and guidance are provided in Forest Service Manuals 2900 Invasive Species Management, 2070 Vegetation Ecology, 2150 Pesticide Use Management and Coordination, Forest Service National Strategic Framework for Invasive Species Management of (2013), and A National Road Map for Integrated Pest Management (2018).

Refer to the Forest Service Strategic Framework for Invasive Species (U.S. Department of Agriculture 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 could coordinate activities within the Forest Service and with Federal, State, and local partners.

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

All Invasive Species

- Integrate invasive species management and funding broadly across a variety of National Forest System programs, while associating the management and 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 Federal, 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.
- An integrated pest management approach to invasive species treatment typically emphasizes eradication on smaller priority areas and new species, with control emphasized on new starts and areas of minor infestations, and containment actions applied to areas of existing large infestations. Invasive species infestations are typically inventoried periodically to monitor the existing and new infestations.
- Prioritize invasive species prevention and treatment activities, with emphasis on all Forest Service administrative sites and high use sites such as trailheads, boat ramps, 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.
- Consider the following factors when prioritizing invasive species treatment: 1)invasive species category – potential invader, new invader, widespread invader; 2) relative invasive nature of the species and its potential to displace native species; 3) relative ecological importance or rarity of the site that could be damaged by the presence of the invasive species; 4) potential for off-site movement of seeds or propagules; 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 Weed Risk Assessment Protocol (U.S. Department of Agriculture 1995) or similar method can determine the risk of weed spread for projects, needed prevention and protection measures, and monitoring needs.
- Use industry standard prevention measures and best management practices, such as, 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; National Best Management Practices for Water Quality Management on National Forest System Lands (FS-990a); and enforce Northern Region Weed and Invasive Species Free Restrictions.
- Include in contracts and permits clauses and specifications requiring the implementation of measures to prevent, control, and contain aquatic or terrestrial invasive species (including noxious weeds). Oversee contract and permit administration to ensure compliance with the provisions.
- Provide continuing education for Forest Service field personnel in invasive species identification.
- Utilize the official database of record to determine a change in extent of a particular species (per invasive species desired condition FW-DC-INV 01: "...Where invasive species occur, their range is reduced where possible, or at a minimum, they do not expand..."), the range is the geographic

extent of a particular species on the landscape. To support MON-INV-01, establishing a baseline year could provide a basis to compare invasive plant species range spatially in subsequent years. An increase in abundance would not necessarily mean there was a change in the range.

Invasive Plant Species

- Prioritize noxious weed species listed by the States of Montana and South Dakota for integrated pest management. Some Montana counties have additional species listed as noxious that can be found on their websites.
- Use protection measures outlined in applicable weed management decisions or subsequent weed management decisions. Refer to Reid (2018) summary of protection and prevention measures for a side-by-side comparison between the Custer National Forest (2006) and Gallatin National Forest (2005) final environmental impact statements' protection measures. Refer to Custer National Forest Weed Field Guide (U.S. Department of Agriculture 2007c) and Custer and Gallatin Herbicide Spill Plans (Reid 2017) as a field friendly source of decisions made in the (2006) Custer National Forest Weed Management Final Environmental Impact Statement, regarding prevention, best management practices, treatment, safety, and monitoring and reporting.
- Evaluate infested at-risk plant sites before treatment. If at-risk plants occur in or near infestations, a weed control plan could be developed to help protect the at-risk plant population. Review noxious weed decisions for sensitive or at-risk species and consult with a botanist or designated resource specialist prior to treating in known at-risk plant locations. Provide weed crews or contractors with maps of all known at-risk plant populations so that known sites can be identified and protected. Provide training for weed crews to identify sensitive plants so that new sites can be identified and protected.
- 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 the plan components and in applicable weed management decisions or subsequent weed management decisions for at-risk species. 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 (for example spot spraying, wick application), or adjusting the priority of the treatment.
- During risk assessments, consider using U.S. Forest Service Region One Eastside Weed Susceptibility Assessment (Mantas and Jones 2001) or similar tool to help determine the level of risk depending upon the environmental settings and invasiveness of a weed.
- 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 or new invasions, manage priority areas for pre-treatment of noxious weeds in any defined project or use area, as needed (for example, fuels treatment, timber harvest, or fire camp areas).

- Enforce weed and invasive species free Northern Region restrictions.
- Provide educational prevention materials at district offices and at trailheads or other recreational areas, to communicate requirements of local, state, and National Forest certified weed seed free hay or pelletized feed restrictions and to encourage removal of weed seeds/burs from treads of mountain bikes, all-terrain vehicles 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.

Aquatic Invasive Species

- Refer to the Guide to Preventing Aquatic Invasive Species Transport by Wildland Fire Operations (National Wildfire Coordinating Group 2017) or similar guidance documents (for example, Northern Rockies Coordinating Group supplemental aquatic invasive species guidance and Aquatic Nuisance Task Force species control and management plans) which provide best management practices to help wildland firefighters prevent contact with and spread of aquatic invasive species, best procedures for decontaminating ground and aviation equipment, aquatic invasive species prevention recommendations for resource advisors, and aquatic invasive species disinfection methods.
- Refer to the South Dakota Department of Game, Fish and Parks and the Montana Fish, Wildlife and Parks rules and guidelines for boat, gear, and equipment inspection and disinfection to prevent the transport of aquatic invasive species.

Emerald Ash Borer

The emerald ash borer, a devastating invasive wood boring beetle native to Asia, is responsible for killing millions of ash trees throughout much of the Midwestern United States, including green ash. The current closest infestations occur in eastern South Dakota, Colorado, and Minnesota. Movement of ash material from infested areas is prohibited by federal quarantine regulations. However, unintentional movement may occur due to lack of awareness of the quarantine regulations onto the national forest (for example transported firewood, pallets). Detection of emerald ash borer infestations is difficult when trees are first attacked, showing few signs that emerald ash borer is present. However, healthy ash trees are killed in two to four years.

- Refer to the National Response Framework for Emerald Ash Borer (U.S. Department of Agriculture 2011a) as well as the Montana (2015) and South Dakota (2017) Response and Readiness Plans for strategic goals of prevention, preparedness, response and recovery for areas with established emerald ash borer infestations and areas where emerald ash borer has not been detected. The national framework also identifies and aligns key roles and responsibilities of USDA's Forest Service and Animal and Plant Health Inspection Service (APHIS), National Association of State Foresters, and the National Plant Board.
- Refer to the Emerald Ash Borer Information Network, U.S. Forest Service Northern Research Station and APHIS websites for additional resources regarding emerald ash borer detection and management.
- Consider an educational approach by posting applicable "Don't Move Firewood" type of posters on the national forest, having educational material on internet, intranet, and social media.
- Consider restriction through special closure orders in coordination with applicable partners.
- Contact local Forest Health Protection if Emerald Ash Borer is suspected. Forest Health Protection is also an appropriate contact to further develop management options if Emerald Ash Borer becomes

established (possible insecticide use in campgrounds and certainly with coordinating requests for biological control agents).

White Pine Blister Rust

White pine blister rust is a non-native disease that entered the U.S. at the turn of the 20th century. Its primary host species on the national forest are whitebark pine and limber pine. It also infects *Ribes* species (currants and gooseberries), and possibly louseworts and Indian paintbrush, which are alternative hosts required for the disease to complete its life cycle. There is no known method for eradicating the disease, although actions such as pruning can reduce infections. A small percentage of host trees display one or more resistance traits that enable them to avoid or survive infection.

- Encourage regeneration (natural or artificial) from these seed sources that display one or more resistance traits.
- Refer to the publication White Pine Blister Rust in Northern Idaho and Western Montana: Alternatives for Integrated Management (Hagle et al. 1989) or similar sources for information on control efforts, disease resistance, and management alternatives.

White-Nose Syndrome

White-Nose Syndrome is a disease caused by a fungus (*Pseudogymnoascus destructans)* that can be transmitted by other bats as well as by humans visiting caves where bats are roosting.

- Refer to A National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats (U.S. Department of the Interior 2011) for general practices and response strategies. This Plan is a coordinated approach for addressing White-Nose Syndrome among Department of Interior, Department of Agriculture, Department of Defense, and State wildlife management agencies.
- Refer to the National White-Nose Syndrome Decontamination Protocol (U.S. Department of the Interior 2016) or similar sources for recommendations to effectively clean and treat clothing footwear, and gear that may have been exposed to White-Nose Syndrome (refer to whitenosesyndrome.org for the most updated information on the status of county and state).

Wildlife

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 plant and animal diversity a goal at the landscape scale to provide habitat and connectivity for a wide range of native and desired non-native species.
- The Custer Gallatin covers an extensive area, with a huge natural range of variation in climate, topography, and myriad other factors that produce a vast mosaic of habitat conditions. Natural processes over time, and more recent human activities have created a dynamic system, and consequently wildlife here are strongly adapted to changing conditions. Natural disturbance, and vegetation management by humans can have adverse impacts on some species or individuals, but can also have neutral, and often beneficial results for wildlife. Vegetation structure and composition provides crucial habitat components for wildlife, and there may be circumstances where vegetation alterations, due to natural or management events would have detrimental impacts for certain species, populations, or individuals. Landscape and ecosystem knowledge can help agency biologists

identify key wildlife habitats in which some types of vegetation and landscape alterations are undesirable. These areas can then be prioritized for protection from natural disturbance events, and site-specific management restrictions can be applied to protect species, populations, or key individuals.

- Management actions for which wildlife habitat restoration, maintenance, or improvement is the sole or primary purpose can be made most effective where prior scientific validation demonstrates that proposed treatment methods have a high probability of achieving the desired effect in the target habitat type. Where no such scientific validation exists for a particular form of treatment or for a particular species/habitat, then small-scale, pilot field tests of the proposed treatment can provide useful information or validation of efficacy prior to implementation of habitat treatment projects on a larger scale. A combination of short- and long-term monitoring may be necessary, and can be most informative relative to the effectiveness of various treatments on a range of species and habitat types.
- Fences, where needed, can be constructed, or reconstructed to be "wildlife friendly" to allow wildlife to move across the landscape without being trapped or injured by fencing material. Also, deploying fence markers or strike diverters can make fences more visible to animals and birds, which may help reduce wildlife collisions with fences. Two publications: Fences (U.S. Department of the Interior et al. 1999), and A Landowner's Guide to Wildlife Friendly Fences (Paige 2012) provide methods that can be incorporated in design criteria for projects requiring new fence construction or reconstruction of existing 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 (such as 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 (U.S. 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.
- 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 U.S. 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 (U.S. Department of Agriculture and Montana Fish Wildlife and Parks 2013). The recommendations included in this document pertain to the Montana portion of the Custer Gallatin National Forest. At the time this revised plan originated, elk occurrence on the South Dakota portion of the national forest was limited to a newly self-established herd. As a result, little was known about elk habitat requirements in the South Dakota portion of national forest. Biologists covering the Sioux Geographic Area can work closely with South Dakota Game Fish and Parks personnel to gather information on habitat use patterns of elk specific to that area, and work cooperatively to manage habitat accordingly.

- Elk Analysis Units (EAU) jointly delineated by Forest Service and State wildlife management personnel, can provide an appropriate scale for landscape assessments and some project-level analyses, and can be useful for evaluating the need to manage security or other ecological factors for elk and other big game species (FW-GDL-WLBG-01 through 03). However, elk analysis units may not provide the appropriate analysis scale for all projects, particularly where relevant information may be lacking for elk analysis units covering multiple jurisdictions, or where elk may not be a priority species for a given project. Appropriate analysis units can best be determined at the project level, and supporting rationale for selection of project-level analysis units can be provided in the project record.
- Specific characteristics of security areas for big game, including size, distance from motorized routes, and the proportion of an area that is secure, can vary depending on the combination of topography, vegetative cover, number and location of motorized routes, as well as other factors. State wildlife management agencies can provide information on local big game population trends and hunting objectives that can inform project-level big game security analyses.
- Nutritional value of forage is an important factor to be considered for big game habitat quality at the project level, as well as for landscape assessments. This factor is particularly important for summer range, where females incur nutritional demands of lactation, while also needing to build fat reserves for winter. Biologists can use a time integrated normalized difference vegetation index (NDVI) as an assessment tool to identify areas of optimal nutrition for big game (DeVoe et al. 2018) (Montana Department of Fish, Wildlife and Parks, pers. comm. 2018). A description of this tool for evaluating elk summer resource selection and applications to summer range habitat management in southwest Montana, is provided in: (Ranglack et al. 2016). Evaluating elk summer resource selection and applications to summer range habitat management.
- Coniferous forest cover provides a wide variety of functions for big game (and other wildlife) species, such as snow intercept making for easier travel and better access to forage in winter; hiding cover to escape predation year-round, and thermal cover to ameliorate stresses caused by extreme temperatures, wind and precipitation. State wildlife management agencies can provide valuable data and insight for project-level considerations where some level of conifer cover is a high priority for maintaining functional elements on key big game seasonal ranges. Important areas to consider retention of conifer cover in project design criteria include reproductive areas to provide hiding and thermal cover for young/vulnerable individuals, winter ranges where animals may already be stressed by cold temperatures and lack of high-quality forage, and traditional migration routes where conifer cover may provide screening from predators, as well as provide visual cues to identify routes. In warmer climates; (such as pine-savanna ecosystem), conifer cover may be especially important in summer to provide relief from high temperatures and biting insects.

- Periodic coordination meetings between Forest Service biologists and state wildlife management agencies can be useful for identifying key habitats, such as areas where conifer retention is crucial in providing necessary structure for thermal regulation on seasonal ranges and hiding cover during hunting seasons or other times of vulnerability (such as calving/fawning seasons). Such coordination can also help identify areas where conifer removal might be desirable to increase forage quality or quantity, or to maintain natural meadow habitats. Periodic coordination meetings are not expected to replace interagency communication at the project level, but may provide a more holistic approach to identification of key habitats for wildlife.
- The Custer Gallatin is ecologically complex, with significant differences between the montane and pine savanna ecosystems, as well as between the various geographic areas within those ecosystems. As a result, what works well in one part of the forest under certain conditions may not be appropriate or applicable in other parts of the forest. These differences can best be addressed at the project level by local Forest Service specialists through consideration of site-specific factors including physical and ecological conditions, as well as availability of pertinent information for an area. State wildlife management agencies can often provide site-specific habitat and/or wildlife population information, as well as insight and experience as to methodologies with proven results in an area.
- 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 et al. 2009) journal article: A large-scale mitigation experiment to reduce bat fatalities at wind energy facilities.
- Snag habitat quality can be maintained with active participation by wildlife biologists in the assessment and designation of snags to be retained in areas proposed for vegetation management. Important factors to consider include size and number of snags in proposed treatment units relative to surrounding landscape, as well as habitat type relative to potential snag-dependent species that may occupy the proposed treatment area. Quality of snags may also be an important consideration given site-specific attributes and snag-dependent species occurrence and focus for the project area. For example, hard snags with low levels of decomposition may provide long-term perches and hiding cover for wildlife, whereas softer snags with significant internal decomposition (such as heart rot) may be preferred by cavity-nesting species. Either, or a combination of both, hard and soft snags may be desirable based on site-specific conditions. Loose or flaking bark may also be a desirable feature of snags for several bats, avian, and reptilian species.
- Key seasonal use dates for wildlife, such as breeding, nesting, denning, wintering, migration etc. can vary widely by species, between individuals within single species, and geographically. Seasonal use may shift over time due to changing environmental conditions or better information gained through research and monitoring. For these reasons, specific seasonal dates are generally not prescribed for wildlife in plan components, as they are subject to change. Important wildlife seasonal dates can best be determined by the local wildlife biologist at the project level, using best available scientific information as obtained from literature, local field data, consultation with other biologists, agency protocols, or other sources as appropriate. 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. Such information can then be documented in project files, as it pertains to effects analysis, recommended mitigation measures, and plan compliance.

- Highway crossings pose a significant risk of mortality for wildlife, due to the high speed and volume of vehicle traffic. Forest Service biologists can work with state agencies (transportation and wildlife management), as well as other willing partners to collect information on wildlife migration routes that cross highways, high mortality areas, and potential mitigation measures such as highway over/under passes for wildlife. Fencing or other obstacle on National Forest System lands can help funnel wildlife movement to safer crossing areas, and vegetation management can be used near highway crossing areas to improve visibility for wildlife as well as to increase wildlife sight-ability for vehicle drivers.

All migratory bird species are protected from harm and harassment under the Migratory Bird Treaty Act (16 U.S.C. 203 (MBTA)). Executive Order 13186 outlines the responsibilities of Federal agencies to protect migratory birds. Many raptor species found on the Custer Gallatin National Forest are migratory and thereby protected under the Migratory Bird Treaty Act. Bald and Golden eagles are further protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 688 (Eagle Act)). Raptor nests are typically large and often conspicuous, while both adults and chicks can be quite vocal. These conditions make raptor nests easier to detect at project sites relative to smaller, more secretive migratory bird species. FW-DC-WL-04 calls for wildlife habitat conditions that provide security and refuge from threats, while FW-GDL-WL-06 requires management activities to avoid disturbance at known active raptor nests and fledging areas. Disturbance can be avoided through project design features such as timing restrictions that limit management activities to periods when raptors with young are not present at a nest or fledging area, or spatial buffers that restrict management activities within a certain distance of a known raptor nest and fledging area. Temporal and spatial restrictions to avoid disturbance of raptors during the reproductive season may vary depending upon the proposed activity, habitat conditions, and species of raptor in the project area. The U.S. Fish and Wildlife Service provides useful conservation measures on their website (https://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php), as well as potential nest buffer distances plus timing considerations for a variety of raptor species (https://www.fws.gov/wyominges/species/raptors.php).

Bats

Multiple bat species are known to occur on the Custer Gallatin 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 or after the late summer dispersal to avoid impacts to bats. Seasonal dates may vary and can best be determined at the project level.
- 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 (such as 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 (such as ponds, or pools in creeks) and artificial water sources (such as 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” (WNS). 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. Details about white-nose syndrome and appropriate decontamination measures can be found at the White Nose Syndrome website (https://www.whitenosesyndrome.org/).
- Montana Fish, Wildlife and Parks, Montana Natural Heritage Program, Montana Department of Environmental Quality, U.S. Fish and Wildlife Service, U. S. Forest Service, Bureau of Land Management, and volunteers from the Northern Rocky Mountain Grotto and Bigfork High School Caving Club have collaboratively developed statewide white-nose syndrome prevention and response guidelines that provide a variety of management options to minimize risk of human-caused spread of the pathogen that causes white-nose syndrome in bats. These guidelines are updated as new information becomes available, and can be consulted for the most current, locally relevant and scientifically-based white-nose syndrome management protocols.

Bighorn Sheep

Management that would result in the presence of domestic sheep or goats on National Forest System lands can be evaluated for potential threats of disease transmission to bighorn sheep by consulting regional, or forestwide risk assessments on the topic. If no broad scale assessment exists, or existing assessments are outdated or otherwise lack information pertinent to a specific proposal, project-specific implications can be evaluated by conducting a risk assessment prior to approval of any permits authorizing the use of domestic sheep or goats for livestock production, recreational pack animals, and targeted weed control. A risk assessment might consider factors such as:

- Size, location, and health of existing bighorn sheep herds
- Current condition of bighorn sheep home range and seasonal range
- Purpose for proposed use of livestock (such as livestock production, targeted weed treatment, recreational use as pack animals)

- Possible spatial overlap of permitted domestic livestock with known bighorn sheep use areas
- Possible temporal overlap of domestic livestock presence with known seasonal use patterns of bighorn sheep
- Proportion of rams/ewes within local bighorn sheep herds that may foray outside of the herd home range, and distances of known forays of wild sheep
- Habitat connectivity between bighorn sheep seasonal ranges and proximity to domestic sheep or goats grazing on National Forest System or other lands
- Consultation with responsible state wildlife and livestock management agencies regarding potential risks and consequences to both wildlife populations and livestock producers, and
- Potential for natural recolonization or translocation of bighorn sheep in any area proposed for domestic sheep or goat grazing

Bison

The Interagency Bison Management Plan (IBMP) (www.ibmp.info), provides a framework for management of Yellowstone bison and their habitat. The purpose of the Interagency Bison Management Plan is to maintain a wild population of Yellowstone bison while also addressing the risk of brucellosis transmission between bison and domestic livestock. As a result, the presence, abundance and distribution of wild bison on the Custer Gallatin National Forest is coordinated with the state of Montana through the identification of, and management emphasis on, bison tolerance zones. The plan calls for deference to bison management within these zones (FW-GDL-WLBI-01).

While management zones are emphasis areas for bison management, bison presence can be accommodated across their range through management practices. For example, within management zones, management practices (to meet intent of FW-GDL-WLBI-01) can be applied if bison approach active livestock allotments. Such management practices may include, but are not limited to the following: adjusting livestock use dates to times when bison are not present, authorizing non-use of livestock allotments for resource protection, changing the kind/class of livestock from cows and calves to horses or steers, or relocating livestock to vacant or forage reserve allotments where risk of bison overlap is low. If opportunities present themselves, a permittee waives their grazing privileges back to the Forest Service and suitable habitat for bison exists on that allotment, the allotment may be retained as vacant, forage reserve, or potentially closed if it is determined through a project level decision to no longer be appropriate for livestock grazing. Management practices to meet the intent of FW-GDL-WLBI-02 and 03 may also be applied outside of management zones if it is determined further expansion is desirable.

Habitat improvement projects can be implemented to facilitate bison movement into suitable, yet unoccupied habitats. Such projects may include, but are not limited to the removal of unnecessary fences that could affect bison movement, mechanical thinning, or prescribed burning of dense forest or deadfall to improve travel corridors between suitable habitats, treatment to remove non-native plants in order to improve forage quality and quantity for bison, aspen/riparian/meadow enhancement, road closures, and livestock allotment management as described above.

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 national forest visitors. However, their behavior patterns are not well understood, and 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.

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 in non-habitat inclusions (such as non-vegetated areas) or in the least suitable habitat possible. New structures can be consolidated where possible to minimize impact of infrastructure and designed to minimize tall structures.
- 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 or other suitable devices can reduce grouse collisions on flat or gently rolling terrain within occupied sage-grouse habitat. Marking fence wires within 2 kilometers of occupied leks with flagging or durable vinyl markers can increase fence visibility, which may reduce the probability of grouse collisions without disrupting permitted livestock grazing infrastructure. When planning new fence projects, avoid building fences in these high-risk areas where possible. Unnecessary fences within sage-grouse habitat can be removed to improve habitat conditions for grouse. These concepts can be applied to other occupied seasonal habitats where sage grouse are known to concentrate and where they could collide with fences, such as brood-rearing habitat and wintering sites.
- Effective seeding practices to re-establish native vegetation after wildfire in Wyoming big sagebrush communities can be found in (Ott et al. 2017). Comparison of postfire seeding practices for Wyoming big sagebrush. Rangeland Ecology and Management 70: 625-632.
- The Montana Mitigation System Habitat Quantification Tool (HQT): Technical Manual for Greater Sage-Grouse, defines processes and provides information to quantify losses of Greater sage-grouse habitat caused by development, and alternatively to estimate conservation benefits resulting from activities that restore, enhance or preserve sage-grouse habitat. The HQT methods can be used to evaluate vegetation management results to ensure no net loss of habitat or demonstrate a net conservation gain for sage-grouse (FW-STD-WLSG-01).
- Conifer encroachment in sage-grouse habitat can be reduced through mechanical treatment or prescribed fire. Mechanical treatment may allow for more selective removal of conifers and better retention of desirable understory shrubs and forbs. Prescribed fire can also be an effective tool for conifer removal where conditions allow, or mitigations can be implemented, to prevent fire escape and establishment of invasive annual grasses or other weeds. Conifer presence at less than 5 percent of ground cover can provide suitable habitat for sage-grouse, although no conifer encroachment is desirable.

- Seasonal timing restrictions can be applied to reduce potential disturbance impacts of management activities during sage-grouse breeding, nesting, and early brood-rearing seasons. State wildlife management agencies can be consulted for information regarding important seasonal dates for sage-grouse. Buffers around active sage-grouse leks can also be used to minimize habitat alterations and disturbance impacts of management actions. Manier et al. (2014) publication: Conservation Buffer Distance Estimates for Greater Sage-grouse – A Review, provides recommendations that may be useful when considering potential mitigation measures at the project level.

Grizzly Bears

The Custer Gallatin land management plan formally adopts habitat standards for grizzly bears from the 2016 Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem (2016a). This document is intended to be dynamic and responsive to changes in science, technology, and ecological conditions. The land management 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; refer to the "1998 baseline." The U.S. Fish and Wildlife Service selected 1998 as a baseline year because it was demonstrated that habitat conditions (such as 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 (2016b).

Developed Sites

Grizzly bear habitat standards were revised using a footprint approach for larger developed sites such as campgrounds, administrative sites, and visitor overnight facilities. Visitor overnight sites include resorts and guest ranches operating under special use permit. Increased use is allowed, not to exceed 10 percent of permitted capacity in 1998 (FW-STD-WLGB-04b). Visitor overnight site capacity can be measured by the number of sites such as cabins or campsites currently permitted, additions can be designed to accommodate capacity similar to existing structures.

The intent of using dispersed site closures as mitigation for new overnight developed sites is to focus human use and capacity into areas that are more effectively managed, thereby reducing the potential for human/bear conflict. Standard FW-STD-WLGB-05(c) requires closures to be effective to meet this intent. Ineffective closures could result in displacement of dispersed use to other nearby locations instead of reducing use. When determining effectiveness, the Forest Service may evaluate enforceability, the type of deterrents and barriers, education, and communication.

Standard FW-STD-WLGB-05(c) requires that areas selected for closure provide a demonstratable benefit to bears and other resources. The intent is to weigh the benefit of dispersed camping closures against the impacts from the new developed site. This analysis could ideally be conducted by a Forest Service wildlife biologist in cooperation with a recreation specialist. Factors to consider include the protection of key habitat types, known patterns and probability of use, distribution of existing disturbance, and the risk and history of conflict. The Custer Gallatin could proceed with the new developed site if the analysis demonstrates a clear benefit to grizzly bears and other resources.

Standard FW-STD-WLGB-05(c) requires that overnight capacity at the new developed site not exceed that of the eliminated dispersed camping. The overnight capacity of dispersed use areas may be determined through the monitoring of recreation use numbers and patterns using a protocol similar to the Region 1 Standards for Dispersed Sites Monitoring Protocol. This determination may occur during the feasibility assessment and prior to the design and analysis phase for the new overnight site development. Current data (generally within 2 years) would provide a dispersed use capacity estimate reflective of current use level.

Open Motorized Access Route Density, Total Motorized Access Route Density, Secure Habitat

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, total motorized access route density and secure habitat, as useful metrics for long-term monitoring of potential effects to grizzly bears and their habitats. The appropriate scale for calculating open motorized access route density, total motorized access route density, 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, can provide an 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 (open motorized access route density, total motorized access route density, and secure habitat) was unnecessary and somewhat redundant in meeting grizzly bear habitat management goals. Open motorized access route density and total motorized access route density 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 open motorized access route density greater than 1 mile per square mile and total motorized access route density greater than 2 miles per square mile. 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 open motorized access route density or total motorized access route density at or above established threshold levels; so there are consequently no plan components associated with open motorized access route density or total motorized access route density levels, but rather these metrics are included in the monitoring section of the Custer Gallatin plan.

Habitat quality and quantity are to be considered when mitigating for unavoidable reductions in secure habitat (FW-STD-WLGB-02). Acreage and patch size of secure habitat lost, availability of key food sources, access to hiding and/or thermal cover, elevation, and habitat protections in place through existing land use designations or plan land allocations, can all be used to evaluate habitat quality and quantity for mitigation purposes.

In addition to management of motorized access routes, non-motorized routes can be managed to avoid bear-human conflicts through information and education programs and appropriate signing. Mountain bike use on trails is an emerging issue; particularly in areas of high bear densities. Mountain bike trails can be designed to minimized bear-human encounters and conflicts by incorporating evaluation of sight distance along trail locations due to vegetation or topography, ambient noise levels such as proximity to running water, and tight corners in trail design. Trail location relative to highly productive bear foods; for example, whitebark pine, berry patches, ungulate winter ranges, can also be considered for seasonal trail use restrictions where necessary.

Habitat Connectivity

Grizzly bear movement within and between Custer Gallatin National Forest administrative units (or geographic areas), as well as grizzly bear movement between the Custer Gallatin National Forest 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 National Forest personnel can work cooperatively with State and Federal agencies (such as 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 (such as 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.

Bear Awareness

Bear awareness programs can be used to promote safe practices for employees, contractors, permittees, and the general public who live, work, or recreate in bear country. Such programs can help to minimize the risk of human injury by bears, as well as minimize human-caused bear mortalities that can result from self-defense or management control actions. Education programs can emphasize the importance of proper food/attractant storage, use of bear spray, how to avoid conflicts with bears, and how to react in the event of a close encounter or bear attack. Appropriate signing at trailheads, picnic areas, and campgrounds can help minimize bear-human conflicts.

Potential Conflicts

When ground disturbance resulting from management actions or natural processes requires vegetative rehabilitation, potential conflicts with grizzly bears can be avoided by using seed mixes that contain less palatable plant species. For example, seed mixes with succulent grasses and forbs, clover, and/or berry-producing shrubs may not be suitable for planting in areas of high human use such as developed recreation areas or near high-use trails.

If domestic sheep or goats are used for targeted weed treatment, potential conflicts with grizzly bears can be reduced with mitigation measures included in contracts, permits or other agreements. Such measures might include instructions that specify timing, location, numbers of livestock, level of oversight, use of electric fencing at night, require retrieval of strays and proper disposition of carcasses, or other measures as determined on a site-specific basis.

If chronic grizzly bear conflicts occur on livestock allotments, possible options for resolving conflicts can include authorizing resource protection non-use (temporary), moving livestock to a vacant or forage reserve allotment where there is less likelihood of conflict, (either temporary or permanently), or if a permittee waives their grazing privileges back to the Forest Service, allotments may be retained as vacant, forage reserve, or potentially closed if determined through a project level decision to no longer be appropriate for livestock grazing.

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 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; such as, encroaching onto adjacent private lands, non-lethal measures can be used to control movement. Such measures might include increasing vegetative structure through planting of tall shrubs, and creating visual impairment by piling slash or building artificial structures to restrict prairie dog expansion into areas where their presence is not desired.

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 can be informed by recovery plans, conservation strategies, and other applicable guiding documents for federally listed species.
- Forest personnel can engage in interagency efforts to protect and restore listed species and their habitats.

Wolverine

Management activities that require motorized access (wheeled vehicles or snowmobiles) can have disturbance impacts if conducted in maternal habitat for wolverines during the reproductive denning season. Non-motorized activities such as skiing, snowshoeing or hiking can also disturb and/or displace wolverines if conducted near known, occupied reproductive wolverine den sites during the same time period. Both motorized and non-motorized types of activities can be evaluated at the project level to determine whether a proposed action meets the intent of FW-GDL-WLWV-01. In areas with existing levels of human use, which demonstrably reduce maternal habitat functionality, an increase in special use authorizations may be allowed in order to concentrate impacts.

Potential Management Strategies and Approaches for 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 Custer Gallatin could analyze impacts of potential management actions on contributions to well-being, quality of life and the health and safety of the public.
- The Custer Gallatin 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.

- The Custer Gallatin could develop programs with youth and underserved populations to learn about the benefits of ecosystems and conservation to humankind.
- The Custer Gallatin could increase opportunities for youth and underserved populations to experience the joys of connecting with nature and recreating outdoors through experiential activities and programs.
- The Custer Gallatin could account for existing local and regional economic conditions and potential changes to direct and indirect economic contributions from the national forest to help inform project planning and management of land, ecosystems and usable resources including public access.

Areas of Tribal Importance

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

- The Custer Gallatin may coordinate with Tribes in managing traditional cultural properties and cultural landscapes, where historic preservation laws alone may not adequately protect the resources or values.
- The Custer Gallatin 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 or aboriginal ties to the national forest.
- Tribal perspectives, needs, and concerns, as well as traditional ecological knowledge, may be incorporated into project design and decisions, as appropriate.
- The Custer Gallatin may develop a Custer Gallatin specific policy, in consultation with the treaty Tribes for the collection of forest products for traditional cultural and purposes.
- The Custer Gallatin may consult with Tribes to identify sacred sites and traditional cultural locations and develop a strategy for appropriate recognition and management.
- In consultation with the Tribes, the Custer Gallatin may undertake protective measures for areas of scenic, cultural, traditional values, and natural resources habitats (such as plants and wildlife, minerals, fossils) identified by Tribes and traditional practitioners that occur on the national forest.
- Tribal traditional ecological knowledge (TEK) may be used to help address climate change and forest restoration.
- The following map of treaty rights and land cessions within and surrounding the Custer Gallatin National Forest (figure 1) may be used to apply plan direction.

Figure 1.Treaty Rights and Land Cessions Within and Surrounding the Custer Gallatin National Forest

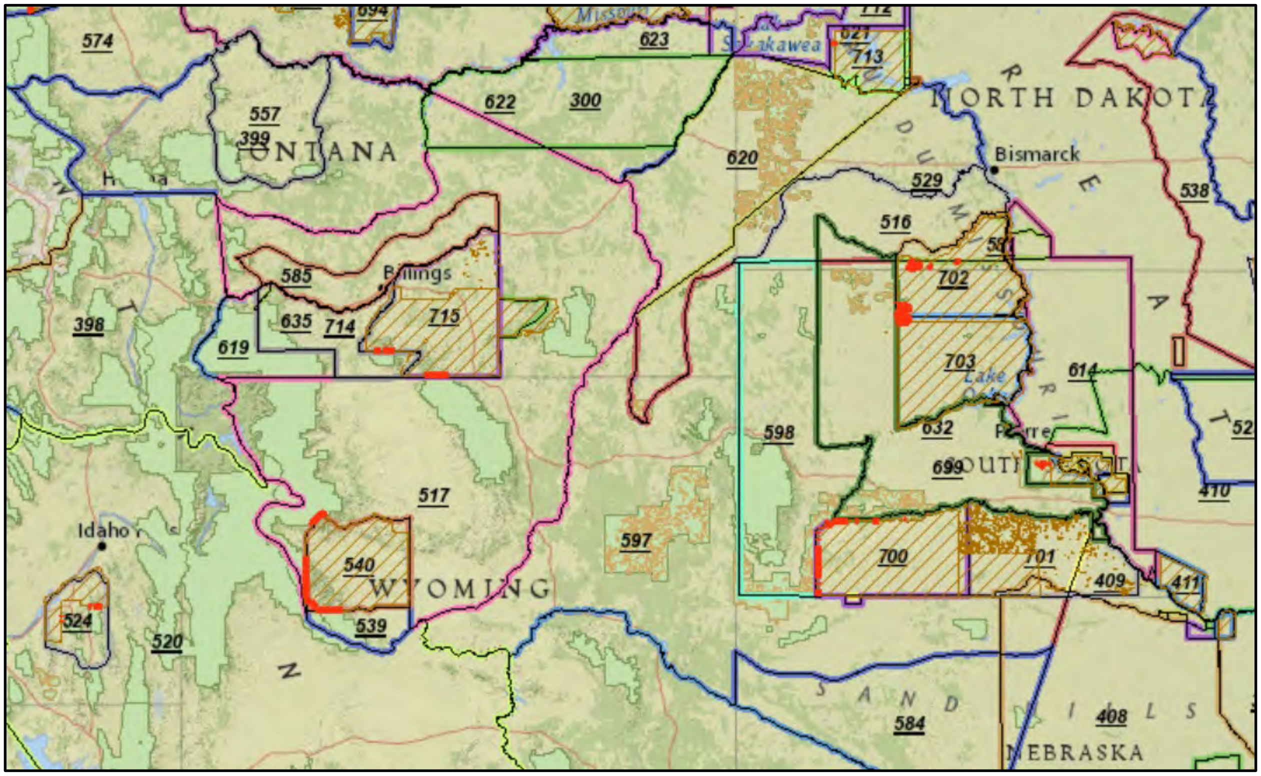


Table 6. Legend for Treaty Rights and Land Cessions Within and Surrounding the Custer Gallatin National Forest

Cessation Number	Date	Tribe Name at Treaty Signing	Reservation Established	Earlier cessations
300	9/17/1851*	Arapaho; Arikara; Assiniboin; Cheyenne; Crow; Gros Ventre; Mandan; Sioux	(no data)	(no data)
373	7/16/1855*	Flathead; Kootenay; Upper Pend d'Orelles	(no data)	(no data)
374	7/16/1855*	Flathead; Kootenay; Upper Pend d'Orelles	(no data)	373
398	9/17/1851*	Open Hunting Grounds	(no data)	(no data)
399	9/17/1851*; 10/17/1855	Nez Perce, Blackfoot and Flathead Nations	(no data)	(no data)
516	4/29/1868*	Sioux	(no data)	(no data)
517	9/17/1851*; 5/7/1868*	Crow	(no data)	(no data)
520	7/3/1868*	Bannock, Shoshoni	(no data)	(no data)
524	6/14/1867; 7/3/1868*; 7/30/1869; 9/1/1888; 2/23/1889	Bannock	Fort Hall Reservation	520
529	9/17/1851*; 4/12/1870	Arikara; Gros Ventre; Mandan	(no data)	(no data)

Cessation Number	Date	Tribe Name at Treaty Signing	Reservation Established	Earlier cessations
540	7/3/1868*; 9/26/1872; 5/21/1887	Shoshoni	Wind River Reservation	517
557	8/16/1873; 1/31/1874; 3/25/1875	Crow	(no data)	399
565	10/17/1855*; 7/5/1873; 8/19/1874	Blackfoot; Gros Ventre; Piegan; River Crow	(no data)	(no data)
574	10/17/1855*; 7/5/1873; 8/19/1874	Blackfoot; Gros Ventre; Piegan; River Crow	(no data)	(no data)
585	10/20/1875, 3/8/1876	Crow	(no data)	517
597	4/29/1868*; 9/26/1876	Arapaho; Sioux	(no data)	(no data)
598	9/26/1876	Arapaho; Sioux	(no data)	(no data)
599	9/26/1876	Arapaho; Sioux	(no data)	516, 699
619	9/17/1851*; 5/7/1868*; 6/12/1880; 4/11/1882	Crow	(no data)	(no data)
620	9/17/1851*; 4/12/1870; 7/13/1880	Arikara; Gros Ventre; Mandan	(no data)	(no data)
622	4/13/1875; 7/13/1880	Blackfoot; Gros Ventre; Piegan; River Crow	(no data)	300
623	4/13/1875; 7/13/1880	Blackfoot; Gros Ventre; Piegan; River Crow	(no data)	300
635	9/17/1851*; 5/7/1868*; 7/10/1882	Crow	(no data)	714, 715
658a	11/26/1884	Cheyenne (Northern)	Executive Order establishing Northern Cheyenne Reservation	517
692	5/1/1888	Gros Ventre, Piegan	Fort Belknap Reservation	565
693	5/1/1888	Indians of Fort Peck Agency	Fort Peck Indian Reservation, Assiniboine and Sioux Tribes	565
694	5/1/1888	Indians of Fort Belknap Agency	Fort Belknap Reservation	692, 565,
695	5/1/1888	Indians at Blackfoot agency	Blackfeet Indian Reservation	565
699	3/2/1889	Sioux	(no data)	(no data)
714	3/3/1891	Crow	(no data)	635
715	3/3/1891	Crow	Crow Reservation Boundary	635

*denotes treaty date

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 Custer Gallatin land management plan. This historic preservation plan may be updated as needed to reflect accomplishments and new direction.
- The Custer Gallatin may complete or update the cultural resource overviews that include prehistory, history and ethnographic studies for the national 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 Custer Gallatin may focus inventory efforts on the generation and refinement of site predictive and distributional models.
- The Custer Gallatin 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 Custer Gallatin 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.
- The Custer Gallatin could evaluate at least five cultural resource sites per year to address the backlog of unevaluated cultural resource sites.

Permitted Livestock Grazing

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

Allotment Planning and Management

- As part of the terms and conditions of permitted grazing, the allotment management plan and annual operating instructions are the tools used to implement plan direction.
- Complete National Environmental Policy Act for Allotment Management Plans or plan revisions, or National Environmental Policy Act sufficiency reviews (FSH 1909.15 Section 18) on a scheduled priority basis. Priorities could include, but are not limited to, allotments where monitoring indicates downward trends, allotments where there are other resource considerations or conflicts, or allotments where opportunities arise for improving conditions.
- Review/update or modify allotment management plans or permit terms and conditions as identified through the allotment inspection process.

- The Custer Gallatin coordinates with the applicable agencies is to continue on those allotments that contain State or Bureau of Land Management lands.
- Control timing, duration, and intensity of livestock grazing 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 (for example, vegetation composition, streambank stability). Each can be used in the appropriate situation.
    - ♦ Upland utilization criteria are to be informed from best available scientific information, 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 scientific information 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.
    - ♦ End of season stubble height method is appropriate on low gradient herbaceous Rosgen channel types C and E rather than on Rosgen channel types A, G, and woody dominated B or C. Obligate wetland or facultative wetland species provide root mass needed for streambank stability (Manning, 2017 personal communication). A species wetland indicator status can be determined using The National Wetland Plant List (Lichvar et al. 2016) or subsequent updates. The plant list is available through the Army Corps of Engineers web application or USDA Plants web application. Ratings for the Sioux and Ashland Geographic Areas apply from the Great Plains wetland region list. Ratings for the Pryor Mountains; Absaroka Beartooth Mountains; Bridger, Bangtail and Crazy Mountains; and Madison, Henrys Lake, and Gallatin Mountains Geographic Areas apply from the western mountains, valleys, and coast wetland region list.
    - ♦ Utilization Studies and Residual Measurements Technical Reference (Coulloudon et al. 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 (for example, timber harvest, aspen regeneration treatments, prescribed fire) coordinate with rangeland managers in case adjustments are needed to grazing management or applicable techniques used to minimize resource concerns.
- Applicable grazing direction in designated wilderness areas is found in FSM 2323.2, which includes direction from H.R. Report No. 96-1126, dated June 24, 1981. Existing grazing allotments in wilderness areas are to be managed in accordance with wilderness values. Recommended wilderness area and backcountry area allocations do 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 could 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 7 displays allotments and acres that are tracked as part of the 1998 Grizzly Bear Recovery Zone baseline.

Table 7. Grizzly bear recovery zone 1998 allotment baseline

Allotment	1998 Allotment Status	2017 Allotment Status	Allotment Acres in recovery zone	Allotment Acres outside of recovery zone	Total Allotment Acres	Percentage of Allotment Acres in recovery zone
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 and 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
Sage Creek	Active Horse	Active Horse	14650	0	14650	100
Taylor Fork	Active Horse	Active Horse	932	0	932	100
Current Active Allotment Subtotal	(no data)	(no data)	**57244**	**2295**	**59539**	(no data)
Percentage of Total	(no data)	(no data)	**21 percent**	(no data)	(no data)	(no data)
Cottonwood	Vacant Cattle	Vacant Cattle	2199	0	2199	100
Lion Creek	Vacant Cattle	Vacant Cattle	6999	0	6999	100

Allotment	1998 Allotment Status	2017 Allotment Status	Allotment Acres in recovery zone	Allotment Acres outside of recovery zone	Total Allotment Acres	Percentage of Allotment Acres in recovery zone
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	(no data)	(no data)	**17040**	**0**	**17040**	(no data)
Percentage of Total	(no data)	(no data)	**6 percent**	(no data)	(no data)	(no data)
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
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

Allotment	1998 Allotment Status	2017 Allotment Status	Allotment Acres in recovery zone	Allotment Acres outside of recovery zone	Total Allotment Acres	Percentage of Allotment Acres in recovery zone
University	Vacant Sheep	2008 Closure - Sheep	15074	0	15074	100
Current Closed Allotment Subtotals	(no data)	(no data)	**198483**	**26073**	**224555**	(no data)
Percentage of Total	(no data)	(no data)	**73 percent**	(no data)	(no data)	(no data)
Grand Total	(no data)	(no data)	**272767**	**28368**	**301135**	(no data)

* 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.

**A 2002 land exchange split the Cinnamon allotment into two allotments, and resulted in a 902 acre increase and one additional allotment over the 1998 baseline.

- If sheep or goats are permitted on the national forest in the future, proportional to the risk of contact between domestic sheep and goats and wild sheep, work with permittees, state wildlife agencies, wild sheep advocates, and others to implement a variety of mitigation strategies.
  - ♦ Mitigation could include, but is not limited to, use of herders, dogs or other guarding animals trained to repel animals foreign to domestic sheep bands or goat flocks (such as wandering wild sheep, various predators), confinement of domestic sheep and goats at night to minimize strays, and adequate fencing configurations designed to achieve the most effective separation possible.
  - ♦ When stocking allotments with sheep or goat use or associated trailing routes, vegetation management (for example targeted weed control), or any other permitted uses involving domestic sheep and goats, closely evaluate the timing of permitted domestic sheep and goat grazing or trailing activities, to reduce disease transmission risk. For example, grazing domestic sheep when ewes are in estrus heightens the possibility of contact between wild sheep and domestic sheep. Base effective separation on temporal and spatial separation of wild sheep and domestic sheep and goats.
  - ♦ Written operating instructions for permitted sheep or goats could include direction for individually identifiable marking of sheep or goats, physical control of sheep or goats, reasonable efforts to keep sheep or goats from contacting bighorn sheep when the potential for contact arises, and emergency actions to undertake when bighorn sheep presence is likely to result in contact with domestic sheep or goats while grazing or trailing.
  - ♦ Consult the Montana Bighorn Sheep Conservation Strategy (Montana Fish Wildlife and Parks 2010) and Action Plan for Management of Bighorn Sheep in South Dakota (South Dakota Department of Game Fish and Parks 2013) or subsequent updated plans for additional mitigation measures.

Allotment Inspections

- Conduct rangeland inspections annually on selected allotments to determine the degree of compliance with National Environmental Policy Act decisions, grazing permits, allotment management plans, or annual operating instructions. Inspections could provide monitoring information for initiating changes or improvements, as applicable.

- Encourage Custer Gallatin permittees 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 supplement placement one-quarter mile away from groundwater-dependent ecosystems, streams, water developments, recreational developments, aspen stands, woody draws, special habitats and populations of at-risk plant species may not be feasible. In these instances, place as far away from these areas as possible in order to minimize livestock impacts. In some instances, limited salting within one-quarter 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

- Prioritize funding for wells and pipelines for those that provide offsite water developments to reduce impacts to riparian/wetlands, woody draws, aspen stands and or at-risk plant populations that are susceptible to grazing impacts, and that improve livestock distribution.
- Prioritize funding for nonstructural range improvements 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.
- As opportunities arise or as issues are identified, consider retrofitting water developments to be wildlife friendly and to facilitate animal escape.
- As opportunities arise, consider decommissioning stock water impoundments that are no longer needed to restore the hydrologic conditions of those drainages.
- If an improvement is found to be damaged or deteriorated through lack of assigned maintenance and care, consider it as 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.

Special Forest Products

Special forest products include, but are not limited to, mosses, fungi (including mushrooms), roots, bulbs, berries, seeds, wildflowers, forbs, sedges, grasses, nuts, boughs, cones, transplants, Christmas trees, firewood, posts and poles, mine props, and rails. Some of the most popular special forest and botanical products on the national forest are firewood, post and poles, Christmas trees, boughs, and mushrooms. Activities and strategies that may be used to meet the desired conditions for personal and commercial uses of special forest products include:

- About 30 species of roughly 110 native medicinal plants harvested in Montana have been listed as highly popular for collection. About 37 of these species are cultivated for the herb market (Klein 2000). Klein (2000) provides estimates on what constitutes a personal amount of harvested plant material versus a commercial amount by species. For personal use amounts, none of the species exceeded two grocery bags full (wet, not dried, plant material).
- Of the United Plant Savers “at risk” medicinal plant species considered sensitive to harvest and other human activities, Echinacea (all *Echinacea* species), eyebright (all *Euphrasia* species), lady’s slipper orchid (all *Cypripedium* species, lomatium (*Lomatium dissectum*), osha (*Ligusticum porteri*), sundew (all *Drosera* species) and trillium, (*Trillium ovatum*) are found within the Custer Gallatin National Forest. These species were, at one time, under a moratorium from harvest and removal. Even though the ban has been lifted, these species could receive close evaluation prior to permitting harvest. According to policy (Forest Service Handbook Region 1 Supplement No. 2409.18-2007-1), forest supervisors are to use discretion when permitting these special forest products and only permit those medicinal species that are not at-risk species. Scientific and research permits for these species may be issued to accredited schools, colleges, universities, or other institutions of higher learning, or to any government agency or to recognized Indian Tribes having reserved rights for non-commercial gathering on National Forest System lands.
- Teepee poles are a special forest product that has high value for tribal traditional use. Forest vegetation desired conditions include forest cover types and structures that promote this specialty product (FW-DC-VEGF-01, 03 and 04). Lodgepole pine stands with these conditions are important for tribal use. During project level planning, areas that meet these desired conditions could be made available for this tribal use. In addition, timber stand improvement activities and no treatment on regenerating lodgepole pine stands, could be considered as options to produce this specialty product in the future.

Energy and Minerals

When attempting to portray potential and possible mineral and energy actions which may take place over the life span of the Custer Gallatin National Forest Land Management 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 potential and possible actions related to mineral and energy cannot be precise. The timing, amount and scope of potential and possible actions could be determined based on geologic environment, commodity prices, environmental constraints, societal demand and generally, the “cost of doing business.” The Custer Gallatin has discretion pertaining to leasable minerals, saleable minerals, geologic resources, and geologic hazards management.

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

- The Custer Gallatin could process and administer a variety of mineral and energy proposals during the life span of the plan. Locatable mineral proposals are anticipated to be principally located in the

Absaroka Beartooth Mountains Geographic Area. Additionally, the Custer Gallatin could process and administer some leasable mineral (oil, gas, coal, geothermal) proposals principally located in the eastern portions of the national forest.

- The Custer Gallatin could make available for public use and enjoyment a number of geologic resources and opportunities such as personal use mineral material collection and geological interpretive opportunities.
- The Custer Gallatin 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 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, and Access

Potential management approaches are those that (1) assist in providing a range of recreation opportunities across the national 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 the following.

Sustainable Recreation

Reference from (O'Toole et al. 2019).

- Encourage mass transit opportunities to major recreational destinations or events where feasible.
- Encourage collaboration 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.
- When appropriate, as administrative boundaries meet, coordinate trail construction, rerouting, improvement, and maintenance with affected agencies.
- Where opportunities exist engage 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.
- As possible, strategically engaging volunteers and partners to engage in resource stewardship and restoration, and to prioritize and complete deferred maintenance and trail degradation due to sustained use.
- Consider, within the under regulations and constraints of existing fee legislation, developing a fee-based system (for example, annual pass, parking permit fee, etc.) for all or part of the Hyalite

Recreation Emphasis Area. Revenues generated could be used to support investments in recreation infrastructure and enforcement in the Hyalite Recreation Emphasis Area.

- Develop a prioritization process that provides direction for maintenance of existing recreation facilities, construction of new facilities, and reconstruction of or additions to existing facilities. In the prioritization process, emphasize the Custer Gallatin's recreation niche and is aligned with regional and national direction.

Developed Recreation Sites

- Resolve recreation and wildlife conflicts within developed sites through proper food storage facilities, signage, education, timing and use restrictions, location (or re-location) of developed sites, wildlife habitat alteration (such as thinning brushy vegetation in campgrounds) to discourage wildlife use within or near developed sites and to encourage wildlife use in areas away from developed sites.
- Address developed campgrounds that need improvements, by prioritizing improvements that address accessibility, health and safety, types of use, size of recreational vehicles, and reduction of bear-human interactions.
- Modify existing developed recreation facilities, and develop new facilities to accommodate the diversity of cultures, abilities, family structures and preferred activities of current populations who could benefit from recreation opportunities.
- Consider the following climate change adaptation strategies in developed recreation sites:
    - ♦ Where feasible, recondition recreation-related infrastructure located in vulnerable areas.
    - ♦ Use appropriate vegetation within developed recreation sites to increase resilience to climate-related stressors.
    - ♦ Consider altering infrastructure to better capture and use natural and man-made snow.
    - ♦ Consider employing snow-based options that are functional in low snow conditions.
    - ♦ Consider an increase in four-season and non-skiing recreation opportunities at winter sports areas.
    - ♦ Where possible relocate existing infrastructure and opportunities to areas with less risk of climate-exacerbated damage.
    - ♦ Where necessary, integrate climate considerations into siting of recreation facilities.
    - ♦ As possible, remove or decommission vulnerable infrastructure.

Dispersed Recreation

Management strategies may be applied when ecological impacts of dispersed recreational uses (trails, camping, etc.) are detected. Ecological impacts could include effects to at risk species, riparian habitats, key linkage areas, soil and watershed, heritage resources and other resources. Examples of management actions to consider:

Conservation Education

- Use information networks, including public service announcements, social media, internet sites and links, and visitor guides and newsletters to communicate information regarding sensitive resources.

- De-emphasize the site or area and develop an information strategy to direct visitors to national forest recreation opportunities that do not affect sensitive resources.

Presence

- Provide field presence to deliver educational messages and to ensure protection of sensitive resources. This presence could include Forest Service personnel, partners, contractors, concessionaires, other permit holders, and volunteer support. Examples could include trail ambassadors, volunteer hosts patrolling dispersed sites, etc.

Direct Action

- Limit visitor use of recreation sites and areas through diurnal, seasonal or temporary closures during critical life cycle periods for affected at-risk species.
- Consolidate use to developed sites, designated sites or system trails and effectively close impacted existing sites or user trails and prohibit future use.
- Where feasible emphasize 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.

Recreation Residences

- To reduce the number of wells and septic drain fields within tracts, encourage permit holders to share facilities with their neighbors when they request to install new water systems or septic drain fields.
- Reasonable consistency in administration of recreation residence permits across the Custer Gallatin could be guided by the Custer Gallatin National Forest Handbook Supplement. As new issues develop, the Handbook Supplement could be updated regularly.
- To address weed control, reduce vandalism at cabins, and developing hazard tree issues, encourage permit holders to work together to pay for contract weed spraying and coordinate schedules for maintaining an owner presence in the tracts.
- The Custer Gallatin could send out regular electronic updates on Forest happenings and offer opportunities for volunteer participation, which could range from oral history documentation (for personal accounts of historic events such as the Madison Canyon Earthquake) to informal trail patrols or photo documentation (such as of regrowth after the Millie Fire).

Visitor Education and Interpretation

- Education programming could promote 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 Custer Gallatin 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.
- Interpretive and environmental education programs could be developed about sensitive resources and habitats for the public, Forest Service personnel, concessionaires, other special-use authorization holders, and volunteers. The services of special-use authorization holders that provide services to the public (for example, concessionaires, organization camps, outfitter guides) could be engaged to assist in the development and delivery of these programs. Authorization holders could be provided with messages about sensitive resources and management issues so that they can use them to educate people. Efforts could be coordinated between national forests for maximum results and cost efficiencies. Existing visitor centers could be used 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.

Scenery and Scenic Character Descriptions

This section describes potential approaches and management strategies for the scenery management plan components. These approaches reflect the fact that scenery management can be proactive for the scenery resource or responsive to actions proposed for the benefits of other resources. This distinction is important to understand because one of the basic concepts of scenery management—Scenic Integrity Objectives—serve as minimum thresholds of scenic integrity for future management actions to meet, and do not necessarily reflect the desired conditions to work towards. For example, in an area with an existing scenic integrity of high and an assigned scenic integrity objective of moderate, the Custer Gallatin would not develop a project expressly to lower the scenic integrity from high to moderate.

This section also includes the scenic character descriptions that are broken out by geographic areas. Because these descriptions are broad, they may need to be refined, tailored, or customized to be more specific and applicable to a project being analyzed, especially for projects that involve cultural or historic visual elements or landscapes that have become accepted and valued over time.

Proactive Strategies and Approaches

Potential proactive strategies and approaches include:

- Consider opportunities to improve the scenery as part of vegetation treatment and fuels reduction projects, especially in areas that do not currently meet assigned scenic integrity objectives.
- Consider opportunities for increasing public enjoyment of the scenery, such as vista clearing, where the work would not result in lowering the scenic integrity of the immediate foreground below the assigned scenic integrity objective, or that would cause the viewing platform to become too obvious when viewed from other critical viewing platforms.
- Consider opportunities to perpetuate valued scenic attributes and improve the scenic stability especially in areas where the visual setting is important, such as in the viewsheds of popular recreation areas.
- Consider views of entire viewsheds, as viewed from the mapped critical viewing platforms, (see the scenery maps in appendix B), and not just the portions of a viewshed that are on national forest land or within a project boundary.

- This approach may allow for opportunities to improve straight lines caused by straight, hard-edged clearings up to the national forest boundary on adjacent non-national forest land
- This approach may allow consideration or incorporation of visual vegetation patterns on non-national forest land or land outside the project area.

- Prepare for work that may need to be done within the context of emergencies, such as fire suppression-related activity or indirect control lines that could have long term negative effects on scenery and may be difficult to mitigate.
    - For highly valued viewsheds such as from the Continental Divide National Scenic Trail, the Beartooth Scenic Byway and other critical viewing platforms especially where the assigned scenic integrity objective is moderate or high, provide the incident commanders, burn area emergency rehabilitation team leaders or post burn area emergency rehabilitation team leader with a list of critical viewing platforms and scenic integrity objectives and suggested approaches.
- Consider opportunities to work in an interdisciplinary fashion to develop projects that meet the assigned scenic integrity objectives from the critical viewing platforms while moving overstory vegetation to more sustainable conditions, especially in areas of important viewsheds or popular recreation settings. For example, a mature Douglas fir stand infested with root rot may not be sustainable or safe over time for a campground, whereas a more diverse overstory would be.

Responsive (Reactive) Strategies and Approaches

Potential responsive (reactive) strategies and approaches for project analysis include:

- Customize the application of the assigned scenic integrity objectives of high, moderate, and low to each new project by conducting a project-specific visibility analysis from the applicable mapped critical viewing platforms (see the scenery maps in appendix B).
- While the application of the scenic integrity objectives is not subjective, there may be some variability in interpretation. For that reason, the Forest Service involves landscape architects and others who are trained to integrate the “environmental design arts” into project analysis and implementation. Forest Service Manual 2380.11b directs the agency to integrate “aesthetic principles and the environmental design arts… and to “use the knowledge, skills, and abilities of landscape architects to meet the goals of aesthetics, scenery management, and environmental integrity on National Forest System lands.”
- Determine how a project might affect scenic integrity based upon each area’s scenic character, which includes the viewer and viewing context, overall sense-of-place and may include cultural or historic valued scenic elements such as rustic fences, old buildings, or historic cabins. Somewhat transitory features such as the wild horses located on the east side of the Pryor Mountains are considered by many to be iconic and most likely contribute to the scenic character. Also integral to the scenic character of an area is the natural range of dynamics related to the vegetation component of the scenery, which includes visible effects of fire.
- During project analysis, aim to integrate scenery management goals with other resources, such as soil or hydrology, to develop design features that address multiple resources. Recognize that plan components for land allocations or for resources other than scenery may be more restrictive of activities than the scenic integrity objectives but may serve to meet the same goals as scenery.

- For projects where the result for scenery is to reduce the foreground visual dominance of roads, landings or burn piles, some of the management approaches in this document in the Soils section may be helpful.
- Because the scenic integrity objectives are the lowest levels of scenic integrity allowed by the land management plan, consider incorporating project design features that could exceed the scenic integrity objectives (result in a level of scenic integrity that is higher than the lowest allowable), where practicable and reasonably implementable.
- When analyzing the visual mitigating effects of forbs and grasses after project work, consider that within the five year window following project completion to meet the assigned scenic integrity objective, there may be unpredictable variables, such as uncertain precipitation, uncertain amount of increased nitrogen available due to prescribed fire/broadcast burn, uncertain response of shrubs and other vegetation to increased sunlight or even unexpected increases in human or wildlife trampling, grazing or browsing.
- During timber project analysis, layout, and implementation, the landscape architect or scenery specialist could work with the silviculturalist and layout crews to determine where specific design features are needed to meet assigned scenic integrity objectives (rather than simply providing a list of generic design features). A project may be more successful in meeting scenic integrity objectives if the scenery specialist works with the timber sale administrator to ensure the administrator understands the design features and to resolve any issues with applying design features. The same approach could be taken for any other non-timber projects.
- 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, most especially vegetation management.
- 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 (created or natural) wherever possible.
- Aim to reduce the visual dominance and contrast of new facilities with their surroundings by carefully choosing colors, non-reflective, textured materials, and by 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, where appropriate, into project work.
- Recreation opportunity spectrum levels do not always correlate with the assigned scenic integrity objectives because they are designed to accomplish two different goals. Recreation opportunity spectrum levels apply several different descriptive parameters, including the level of naturalness, to the immediate recreating environment on national forest land. In contrast with that, the assigned scenic integrity objectives are applied as viewed by people who may not be recreating and may be on any of the identified, mapped critical viewing platforms—many of which are located outside the national forest boundary.
- For project-specific approaches to meet or exceed scenic integrity objectives (meet a higher/more constraining scenic integrity level), consult the National Forest Landscape Management Handbooks ,

including Chapter 2 Utilities, Chapter 3 Range , Chapter 4 Roads , Chapter 5 Timber , Chapter 6 Fire , Chapter 7 Ski Areas , and 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.

- After project completion, determine whether the completed project has met the assigned scenic integrity objectives and if the design features were appropriate and successful.

Scenic Character Descriptions

Introduction

The 2012 Land Management Planning Rule requires the Forest Service to consider the contribution of the national forest scenery to the social and economic sustainability of the national forest. The Planning Rule defines the term *scenic character* as the visual combination of "the physical, biological, and cultural images that give an area its scenic identity." Scenic character incorporates visible results of natural landscape dynamics, such as changes in vegetation color, line, patterns, and textures resulting from fire, visible changes in rivers due to landslides or other geologic activity, and may also incorporate historic/cultural features such as cabins and fence rows in a context where they have become broadly accepted over time as contributing to the sense of place and scenic identity of an area.

The Scenery section of the plan explains that "changes to the scenic character resulting from management actions on national forest land are described and measured in terms of deviations from or disruptions to the scenic character" and are expressed as levels of integrity of the scenic character. The lowest allowable scenic integrity levels assigned for all land within the Custer Gallatin are referred to as the scenic integrity objectives. When using these scenic character descriptions for project analysis, they may need to be refined or customized to be more specific, especially for projects that involve analysis of cultural or historic visual elements or landscapes in relation to their context within the natural-appearing character in the overall general project area.

Sioux Geographic Area

The eight Sioux District units spread across Montana and South Dakota are often romantically described as "islands of green in a sea of rolling prairie." All of the units are discrete areas of mesas and hills rising 300 to 500 feet above the surrounding wheat and hay fields, rolling prairie and pastureland that are partially covered by ponderosa pines and open grass meadows. With scenery unlike other parts of the Custer Gallatin, the Sioux Geographic Area boasts two designated National Natural Landmarks: the Castles and Capitol Rock. The Castles, located in the Slim Buttes unit, are a massive sandstone uplift resembling a medieval castle. Capitol Rock, located in the Long Pines unit, is a massive white siltstone, sandstone, and volcanic ash uplift resembling the Nation's capital building in Washington, D.C., and is surrounded by rolling open grassland with only small, intermittent pockets of trees to the east and more on north-facing sides of ridges to the west. While not nationally designated, other dramatic limestone cliffs and break-overs exist in almost all of the units. The Chalk Buttes and Ekalaka Hills are more forested than Long Pines, and much more so that the North and South Cave Hills units which are mostly open grassland stepped plateaus where stringers or groups of trees are found mostly in ravines or other areas somewhat sheltered from the wind. Even in the Slim Buttes unit with its spectacular cliffs, walls and continuous escarpments of wildly eroded sandstone, shale, and ash, there are larger areas of ponderosa pines, but they still appear to be limited to ravines, northerly sides of ridges, or sheltered among rock outcrops on topographically convoluted land, like the area north of Reva Gap along Highway 20. Those who venture into the interior of some of the units find numerous natural springs and a few rare natural ponds encouraging deciduous vegetation and shrubs that provide contrasting fall colors. Over the years, fires have played, and continue to play, a role in shaping the vegetation in different parts of these units, in places burning through large sections of ponderosa pine, especially in the Ekalaka Hills and the Long Pines units.

Highway 20, as it passes through Reva Gap and by Reva Gap Campground, offers impressive views of the evocatively shaped and named eroded limestone outcrops called the Castles and Battleship Rock. There are a number of very small communities and infrequently travelled roads, from which these raised islands of the Sioux District are viewed. Highway 323 passes southeast of Ekalaka through the Ekalaka Hills unit and provides views of some sloping grassy meadows backed by ponderosa pines in the immediate foreground. From Highway 85, where it passes through Ludlow, the North and South Cave Hills units are barely discernible.

Throughout these units there are some visible reminders of their history. In the Ekalaka Hills unit, Camp Needmore is a historic camp that is still used today and was originally constructed by the Civilian Conservation Corps in the 1930s to house men working in the logging industry. The historic Jesse Elliot Cabin in the south part of the Slim Buttes unit served as a Forest Service ranger station in its time.

Figure 2. Capitol Rock National Natural Landmark in the south part of the Long Pines Unit, Sioux Geographic Area. Photo: Kurt Hansen.

Ashland Geographic Area

The Ashland Geographic Area is slightly elevated, dissected land between the Tongue River on its west and the Powder River on its east, and with Otter Creek cutting through it from south to north. One primary road, from which travelers view land in the Ashland District is Highway 212, an east-west road that runs between Ashland and Broadus. Secondary roads, such as the Ashland Birney Road and the Otter Creek Road, provide limited views up to side slopes and low ridgetops, and numerous other primitive roads follow shallow valleys and rolling grasslands around low mountain breaks, providing views across open grasslands up to occasional steep rock outcrops and exposed light gray soil and rock on drier and barer south-facing slopes, backed by Ponderosa pines and grass on the upper flatter or north-facing slopes. Elevational differences between the low points and high points are generally only about 600 to 800 feet. However, the Cook Mountain Backcountry Area, in the north, tops out at 4,369 feet, and two of the other high points in the south of the District, Poker Jim Butte (4,348 feet) and Diamond Butte (4,301 feet) both host fire lookouts. The King Mountain and Tongue River Breaks Backcountry Areas provide open views of the surrounding national forest land and down more than 1,000 feet into the Tongue River Valley below. In 2012, the Ash Creek and Taylor Fires created some dramatic, dynamic changes in the scenery when they burned across approximately two-thirds of the District in a mosaic fashion, torching and killing ponderosa pines and other vegetation. Fire continues to shape the vegetation, with about 63 percent of the District affected by wildfire since 1994.

Visible cultural features that contribute to the scenic character are the two fire lookouts and the historic Whitetail Cabin built by the Civilian Conservation Corps in the 1930s. Other still-visible elements constructed by the Corps camp located in Ashland include the Red Shale Campground and numerous dry-laid stone culverts throughout the area and other rock walls, like the one at the District Office in Ashland. Grazing, as a common theme that reflects the local culture and character throughout this area, is visible in the form of fences, stock ponds, and other supporting elements. Even some of the place names relate to the early ranching days, such as Poker Jim, a ranch hand whose name is found on several landmarks and locations in eastern Montana, North and South Dakota, and beyond. The raised flat grassy plateau of Poker Jim, next to the Lookout, hosts an annual presentation by Shakespeare in the Parks, when visitors enjoy commanding westerly views over the Tongue River drainage and the Northern Cheyenne Indian Reservation.

Figure 3. Whitetail Recreation Rental Cabin, Ashland Geographic Area. Photo: Jane Ruchman.

Pryor Mountains Geographic Area

Unlike many parts of the west side of the Custer Gallatin, views of the Pryor Mountains are not generally dominated or defined by dense commercial or residential development visible on private land foothills of the foreground, however a wind farm is being developed on their west side on private land. The Pryor Mountains rise out of the rolling, expansive prairie of dry grasslands, and bare mineral soil, intermittently grass-covered and spotted with sagebrush. The national forest portion of the Pryor Mountains contains most of the higher elevation subalpine land in the area, bordered by the Crow Indian Reservation to the north, and on the west, south, and east by Bureau of Land Management land, part of which is the Pryor Mountain Wild Horse Range that crosses the Big Horn National Recreation Area managed by the National Park Service. Located almost equidistant from Red Lodge and Billings at about 30 miles, the Pryor Mountains are within the direct viewshed of only a few small communities, such as Lovell, Wyoming and

Bridger, Montana. Visitors are drawn to the Pryor Mountains for a variety of reasons, including the range's sense of isolation, the dramatic contrast of its high lands from the more desert-like lower elevation areas, to access the high expansive vistas and serrated rocky canyons or to search out a greater understanding of its plants, animals, geology, human history, and culture.

The geology of the Pryor Mountains is on display. Its thick layers of limestone have been uplifted towards the north and northeast, where it meets some gentler slopes before dropping down more sharply on the north and northeast sides. The limestone, more exposed near the bottom, is incised with deep, vegetated, steep-walled ravines that contrast starkly with the exposed light-colored limestone and soil on the adjacent slopes.

Up higher, the uplifted limestone culminates in the Douglas-fir and grass-covered gentler slopes of Big Pryor Mountain, the highest point in the Pryor Mountains at 8,780 feet, almost equaled by East Pryor Mountain at 8,776 feet. A strong visual difference between the north-facing and south-facing slopes is evident throughout the Pryor Mountains. South and southwest-facing slopes are arid, covered mostly with sagebrush down lower, and sparse Utah juniper and some limber pine up a bit higher. Slopes that are north-facing or not angled directly to the sun and wind from the southwest are lusher, hosting Douglas-fir, lodgepole pine, and subalpine grassy meadows up higher with a variety of flowering perennials, and aspen in places with more moisture. In some places, such as on the upper slopes west of Crooked Creek, past fire activity is evident. Where there are slope breaks or sharp topographic changes, the limestone has eroded to form cliff breaks, canyons, and caves in the cliffs. Other formations that add to the visual variety include sandstone layers and disintegrating walls or domes of exposed bright rust colored Chugwater and Amsden formations.

Because there are currently only two developed recreation sites (Sage Creek Campground and Big Ice Cave) within the national forest portion of the Pryor Mountains and no all-weather through-roads, the area has a sense of remoteness. However, there are lots of visible reminders associated with the history of the area, from old, unmaintained homesteader or cattle runner cabins and remnants of abandoned mines. While not obvious to the average visitor, the Pryor Mountains have a deep history and are considered sacred by the Crow Indians. For the carefully observant, there are still visible signs of their traditional use of the area, such as pictographs and caves. Early Forest Service presence is evidenced by the now-restored, historic Sage Creek Ranger Station. Several small bands of wild horses, visible in their designated range on East Pryor Mountain, add a popular visual element for visitors who have come to associate wild horses with the Pryor Mountains. The horses, while managed, add to the wild character of the Pryor Mountains and increase enjoyment for people viewing the scenery.

Figure 4. Cliff and caves in Crooked Creek, Pryor Mountains Geographic Area. Photo: Jane Ruchman.

Absaroka Beartooth Mountains Geographic Area

Views looking east into this geographic area from the Paradise Valley along the Yellowstone River and the Highway 89 corridor between Livingston and Gardiner, towards the Absaroka-Beartooth Wilderness Area with its peaks, cirques, avalanche chutes and densely forested steep slopes, are jaw-dropping, especially when the peaks are blanketed with snow. The I-90 corridor east of Livingston offers stunning glimpses into the north side of this area, of the ramped dolomite block of Elephanthead Mountain surrounded by other peaks about 10 miles to the south. Highway 78, between Absarokee and Red Lodge, parallels the uplifted east face of the Beartooth Mountains visible above rolling ranch lands. Highway 78 gets closer to the face as it approaches Red Lodge, from where some of the Red Lodge Mountain Ski Resort runs are visible surrounded by the densely forested side slopes. While the heart of this geographic area is the Absaroka-Beartooth Wilderness, a number of smaller roads follow sparkling creeks and rivers up into this geographic area, the longest being the Main Boulder Road that offers “cherry stem” road access at the geographic dividing line between the Absaroka Mountains on the west and the Beartooth Mountains on the east. Other small routes lead to sub-alpine and alpine areas outside of the Wilderness, though with similar scenic character and views into the wilderness, such as those north of Cooke City.

There are many visible reminders of the human history of this landscape area that add depth and meaning to the natural scenery. The early days of dude ranching are exemplified in the OTO Ranch, north of Gardiner and Camp Senia, near Red Lodge. The Civilian Conservation Corps built many recreation facilities, including Pine Creek Campground south of Livingston and the Lions Organizational Camp near

Red Lodge. There are other existing historic Forest Service structures and those left by miners, early residents, homesteaders, or herders. Many of these have been repurposed, but still add to the area's stories, such as the Fourmile Cabin, the West Boulder Station, Meyers Creek Station, Box Canyon Cabin, and Mill Creek Cabin. Although there is still active mining in some parts of this landscape, there are a few areas where the remnants of the mining activity have become visitor destinations of interest, appreciated within the overall natural-appearing settings, and over time have become a part of the identity of the landscape, such as at Independence at the head of the Main Boulder, New World Mining District near Cooke City, and Benbow on the northeast face of the Beartooth. The Nez Perce National Historic Trail - Autotour Route travels along the west end of the Beartooth National Forest Scenic Byway through Cooke City even though the Nez Perce did not actually come through Cooke City on their 1877 tragic flight seeking freedom.

The Beartooth National Forest Scenic Byway, also designated An All-American Road, attracts and delights people from all over the world as they traverse through natural-appearing lush forests, across high open tundra and past pristine rock-lined alpine lakes. This area's quintessential scenery results largely from geologic uplift and glacial sculpting. Topography, water, and rock features play a dominant role in the visual image of this area, with lakes, ponds, creeks and rivers glistening and sparkling throughout this area. Even some constructed water impoundments are valued for the enhancements they lend to their dramatic settings, such as Glacier Lake, Mystic Lake, and Wild Bill Lake. At Natural Bridge, the Main Boulder River disappears underground in the eroded limestone karst topography and reappears on the face of a waterfall, surrounded by dramatic, 100-feet tall limestone cliffs.

Fire has played and continues to play a visually dominant role in some of the drainages and up the side ridges, leaving noticeable differences in vegetation, such as bleached gray tree skeletons or stands of even-age regenerated lodgepole pine.

Figure 5. Ovis Lake and Long Lake from Sheep Mountain, with the Absaroka-Beartooth Wilderness in the background, Absaroka Beartooth Geographic Area. Photo: Jane Ruchman.

Bridger, Bangtail, and Crazy Mountains Geographic Area

Bridger and Bangtail Mountains

The approximately 38-mile long north-south trending Bridger Mountains comprise the Gallatin Valley's much-loved eastern viewshed, rising up as a convoluted series of secondary ridges and valleys leading off from the main ridge, lined by small creeks and riparian vegetation. Part of Bozeman's domestic water supply comes from a creek on the west side of the Bridger Mountains. From the west, the sub-ridges display a strong north-south difference in the lowest elevations. These north-facing slopes appear covered with dense conifers, but the low-elevation south-facing slopes are sparser and grassy, with conifers only in slightly more protected areas. The conifer coverage is more continuous on both south and north-facing mid-mid-elevation slopes. In spring, when the west-facing slopes hold snow after it has melted off the foothills and valley floor, the view of the snowy Bridger Mountains form an impressive backdrop to the communities and surroundings in the Gallatin Valley, especially when illuminated by the setting sun. The ridge's spine gains elevation from south to north, culminating at Sacajawea Peak (the highest at 9,666 feet). When viewed from the west and northwest, individual peaks and landmarks are more distinct, especially the exposed rock plug and cliffs of Ross Peak with its limestone spires and fins next to the open grassy Ross Pass. Flathead Pass, to the north, is also an easily distinguishable feature even from a distance.

Figure 6. View from the southwest of the Bridger Mountains and on the far right, the Bangtail Mountains, in the Bridger, Bangtail and Crazy Mountains Geographic Area. Photo: Jane Ruchman.

Views of the east side of the Bridger Mountains are primarily from Highway 86, also called the Bridger Canyon Road, and from the Jackson Creek Road and all of the adjacent residences. The east side of the Bridger Mountains appears more dramatic and lusher and displays much more defined avalanche slopes and scoured-off visible rock faces and treeless upper slopes. This is largely due to the prevailing westerly wind and orientation to the sun that causes more snow to be deposited and stay longer on the east side, creating cornices, subsequent avalanches, and more available moisture. From this side the broken limestone dome of Ross Peak appears more dramatic. Skiers and riders enjoy this combination of factors at the Bridger Bowl Ski Area. From the Fairy Lake area, massive rock fins and walls enhance the area's rugged feel. North of the Fairy Lake area, spectacularly uplifted and twisted multi-colored rock strata are visible.

Figure 7. Bridger Ridge, looking north in the Bridger Mountains, from the high point on the Shafthouse Trail, in the Bridger, Bangtail and Crazy Mountains Geographic Area. Photo: Jane Ruchman.

In addition to the commanding views to the north and south available from the top of the ski area and its runs and ridges, skiers and riders look east to the Bangtail Mountains, a smaller and lower northwest-southeast trending ridge, with its highest point being the aptly named Grassy Mountain (7,622 feet). Most of the national forest land in the Bangtail Mountains is on the east-facing side. From I-90, the east side of the Bangtail Mountains are not easily identified, however the Bridger Mountains are visible and identified by a highway sign for west-bound travelers. Motorized recreationists and mountain bikers enjoy the upper parts of the Bangtail Ridge, with its mix of open flower meadows and patches of dense forest. The Bangtail Divide Trail is considered one of the classic mountain bike trails in the area.

Perhaps due to its proximity to the Gallatin Valley, there are not many remaining easily visible historic remnants in the Bridger or Bangtail Mountains. The Battle Ridge Cabin, a historic Forest Service guard station in the Bangtail Mountains, is one of the Custer Gallatin's most popular rental cabins. The Bridger Mountain National Recreation Trail connects the "M" Trail, which may be one of the most popular trails in the entire region, with Fairy Lake.

Crazy Mountains

The Crazy Mountains are a visually striking isolated mountain range rising abruptly more than 6,000 feet above the surrounding flatter open ranch lands and rolling forested ground. They are visible from the I-90 corridor near Big Timber, Montana, as it parallels the Yellowstone River, and also visible from the Highway 89 corridor on the west as it passes through the Shields River Valley, and Highway 191 on the east. The highest peaks, including Crazy Peak at 11,214 feet and Big Timber Peak at 10,795 feet are sometimes hooded by clouds generated by the range itself. The harder igneous rocks of this range, left after all surrounding softer sediments were eroded away, were then scoured by glaciers, leaving knife-edge ridges, sharp peaks, and steep sweeping talus and scree slopes with a series of glacial cirque valleys that contain beautiful alpine lakes, below which glacier-shaped valleys are still being slowly sculpted by their steep and often incised creeks and rivers. Even from a distance, these dramatic forms are apparent. Covering the middle elevation slopes are thick forest that grade into sloping grasslands lower down. The land within the Custer Gallatin National Forest in the southern two-thirds of the mountain range is interspersed with many private sections of land, most of which are ranching land or have little to no development. Due to the steepness of the slopes, many of the streams and valleys they tumble down are also steep, creating exciting turbulence and waterfalls. Just the name of this mountain range implies an interesting history though there are a few different stories. While not visually apparent to the casual visitor, these mountains hold great spiritual significance to the Crow Tribe. There are a few visible remnants from early Forest Service presence including the historic Porcupine and Ibex cabins.

Figure 8. Crazy Mountains viewed from Interstate-90 along the Yellowstone River, in the Bridger, Bangtail and Crazy Mountains Geographic Area. Photo: Sandy Smith.

Madison, Henrys Lake, and Gallatin Mountains Geographic Area

The Henrys Lake and Madison Mountains, Gallatin Canyon

This area is appreciated for its ridges, peaks, and forested valleys, and provides the scenic backdrop for the communities of West Yellowstone, Big Sky, and the Gallatin Valley. It also provides the viewsheds, varying from immediate foreground to background, for travelers, residences, and businesses along Highway 20 between West Yellowstone and Targhee Pass; Highway 287 along Hebgen Lake and downstream along the Madison River to Earthquake Lake and its massive landslide; and the Big Sky Spur Road, Highway 64, where its sharp ridge of cirques and avalanche gullies offer a dramatic backdrop to the community. From Highway 191, between West Yellowstone and the Gallatin Valley, the national forest land in the Madison Range comprises the viewshed to the west (and southwest as seen from the Gallatin Valley), except for the portion of the highway that passes through Yellowstone National Park.

All of these roads are heavily travelled, especially during the summer when high numbers of national and international tourists or second-home owners spend their vacations in Montana, many sightseeing on their way to the west entrance of Yellowstone National Park. Large parts of the interior of this landscape area are included in the three separate units of the Lee Metcalf Wilderness, where its snow and wind-sculpted peaks (the highest being Gallatin Peak at 11,015 feet), windswept long open ridges, deep forested valleys, and glacial cirques dotted with alpine lakes are popular hiking or horseback riding destinations. Between the two southern units of the Lee Metcalf Wilderness is the Cabin Creek Recreation and Wildlife Management Area, with its extensive willow-covered wetlands and thick conifer forests. Locals and visitors seek out “blue ribbon” fishing on the Madison River, especially in the section upstream from Hebgen Lake and downstream of the Hebgen Dam.

The Gallatin River, coursing along part of the east side of this landscape area, divides the Madison Mountains from the Gallatin Mountains on the east. In places the Gallatin River is lined with spectacular granite and limestone cliffs, attractive to rock climbers, which entirely visually dominate or protrude from the adjacent steep Douglas fir-covered slopes that often sweep out over the river. Kayakers and rafters are attracted to the rapids, especially downstream of Big Sky where the amount of water, boulders, and rapids increase. In contrast, the river upstream from Big Sky meanders more through wide, flat willow bottoms, lined by steep hills and cliffs.

Viewers in this area can see remnants of the area’s history in the form of historic cabins that represent not only the early days of the Forest Service but the early settlers, tie cutters, and others associated with the railroads, or the early ranchers. A few of the historic Forest Service cabins and former ranger stations include Spanish Creek, Cinnamon Station, Wapiti and Beaver Creek and most notably the Squaw Creek Ranger Station that was the site of the Squaw Creek Civilian Conservation Corps camp. Some of the recreation residences on national forest land, built around the 1930s, still appear rustic and lend a sense of history to their settings. The historic Covered Wagon Ranch on national forest land functions today as a dude ranch. Highway 20 over Targhee Pass is also the Nez Perce National Historic Trail-Autotour Route that follows the 1877 flight of the Nez Perce on their way towards Yellowstone National Park. Targhee Pass on Highway 20 is also where the Continental Divide National Scenic Trail crosses on its north-south route. Highway 287 passes through the Earthquake Lake Geologic Area and along the eerily beautiful Earthquake Lake with its inundated forest and ghostly trees. This corridor, along with the Highway 20 corridor, is a popular Montana Department of Tourism loop tour, enjoyed by bus groups and tourists, along with bicycle tourers, with one of the popular stops at the Forest Service Earthquake Lake Visitor center.

Winter attracts a different set of adventure seekers to the Big Sky area for downhill or cross-country skiing. West Yellowstone is transformed into a “Snowmobile Capital” when many visitors enjoy the Big Sky Snowmobile Trail and the Two Top Snowmobile Trail leads to high open vistas with wind-sculpted, snow-covered trees. The lodgepole pine covered rolling hills immediately southwest of West Yellowstone attract national and international cross-country skiers on the professionally groomed Rendezvous Ski Trails. The Refuge Point Cross-Country Ski Trail leads to an open overlook of the upper end of Earthquake Lake and Ghost Village, where buildings were destroyed by the 1959 earthquake and resulting landslide and flood.

Figure 9. View of Quake Lake from Highway 287, looking west toward the landslide, in the Madison, Henrys Lake and Gallatin Mountains Geographic Area. Photo: Jane Ruchman.

The Gallatin Mountains

The Gallatin Mountains are a roughly north-south trending mountain range about 75 miles long and 20 miles wide, with about half that length on the Custer Gallatin National Forest and the southern half inside Yellowstone National Park. These mountains form the southern viewshed for the rapidly growing population of the Gallatin Valley. The upper parts of the sharp volcanic cliffs, peaks and subalpine and alpine meadows, cirques, and lakes in the Hyalite area, considered by many to be the jewel of the Gallatin Mountains, can be seen from the north part of Gallatin Valley. Portions of the western edge of the Gallatin Range, where it parallels Highway 191 and the Gallatin River, present exposed slabs of vertical and stair-stepped limestone and gneiss cliffs that alternately create a spectacular foreground or frame views upside drainages. Except for farther south closer to and inside Yellowstone National Park, the Gallatin Mountains, when viewed from along Highway 89 and Paradise Valley, appear as a series of rounded ridges and are overshadowed by the more angular Absaroka peaks on the east side of Paradise Valley.

Figure 10. View towards the southeast of Hyalite Reservoir, Hood Creek Campground and Sleeping Giant Mountain in the Gallatin Mountains, Bozeman District. Photo: Jane Ruchman.

Numerous side ridges and drainages branch off of the main ridge. Many of the north and east-facing slopes are densely covered with mostly lodgepole pine and Douglas-fir and some whitebark pine at the highest elevations. Contrastingly, the south- and west-facing slopes are often sparser or completely open and grass-covered.

Most of the interior of this range is within the Hyalite Porcupine Buffalo Horn Wilderness Study Area, with its sharp, treeless ridges that alternate between grassy and broad to narrow and rocky, talus and scree slopes that dramatically sweep down into grassy subalpine meadows punctuated with angular boulders or small lakes, cliff faces where petrified wood pieces are found. The Garnet Mountain Trail, the Palisade Falls Trail, and the Gallatin Riverside Trail are all national recreation trails. The Gallatin Petrified Forest Trail originates in the Tom Miner drainage on the east side.

In the lower parts of some of the drainages, historic remnants of earlier Forest Service days and settlers contribute to the sense of place and identity, including the Big Creek Cabin, Buffalo Horn Cabin, the Squaw Creek Ranger Station, and the site of the Squaw Creek Civilian Conservation Corps Camp. Remnants of Corps projects include rock walls and trails, the Maxey Cabin, Window Rock Cabin, the Porcupine administrative cabin, and the Little Bear cabin. Along the Yellowstone River in the Paradise Valley side of the Gallatin Mountains, remnants of the historic Yankee Jim Toll Road and other early approaches to Yellowstone National Park are easily visible. Many of the privately-owned recreation residences on national forest land in Gallatin Canyon built around the 1930s still retain much of their historic appearance.

Signs that fire has had a long history in shaping the vegetation of this area are clearly discernible in many different parts of the Gallatin Mountains, including the Purdy Creek Fire, the Fridley Fire, and most recently the Millie Fire.

Land Status and Ownership, Access, and Land Uses

Potential strategies that could be used to trend toward desired conditions for lands management include the following elements.

Land Status and Ownership

Adjust land ownership through purchase, exchange, or other land adjustments, to protect resources and improve management efficiency. Consider the following when evaluating lands for acquisition:

- Lands that would consolidate surface and mineral ownership within the Forest boundary.
- 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 congressionally designated areas such as Wilderness or Wild and Scenic River corridors.
- Lands that contain eligible Wild and Scenic Rivers.
- Other environmentally sensitive lands.
- Lands that reduce expenses and support logical and efficient management.

Consider the following 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 authorizations that are not consistent with national forest purposes and character, or with authorized uses identified for “phase out” per national policy.
- Lands not logical or efficient to manage.
- Lands eligible under conveyance authorities of the Forest Service including the Small Tracts Act.

Prioritize national forest land boundary surveys to areas where there are vegetation management needs, where trespass is most likely, and for right-of-way acquisition to provide access to National Forest System lands.

Land Uses

The strategy for prioritizing the workload for land uses could include the following:

- Process renewals and re-issuances in a timely fashion. Conduct minimal environmental analysis for those uses where the decision to allow the use has already been made and the new permit is simply an administrative function.
- Emphasize processing new proposals that contribute to the greater public good (utility projects, public highways, reciprocal access cases).
- For utility authorizations that do not have current Operation and Maintenance Plans, work with holders to develop and implement Plans.
- Prioritize and facilitate vegetation management activities within and adjacent to utility line rights-of-ways.

Water Uses

- 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.
- Permit reissuance of existing hydropower support facilities located within the riparian management zones could reduce impacts on aquatic and riparian resources, by methods such as moving support facilities outside of riparian management zones or further from water bodies where feasible.

Communication Uses

- The Custer Gallatin could request that proponents for new communication uses (cellular, FM radio, internet service provider, etc.) first consider co-location in an existing site that has an approved communication site management plan. There are currently eleven locations on the national forest where leases for communication sites have been authorized. Per special uses policy, the Forest Service authorizes use of National Forest System lands as communication sites by issuing leases to facility owners or managers, who may sublease their facilities to multiple occupants for operation of communications equipment. Currently, many sites have space for additional occupants in or on existing facilities, as well as space for construction of additional facilities.
- New facilities, which would require new leases, at these eleven sites could be authorized after a site-specific environmental analysis pursuant to the National Environmental Policy Act is completed. Communication sites are designated for a specific type or types of communication uses. Broad categories of communications uses include:
    - ♦ Broadcast. Television, AM/FM radio, cable television, broadcast translator, and low power television and radio.
    - ♦ Non-Broadcast. Intermittent transmitter use, including mobile radio service (two-way radio or paging), cellular phone, microwave.
- At existing communication sites, the senior use at the site establishes the site designation.
- Sometimes a use that is not compatible with the designated use is proposed. In these situations, the proponent must demonstrate that the equipment for the proposed use can be installed and operated in a manner that is compatible with the site designation.
- In addition to the site designation, some sites have specific restrictions, such as Government-entities only. Table 9 summarizes information about the existing sites, including the categories of use. Communication site locations are displayed on figure 10 through figure 15.

Table 8. Communication sites

Communication Site Name	Geographic Area	Ranger District	Legal Description	Site Designation
Bridger Ridge	Bridger, Bangtail, Crazy Mountains	Bozeman	T1N, R6E, sections 24 and 25.	Low Power, Non-Broadcast
Buck Ridge	Madison, Henrys Lake, Gallatin Mountains	Bozeman	T8S, R3E, section 11	Low Power, Non-Broadcast
Eaglehead	Madison, Henrys Lake, Gallatin Mountains	Bozeman	T7S, R5E, section 17	Government Use Only
East Pryor Mountain	Pryor Mountains	Beartooth	T8S, R28E, section 6	Low Power, Non-Broadcast

Communication Site Name	Geographic Area	Ranger District	Legal Description	Site Designation
Home Creek Butte	Ashland	Ashland	T3S, R47E, section 4	Low Power Broadcast
Horse Butte	Madison, Henrys Lake, Gallatin Mountains	Hebgen	T12S, R4E, section 26	Low Power, Broadcast
Henderson Mountain	Absaroka Beartooth Mountains	Gardiner	T9S, R14E, section 13	Government use only
North End	Sioux	Sioux	T18N, R8E, section 6	Low Power, Non-Broadcast
Obsidian Flat	Madison, Henrys Lake, Gallatin Mountains	Bozeman	T14S, R5E, section 3	Broadcast
Tower Hill	Sioux	Sioux	T1N, R58E, section 25	Low Power, Non-Broadcast
TriPoint	Sioux	Sioux	T2S, R61E, section 22	Low Power, Non-Broadcast

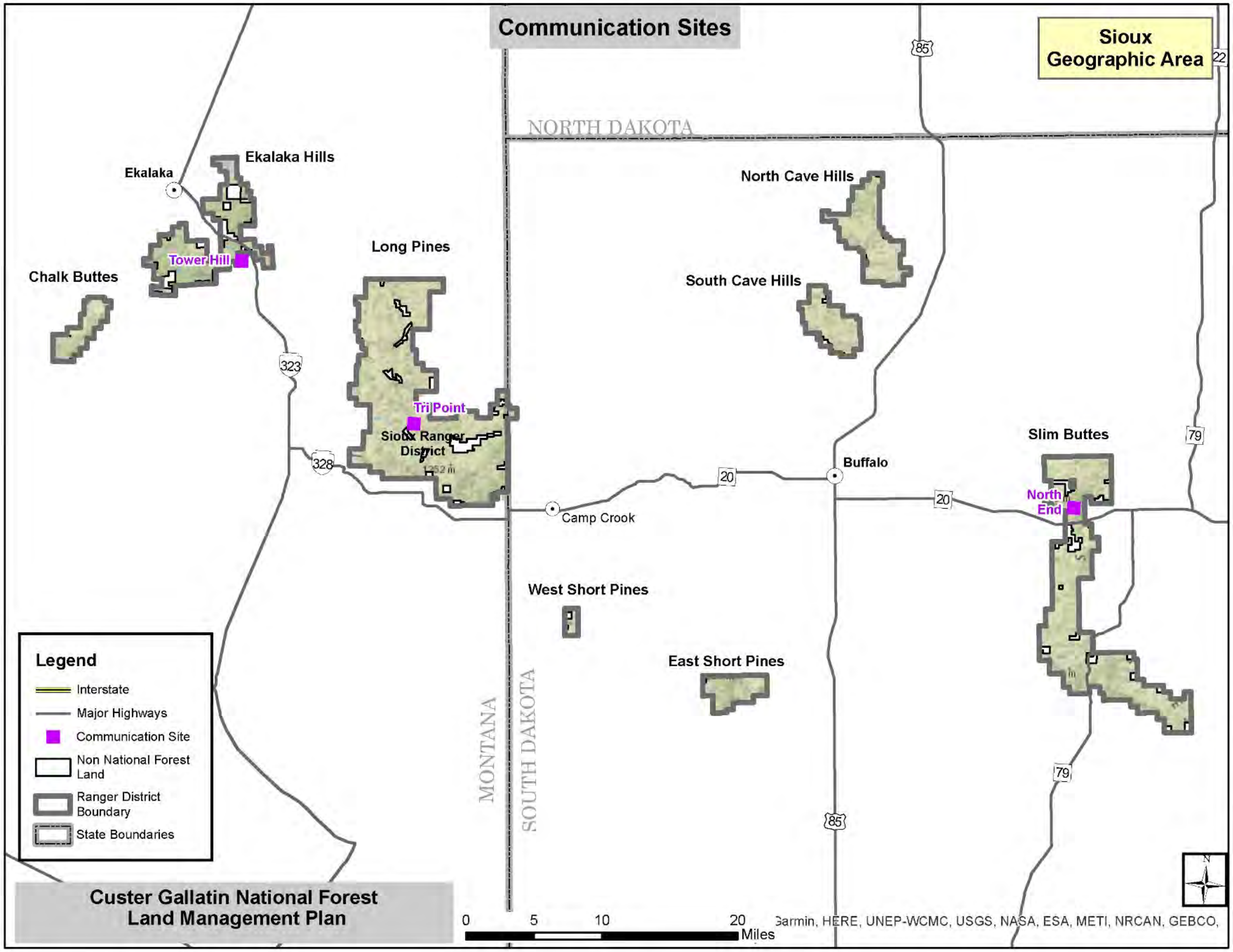


Figure 11. Communication sites on the Sioux Geographic Area

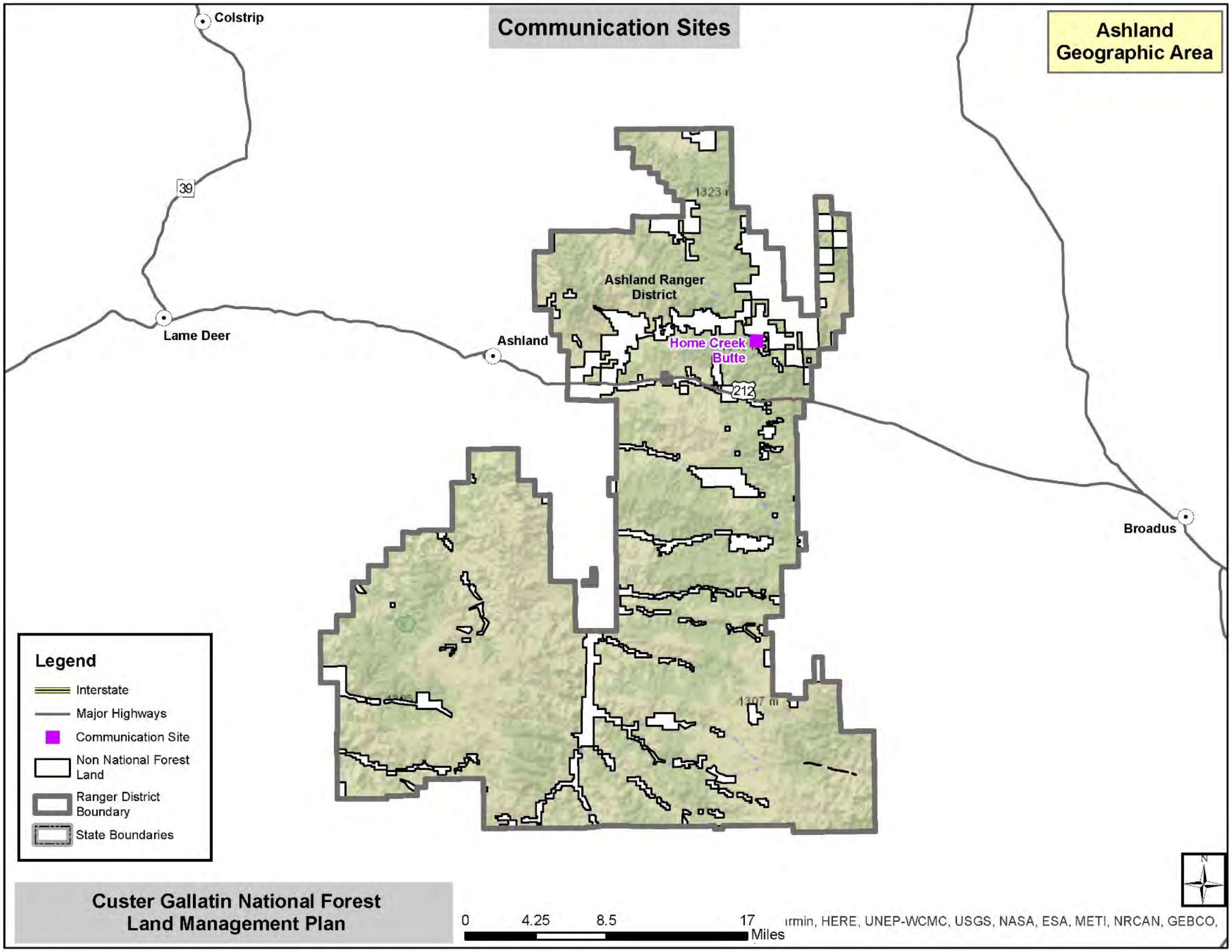


Figure 12. Communication sites on the Ashland Geographic Area

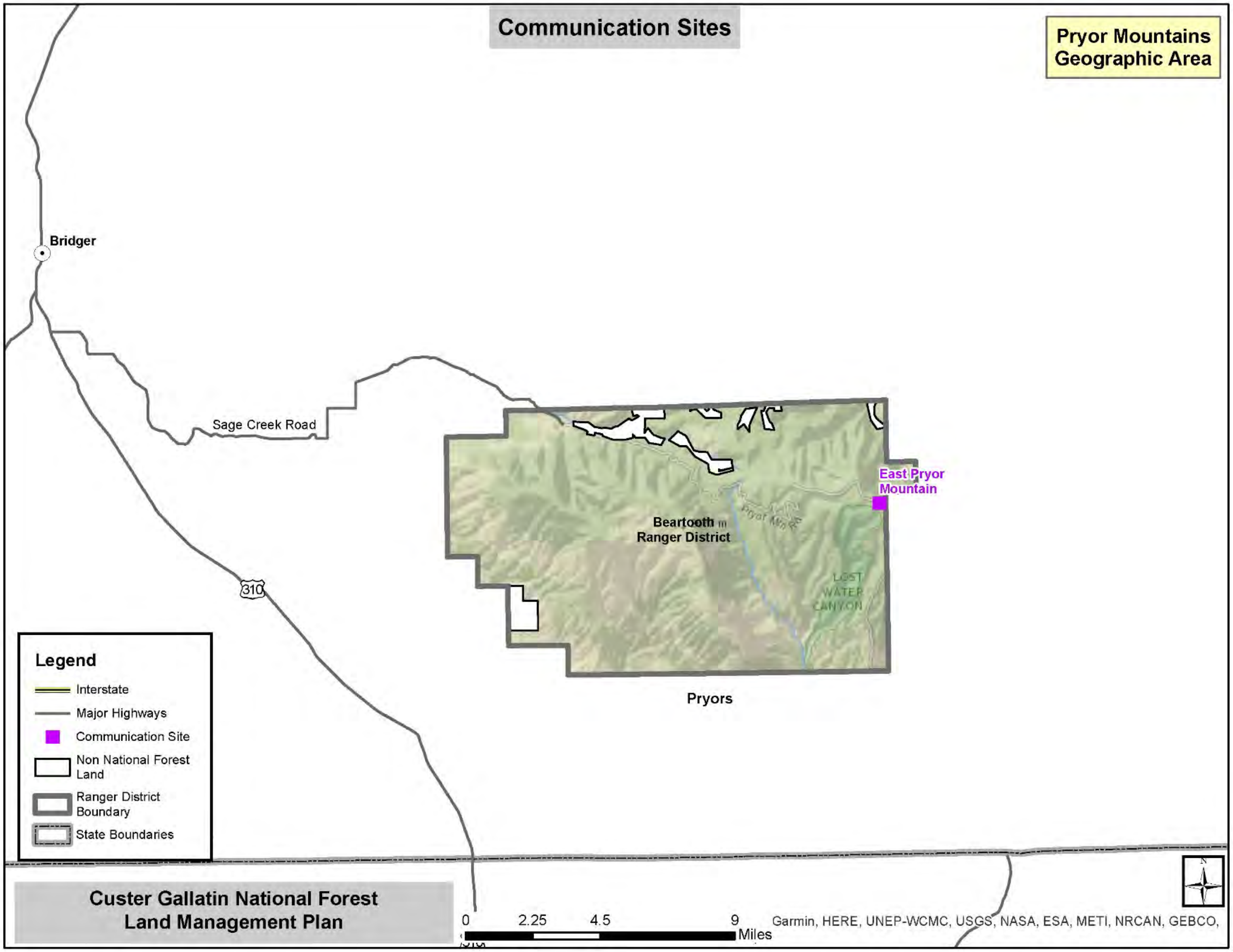


Figure 13. Communication sites on the Pryor Mountains Geographic Area

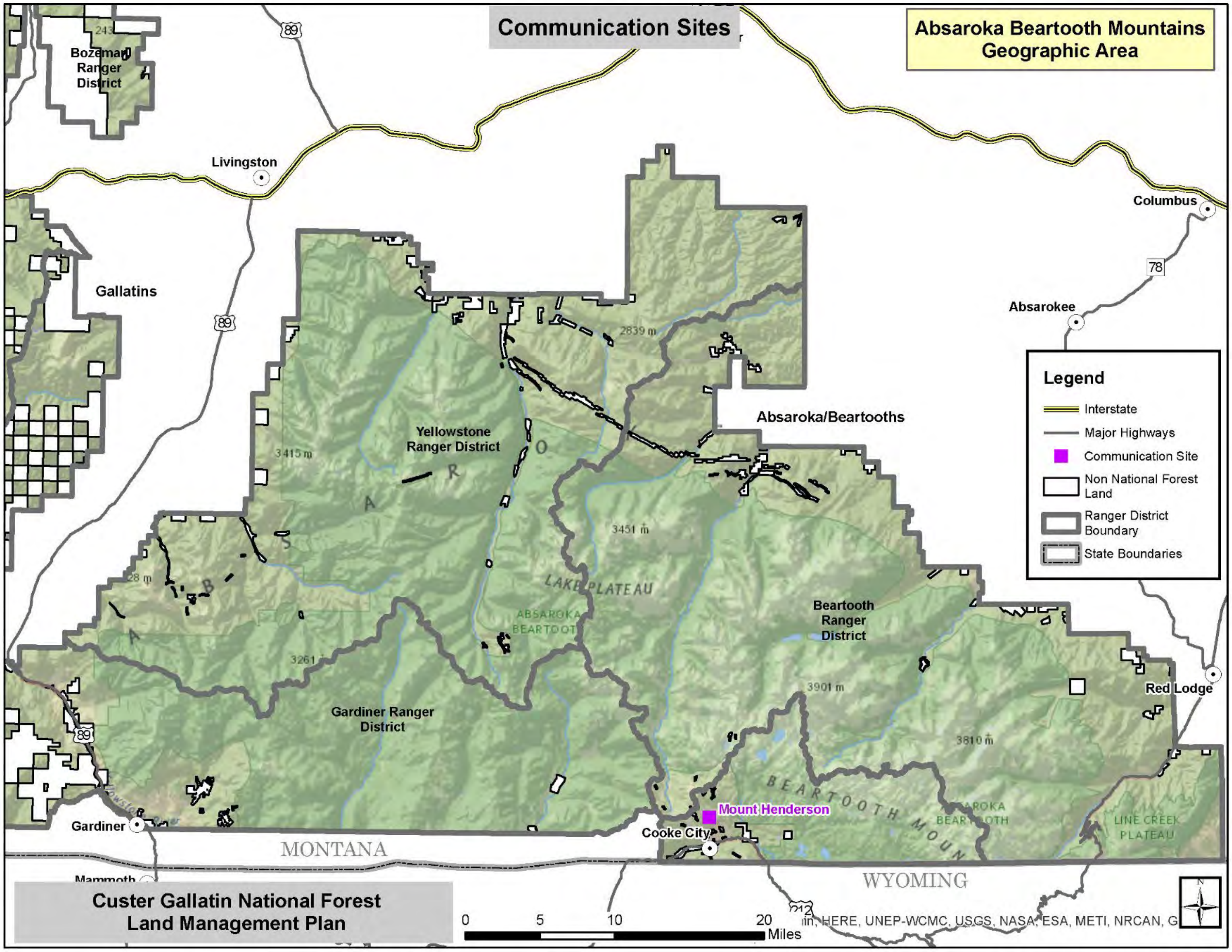


Figure 14. Communication sites on the Absaroka Beartooth Mountains Geographic Area

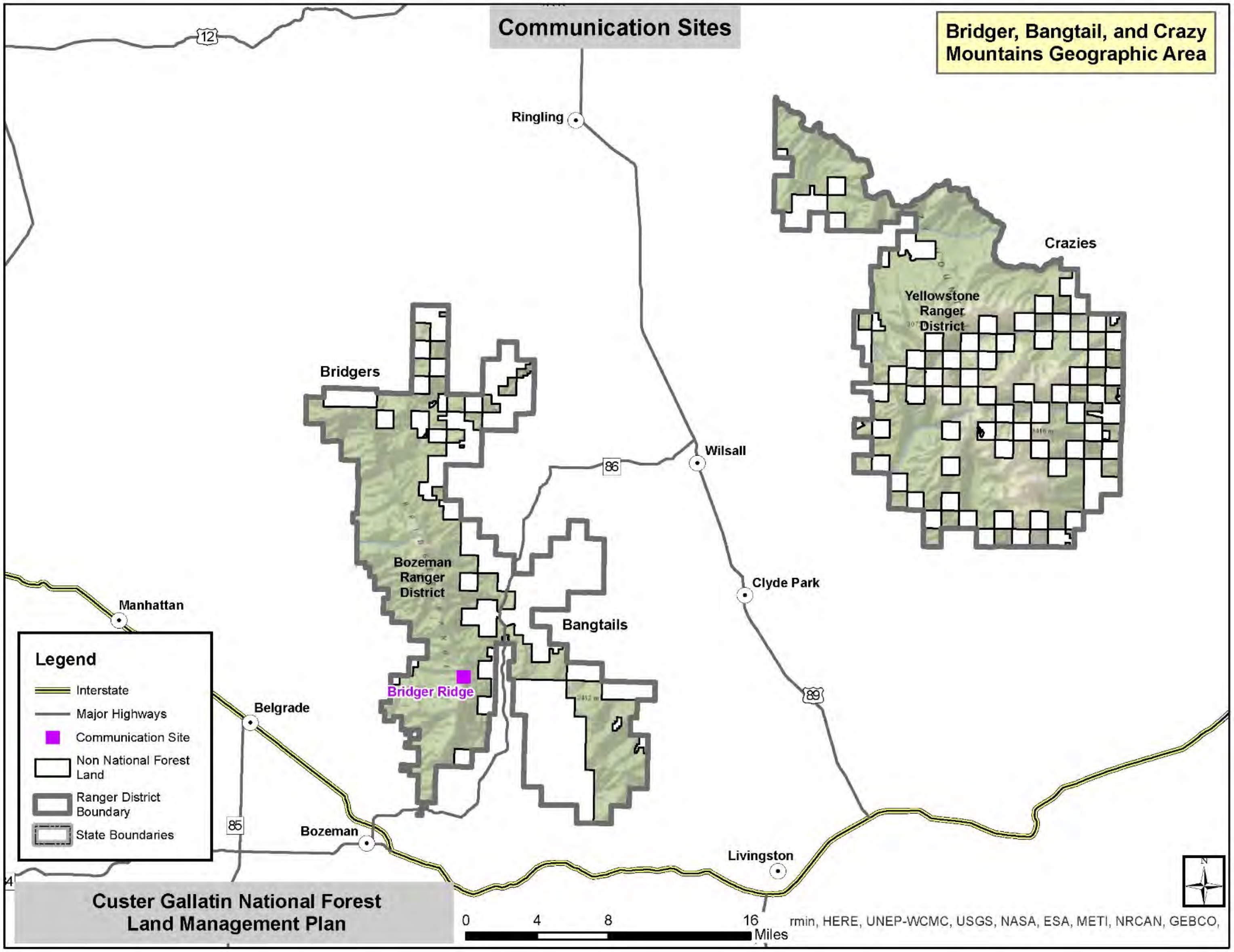


Figure 15. Communication sites on the Bridger, Bangtail, and Crazy Mountains Geographic Area

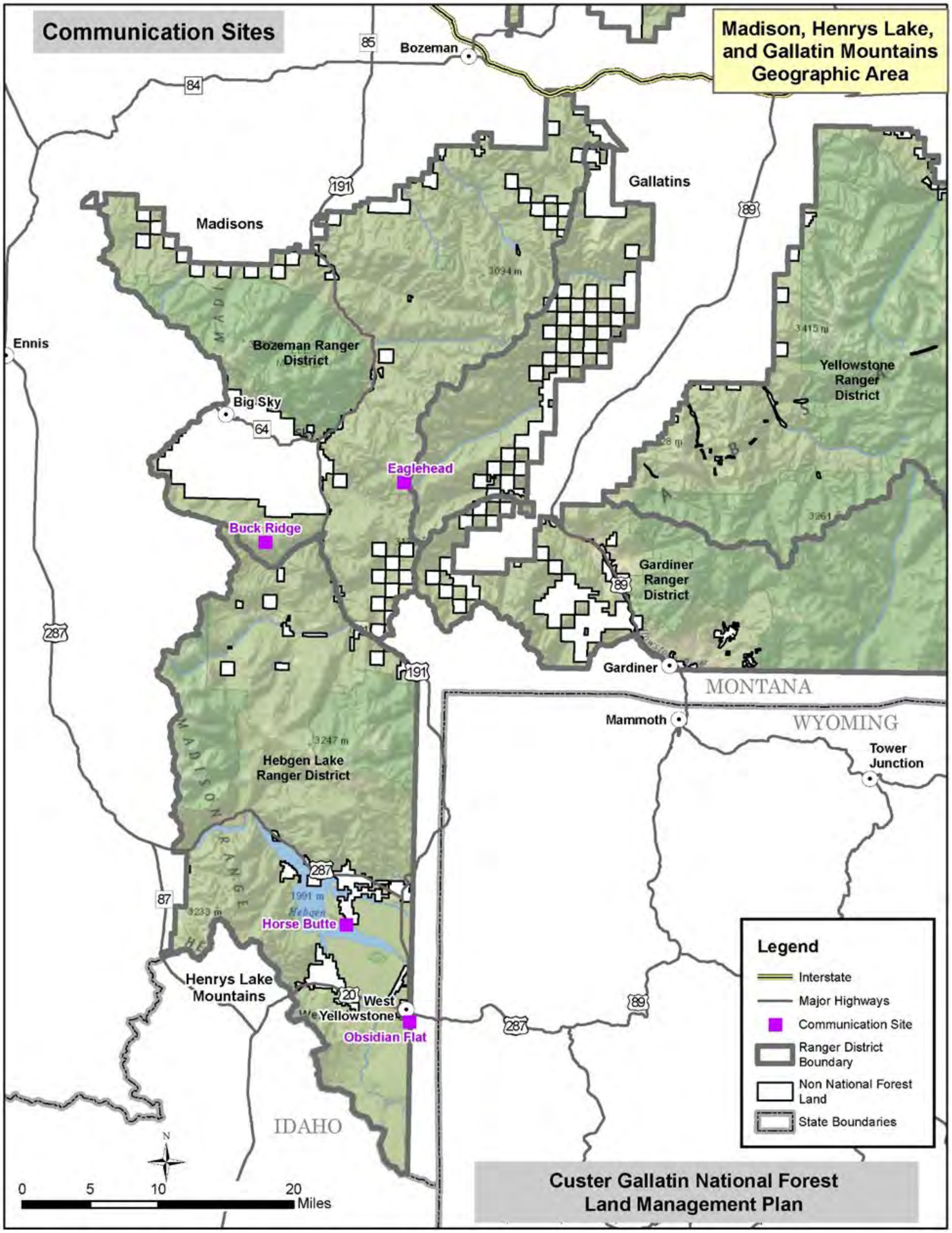


Figure 16. Communication sites on the Madison, Henrys Lake, and Gallatin Mountains Geographic Area

Designated Areas

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

Designated Wilderness

General

- The Custer Gallatin leads wilderness wide consistency and cooperation for both the Absaroka and Lee Metcalf wilderness areas and holds coordination committee meetings at appropriate intervals to facilitate clear communication between the units, set strategic goals and provide for project coordination.
- Monitor preservation of wilderness character by establishing a wilderness character baseline and monitoring trends over time utilizing national protocols.
- Monitor opportunities for solitude or primitive and unconfined recreation such as encounters, campsite impacts, and user created trails utilizing national protocols.
- Evaluate monitoring data at five years intervals from the establishment of a Wilderness Character Baseline for the Lee Metcalf Wilderness and the Absaroka-Beartooth Wilderness to determine how conditions are trending utilizing thresholds as outlined in the Wilderness Character Monitoring Technical Guide (2020a).

Encounters

If the index of traveling or campsite encounters increases between five-year monitoring intervals by ten percent or more over the baseline in zones I, II, or III, assess impacts and determine if management actions are needed to maintain wilderness character.

When the solitude condition thresholds are met or exceeded, consider additional management actions that may include, but are not limited to:

- Increase education advertising recreation opportunities in underutilized areas or outside wilderness.
- Consider physical design or alterations of access roads and trailheads to limit the number of users.
- Designate campsites.
- Reduce party size limits.
- Consider permit systems.

Campsite Impacts

If the index of condition impact scores increases between five-year monitoring intervals by five percent or more over the baseline in Zone I, II, or III, assess impacts and determine if management actions are needed to maintain wilderness character.

When the campsite condition thresholds are met or exceeded, consider additional management actions that may include, but are not limited to:

- Make campsites less appealing or accessible. Remove fire rings and other evidence of human impact. Rehabilitate campsites.

- Increase education at trailheads or portals with techniques such as: post restoration information, encourage visitors to avoid campsites undergoing restoration, or suggest alternative camping locations.
- Implement site closures, and inform the public by posting notices on portals and at administrative sites.
- Establish overnight stay limits at sites.
- Require human waste to be packed out.
- Designate specific campsites for stock use.
- Further limit the number of stock allowed when camping overnight.
- Prohibit overnight grazing of pack and saddle stock.
- Prohibit use of stock where warranted.
- Consider permit systems which includes Leave No Trace information.
- Designate campsites.

Unauthorized Trails

Unauthorized trails include user-created trails as well as other unauthorized routes such as decommissioned roads or trails. If total miles of unauthorized trails increase between five year monitoring intervals by three percent or more over the baseline in zone I, II or III, assess impacts and determine if management actions are needed to maintain wilderness character.

When total miles of unauthorized trails meet or exceeded the above thresholds, consider additional management actions that may include, but are not limited to:

- Increase education at trailheads or portals concerning traveling on durable surfaces and utilizing existing trail systems.
- Monitor to identify lightly impacted social routes and physically block or hide routes before use increases.
- Assess trail signing to ensure users can identify the system route.
- Physically close and restore routes.
- Coordinate with Montana Fish Wildlife and Parks to investigate the relationship between increasing user route networks and fish and wildlife management, and to develop solutions.

Continental Divide National Scenic Trail

- Provide consistent signage along the trail corridor at road and trail crossings to adequately identify the trail. Provide interpretive signs at key trail entry points and limited historic and cultural sites to orient visitors and enhance the visitor experience.
- As possible, ensure Incident Commanders are aware of the Continental Divide National Scenic Trail as a resource to be protected during wildfire suppression activities, and clearly identify fire suppression rehabilitation and long-term recovery of the Continental Divide National Scenic Trail corridor as high priorities for Incident Commanders, Burned Area Emergency Response (BAER) Team Leaders and post-fire rehabilitation efforts.

National Recreation Trails

- The Custer Gallatin National Forest could evaluate all currently listed National Recreation Trails to ensure they are being managed under the correct designation. A few of the currently designated trails are lightly used, do not offer exemplary, outstanding, or unique experiences and might be reconsidered as to whether they are appropriate for the designation. There may be other trails on the national forest that would be more worthy of being designated a national recreation trail.

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 Northern Region 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 et al. 1996). Although *Pinus ponderosa*/*Agropyron spicatum* and *Pinus ponderosa*/*Prunus virginiana* show up as a target in Chadde and others (1996), they are represented in Poker Jim Research Natural Area.

Refer to the following publications, establishment records, and decisions: Poker Jim (U.S. Department of Agriculture 1974f); Line creek Plateau (U.S. Department of Agriculture 2000); Lost Water Canyon (U.S. Department of Agriculture 1994a;b;2004); Black Butte (U.S. Department of Agriculture 1974a); East Fork Mill Creek (U.S. Department of Agriculture 1974b); Obsidian Sands (U.S. Department of Agriculture 1974c); Palace Butte (U.S. Department of Agriculture 1974d); Passage Creek (U.S. Department of Agriculture 1974e); Sliding Mountain (U.S. Department of Agriculture 1974g); Wheeler Ridge (U.S. Department of Agriculture 1974h); (Chadde et al. 1996); (Evenden et al. 2001) and (U.S. Department of Agriculture 1983)

Potential strategies that could be used to trend toward desired conditions for research natural areas include:

- 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 (Evenden et al. 2001) provide 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 et al. 2001).
- 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 (for example, 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 Research Natural Area. 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 Research Natural Area 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 research natural area on maps distributed to the general public or signing the areas as research natural areas would typically not be done so as to not encourage recreational use.
- 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 7 and table 8 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 Northern Region assessment.

Table 9. Unfilled community type target recommendations for Custer portion of Custer Gallatin National Forest and priority ranking based on Chadde et al. (1996)

Class	Community Type	Likelihood of Occurring	Priority
Forest and Woodland	*Fraxinus pennsylvanica-(Ulmus americana)/Prunus virginiana series*	Ashland and Sioux Districts	Moderate
Forest and Woodland	*Fraxinus pennsylvanica/Prunus virginiana*	Ashland and Sioux Districts	High
Forest and Woodland	*Fraxinus pennsylvanica/Symphoricarpos occidentalis*	Ashland and Sioux Districts	Moderate
Forest and Woodland	*Juniperus scopulorum/Agropyron spicatum*	Beartooth, Ashland, and Sioux Districts	Moderate
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 and Sioux Districts	Moderate
Forest and Woodland	*Populus angustifolia/Cornus stolonifera*	Beartooth District	Moderate
Forest and Woodland	*Populus deltoides/Cornus stolonifera*	Beartooth, Ashland, and Sioux Districts	Moderate
Forest and Woodland	*Populus tremuloides communities*	Beartooth, Ashland, and Sioux Districts	Moderate
Shrubland	*Artemisia cana/Agropyron smithii*	Ashland and Sioux Districts	Moderate
Shrubland	*Artemisia cana/Festuca idahoensis*	Ashland District	Moderate
Shrubland	*Artemisia tridentata/Agropyron smithii*	Beartooth, Ashland, and Sioux Districts	Moderate
Shrubland	*Artemisia tridentata/Agropyron spicatum*	Beartooth, Ashland, and Sioux Districts	Moderate
Shrubland	*Artemisia tridentata - Atriplex confertifolia*	Beartooth District	Moderate

Class	Community Type	Likelihood of Occurring	Priority
Shrubland	*Potentilla fruticosa/Andropogon scoparius*	Ashland District	High
Shrubland	*Rhus aromatica/Agropyron spicatum*	Beartooth, Ashland, and Sioux Districts	Moderate
Shrubland	*Rhus aromatica/Festuca idahoensis*	Beartooth and Ashland Districts	Moderate
Shrubland	*Rhus aromatica/Muhlenbergia cuspidata*	Ashland and Sioux Districts	Moderate
Shrubland	*Sarcobatus vermiculatus/Agropyron smithii*	Sioux District	Moderate
Shrubland	*Sarcobatus vermiculatus/Agropyron spicatum*	Sioux District	Moderate
Shrubland	*Shepherdia argentea*	Ashland and Sioux Districts	Moderate
Shrubland	*Symphoricarpos occidentalis*	Beartooth, Ashland, and 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 and Sioux Districts	Moderate
Dwarf Shrubland	*Juniperus horizontalis/Carex heliophila*	Sioux District	Moderate
Herbaceous Vegetation	*Agropyron smithii - Carex filifolia*	Sioux District	Moderate
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

Table 10. Unfilled community type target recommendations for Gallatin portion of Custer Gallatin National Forest and priority ranking based on Chadde et al. (1996)

Class	Community Type	Likelihood of Occurring	Priority
Dwarf Shrubland	*Artemisia arbuscular/Agropyron smithii*	Gardiner and Hebgen Districts	Moderate
Dwarf Shrubland	*Artemisia arbuscular/Agropyron spicatum*	Gardiner and Hebgen Districts	Moderate
Dwarf Shrubland	*Artemisia arbuscular/Festuca idahoensis*	Gardiner and 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

Special Area

Refer to the following for background and decisions regarding the Black Sand Springs and Bangtail designated special areas: (U.S. Department of Agriculture 1997); (U.S. Department of Agriculture 1998); and (U.S. Department of Agriculture 2007a).

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

- Black Sand Springs and Bangtail designated special areas and potential Pryor Mountain botanical special area. Due to the high value for biological integrity of these areas, consider invasive species control in and around these areas as 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. Regional forester approval is necessary for areas less than 100,000 acres under 36 CFR 294.1b (FSM 2372.04a(2)).

Pryor Mountain Wild Horse Territory

Refer to United States of America Public Law 195-92 1971, 1976, 1978, 2004. Wild Free-Roaming Horse and Burro Act as amended, the Code of Federal Regulations. 36 CFR Subpart B - 222.20-36. Management of Wild Free- Roaming Horses and Burros and FSM 2260 for additional direction for wild horse territory management.

The 2009 Interagency Herd Management Area and Territory Plan (U.S. Department of the Interior et al. 2009), or subsequent plans, provides operational decisions and direction for management of the Pryor Mountain wild horses and range. Potential management approaches that could be used to trend toward desired conditions for the Pryor Mountain wild horse territory include:

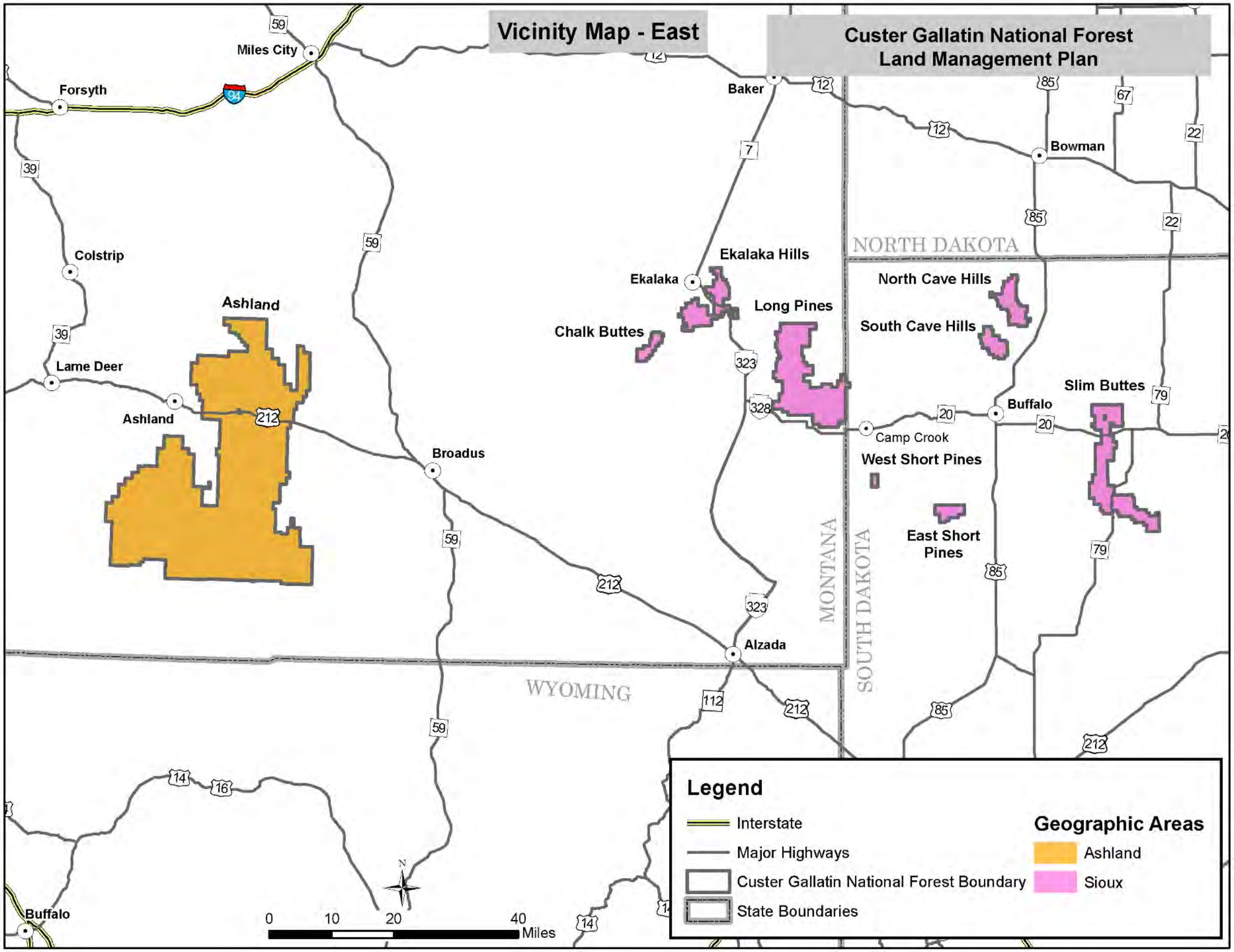
- Maintenance of the north boundary buck and rail fence is important to keep wild horses within their designated lands, pursuant to the 1971 Wild and Free-Roaming Horses and Burros Act, and prevent wild horse access into the Lost Water Canyon Research Natural Area and Lost Water Canyon recommended wilderness.

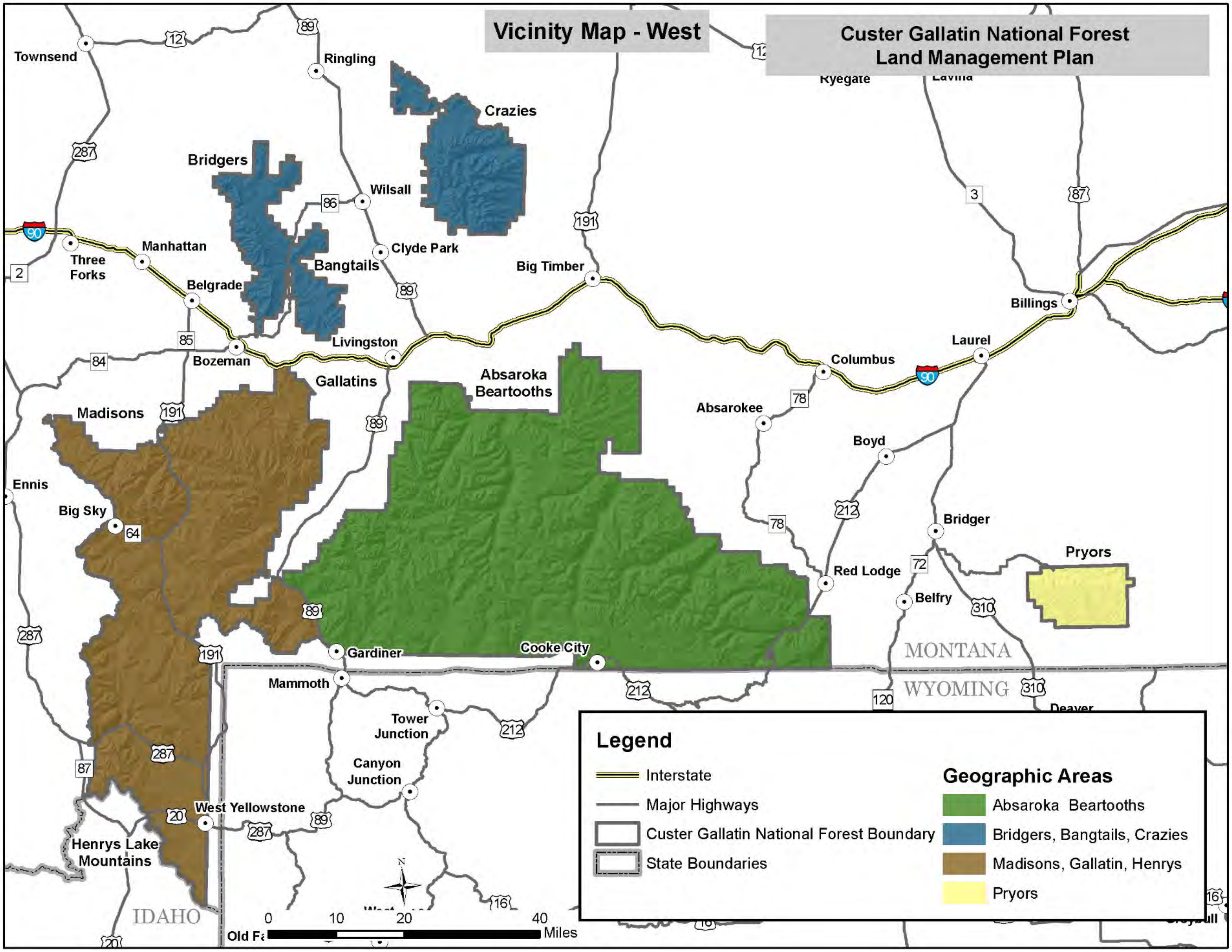
- Burnt Timber Road #2849 and the two long-term rangeland study exclosures are important to retain for wild horse management. The historic horse trap adjacent to the Burnt Timber Road is important to retain for cultural/historical purposes.
- Drone use can be allowed for administrative purposes or in 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.
- Refer to the following sources for further information regarding the Pryor Mountain Wild Horse Range: (Hall 1972, U.S. Department of the Interior 1984;1992, Peterson 1999, Heidel 2001, Ricketts 2004, Schoenecker 2004, Sneed and Winterowd 2006, U.S. Department of the Interior et al. 2008;2009).

Appendix B: Maps

Note: Vicinity maps are displayed first, followed by maps for each geographic area. The vicinity maps delineate the geographic areas.

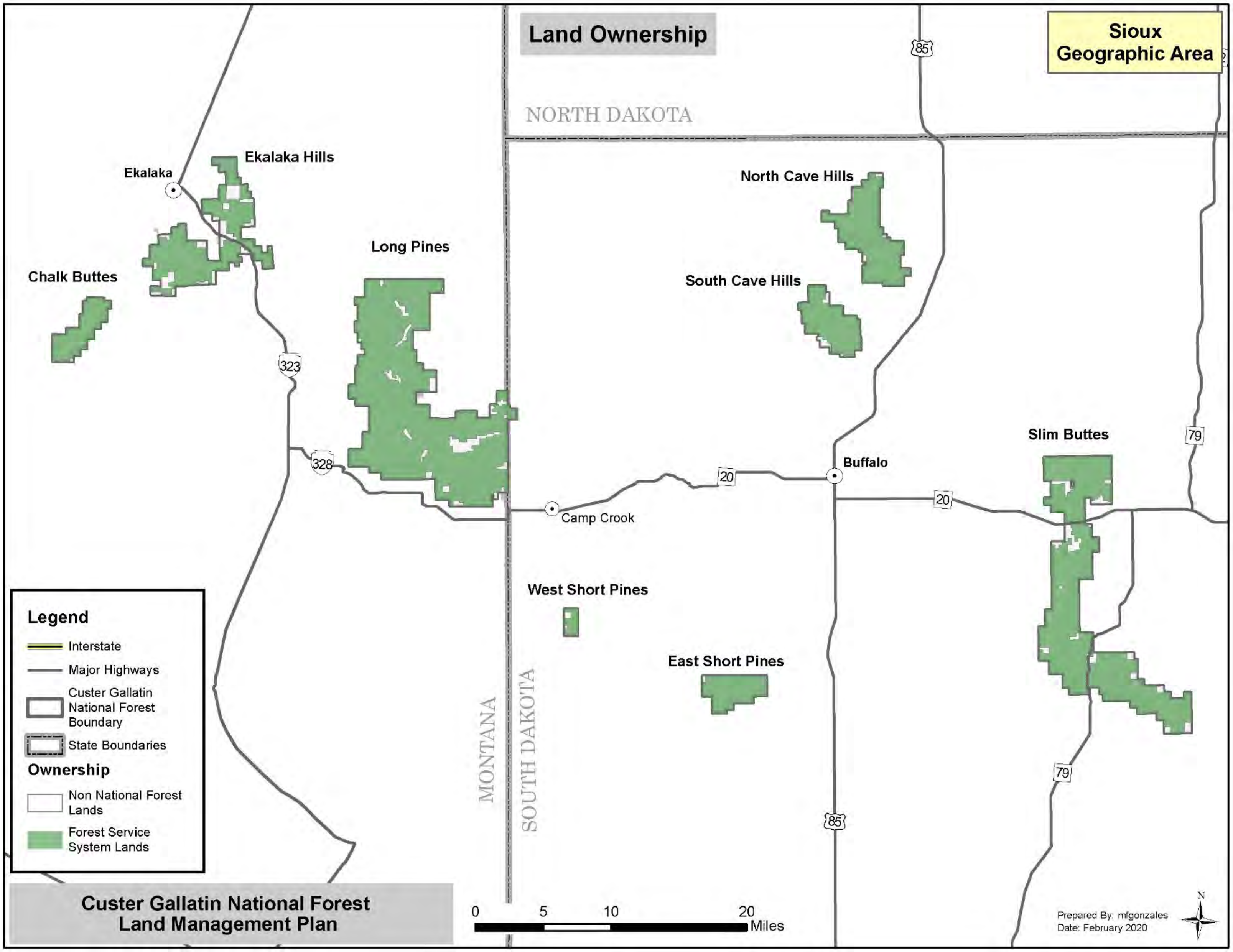
Vicinity Maps



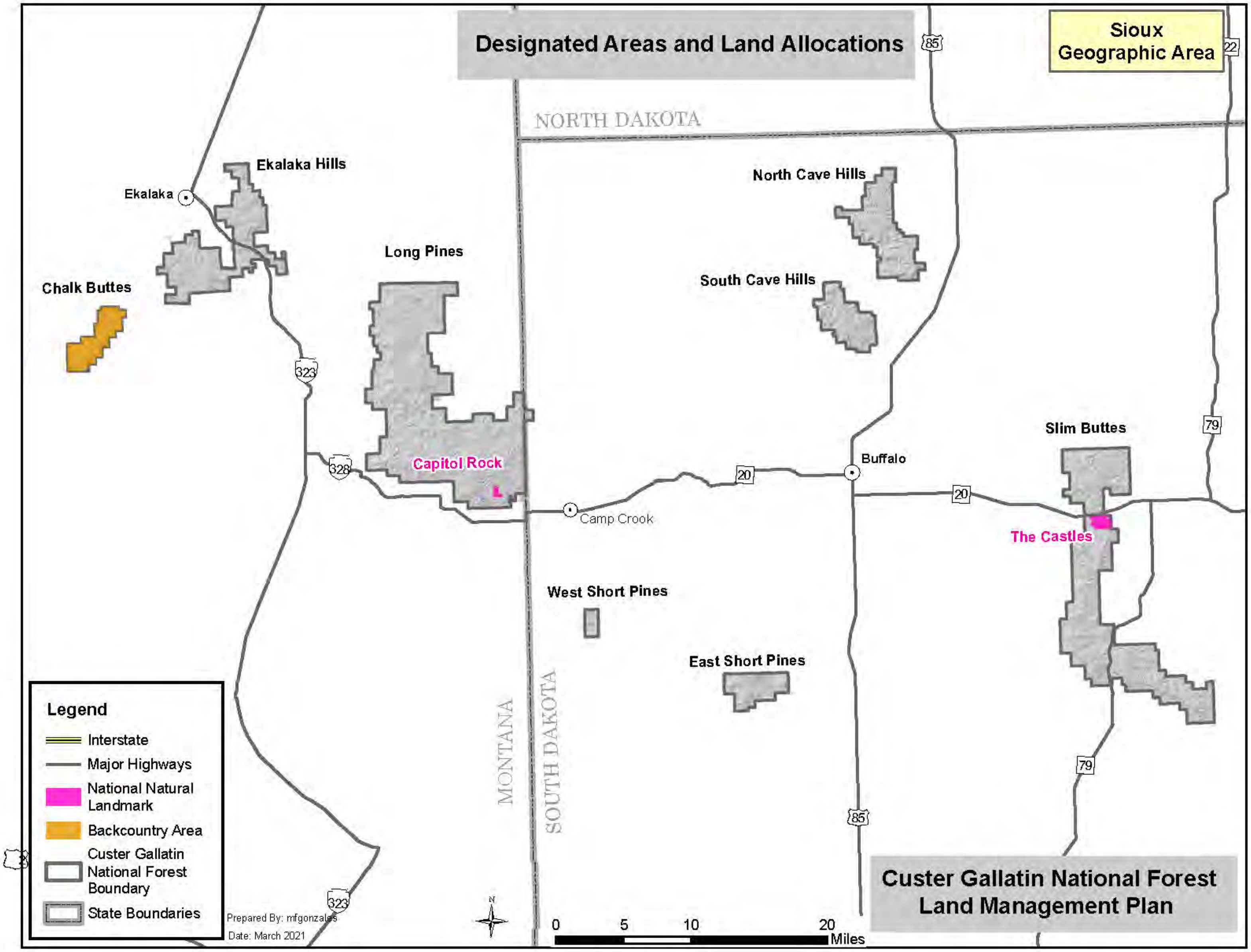

Vicinity Map - West
Custer Gallatin National Forest
Land Management Plan
Townsend
Ringling
Crazies
Bridgers
Wilsall
Clyde Park
Bangtails
Big Timber
Ryegate
Three Forks
Manhattan
Belgrade
Bozeman
Livingston
Gallatins
Absaroka Beartooths
Billings
Laurel
Columbus
Absarokee
Boyd
Madisons
Ennis
Big Sky
Bridger
Pryors
Red Lodge
Belfry
Gardiner
Cooke City
Mammoth
Tower Junction
Canyon Junction
West Yellowstone
Henrys Lake Mountains
MONTANA
WYOMING
IDAHO
0
10
20
40
Miles
Legend
Interstate
Major Highways
Custer Gallatin National Forest Boundary
State Boundaries
Geographic Areas
Absaroka Beartooths
Bridgers, Bangtails, Crazies
Madisons, Gallatin, Henrys
Pryors

Geographic Area Maps – Sioux Geographic Area

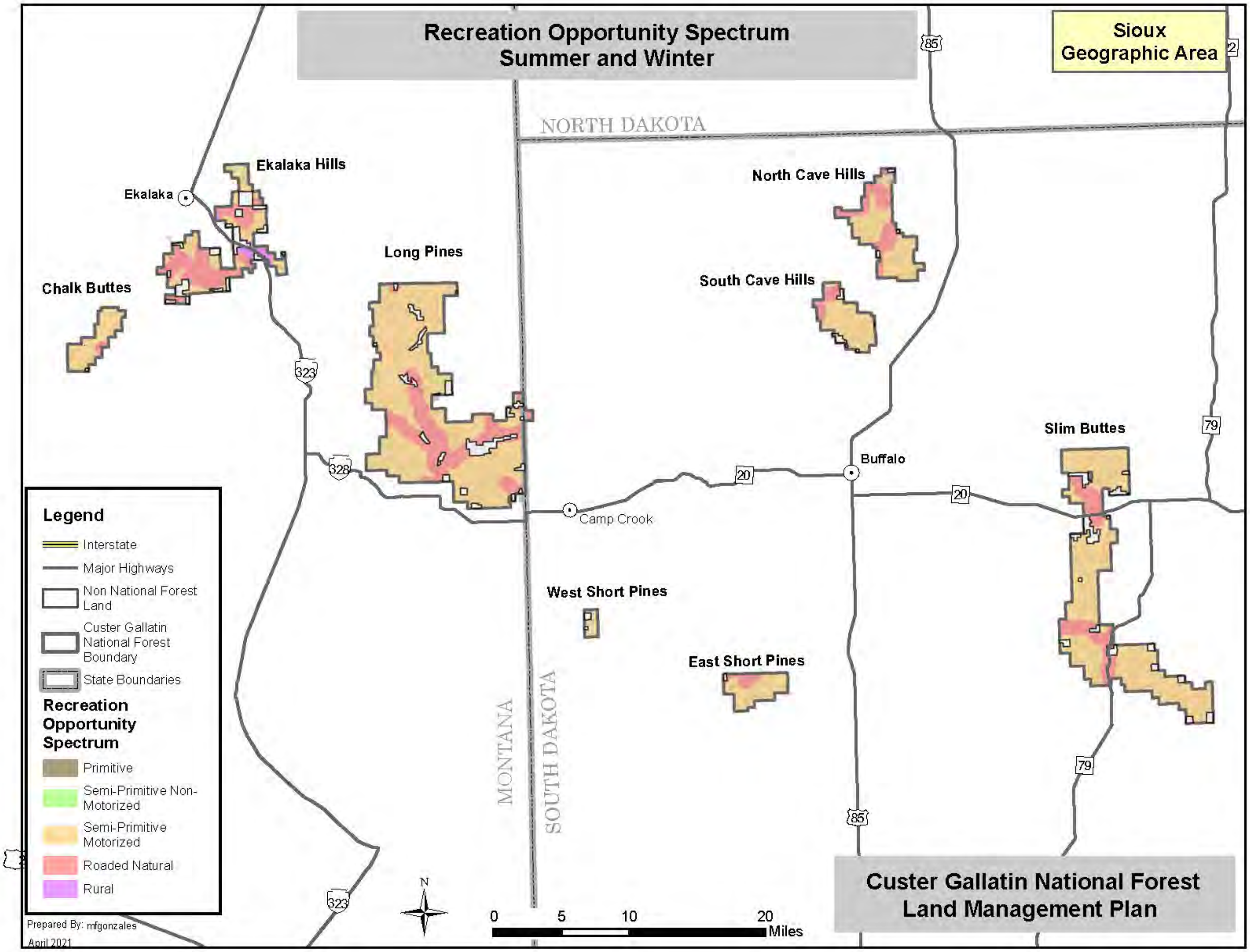
Land Ownership



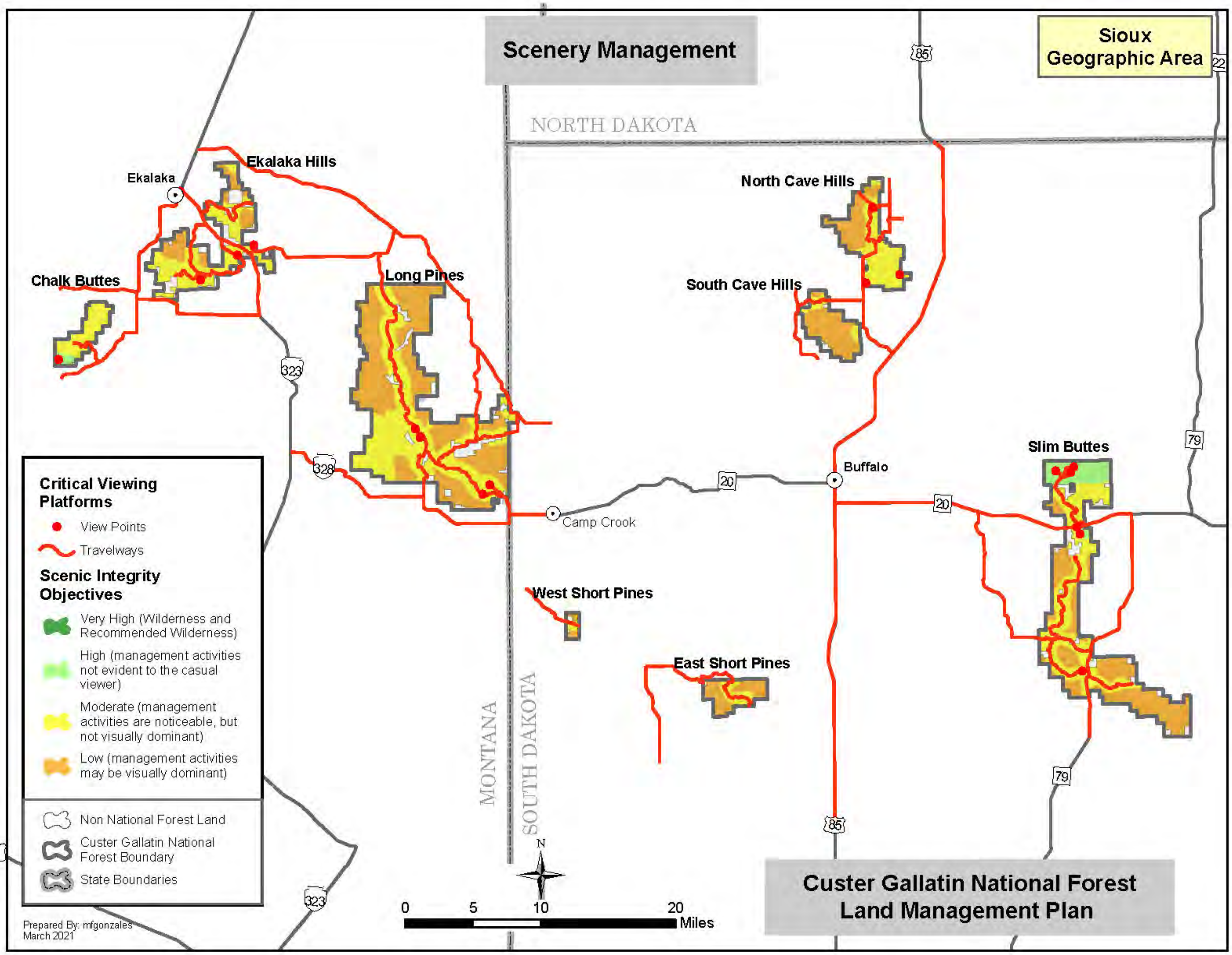
Designated Areas and Land Allocations



Recreation Opportunity Spectrum – Summer and Winter

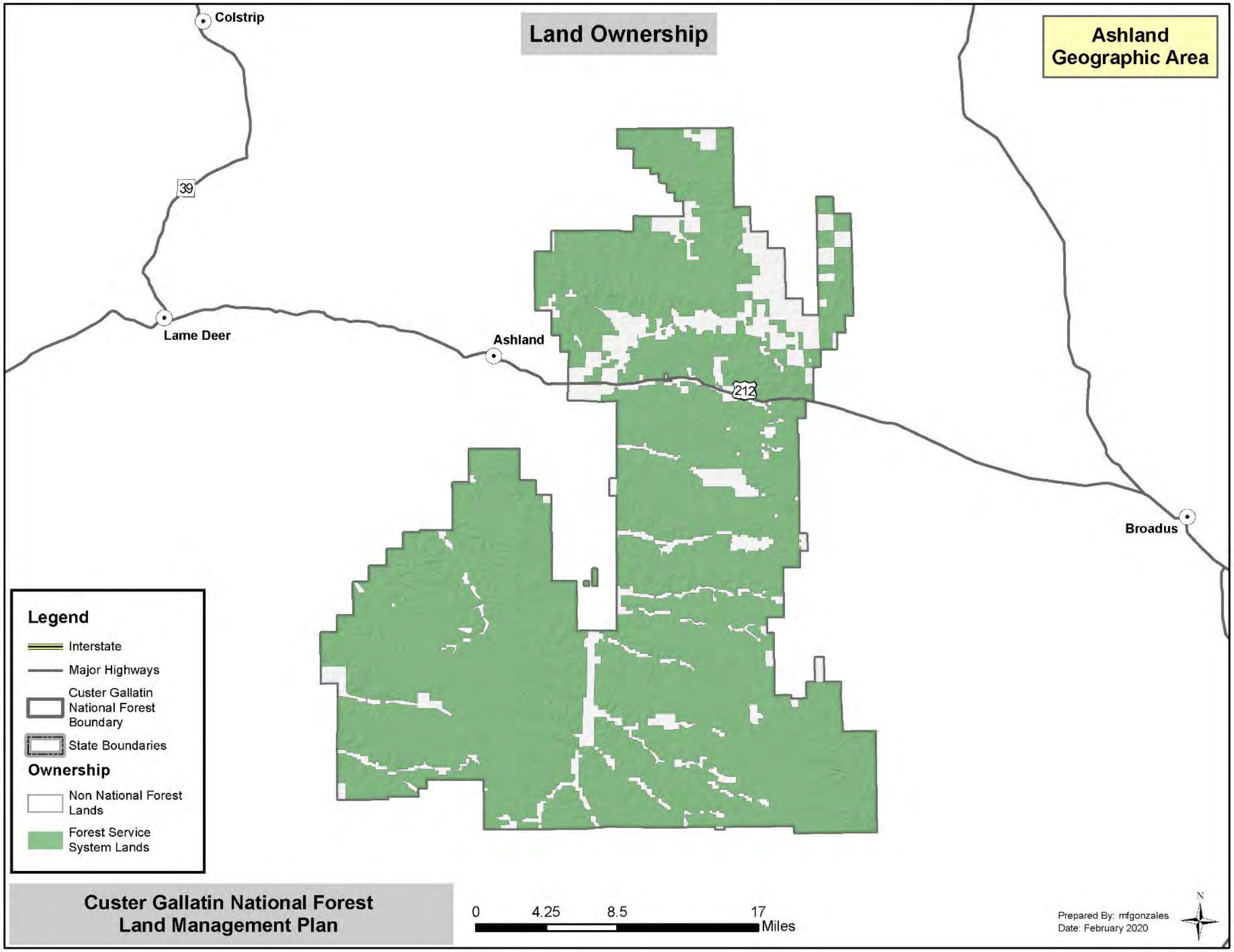


Scenery Management

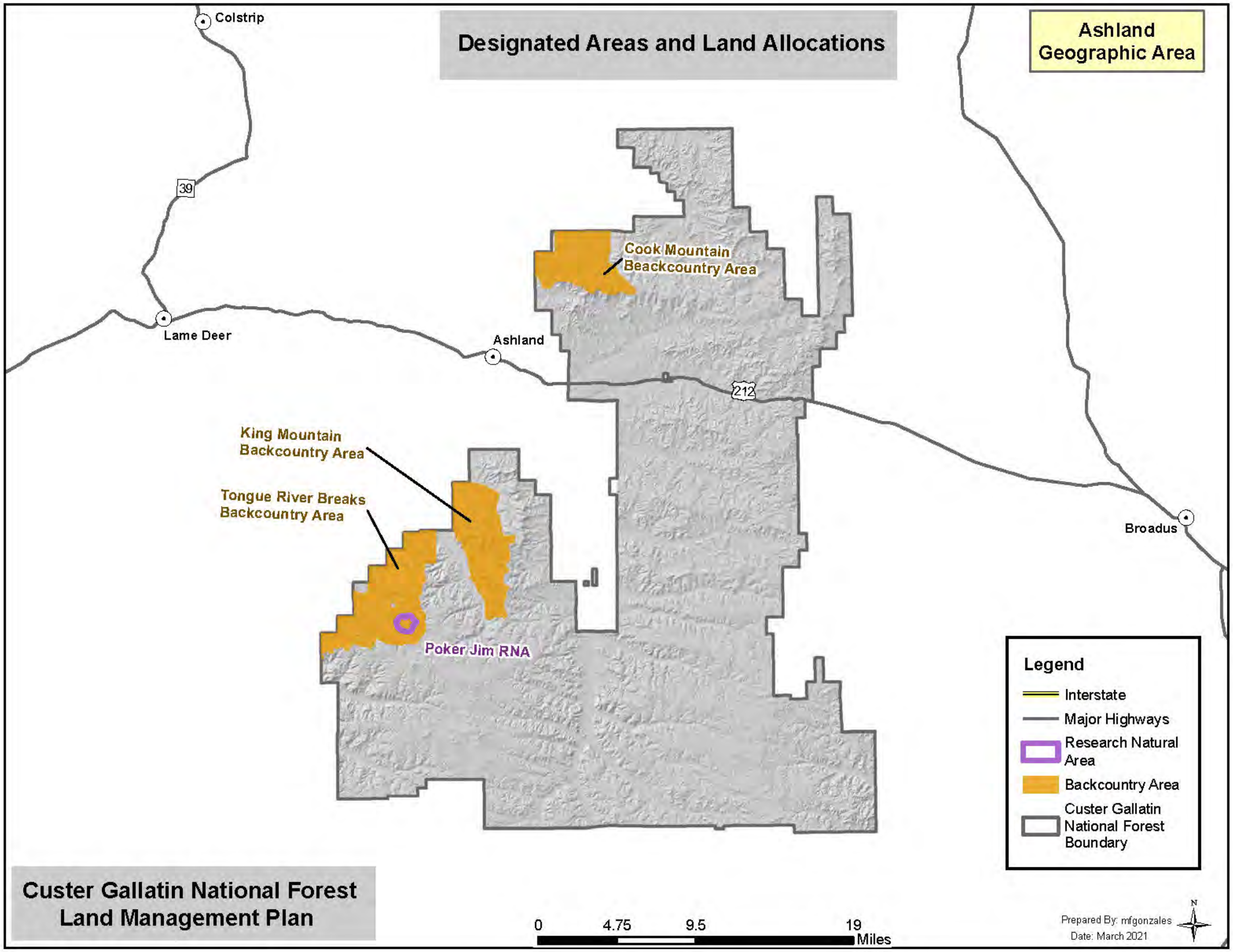


Geographic Area Maps – Ashland Geographic Area

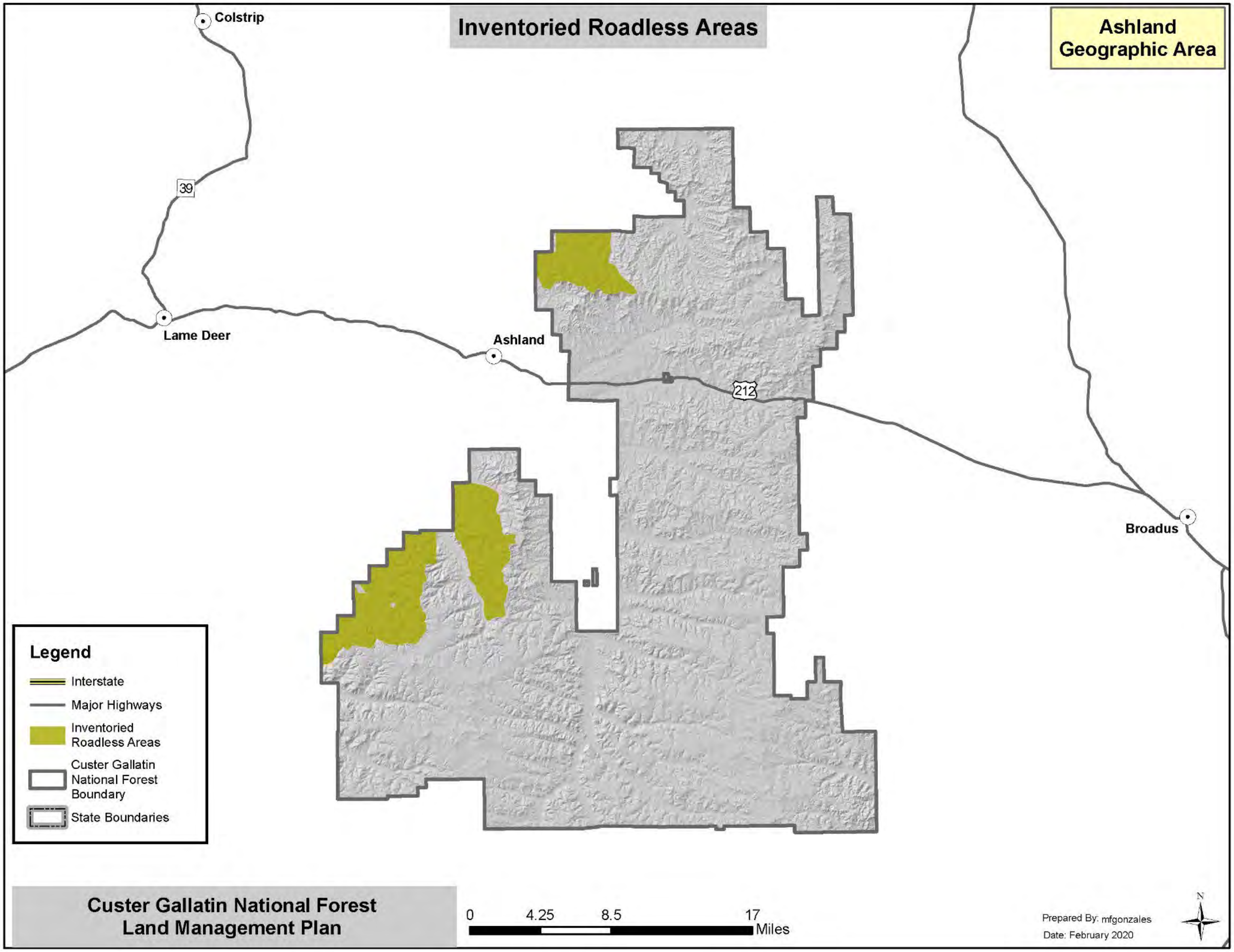
Land Ownership



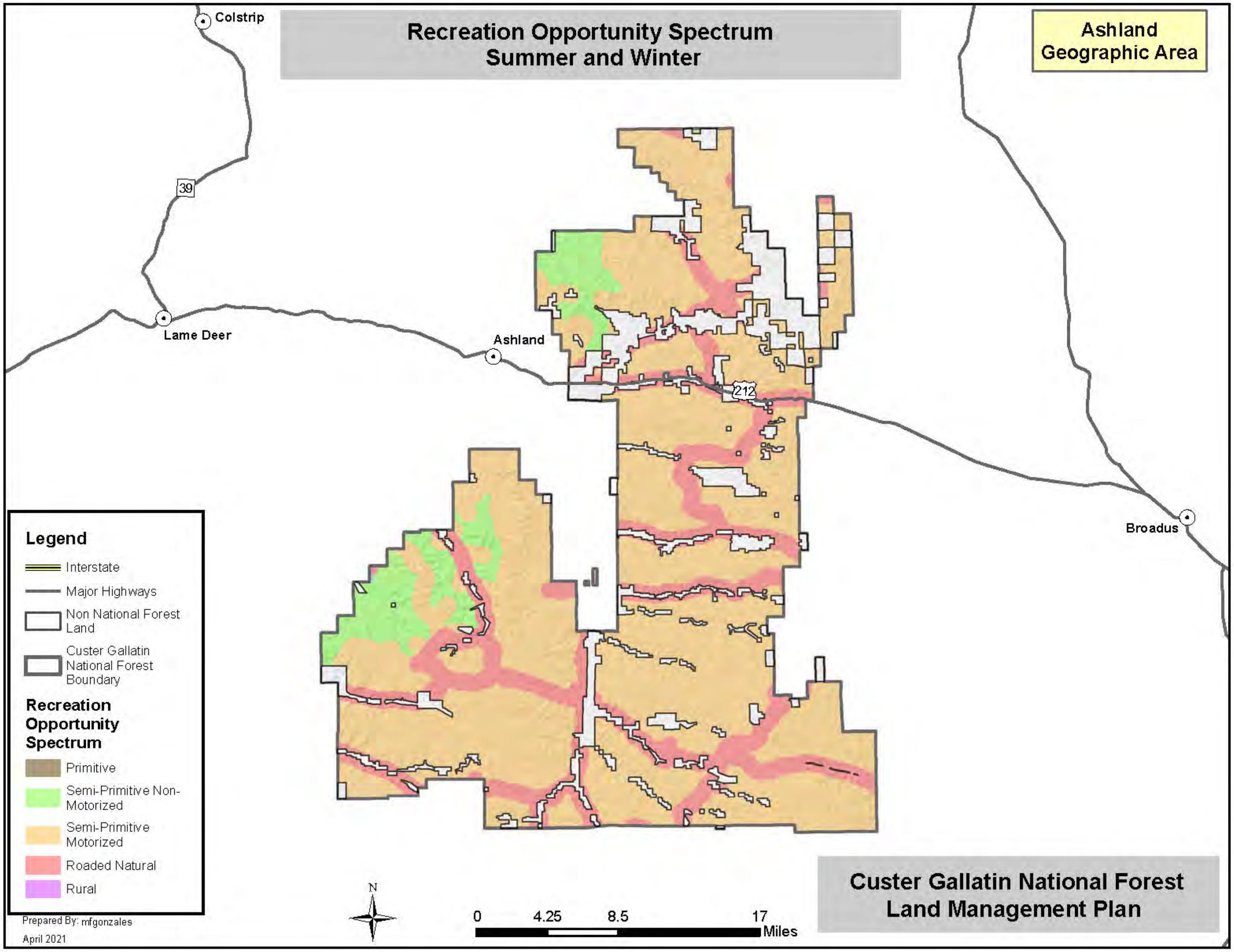
Designated Areas and Land Allocations



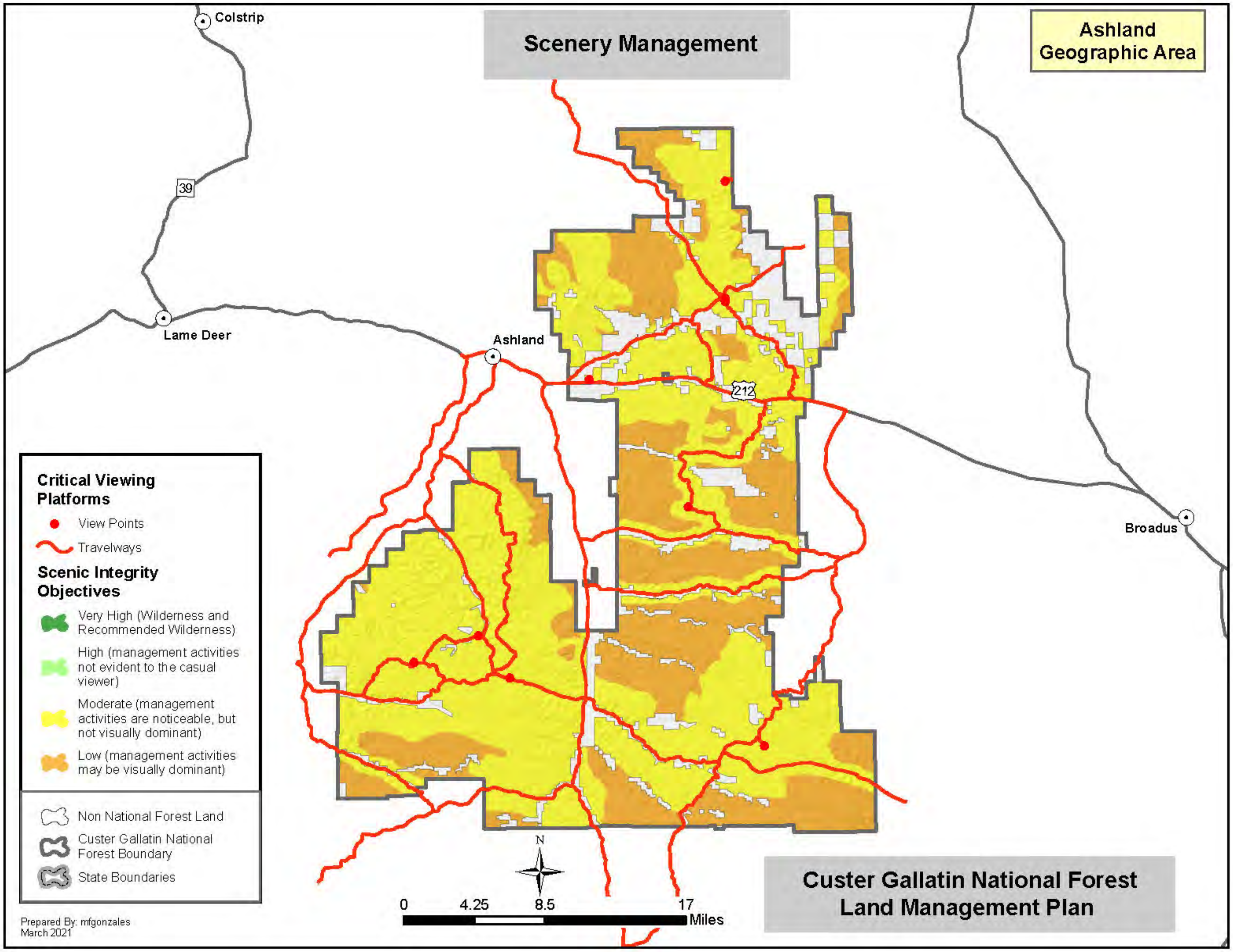
Inventoried Roadless Areas



Recreation Opportunity Spectrum – Summer and Winter

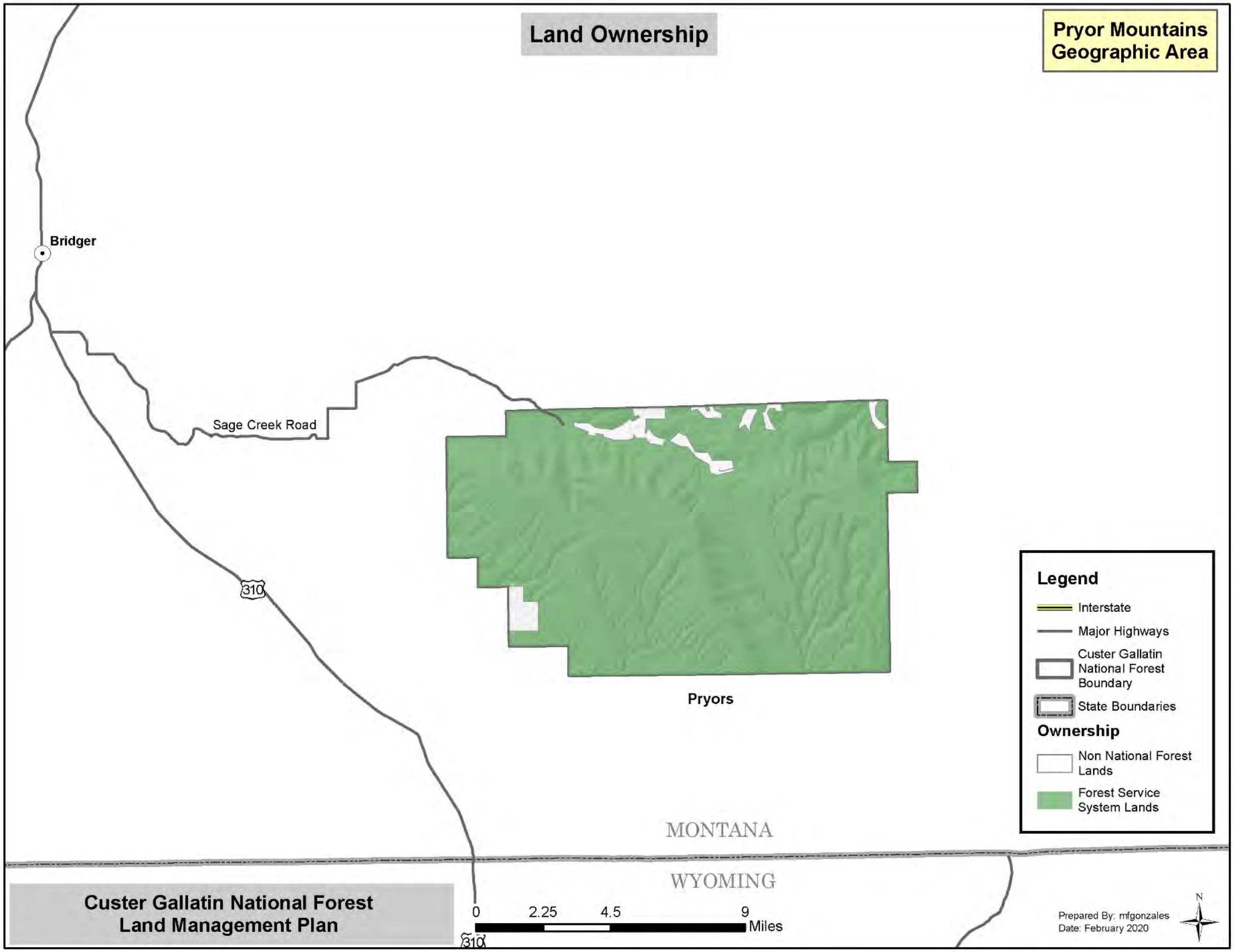


Scenery Management

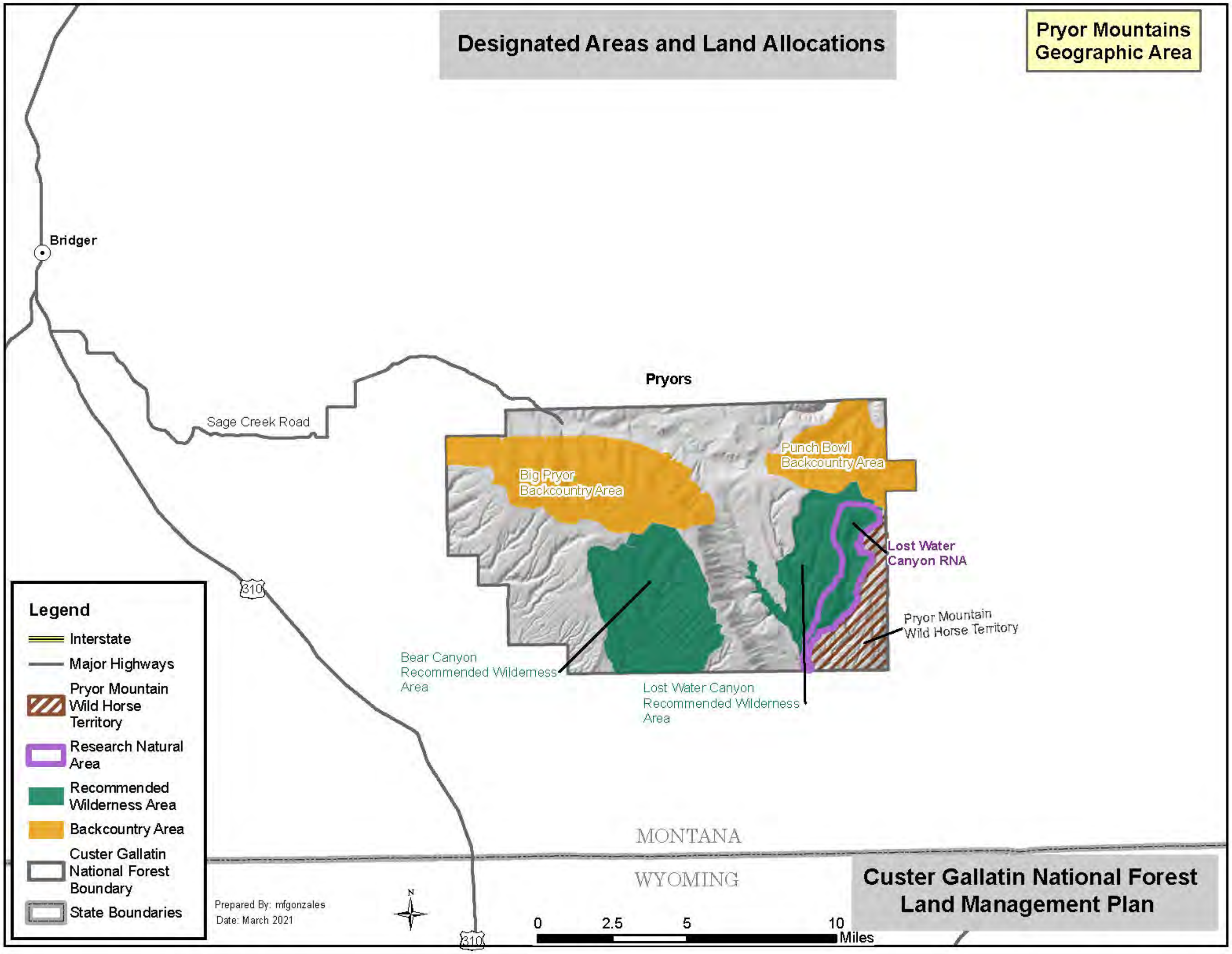


Geographic Area Maps – Pryor Mountains Geographic Area

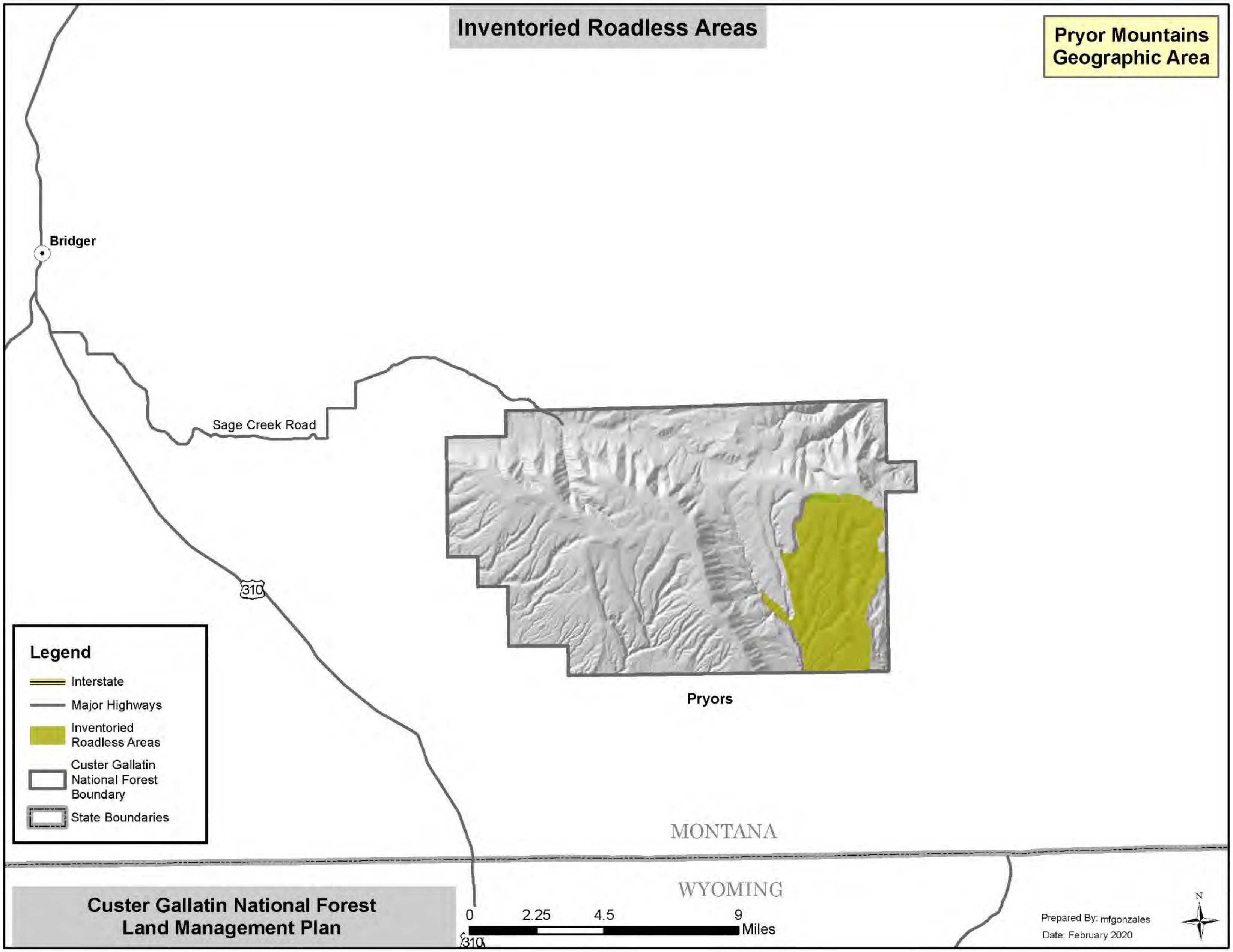
Land Ownership



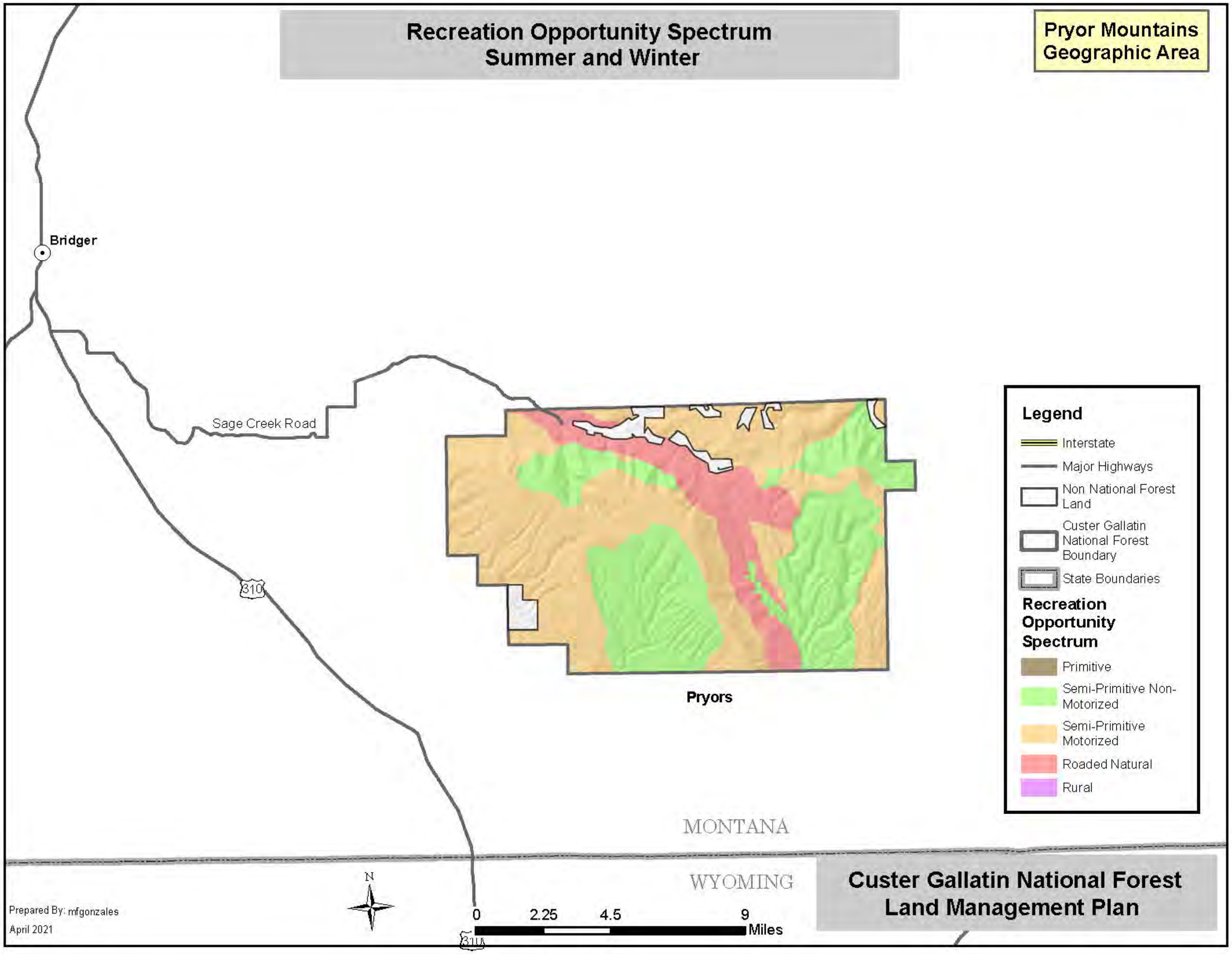
Designated Areas and Land Allocations



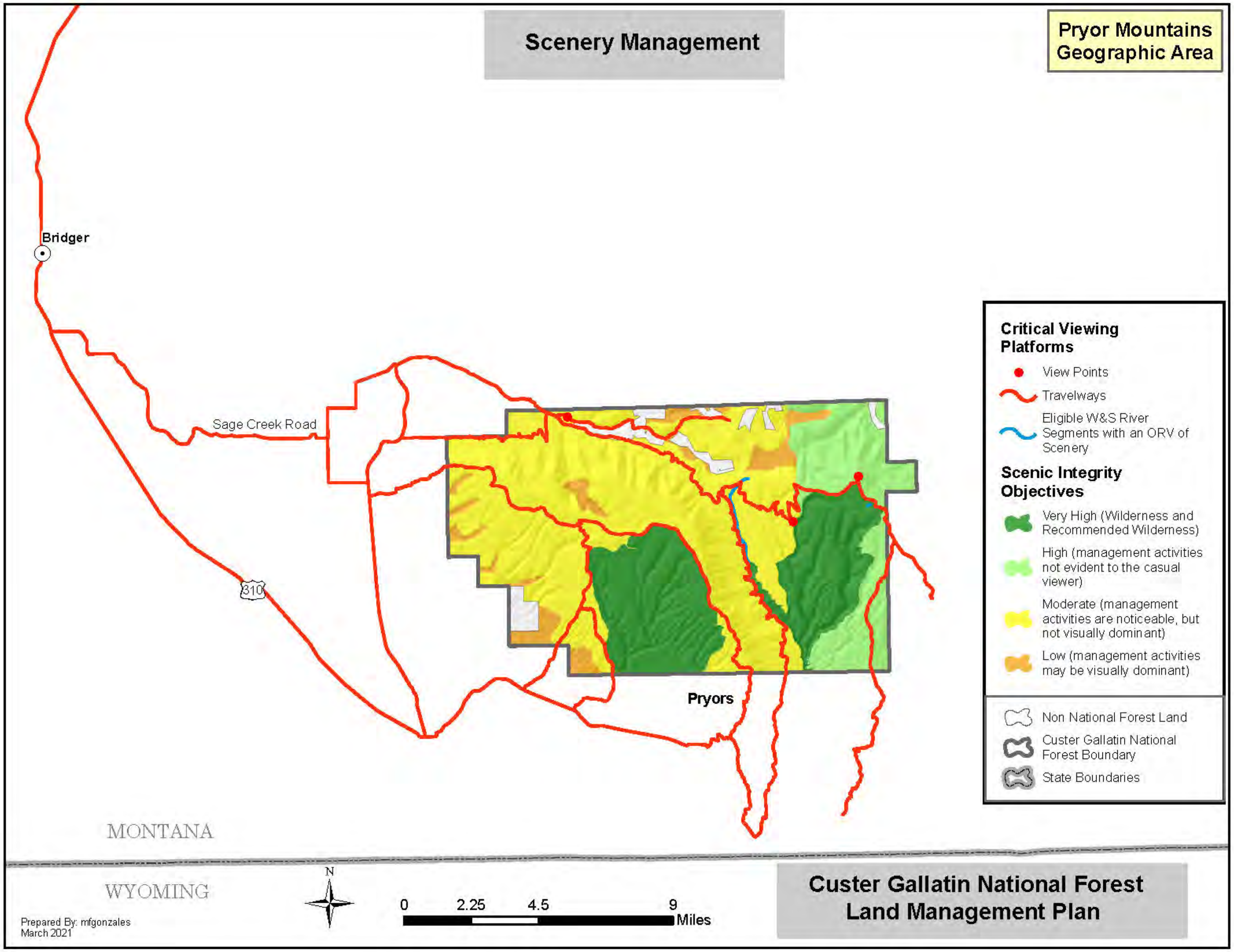
Inventoried Roadless Areas



Recreation Opportunity Spectrum – Summer and Winter

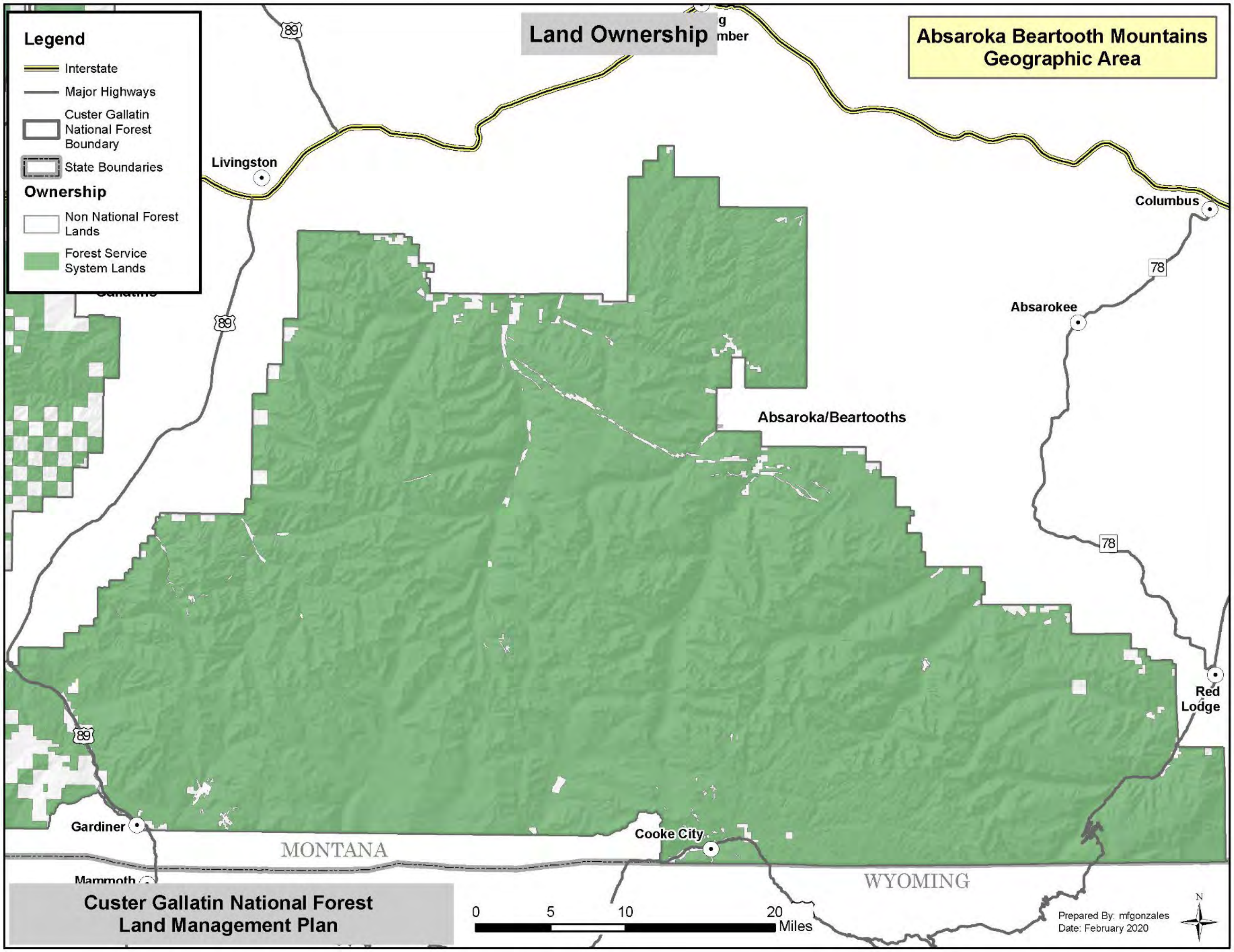


Scenery Management

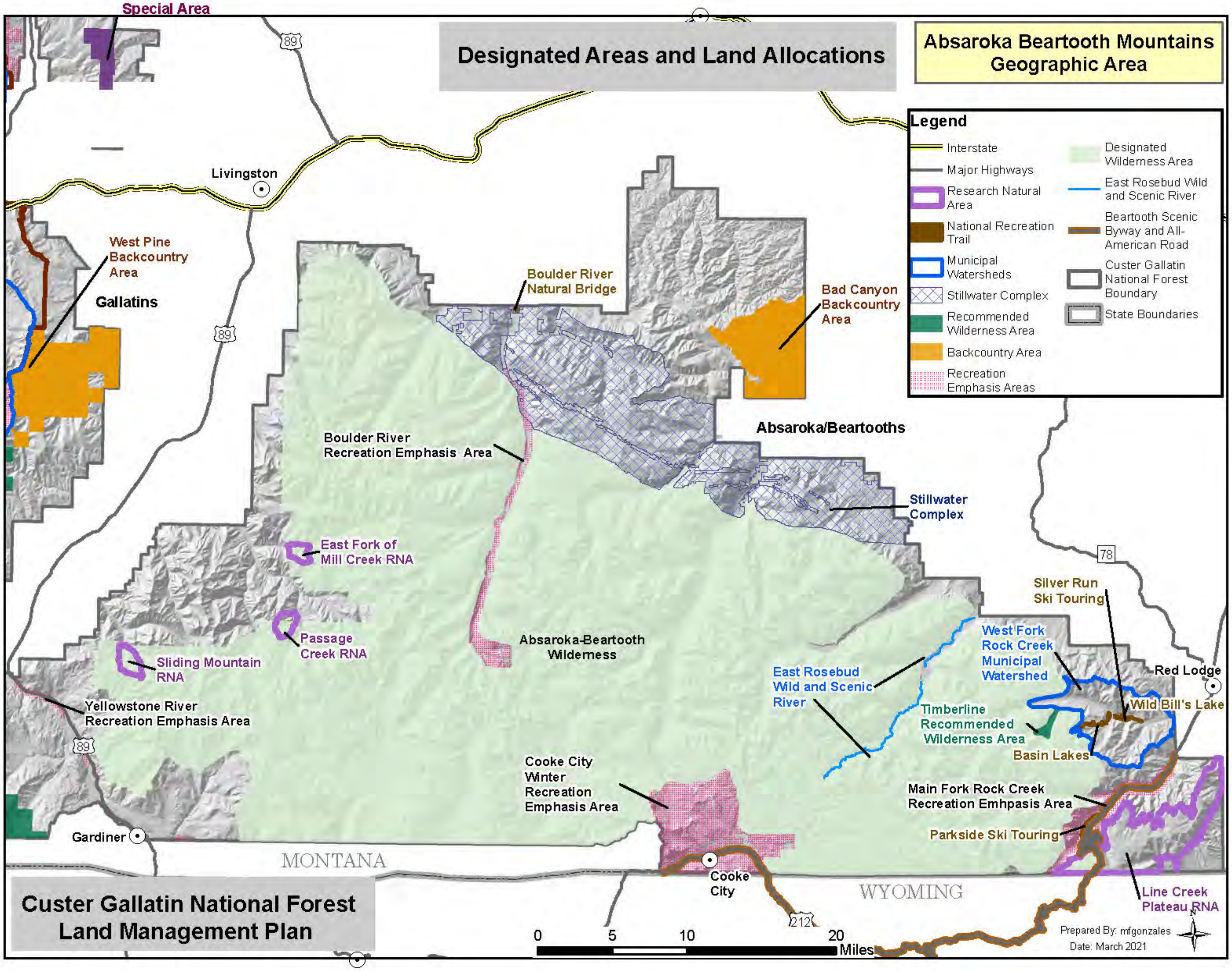


Geographic Area Maps – Absaroka Beartooth Mountains Geographic Area

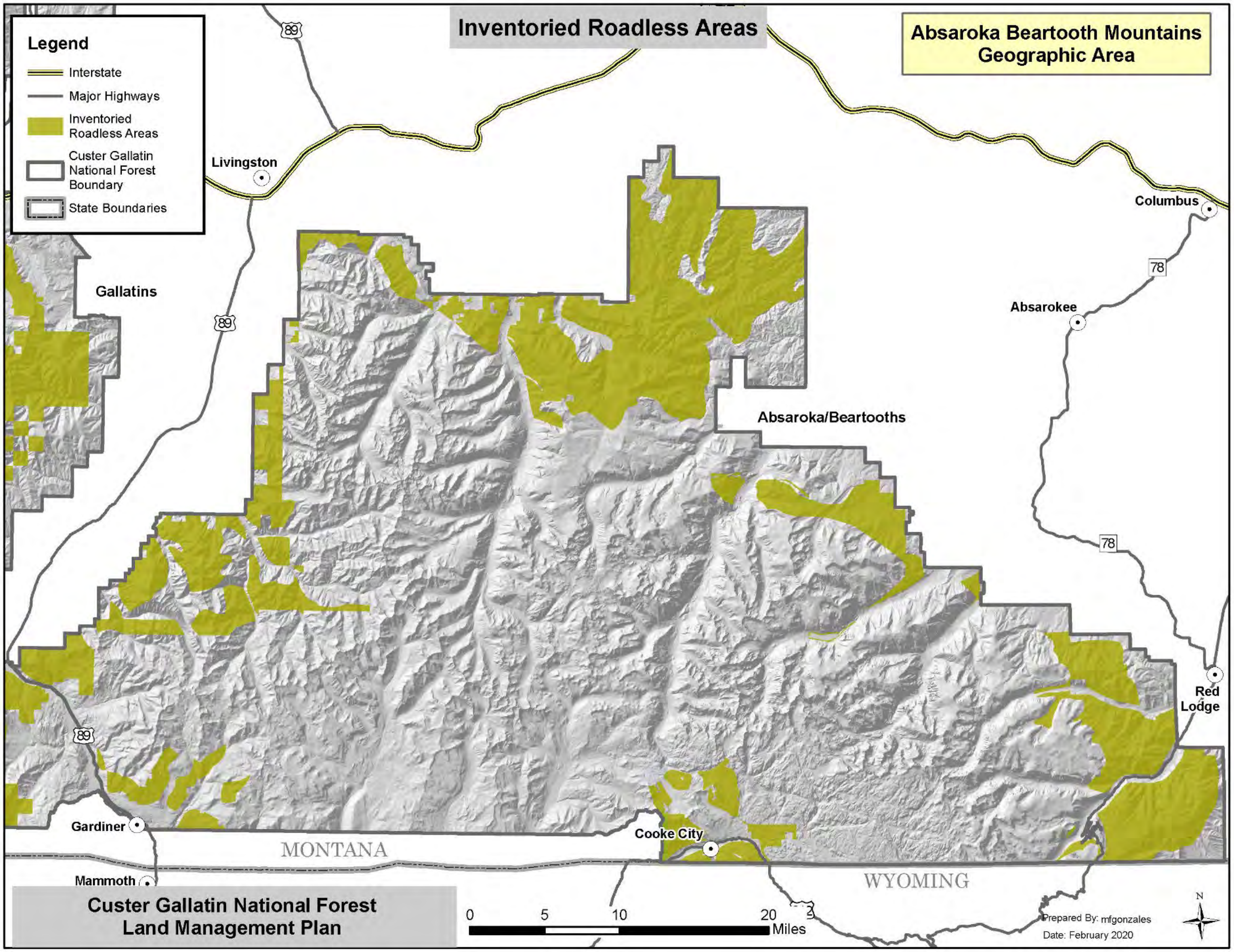
Land Ownership



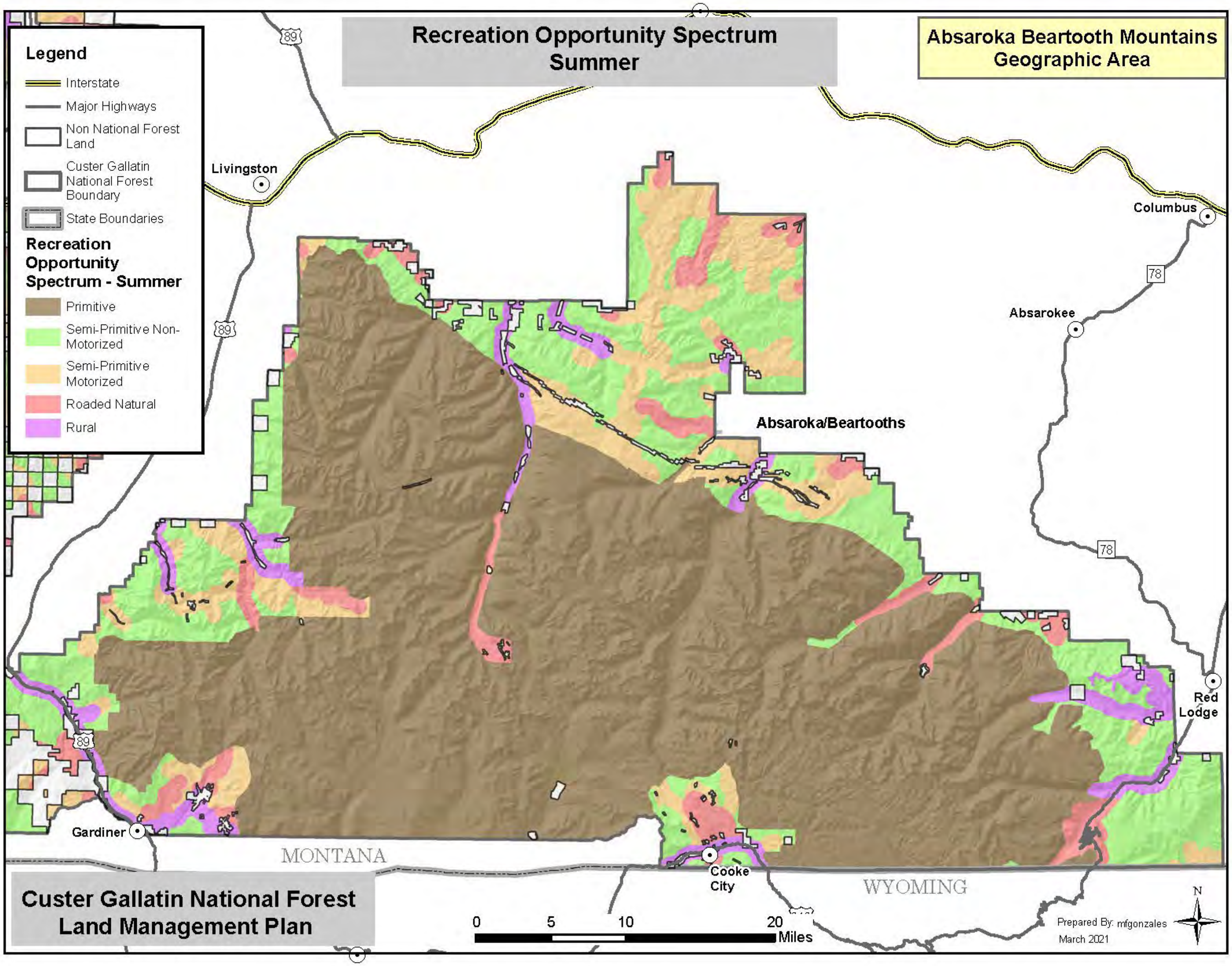
Designated Areas and Land Allocations



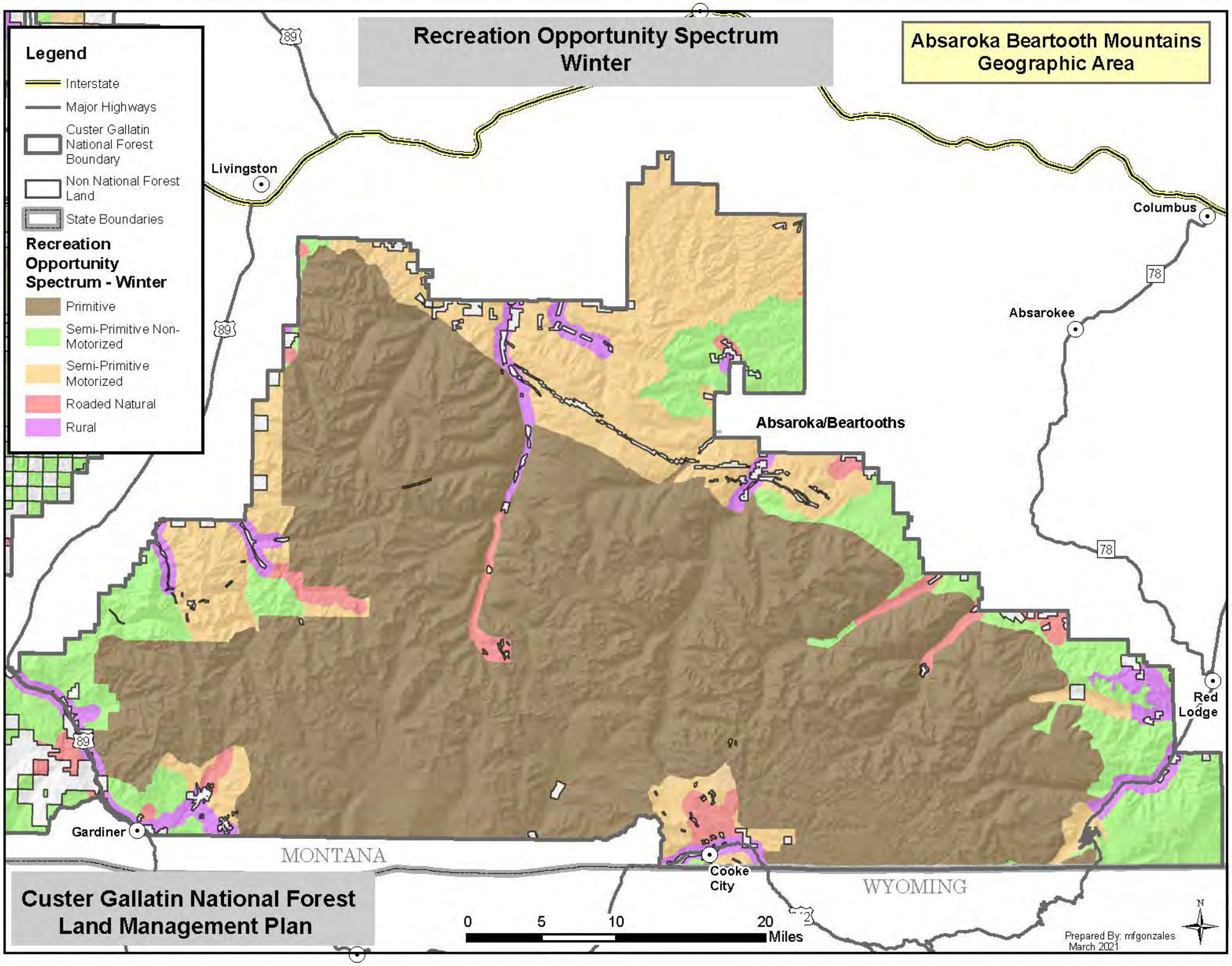
Inventoried Roadless Areas



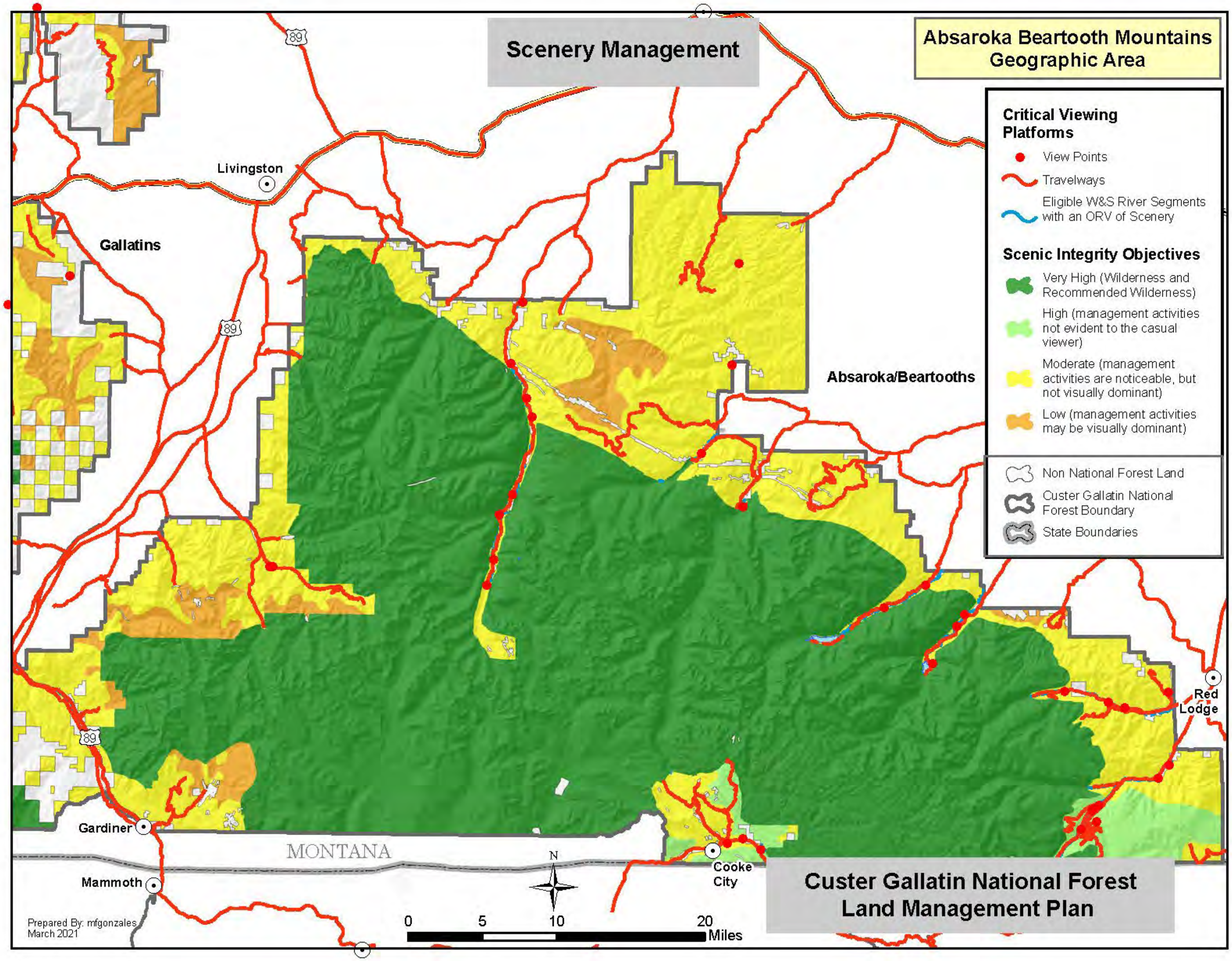
Recreation Opportunity Spectrum – Summer



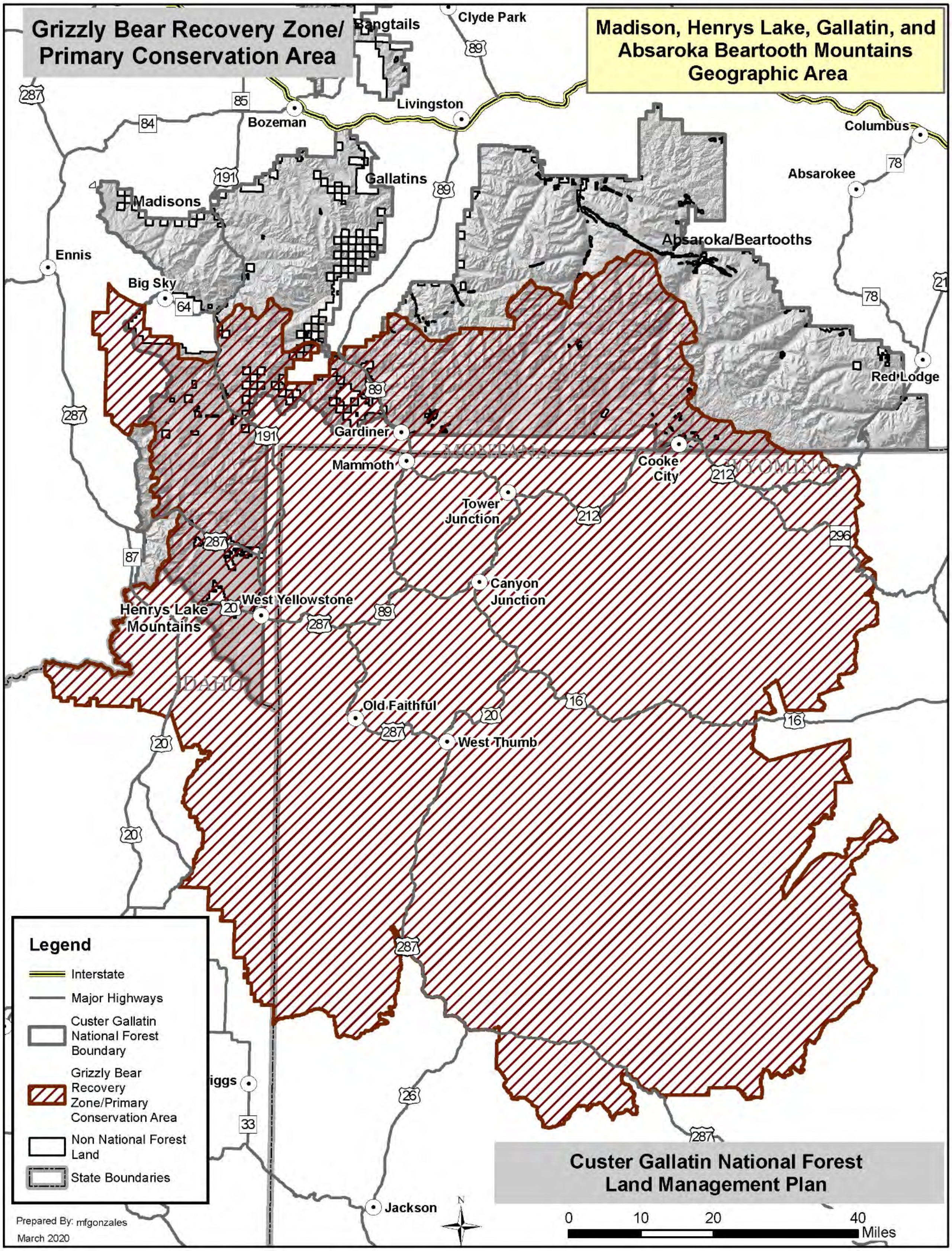
Recreation Opportunity Spectrum – Winter



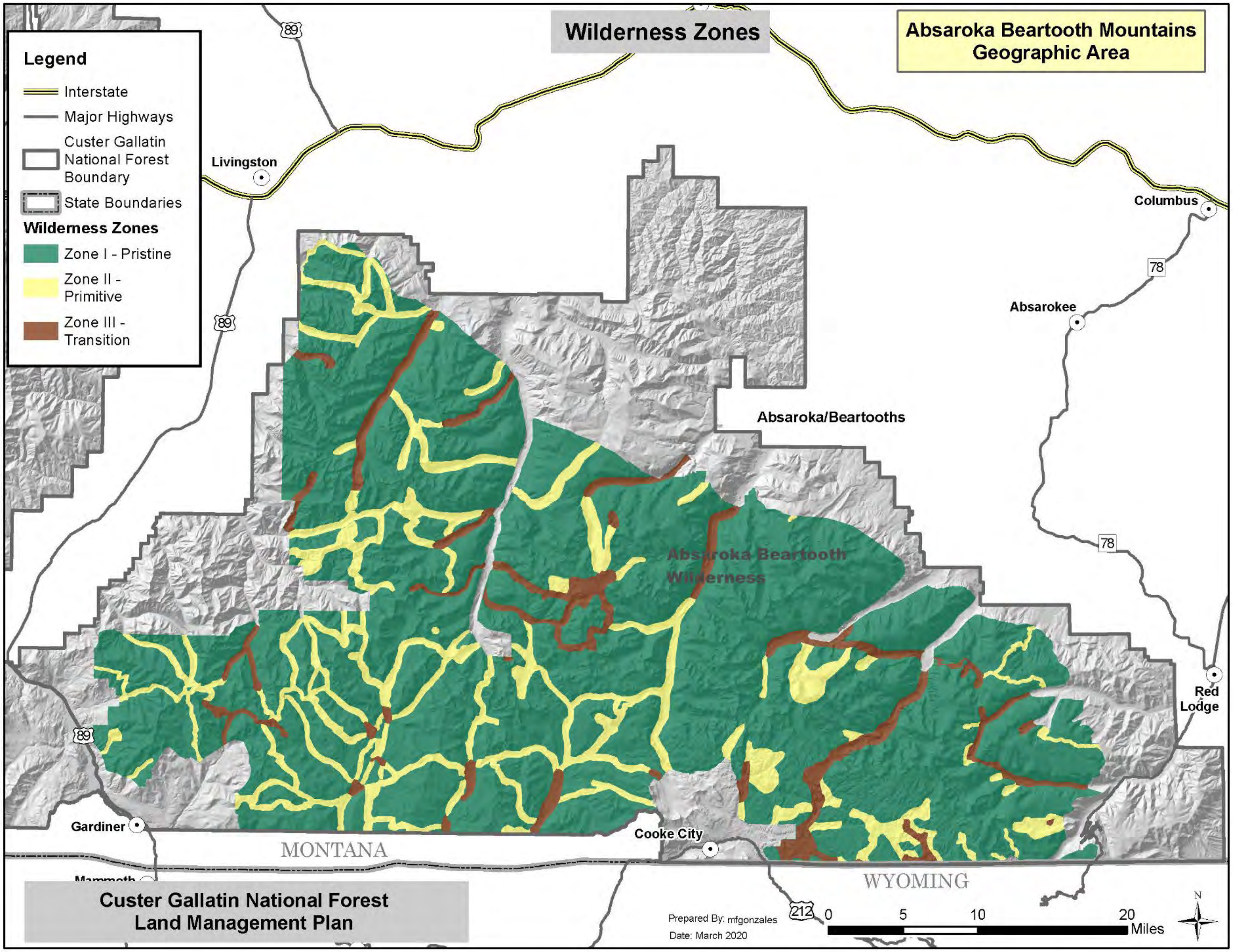
Scenery Management



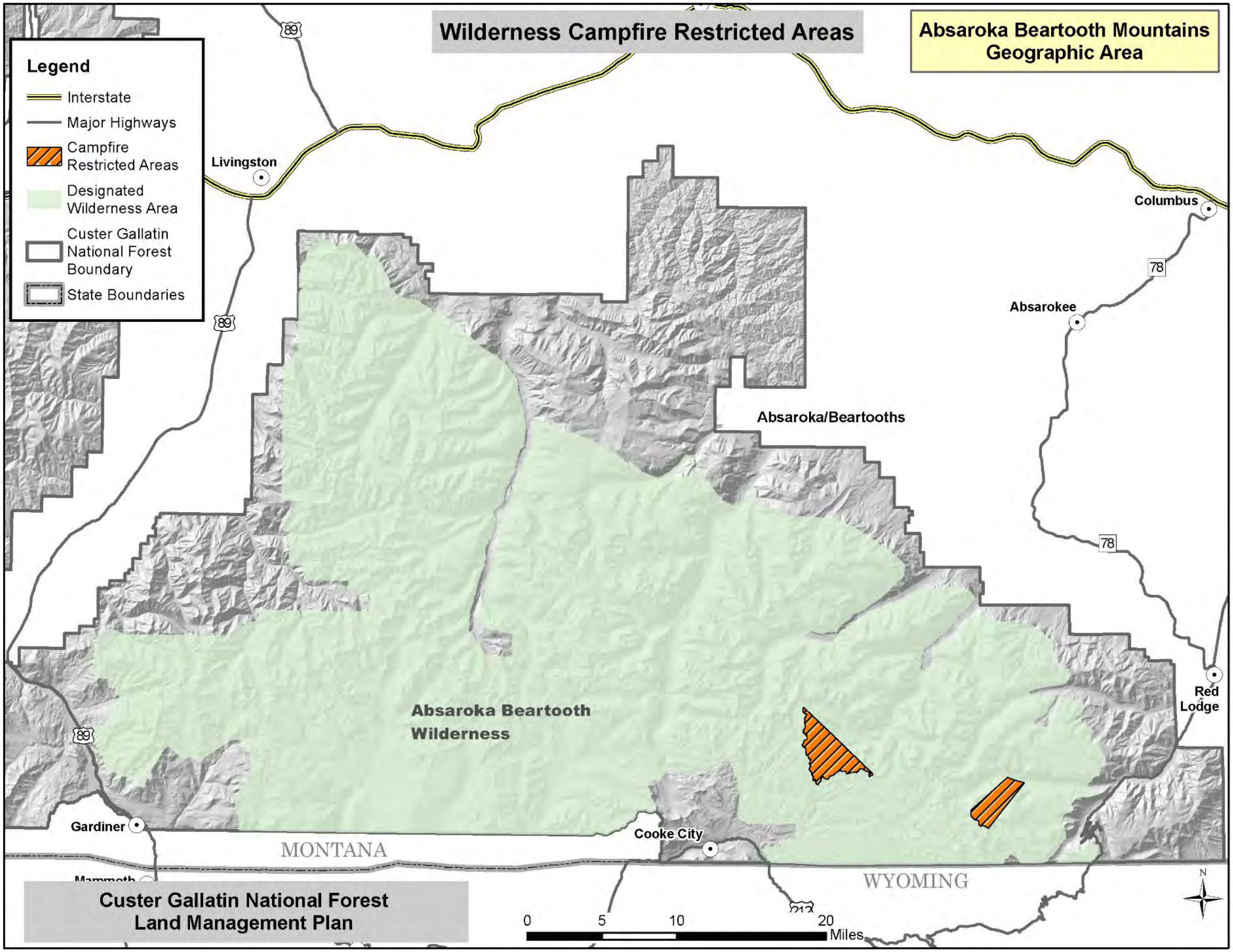
Grizzly Bear Recovery Zone/Primary Conservation Area



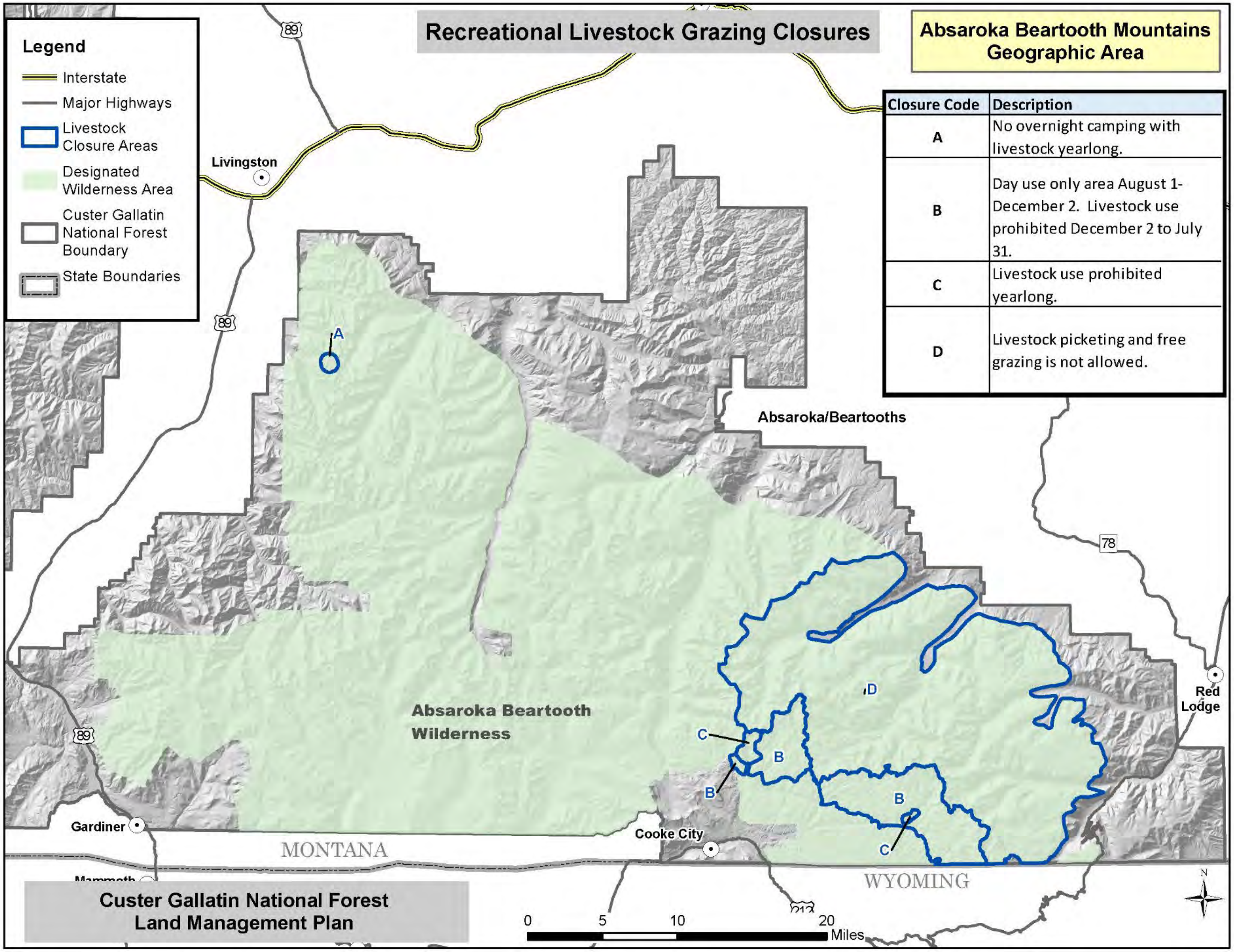
Wilderness Zones



Wilderness Campfire Restricted Areas



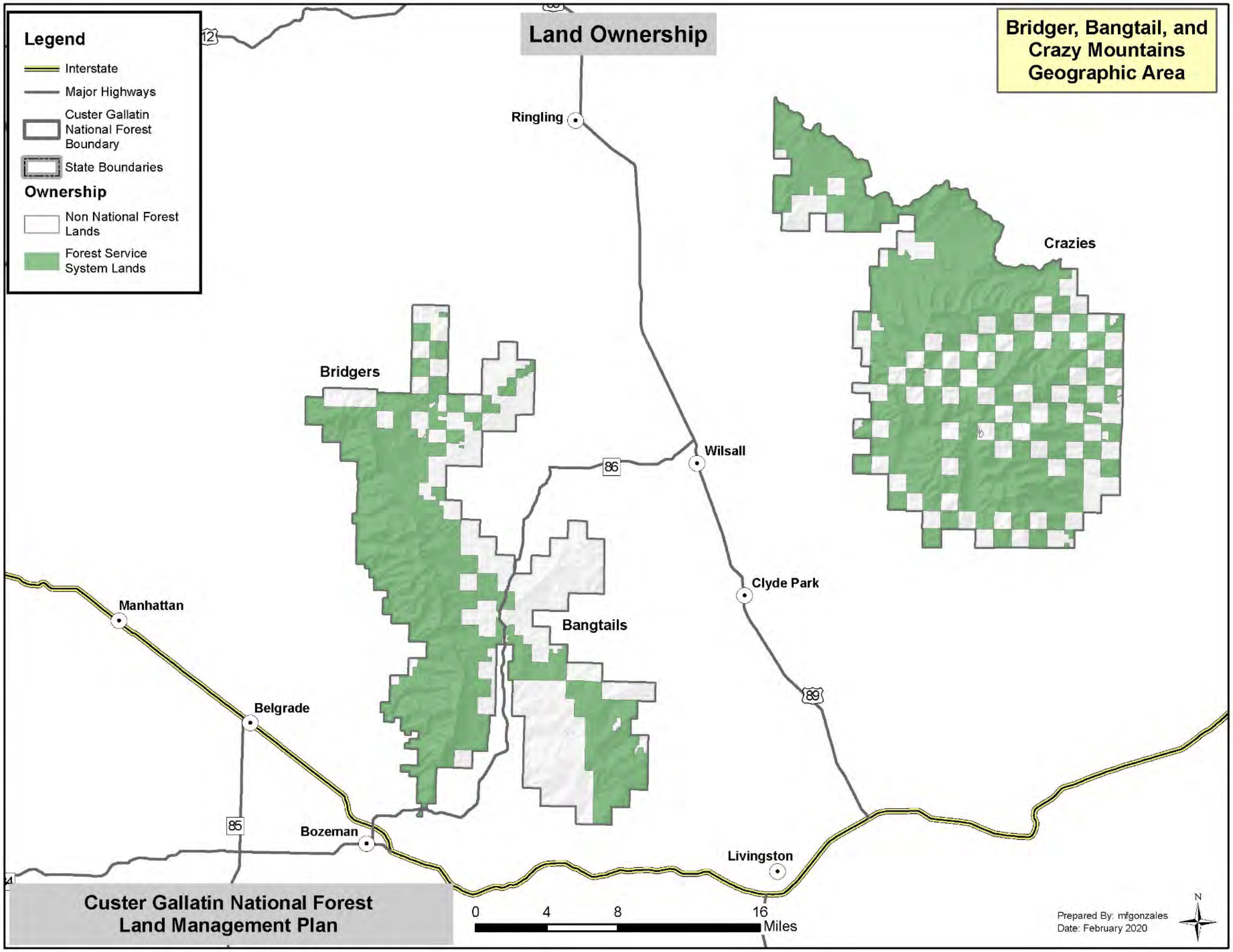
Wilderness Recreational Livestock Closures



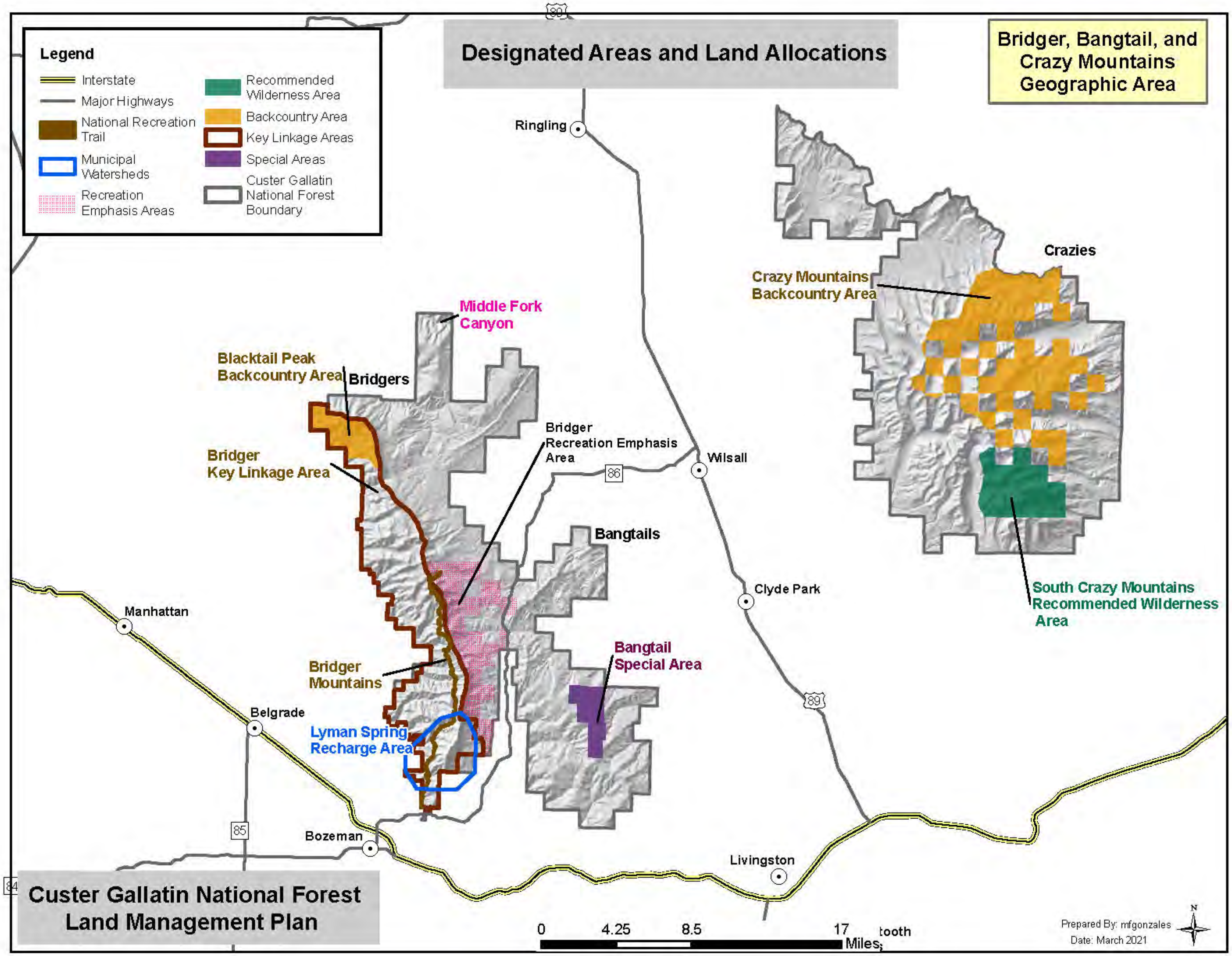
Closure Code	Description
A	No overnight camping with livestock yearlong.
B	Day use only area August 1-December 2. Livestock use prohibited December 2 to July 31.
C	Livestock use prohibited yearlong.
D	Livestock picketing and free grazing is not allowed.

Geographic Area Maps – Bridger, Bangtail, and Crazy Mountains Geographic Area

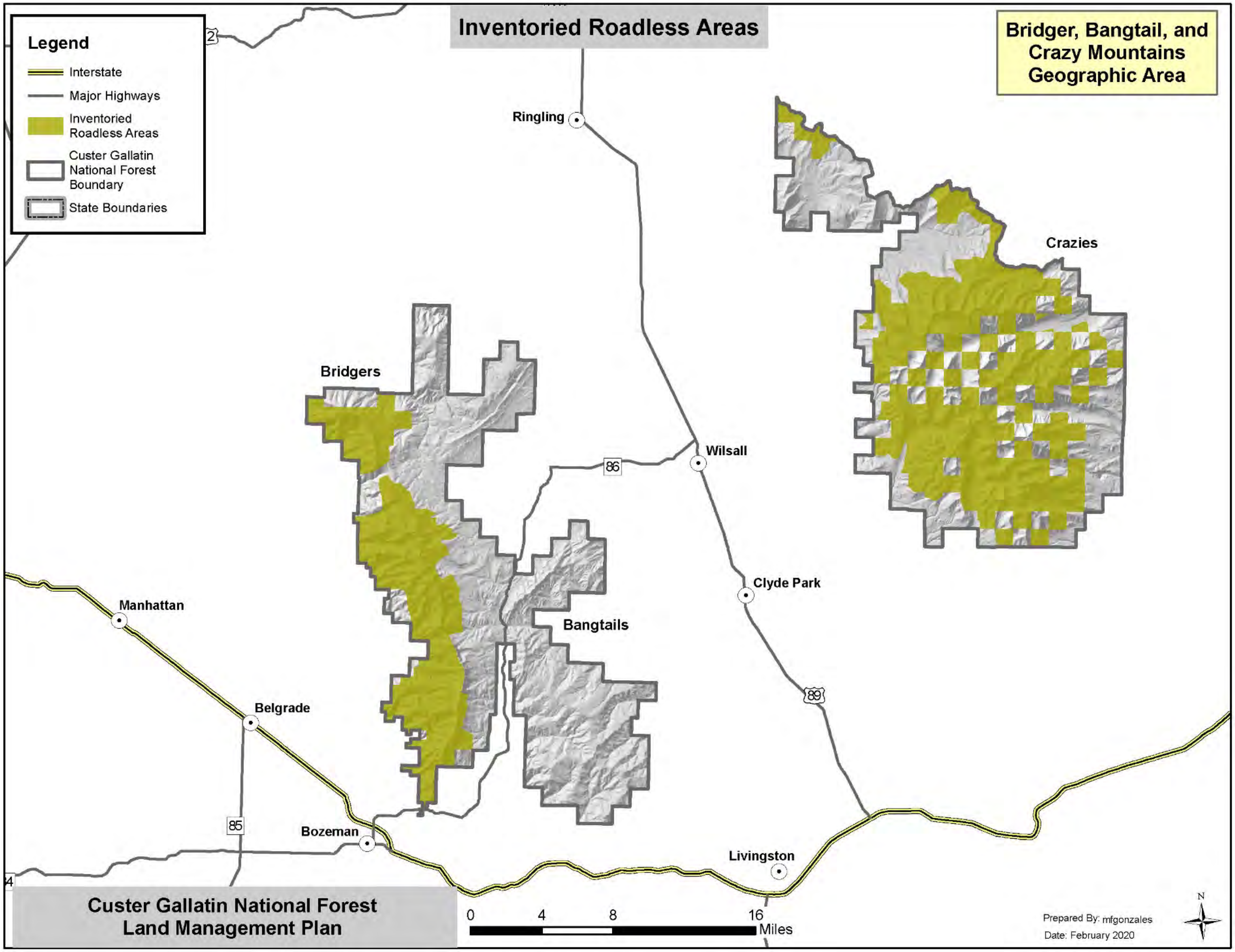
Land Ownership



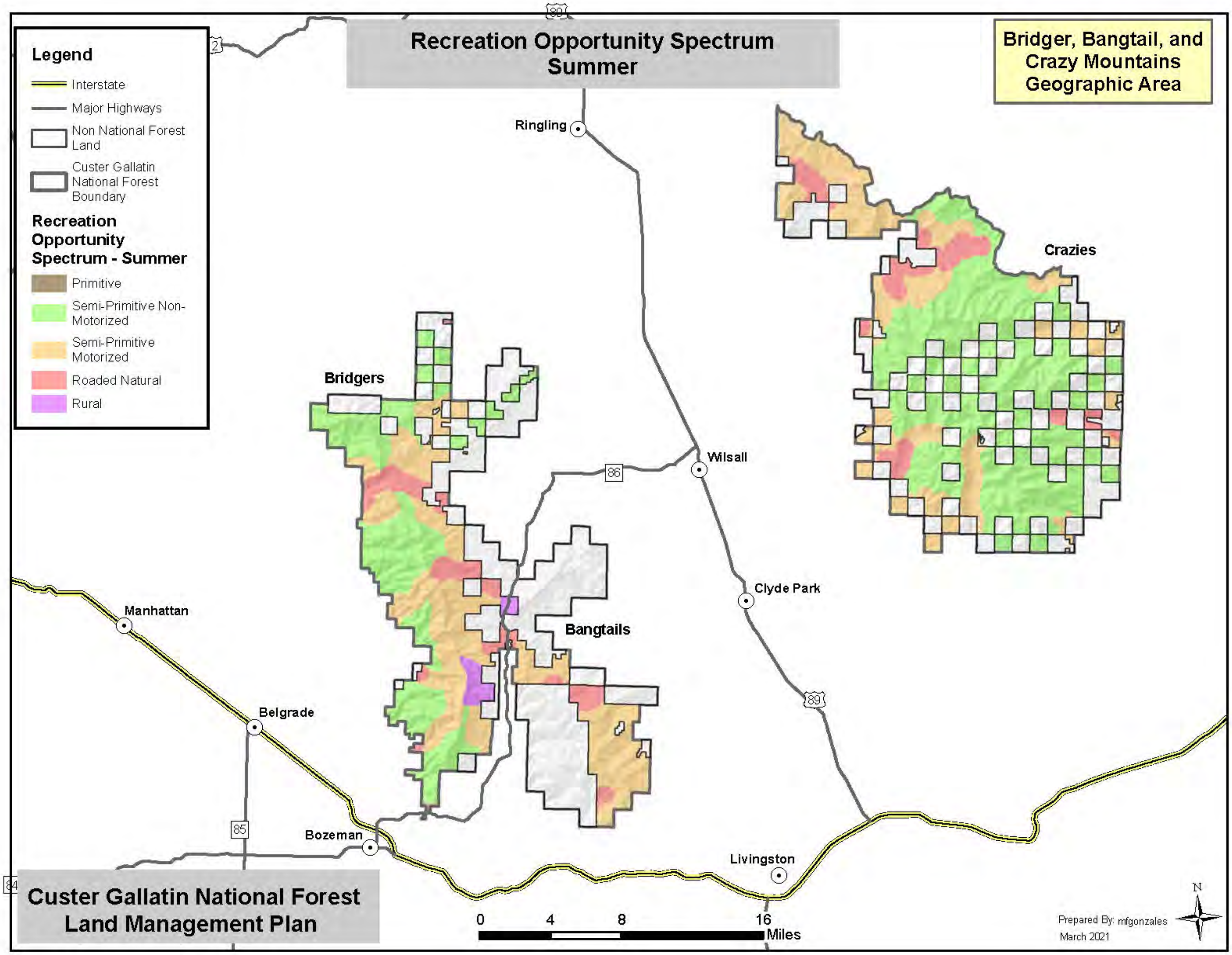
Designated Areas and Land Allocations



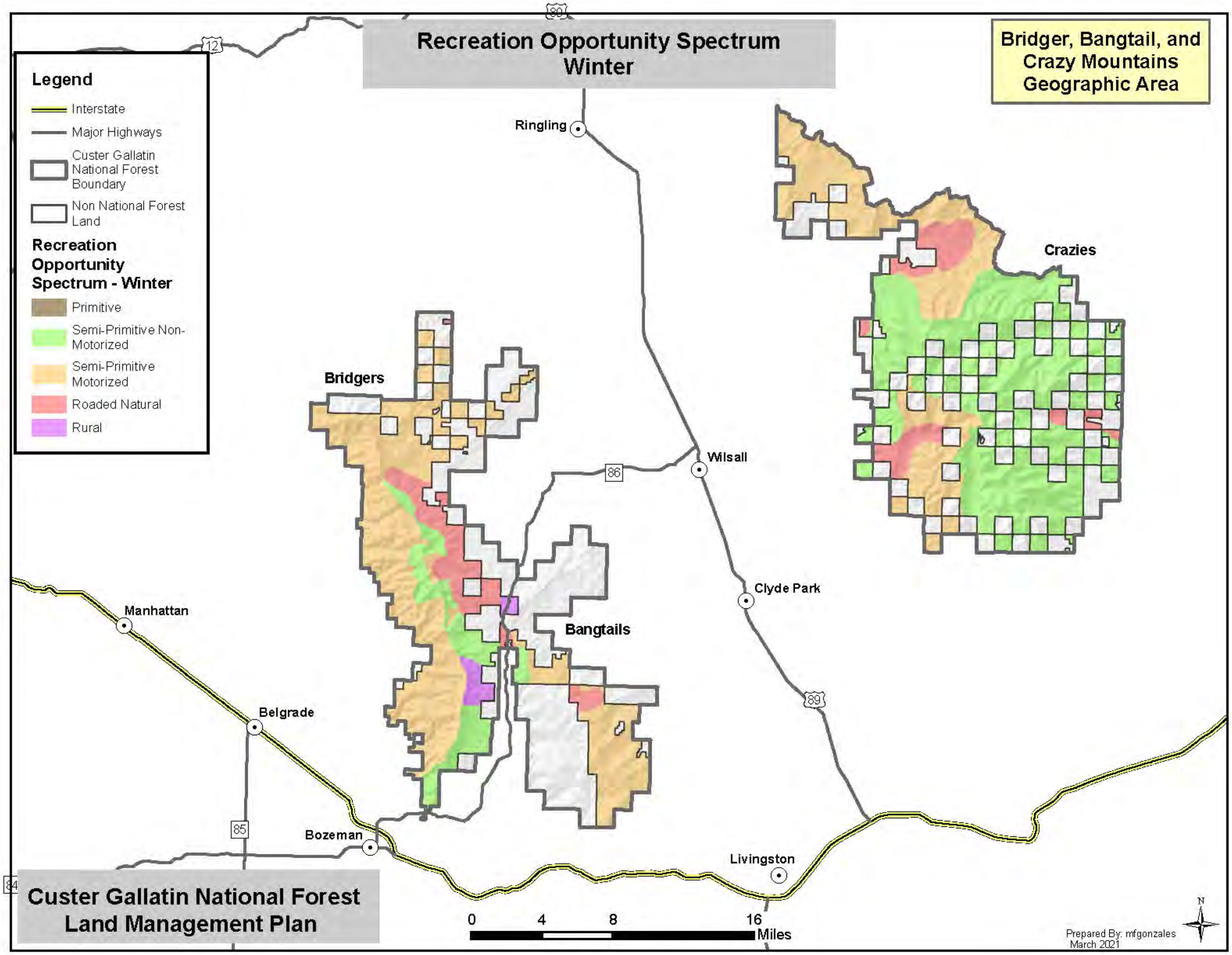
Inventoried Roadless Areas



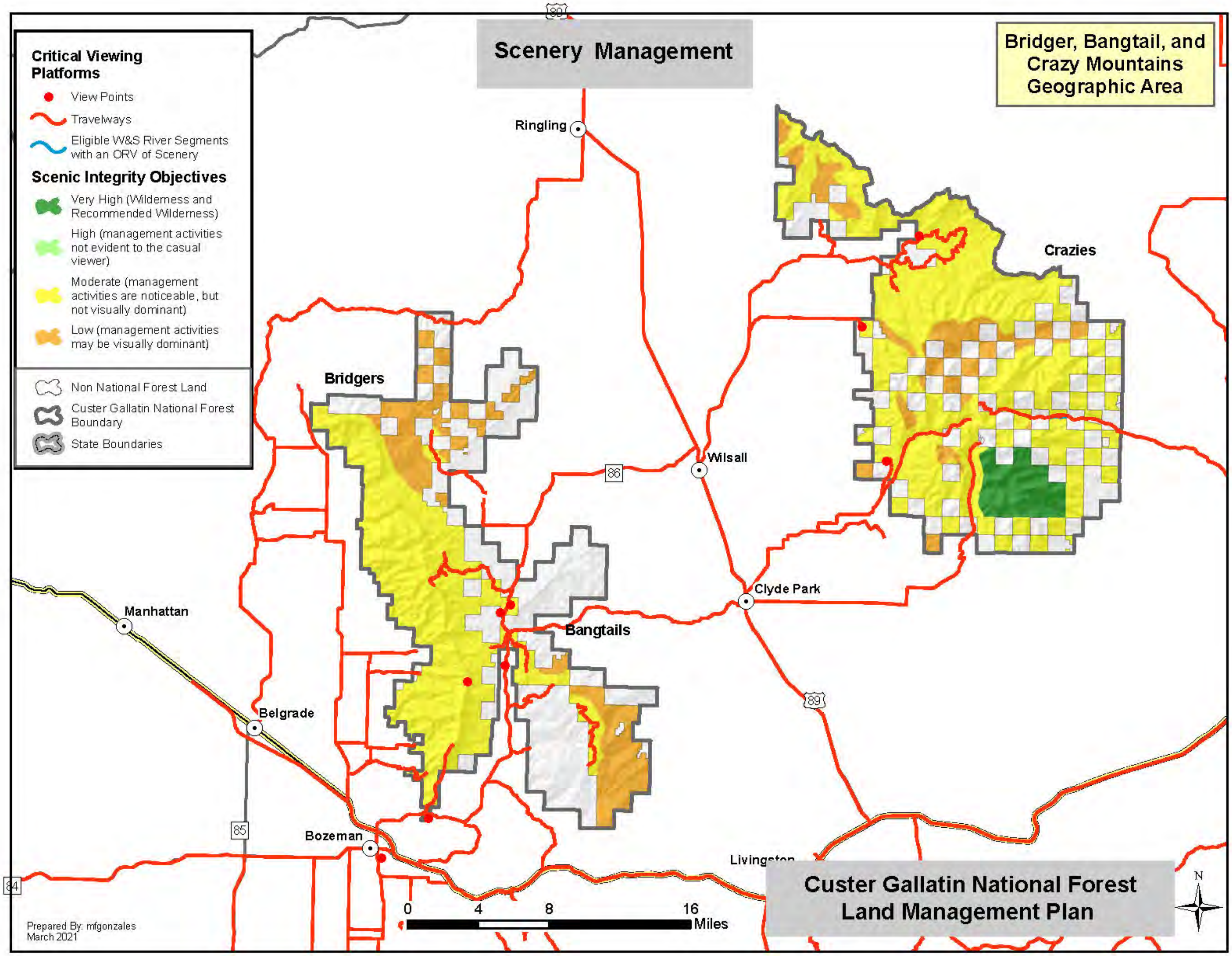
Recreation Opportunity Spectrum – Summer



Recreation Opportunity Spectrum – Winter

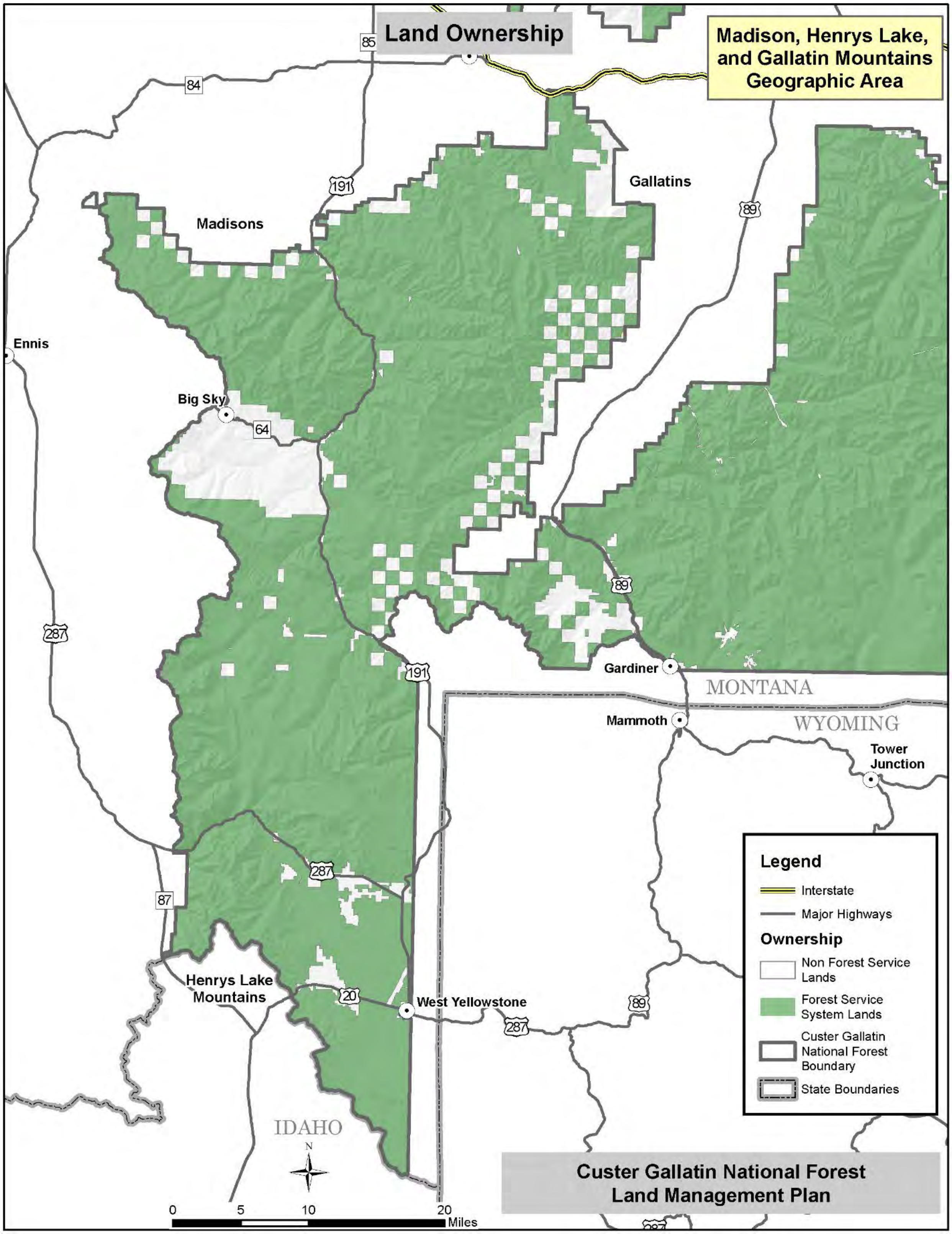


Scenery Management

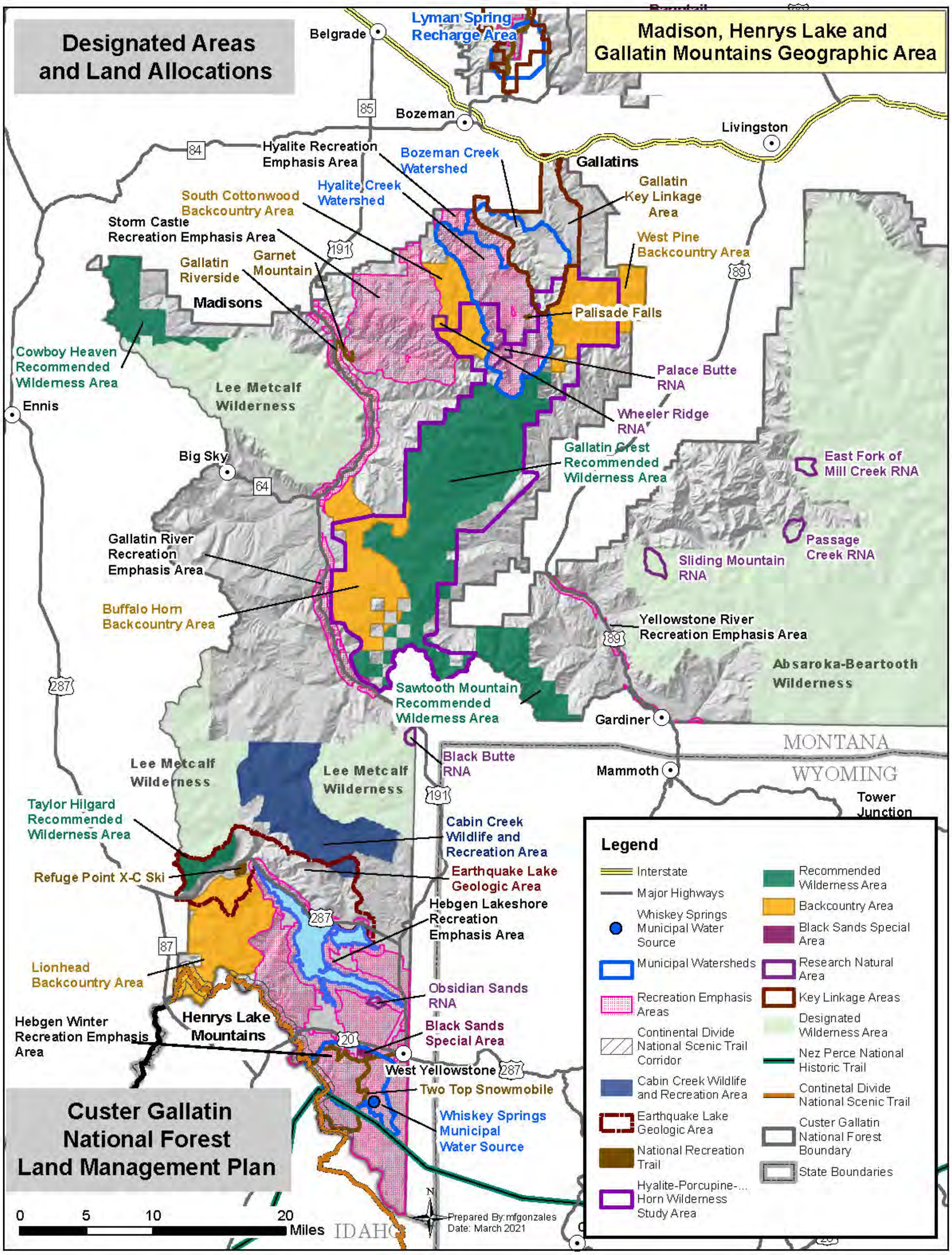


Geographic Area Maps – Madison, Henrys Lake, and Gallatin Mountains Geographic Area

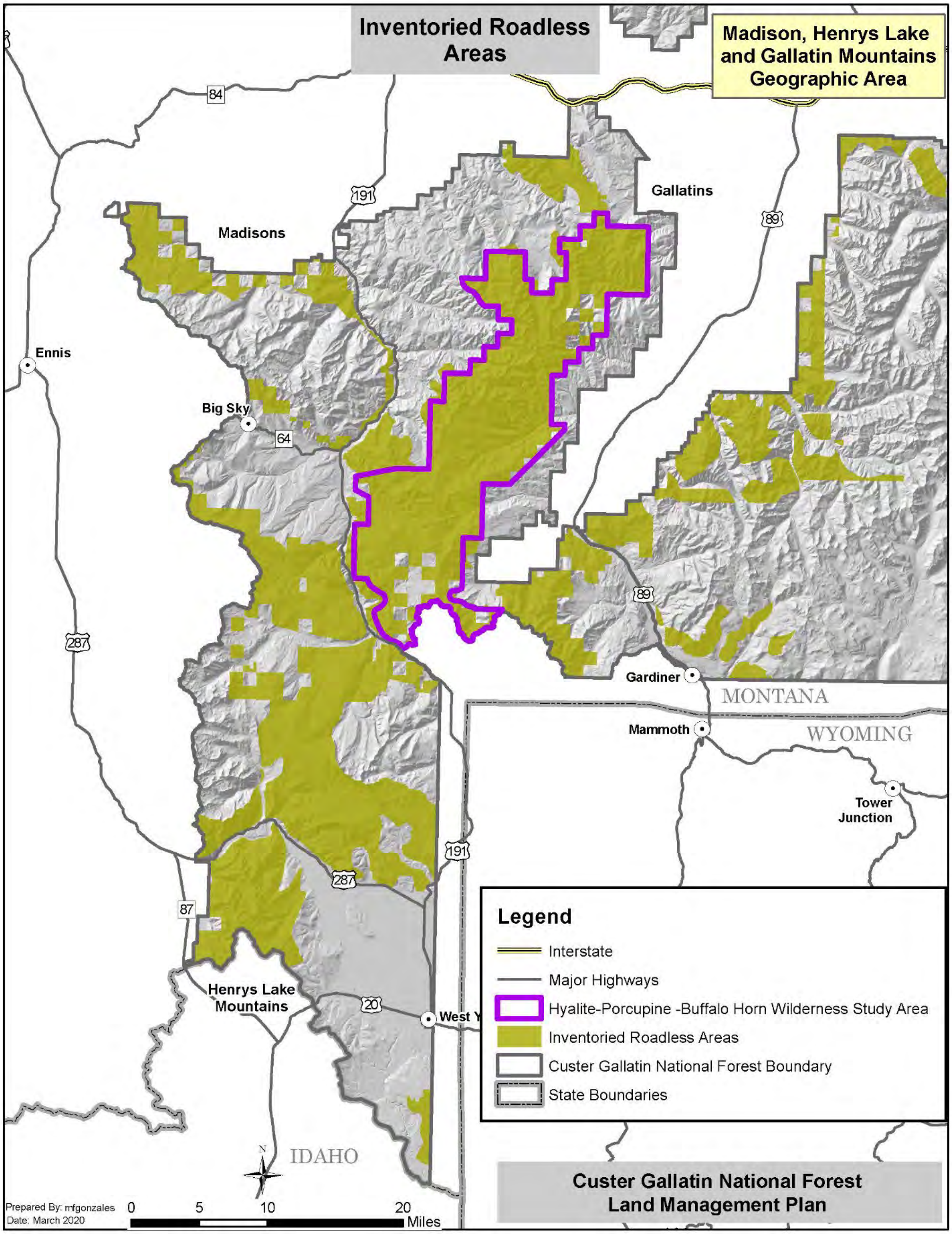
Land Ownership



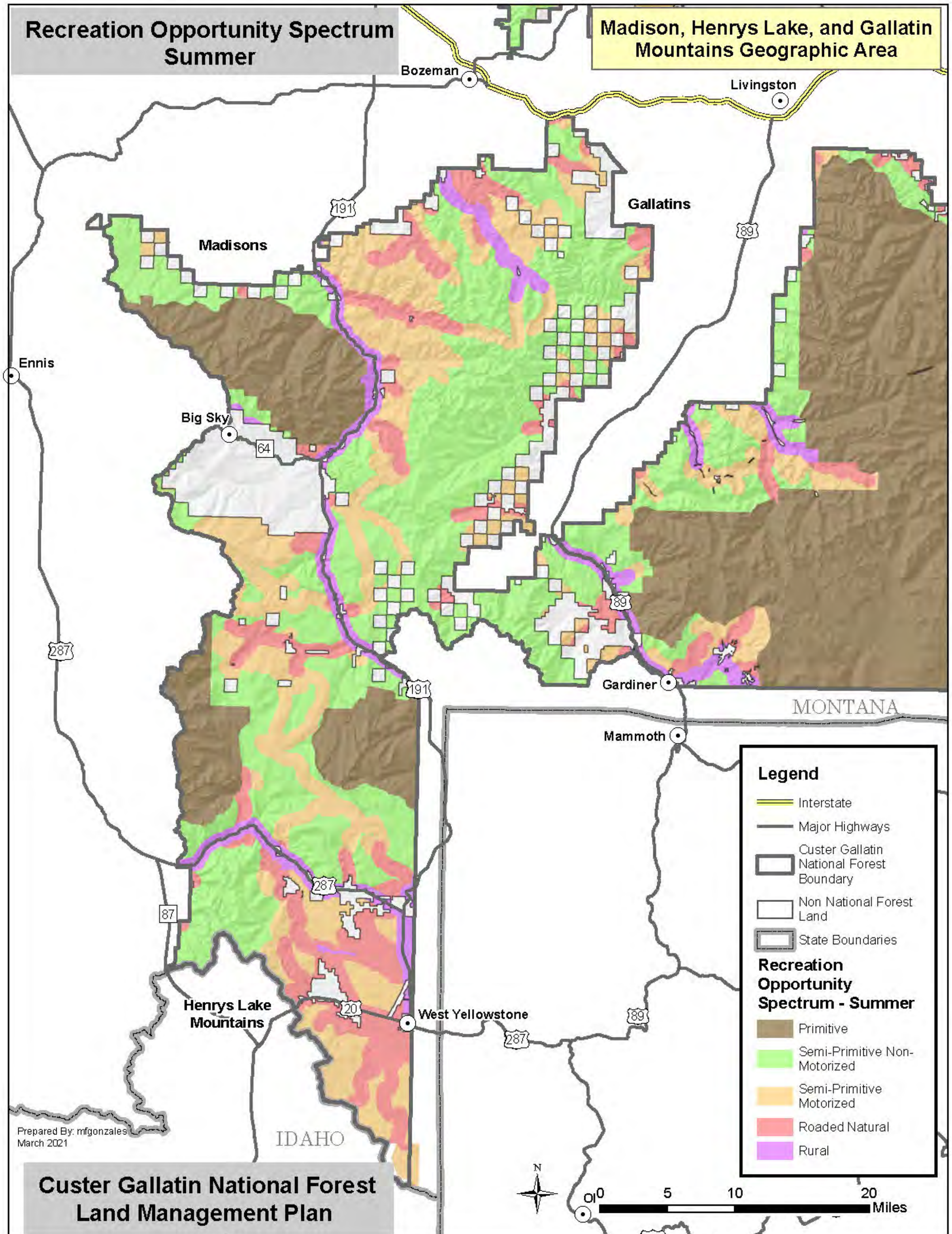
Designated Areas and Land Allocations



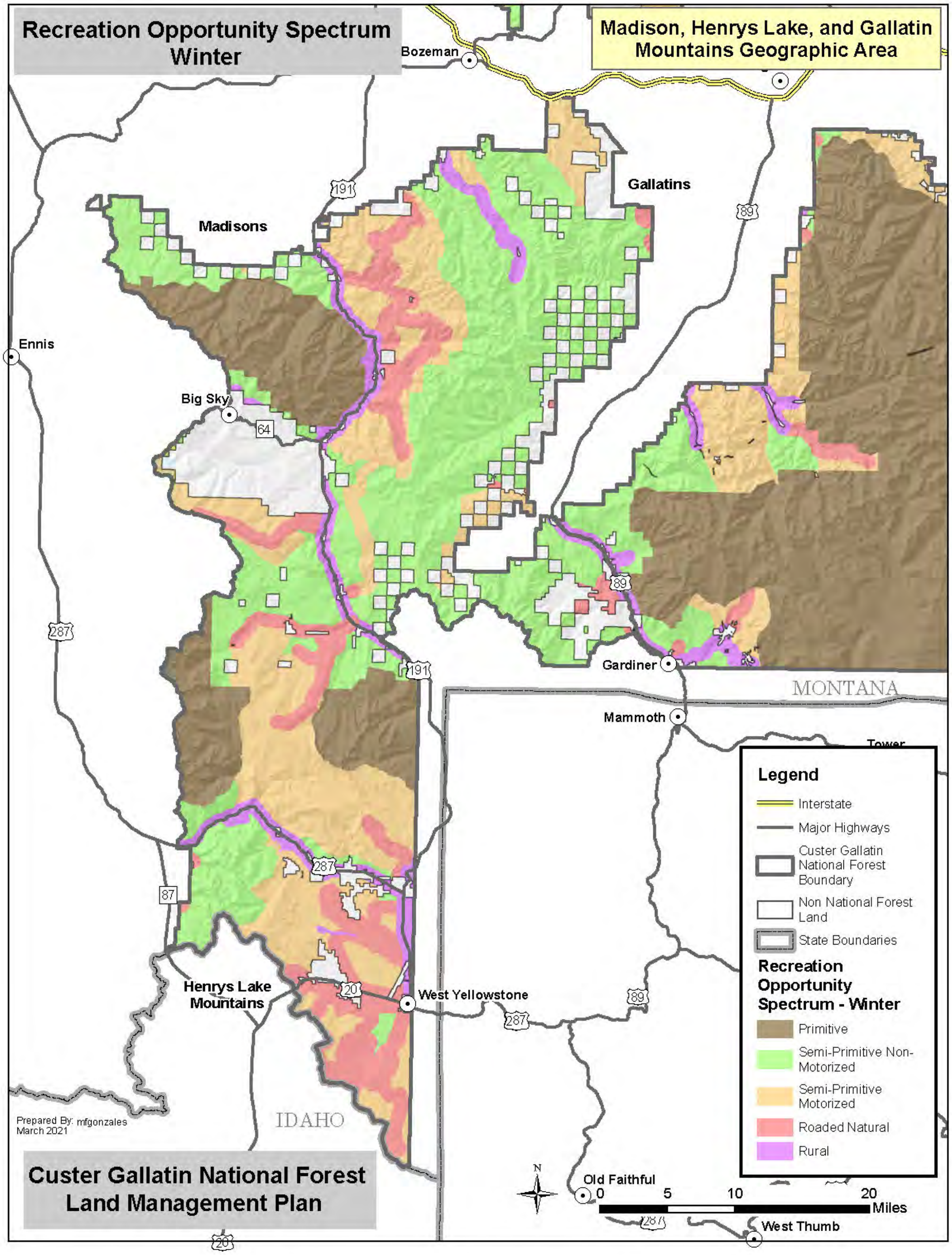
Inventoried Roadless Areas



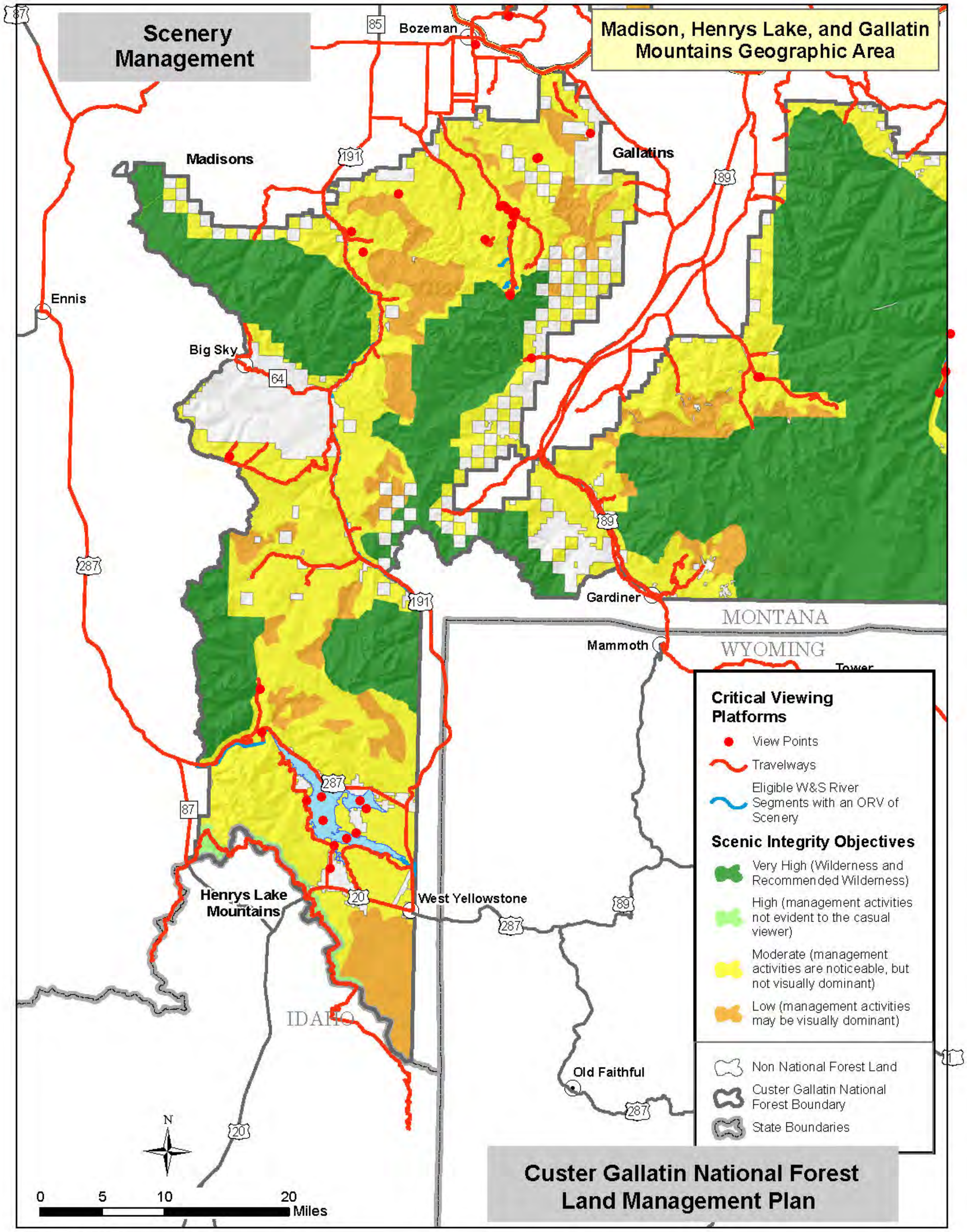
Recreation Opportunity Spectrum – Summer



Recreation Opportunity Spectrum – Winter

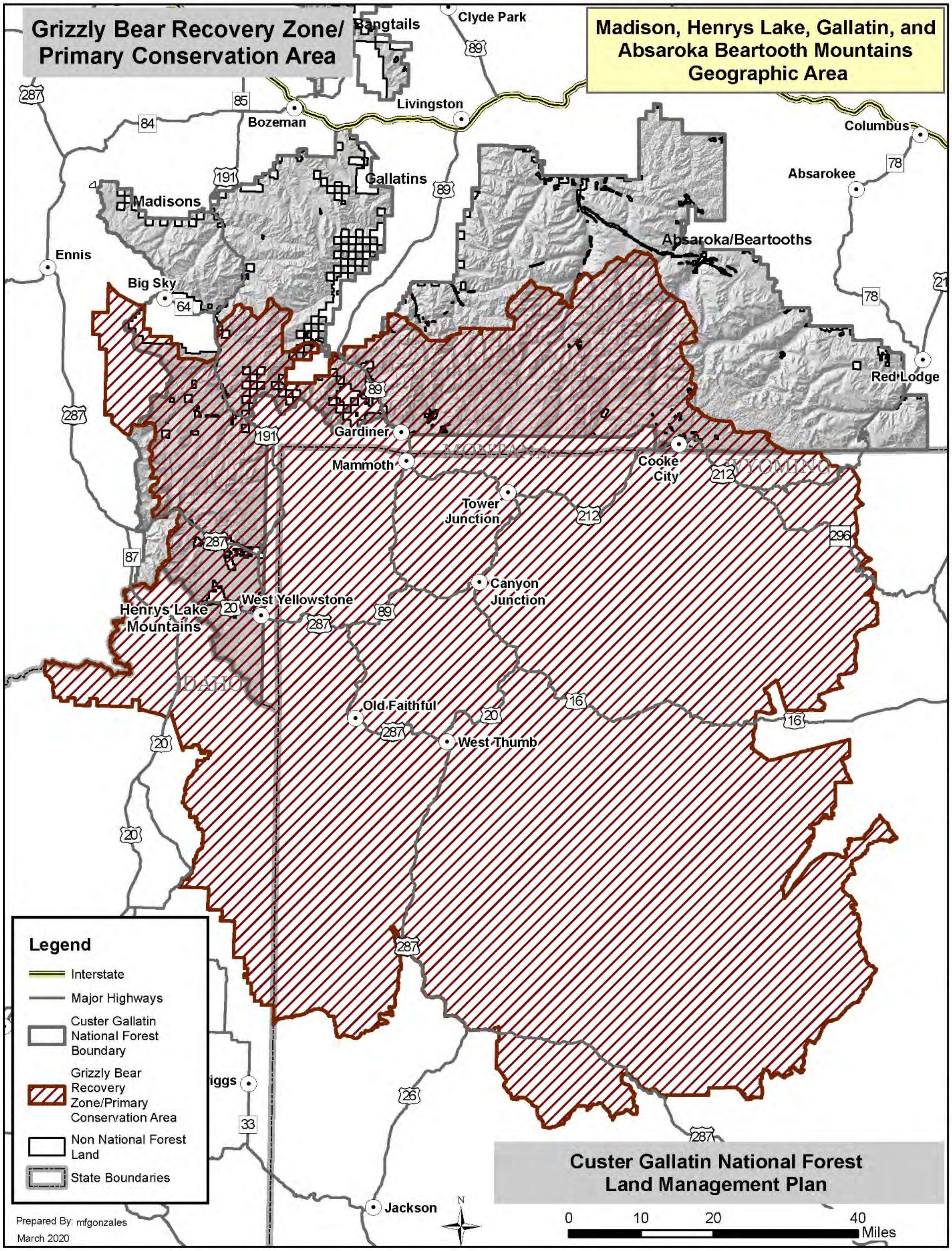


Scenery Management

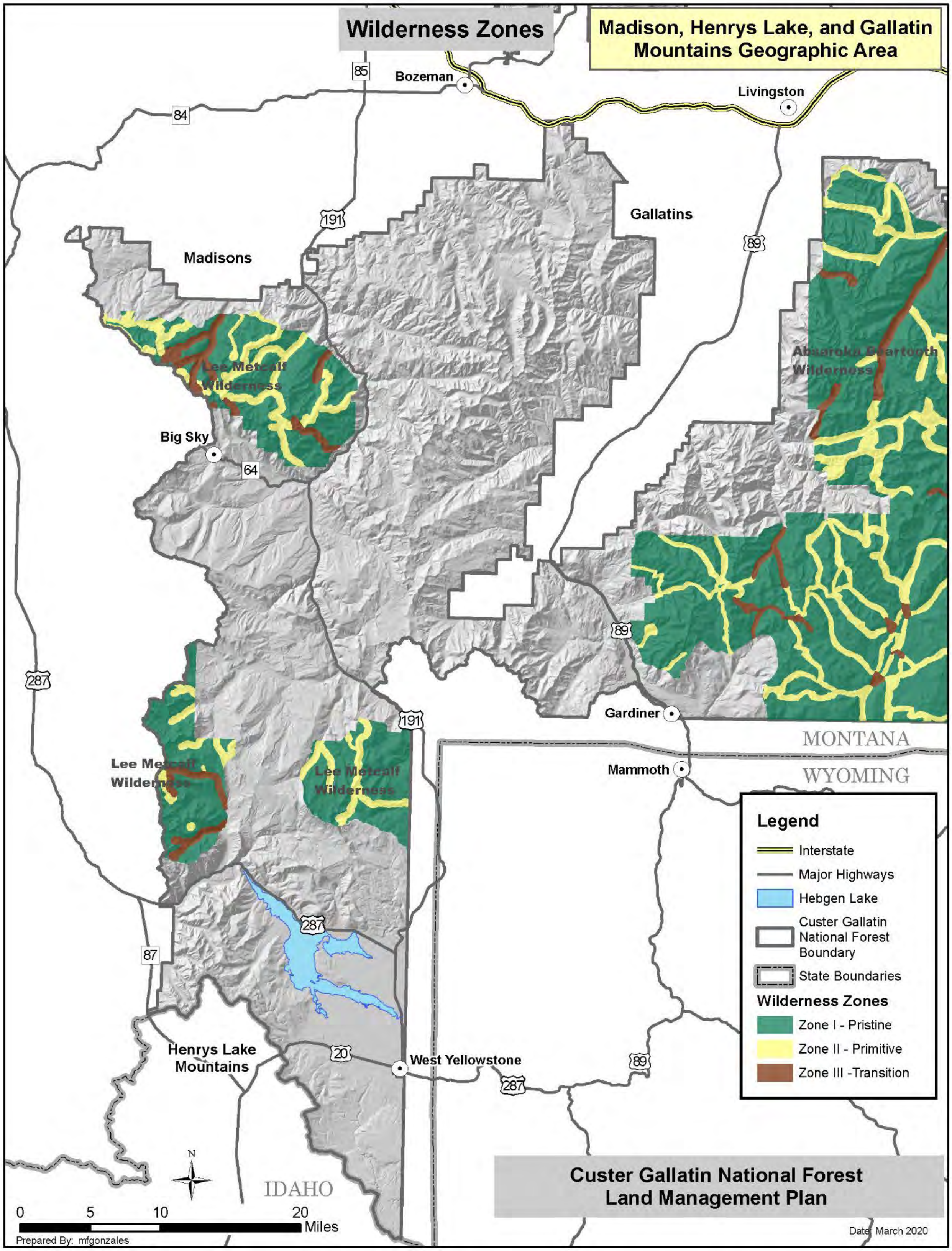


Prepared By: mfgonzales
March 2021

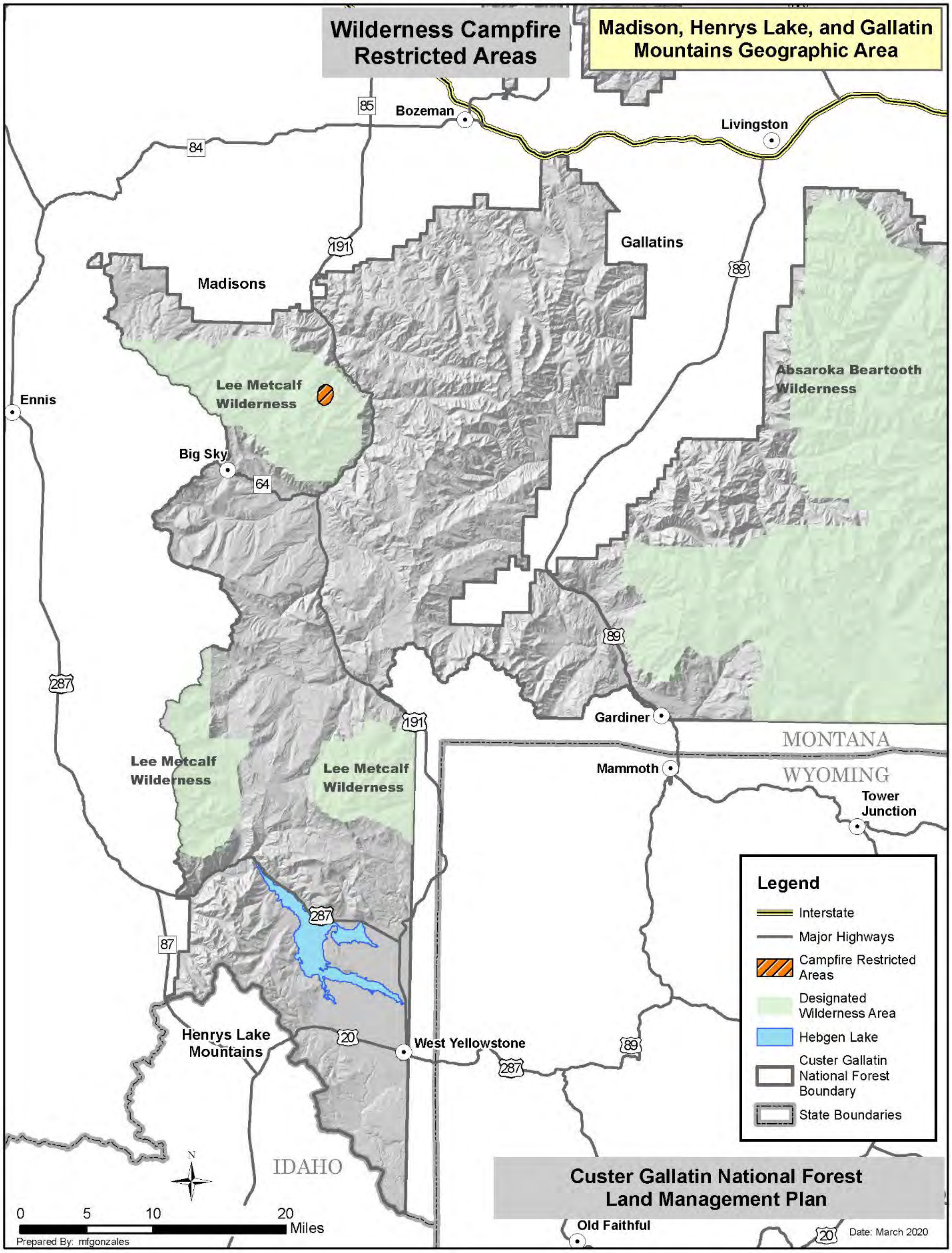
Grizzly Bear Recovery Zone/Primary Conservation Area



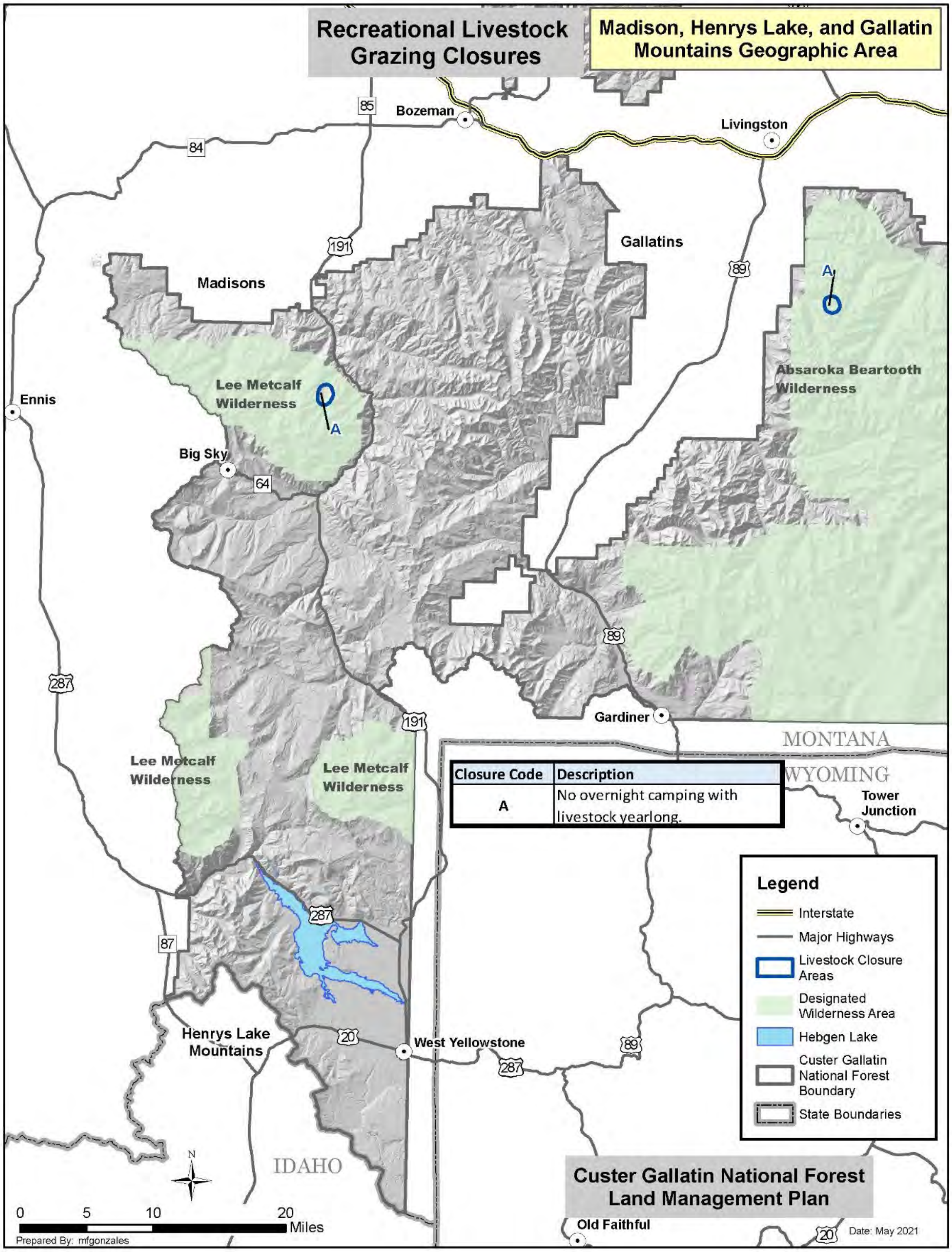
Wilderness Zones



Wilderness Campfire Restricted Areas



Wilderness Recreational Livestock Closures



Appendix C: Priority Watersheds and Conservation Watershed Network

Introduction

One of the original purposes for establishing the National Forest System was to protect the Nation's water resources. The 2012 Planning Rule includes a newly created set of requirements associated with maintaining and restoring watersheds and aquatic ecosystems, water resources, and riparian areas on the national forests. The increased focus on watersheds and water resources in the 2012 Planning Rule reflects the importance of this natural resource, and the commitment to stewardship of water.

The 2012 Planning Rule requires that plans identify watersheds that are a priority for restoration and maintenance. The 2012 Planning Rule requires all plans to include components to maintain or restore the structure, function, composition, and connectivity of aquatic ecosystems and watersheds in the plan area, considering potential stressors, including climate change, and how they might affect ecosystem and watershed health and resilience.

Plans are required to include components to maintain or restore water quality and water resources, including public water supplies, groundwater, lakes, streams, wetlands, and other bodies of water. The 2012 Planning Rule requires that the Forest Service establish best management practices for water quality, and that plans ensure implementation of those practices.

Plans are also required to include direction to maintain and restore the ecological integrity of riparian areas. The Custer Gallatin National Forest proposes to maintain riparian areas through ecological desired conditions striving to maintain ecosystems as a whole as well as specific riparian and aquatic standards, guidelines, and management approaches. This direction will also protect native fish and further strengthen the watershed condition framework priority watersheds and Watershed Conservation Network.

Watershed Condition Framework

In 2011, sixth-level watersheds (typically 10,000 to 40,000 acres) across all National Forest lands were classified using the national watershed condition framework. This framework was designed to be a consistent, comparable, and credible process for improving the health of watersheds across all National Forest lands. The first step was to rate the watershed condition of each watershed, utilizing existing data, knowledge of the land, and professional judgment. Watersheds were rated using a set of indicators of geomorphic, hydrologic, and biotic integrity relative to potential natural condition. The ratings are entered into a computer database, which generates an overall rating for each watershed. The results are also used to create a watershed condition class map.

Geomorphic functionality or integrity is defined in terms of attributes such as slope stability, soil erosion, channel morphology, and other upslope, riparian, and aquatic habitat characteristics. Hydrologic functionality or integrity relates primarily to flow, sediment, and water-quality attributes. Biological functionality or integrity is defined by the characteristics that influence the diversity and abundance of aquatic species, terrestrial vegetation, and soil productivity.

In each case, integrity is evaluated in the context of the natural disturbance regime, geoclimatic setting, and other important factors within the context of a watershed. The definition encompasses both aquatic and terrestrial components because water quality and aquatic habitat are inseparably related to the integrity and functionality of upland and riparian areas within a watershed. The three watershed classes are as follows:

- Class 1- functioning properly: watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.
- Class 2 functioning-at-risk: watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.
- Class 3 impaired: watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.

In this framework, a watershed is considered in good condition if it is functioning in a manner similar to one found in natural wildland conditions. This characterization would not be interpreted to mean that managed watersheds cannot be in good condition. A watershed is considered to be functioning properly if the physical attributes are appropriate to maintain or improve biological integrity. This consideration implies that a class 1 watershed in properly functioning condition has minimal undesirable human impact on natural, physical, or biological processes and is resilient and able to recover to the desired condition when or if disturbed by large natural disturbances or land management activities. By contrast, a class 3 watershed has impaired function because some physical, hydrological, or biological threshold has been exceeded. Substantial changes to the factors that caused the degraded state are commonly needed to set them on a trend or trajectory of improving conditions that sustain physical, hydrological, and biological integrity.

The Custer Gallatin National Forest is located in 269 subwatersheds. Eighty-one of these are in pine savanna geographic areas, while 188 are in montane geographic areas. Following the watershed condition class protocol in 2016, 221 watersheds were rated as functioning properly, 48 watersheds were rated as functioning at risk, and none were rated as impaired. Of the functioning at-risk watersheds 20 were in pine savanna geographic areas, while 28 were in montane geographic areas. Table 10 is a summary of watershed condition classes across the Custer Gallatin National Forest by geographic area.

Table 11. 6th level watersheds rated in each condition class using the watershed condition framework

Geographic Area	Class 1	Class 2	Class 3	Total
Sioux	35	7	0	42
Ashland	26	13	0	39
Pryor Mountains	9	0	0	9
Absaroka Beartooth Mountains	72	12	0	84
Bridger, Bangtail, and Crazy Mountains	24	11	0	25
Madison, Henrys Lake, and Gallatin Mountains	55	5	0	60
Total	**221**	**48**	**0**	**269**

The next step of the watershed condition framework was to use the watershed condition class data to identify priority watersheds, develop watershed action plans, and implement projects to maintain or restore conditions in priority watersheds. Since the onset of the watershed condition framework the Custer Gallatin National Forest has moved 3 priority watersheds to an improved state which include Pass Creek, Upper South Fork Sixteen Mile Creek, and Odell Creek.

Benefits from implementing the watershed condition framework are as follows:

- Strengthens the effectiveness of Forest Service watershed restoration.
- Establishes a consistent, comparable, credible process for determining watershed condition class.
- Enables a priority-based approach for the allocation of resources for restoration.
- Improves Forest Service reporting and tracking of watershed condition.
- Enhances coordination with external agencies and partners.

Priority Watersheds

Current priority watersheds on the Custer Gallatin National Forest are displayed in table 11. Future priority watersheds will be re-evaluated and determined throughout the life of this plan based on budget, partnerships, public input, and resource needs.

Priority areas for potential restoration activities could change quickly because of events such as wildfire or the introduction of invasive species. Therefore, the 2012 Planning Rule includes priority watersheds as plan content, so that an administrative change could be used to quickly respond to changes in priority.

Table 12. Current priority watersheds on the Custer Gallatin National Forest

HUC 6 Watershed Name	Attributes Rated at Risk in Watershed Condition Framework Assessment	Partnerships	Notes
Bozeman Creek	Water quality and quantity (303d listed); channel shape and function; non-native species; fire regime condition class rating of at-risk; Insect and disease puts forest health at-risk; road density	City of Bozeman; Montana Fish, Wildlife and Parks; Montana Department of Natural Resources	Opportunity for forest and riparian area restoration through treatments
Upper Hyalite Creek	Water quality and quantity (303d listed); channel shape and function; non-native species; fire regime condition class rating of at-risk; Insect and disease puts forest health at-risk; road density	City of Bozeman; Montana Fish, Wildlife and Parks; Montana Department of Natural Resources	Opportunity for forest and riparian area restoration through treatments
Shields River-Bennett Creek	Water quality; habitat fragmentation; channel form and function; nonnative species; fire regime condition class rating of at-risk	Montana Fish, Wildlife and Parks	Opportunity to conserve Yellowstone cutthroat trout by eradicating non-native brook trout as a barrier was installed in 2016; reduce sedimentation and increase fish passage by installing aquatic organism passages

HUC = hydrologic unit code

Restoration of Impaired Waterbodies

In 1972 Congress passed the Water Pollution Control Act, more commonly known as the Clean Water Act. Its goal is to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” The Clean Water Act requires each state to set water quality standards to protect designated beneficial water uses and to monitor the attainment of those uses. Fish and aquatic life, wildlife, recreation, agriculture, industrial, and drinking water are all types of beneficial uses. Streams and lakes (also referred to as waterbodies) that do not meet the established standards are called “impaired waters.” These waters are identified on the 303(d) list, named after Section 303(d) of the Clean Water Act, which mandates the monitoring, assessment, and listing of water quality limited waterbodies.

Both Montana state law (75 MCA section 5-703) and section 303(d) of the Federal Clean Water Act require the development of total maximum daily loads for impaired waters where a measurable pollutant (for example, metals, nutrients, *e. coli*) is the cause of the impairment. A total maximum daily load is a loading capacity and refers to the maximum amount of a pollutant a stream or lake can receive and still meet water quality standards.

The Montana Water Quality Act requires the Montana Department of Environmental Quality to develop total maximum daily loads for streams and lakes that do not meet, or are not expected to meet, Montana water quality standards. The Montana Department of Environmental Quality submits the total maximum daily loads to the United States Environmental Protection Agency for approval. Total maximum daily loads provide an approach to improve water quality so that streams can support and maintain their state-designated beneficial uses.

According to the Montana Department of Environmental Quality list, published in 2018, 23 stream segments on the Custer Gallatin National Forest in Montana are on the 303d list and not meeting water quality standards There are no streams on the Sioux District in South Dakota (on national forest lands) that are listed with South Dakota Department of Environment and Natural Resources. This list is typically updated every 2 years by the Montana Department of Environmental Quality.

Conservation Watershed Network

A conservation watershed network is a designated collection of watersheds where management emphasizes habitat conservation and restoration to support native fish and other aquatic species. The goal of the network is to sustain the integrity of key aquatic habitats to maintain long-term persistence of native aquatic species. Designation of conservation watershed networks, which could include watersheds that are already in good condition or could be restored to good condition, are expected to protect native fish and help maintain healthy watersheds and river systems. Selection criteria for inclusion could help identify those watersheds that have the capability to be more resilient to ecological change and disturbance induced by climate change. For example, watersheds containing unaltered riparian vegetation will tend to protect streambank integrity and moderate the effects of high stream flows. Rivers with high connectivity and access to their floodplains will experience moderated floods when compared to channelized and disconnected stream systems. Wetlands with intact natural processes slowly release stored water during summer dry periods, whereas impaired wetlands are likely less effective retaining and releasing water over the season. For all of these reasons, conservation watershed networks represent the best long-term conservation strategy for native fish and their habitats.

Many watersheds in the Absaroka Beartooth Mountains and the Madison, Henrys Lake, and Gallatin Mountains Geographic Areas that support healthy populations of native trout or other aquatic organisms already have their headwaters protected through lands managed as Congressionally-designated wilderness areas (Absaroka Beartooth and Lee Metcalf Wilderness). Several watersheds in the Ashland and Sioux Geographic Areas have perennial waters with native fish and other aquatic species present. These locations are the building blocks of a conservation network as naturally functioning headwaters have a large influence on the function of downstream stream reaches.

The best available scientific information indicates the Custer Gallatin National Forest is and will be an important stronghold for conservation of native salmonids (westslope and Yellowstone cutthroat trout) across their range and also will be important habitat for native warm-water prairie fish ecosystems in the pine savanna ecoregions. For montane watersheds, data from Montana Fish, Wildlife and Parks and the Forest Service were used to identify watersheds with larger metapopulations of westslope and Yellowstone cutthroat trout, isolate populations of westslope and Yellowstone cutthroat trout above natural or constructed barriers, and watersheds with potential of cutthroat projects in the future. Data collected by the Forest Service from 2015 to 2017 was examined to identify watersheds that consistently have an assemblage of native fish and perennial water in the pine savanna geographic areas. These watersheds were included as part of the conservation watershed network displayed in table 12 and in figure 16 through figure 21.

Table 13. Conservation Watershed Network subwatersheds

Subwatershed/6th Level Hydrologic Unit Code (HUC number)	6th Level HUC Acres
Sioux Geographic Area Subwatersheds	
Plum Creek (101102010802)	12819
Slick Creek (101102010803)	37776
Snow Creek (1011020509)	12658
Speelmon Creek (101102020505)	17718
Upper Crooked Creek (101303010104)	18,033
Ashland Geographic Area Subwatersheds	
Brian Creek-Otter Creek (100901020210)	36063
Horse Creek-Otter Creek (100901020203)	21592
Odell Creek (100901020406)	29692
Taylor Creek (100901020205)	29059
Pryor Mountains Geographic Area Subwatersheds	
Commissary Creek-Crooked Creek (100800100501)	13,739
Lost Water Creek-Crooked Creek (100800100501)	21,618
North Fork Sage Creek-Sage Creek (100800140401)	31,025
Piney Creek-Sage Creek (100800140404)	38,861
Upper Dry Head Creek (100800100801	22,737
Absaroka Beartooth Mountains Geographic Area Subwatersheds	
Bad Canyon Creek (100700050502)	12,244
Bear Creek (100700010901)	31,133
Cedar Creek (100700020104)	13,774
East Fork Mill Creek (100700020304)	20,923

Subwatershed/6th Level Hydrologic Unit Code (HUC number)	**6th Level HUC Acres**
Elbow Creek (100700020401)	18,833
Falls Creek (100700020801)	9338
Fishtail Creek (100700050401)	24,113
Fourmile Creek (100700020903)	20,118
Limestone Creek (100700050202)	31726
Line Creek (100700060511)	24,881
Lower Hellroaring Creek (100700010805)	23,017
Lower Mill Creek (100700020305)	22,257
Lower West Boulder River (100700020805)	30,786
Lower West Fork Rock Creek (100700060905)	22,567
Lower Tom Miner Creek (100700020106)	27,510
Lower Upper Deer Creek (100700021402)	21,783
Lower West Fork Stillwater River (100700050203)	14773
Middle Hellroaring Creek (100700010803)	25,210
Middle Slough Creek(100700010706)	36,803
Middle West Boulder River (100700020804)	17,044
Passage Creek (100700020301)	13,586
Reese Creek-Yellowstone River (100700010902)	28,501
Sixmile Creek (100700020205)	30,520
Trout Creek (100700050504)	16,873
Upper East Boulder River (100700020701)	36,219
Upper Lower Deer Creek (100700021404)	16,382
Upper Hellroaring Creek (100700010802)	28,619
Upper Mill Creek (100700020302)	21,591
Upper Slough Creek (100700010705)	30,026
Upper Soda Butte Creek (100700010702)	37,564
Upper Tom Miner Creek (100700020105)	14,318
Upper Upper Deer Creek (100700021401)	16,360
Upper West Boulder River (100700020802)	16,996
Upper West Fork Rock Creek (100700060904)	21,136
West Fork Mill Creek (100700020303)	25,895
West Fork Red Lodge Creek (100700061001)	30,089
Willow Creek (100700061005)	32,362
Woodbine Creek-Stillwater River (100700050105)	40,510
Bridger, Bangtail, and Crazy Mountains Geographic Area Subwatersheds	
Bangtail Creek (100700030502)	8,260
Bennet Creek-Shields River (100700030301)	31,910
Canyon Creek (100700030501)	14,015
Carrol Creek (100700030201)	19,184
Cottonwood Creek (100700030402)	23,515
Elk Creek (100901020208)	19,754

Subwatershed/6th Level Hydrologic Unit Code (HUC number)	6th Level HUC Acres
Lower Bridger Creek (100200080802)	13,553
Muddy Creek (100700030204)	13,470
Rock Creek (100700030405)	33,902
Smith Creek (100700030302)	15,908
Upper Bracket Creek (100700030403)	27605
Upper Flathead Creek (100700030202)	14,650
Upper South Fork Sixteen Mile Creek (100301010201)	17,124
Willow Creek (100700030503)	19,888
Madison, Henrys Lake, and Gallatin Mountains Geographic Area Subwatersheds	
Bacon Rind Creek (100200080104)	10396
Bozeman Creek (100200080904)	33,236
Buck Creek (100200080303)	14651
Cabin Creek (100200070401)	19488
Deer Creek-Gallatin River (100200080306)	24535
Elkhorn Creek-Gallatin River (100200080302)	15,980
Grayling Creek (100200070305)	32,750
Hebgen Lake (100200070307)	40,373
Lower Big Creek (100700020203)	22,649
Lower Taylor Fork (100200080108)	28154
Middle Cherry Creek (100200071402)	11,180
Middle South Fork Madison River (100200070204)	15,933
North Fork Spanish Creek (100200080401)	20,788
Porcupine Creek (100200080305)	16927
Rock Creek (100700020201)	18,233
Tepee Creek (100200070306)	14,398
Upper Beaver Creek (100200070402)	18,649
Upper Cherry Creek (100200071401)	13,265
Upper Hyalite Creek (100200081001)	31,067
Upper South Fork Madison River (100200070203)	31715
Upper Taylor Fork (100200080107)	34639

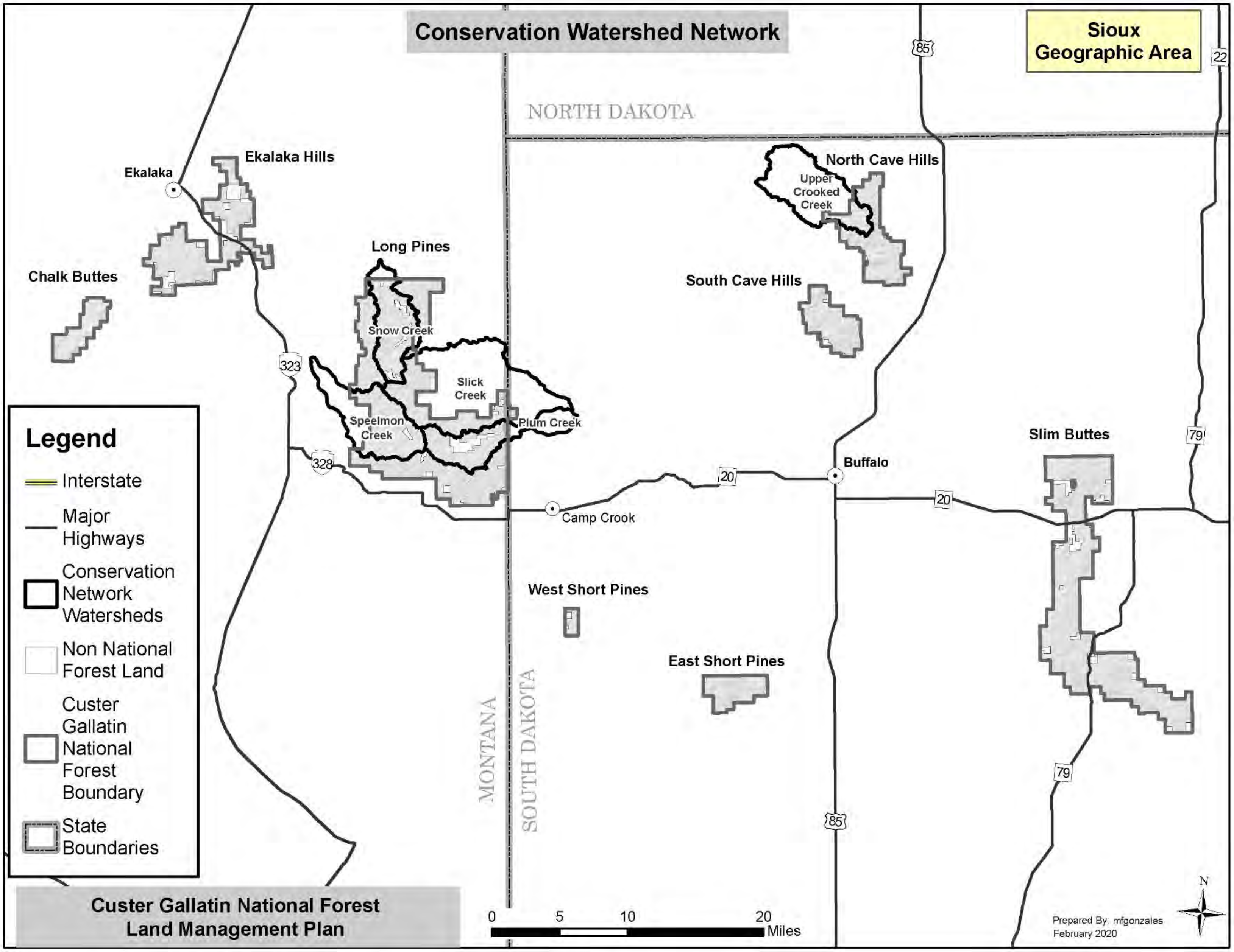


Figure 17. Conservation Watershed Network Sioux Geographic Area

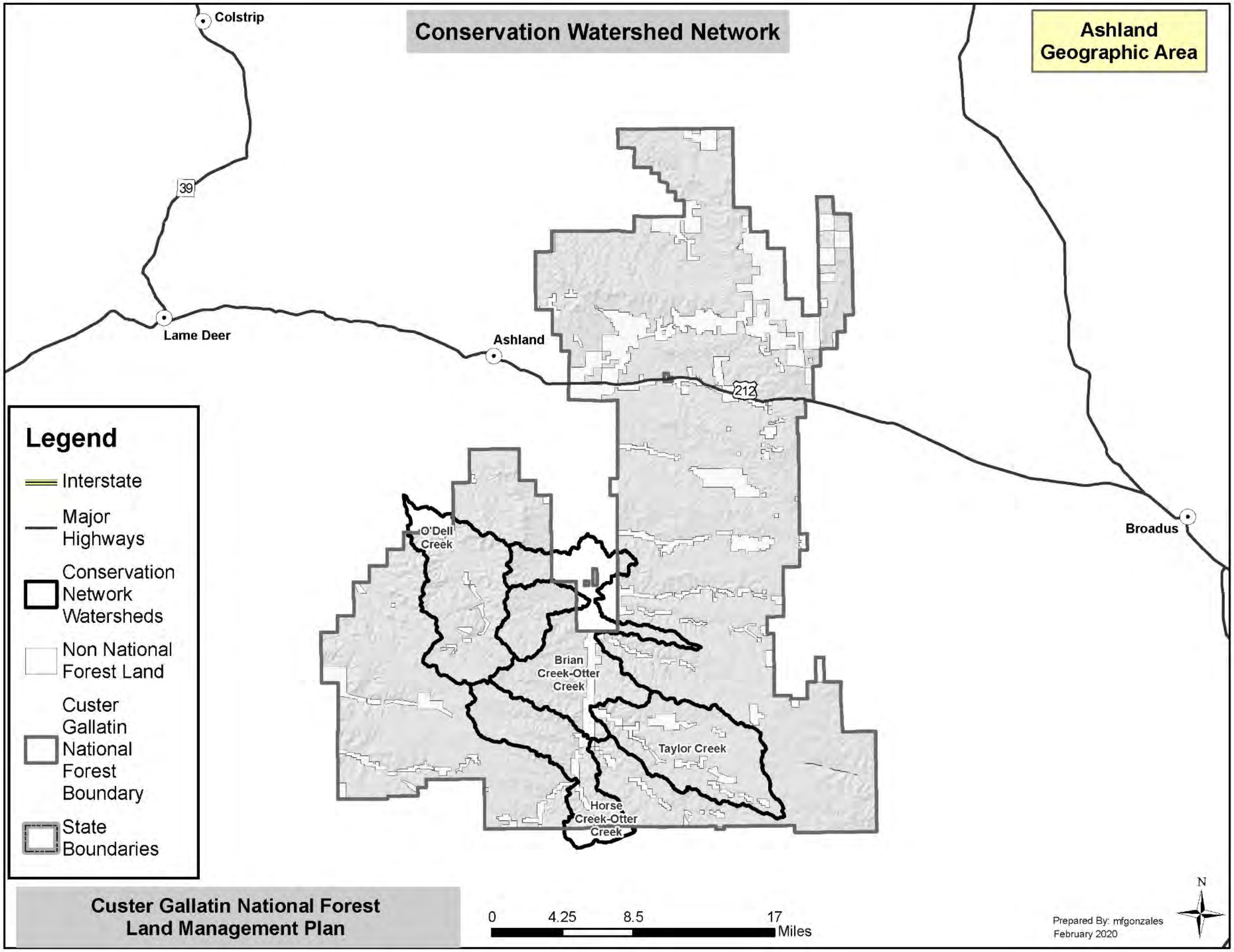


Figure 18. Conservation Watershed Network Ashland Geographic Area

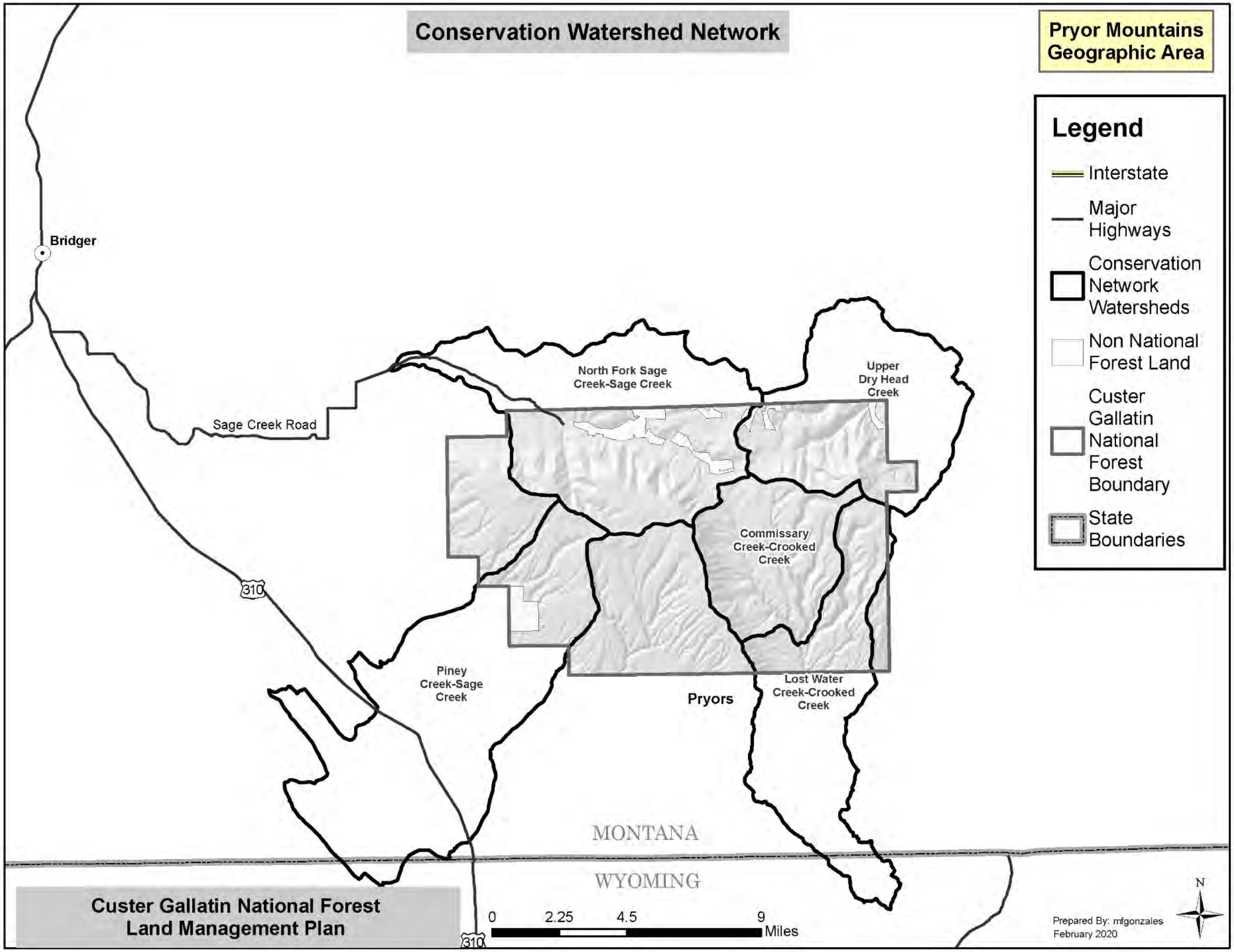


Figure 19. Conservation Watershed Network Pryor Mountains Geographic Area

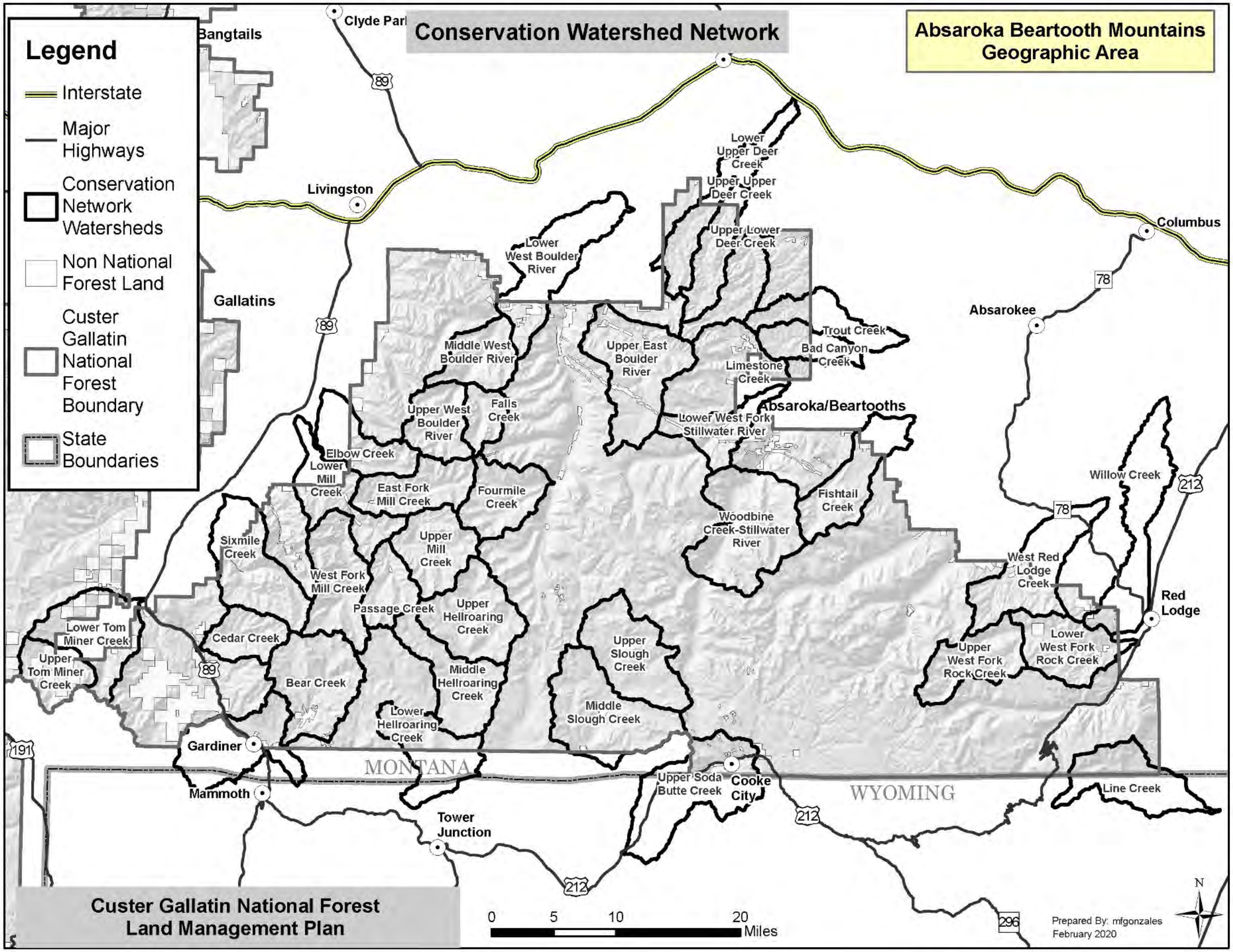


Figure 20. Conservation Watershed Network Absaroka Beartooth Mountains Geographic Area

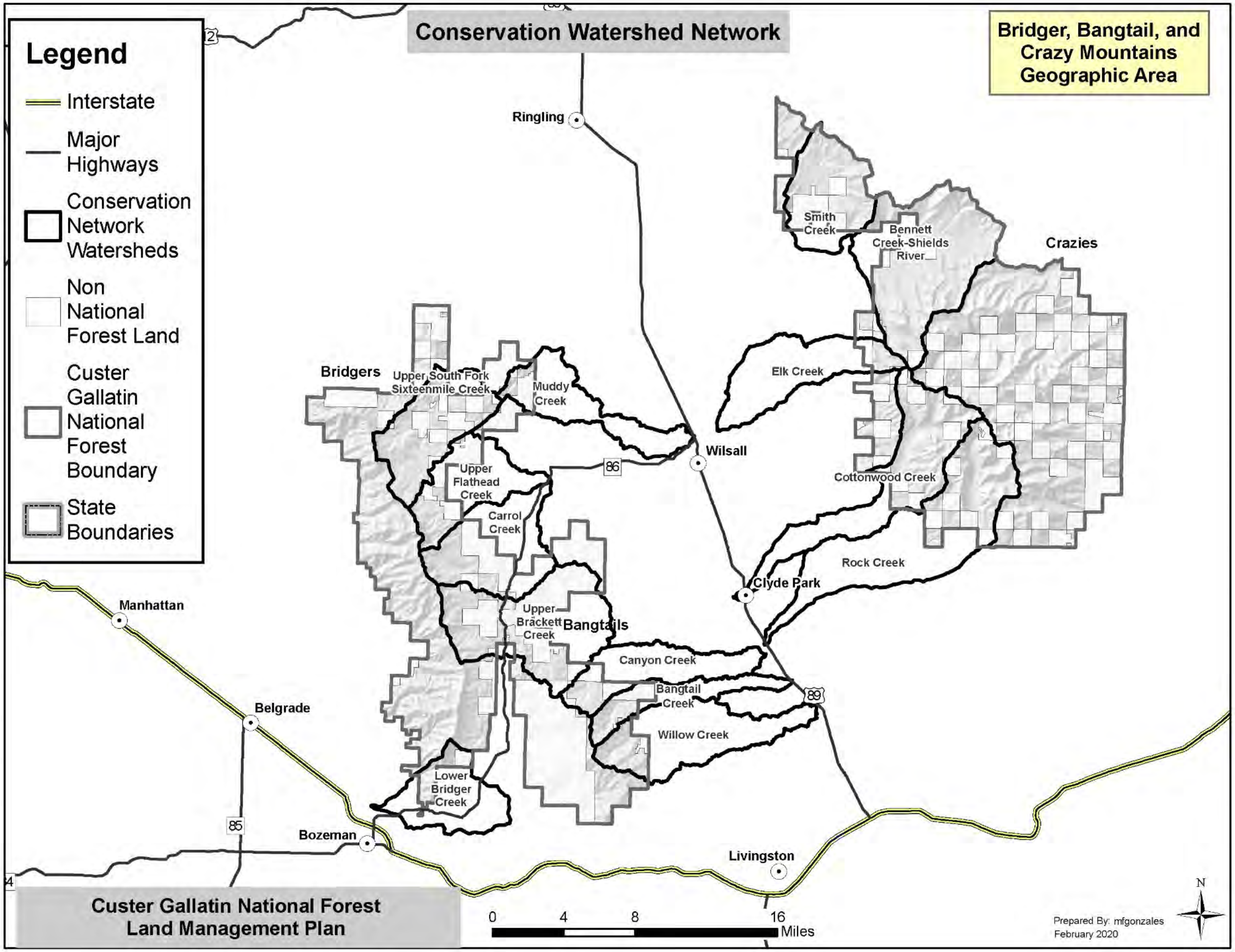


Figure 21. Conservation Watershed Network Bridger, Bangtail, and Crazy Mountains Geographic Area

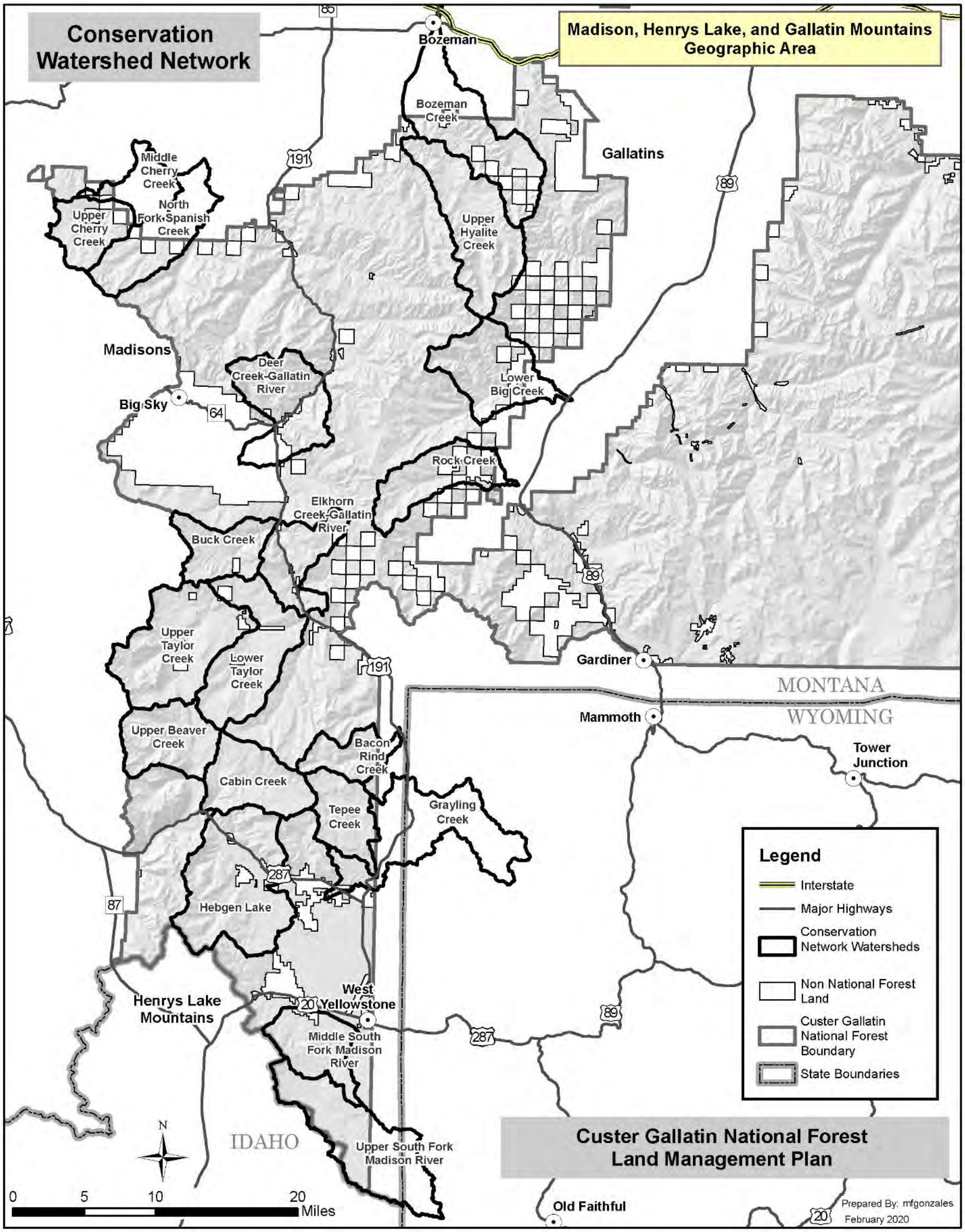


Figure 22. Conservation Watershed Network Madison, Henrys Lake, and Gallatin Mountains Geographic Area

Appendix D: Vegetation Classifications and Development of Vegetation Plan Components

Introduction

This appendix describes in detail the vegetation classifications and plant communities upon which many plan components are built, forming the basis for many plan components related to vegetation and wildlife habitat. This appendix also describes the process by which the natural range of variation was developed or modeled for vegetation attributes, and used to inform desired conditions.

Vegetation Classifications

Lands across the Custer Gallatin National Forest have been grouped into broad potential vegetation types, based on climatic and site conditions. Potential vegetation types serve as a basis for description of ecological conditions across the national forest. These groups are useful in understanding the various ecosystems, their potential productivity, natural biodiversity, and processes. Potential vegetation types are essentially assemblages of habitat types, which are aggregations of ecological sites of like biophysical environments (such as climate, aspect, and soil characteristics) that produce plant communities of similar composition, structure and function (Pfister et al. 1977, Mueggler and Stewart 1980, Hansen and Hoffman 1988). The vegetation communities that would develop over time given no major disturbances (the climax plant community) would be similar within a habitat type or potential vegetation type. However, existing vegetation condition may vary widely on a potential vegetation type, reflecting each site's unique history, forest character, pattern of disturbances, and point in time along the successional pathways. Therefore, plan components also use classifications of cover types, which are assemblages of existing vegetation that occur at any one point in time. Cover types change through time whereas potential vegetation types generally remain constant.

A consistent hierarchy of broad potential vegetation type and cover type was developed for Custer Gallatin National Forest plan revision (Reid et al. 2018). This system is based on the Northern Region Existing and Potential Vegetation Groupings used for Broad-level Analysis and Monitoring (Milburn et al. 2015). Potential vegetation types and cover types are classified for plot data and map products. Estimates are made using plot data that is summarized with Northern Region analysis tools (Bush 2014). Attributes are also approximated on maps to understand the distribution and connectivity on the landscape. Mapping of potential vegetation types was completed across the Northern Region using data sources that included field plots, remote sensing, and modeling. Mapping of cover types is derived from dominance types classified in the Northern Region Vegetation Map (Brown 2016). The Northern Region Vegetation Map is a spatially explicit, polygon-based vegetation map derived from remotely sensed data that contains information about the extent, composition, and structure of vegetation across National Forest System lands in Northern Region. The Custer Gallatin National Forest's vegetation map used for analysis is a compilation of the Northern Region Vegetation Map and the Northern Region Broad Potential Vegetation Map.

Table 13 and the following sections describing potential vegetation types show the classification for Northern Region broad potential vegetation types for forested and non-forested vegetation, based on (Reid et al. 2018).

Table 14. Potential vegetation type classification for forested habitat types* found on the Custer Gallatin National Forest

Northern Region Broad Potential Vegetation Type	Northern Region Habitat Type Groups	Northern Region Potential Vegetation Types[1]	Automatic Data Processing Habitat Type Code[2]
Warm Dry	Hot Dry	limber pine	091[3], 092[3], 093[3], 095[3]
Warm Dry	Warm Dry	ponderosa pine	100, 110, 130, 140, 141, 142, 160,161, 162
		Douglas fir [1]	200, 210, 220
		Douglas fir [2]	311, 380
		Douglas fir [3]	321
		ponderosa pine	180, 181, 182
Warm Dry	Mod Warm Dry	ponderosa pine	170, 171, 172
		spruce	430
		Douglas fir [2]	260, 261, 262, 280,281, 292, 310, 312, 313
		Douglas fir [3]	320, 321, 323, 330, 340, 360, 370
Warm Dry	Mod Warm Mod Dry	Douglas fir [2]	290
Cool Moist	Cool Moist	subalpine fir [2]	600, 660, 661, 663,670, 740
		spruce	400, 460, 461, 470
Cool Moist	Cool Wet	subalpine fir [1]	630, 650, 651, 653
		spruce	410, 440, 480
Cool Moist	Cool Mod Dry to Moist	subalpine fir [2]	661, 663, 740
		subalpine fir [3]	691, 720, 750, 770, 780, 790, 791, 792
		spruce	450
		lodgepole pine	900, 910, 930, 950
Cold	Cold	subalpine fir [3]	731, 732, 733
		subalpine fir [4]	730,740, 800, 810, 820
		lodgepole pine	940
Cold	Timberline	whitebark pine	850, 870

* A habitat type is land that supports, or has the potential of supporting, the same reference condition vegetation type (association). A phase is a finer subdivision of a habitat type representing a minor variation in reference vegetation. In addition to habitat types, several major seral plant communities that are stable for time frames relevant to land management decisions have been described. These are referred to as community types.

1. Region 1 potential vegetation types based on “Jones” metadata logic and labels.
2. Automatic Data Processing Code (habitat type publications) - includes all codes from valid references in Northern Region for use with Natural Resource Manager FSVeg. Unless otherwise specified, codes are from 101 (Forest Habitat Types of Montana, (Pfister et al. 1977))
3. Reference 199 = FSH 2409.21h R-1 Timber Management Data Handbook. Used in Region 1 until 2001.

Potential Vegetation Type Classification for Grassland Habitat Types

Northern Region Broad Potential Vegetation Type Xeric Grassland

Northern Region Habitat Type Group Bluebunch Wheatgrass

Habitat types classified by Hansen and Hoffman (1988):

- Needle and thread/threadleaf sedge habitat type (Sioux Ranger District)
- Needle and thread/sun sedge habitat type (Sioux Ranger District)
- Prairie sandreed/sun sedge habitat type (Sioux Ranger District)
- Western wheatgrass/threadleaf sedge habitat type (Sioux Ranger District)
- Western wheatgrass/green needlegrass habitat type (Sioux Ranger District)
- Little bluestem/threadleaf sedge (Sioux and Ashland Ranger Districts)
- Bluebunch wheatgrass/side-oats grama habitat type (Ashland Ranger District)
- Bluebunch wheatgrass/threadleaf sedge habitat type (Ashland Ranger District)

Habitat types classified by Mueggler and Stewart (1980):

- Needle and thread grass/blue grama habitat type (all Ranger Districts)
- Needle and thread grass/blue grama habitat type – western wheatgrass phase (all Ranger Districts)
- Bluebunch wheatgrass/blue grama habitat type (Ashland, Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Bluebunch wheatgrass/blue grama habitat type – liatris phase (Ashland, Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Bluebunch wheatgrass/western wheatgrass habitat type (Ashland, Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Bluebunch wheatgrass/western wheatgrass habitat type –green needlegrass phase (Ashland, Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Bluebunch wheatgrass/Sandberg bluegrass habitat type (Ashland, Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Bluebunch wheatgrass/Sandberg bluegrass – needle and thread grass (Ashland, Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)

Northern Region Broad Potential Vegetation Type Mesic Grassland

Northern Region Habitat Type Group Western Wheatgrass; Fescue

Habitat types classified by Hansen and Hoffman (1988)

- Idaho fescue/sun sedge habitat type (Ashland Ranger District)

Habitat types classified by Mueggler and Stewart (1980):

- Idaho fescue/western wheatgrass habitat type (Ashland, Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Idaho fescue/bluebunch wheatgrass habitat type (Ashland, Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Idaho fescue/slender wheatgrass habitat type (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Idaho fescue/slender wheatgrass habitat type - sticky geranium phase (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Idaho fescue/threadleaf sedge habitat type (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Idaho fescue/Richardson’s needlegrass habitat type (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Idaho fescue/tufted hairgrass habitat type (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Tufted hairgrass/sedge species habitat type (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)

Potential Vegetation Type Classification for Shrubland Habitat

Northern Region Broad Potential Vegetation Type Xeric Shrubland

Northern Region Habitat Type Group Xeric Shrubland

Habitat types classified by Hansen and Hoffman (1988):

- Skunkbrush/threadleaf sedge habitat type (Sioux Ranger District)
- Skunkbrush/bluebunch wheatgrass (Sioux Ranger District)
- Horizontal juniper/sun sedge habitat type (Sioux Ranger District)

Habitat types classified by Mueggler and Stewart (1980):

- Bitterbrush/bluebunch wheatgrass habitat type (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Bitterbrush/Idaho fescue habitat type (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Mountain mahogany/bluebunch wheatgrass habitat type (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Skunkbrush/bluebunch wheatgrass habitat type (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Skunkbrush/Idaho fescue habitat type (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)

Community Types

- Wood’s rose
- Chokecherry
- Serviceberry

Northern Region Broad Potential Vegetation Type Xeric Shrubland

Northern Region Habitat Type Group Low Shrubland

Habitat types classified by Mueggler and Stewart (1980):

- Low sagebrush/bluebunch wheatgrass habitat type
- Low sagebrush/bluebunch wheatgrass habitat type – needle and thread grass phase
- Low sagebrush/Idaho fescue;
- Black sage

Community types classified by DeVelice and Lesica (1993) Pryor Mountains:

- Black sagebrush/bluebunch wheatgrass
- Birdfoot sage/bluebunch wheatgrass
- Birdfoot sage/Nuttall's saltbush

Northern Region Broad Potential Vegetation Type Xeric Shrubland

Northern Region Habitat Type Group Mountain Shrubland

Habitat types classified by Hansen and Hoffman (1988):

- Wyoming big sagebrush/bluebunch wheatgrass habitat type (Ashland Ranger District)
- Wyoming big sagebrush/western wheatgrass habitat type (Ashland Ranger District)

Habitat types classified by Mueggler and Stewart (1980):

- Wyoming sagebrush/bluebunch wheatgrass
- Wyoming sagebrush/Idaho fescue

Northern Region Broad Potential Vegetation Type Xeric Shrubland

Northern Region Habitat Type Group Mountain Shrubland

Habitat types classified by Mueggler and Stewart (1980):

- Mountain sagebrush/bluebunch wheatgrass
- Mountain sagebrush/Idaho fescue

Northern Region Broad Potential Vegetation Type Xeric Shrubland

Northern Region Habitat Type Group Mountain Shrubland

Habitat types classified by Hansen and Hoffman (1988):

- Silver sage/western wheatgrass habitat type (Sioux and Ashland Ranger District)

Northern Region Broad Potential Vegetation Type Xeric Shrubland

Northern Region Habitat Type Group Xeric Shrubland

Habitat types classified by Mueggler and Stewart (1980):

- Mountain sagebrush/bluebunch wheatgrass

Northern Region Broad Potential Vegetation Type Mesic Shrubland

Northern Region Habitat Type Group Mesic Shrubland

Habitat types classified by Hansen and Hoffman (1988):

- Greasewood/bluebunch wheatgrass (Ashland Ranger District)
- Greasewood/western wheatgrass habitat type (Ashland Ranger District)
- Western snowberry community type (Sioux and Ashland Ranger District)
- Silver buffaloberry community type (Sioux and Ashland Ranger District)

Habitat types classified by Mueggler and Stewart (1980):

- Shrubby cinquefoil/Idaho fescue habitat type (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Greasewood/western wheatgrass habitat type (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)
- Greasewood/basin wildrye habitat type (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)

Community Types

- Ceanothus/bluebunch wheatgrass,
- Mallow ninebark/serviceberry,
- Mallow ninebark/OSOC,
- Smooth sumac,
- Smooth sumac/bluebunch wheatgrass,
- Snowberry/bluebunch wheatgrass,
- Snowberry/balsamroot,
- Snowberry/Idaho fescue,
- Snowberry/gallium

Potential Vegetation Type Classification for Xeric Woodland Habitat

Northern Region Broad Potential Vegetation Type Xeric Woodland

Northern Region Habitat Type Group Mountain Mahogany Woodland

Habitat types classified by Mueggler and Stewart (1980) (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts):

- Curl-leaf mountain mahogany/bluebunch wheatgrass,
- Bitterbrush/bluebunch wheatgrass,
- Bitterbrush/Idaho fescue,
- Skunkbrush/Idaho fescue,
- Rabbitbrush/bluebunch wheatgrass,
- Horizontal juniper/little bluestem,
- Bitterbrush/bluebunch wheatgrass

Northern Region Broad Potential Vegetation Type Xeric Woodland

Northern Region Habitat Type Group Juniper Woodland

Habitat types classified by Hansen and Hoffman (1988):

- Rocky Mountain juniper/bluebunch wheatgrass habitat type (Ashland Ranger District)
- Rocky Mountain juniper/littleseed ricegrass habitat type (Ashland Ranger District)

Community types classified by DeVelice and Lesica (1993) for Pryor Mountains (Beartooth Ranger District):

- Utah juniper/bluebunch wheatgrass,
- Utah juniper/big sagebrush,
- Utah juniper/mountain mahogany,
- Rocky Mountain juniper/black sagebrush,
- Limber pine-Utah juniper,
- Limber pine-Rocky Mountain juniper,
- Limber pine/Idaho fescue,
- Limber pine/Common juniper

Potential Vegetation Type Classification for Riparian Areas and Wetlands

Northern Region Broad Potential Vegetation Type Riparian/Wetland

Northern Region Habitat Type Group Riparian - Green Ash Woodland

Habitat types classified by Hansen and Hoffman (1988):

- Green ash/chokecherry habitat type (Sioux and Ashland Ranger Districts) (Non-riparian - green ash woodland)

Habitat types classified by Hansen and Hoffman (1988):

- Green ash/chokecherry habitat type (Sioux and Ashland Ranger Districts) (riparian - green ash woodland)

Habitat types/community types classified by Hansen et al. (1995):

- Northern Great Plains (Sioux and Ashland Ranger Districts)
- Green ash/common chokecherry habitat type
- Box-elder/common chokecherry habitat type

Northern Region Broad Potential Vegetation Type Riparian/Wetland

Northern Region Habitat Type Group Aspen Woodland

Habitat types classified by Hansen and Hoffman (1988):

- Aspen/Oregon grape habitat type (Sioux and Ashland Ranger Districts)

Habitat types/community types classified by Hansen et al. (1995):

Northern Great Plains (Sioux and Ashland Ranger Districts)

- Quaking aspen/creeping Oregon grape habitat type
- Quaking aspen/red-osier dogwood habitat type
- Quaking aspen/western sweet cicely habitat type
- Quaking aspen/Kentucky bluegrass community type

Rocky Mountains, Foothills, and Intermountain Valleys (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)

- Quaking aspen/red-osier dogwood habitat type
- Quaking aspen/bluejoint reedgrass habitat type
- Quaking aspen/western sweet-cicely habitat type
- Quaking aspen/Kentucky bluegrass community type

Northern Region Broad Potential Vegetation Type Riparian/Wetland

Northern Region Habitat Type Group Riparian Deciduous Tree

Habitat types/community types classified by Hansen et al. (1995)

Northern Great Plains (Sioux and Ashland Ranger Districts)

- Great Plains cottonwood/recent alluvial bar community type
- Great Plains cottonwood/herbaceous community type
- Great Plains cottonwood/red-osier dogwood community type
- Great Plains cottonwood/western snowberry community type
- Black cottonwood/recent alluvial bar community type
- Black cottonwood/herbaceous community type
- Black cottonwood/red-osier dogwood community type
- Black cottonwood/western snowberry community type
- Narrow-leaf cottonwood/recent alluvial bar community type
- Narrow-leaf cottonwood/herbaceous community type
- Narrow-leaf cottonwood/red-osier dogwood community type
- Narrow-leaf cottonwood/western snowberry community type
- Peach-leaf will community type
- Russian olive community type

Rocky Mountains, Foothills, and Intermountain Valleys (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)

- Great Plains cottonwood/recent alluvial bar community type
- Great Plains cottonwood/herbaceous community type
- Great Plains cottonwood/red-osier dogwood community type
- Great Plains cottonwood/western snowberry community type

- Black cottonwood/recent alluvial bar community type
- Black cottonwood/herbaceous community type
- Black cottonwood/red-osier dogwood community type
- Black cottonwood/western snowberry community type
- Narrow-leaf cottonwood/recent alluvial bar community type
- Narrow-leaf cottonwood/herbaceous community type
- Narrow-leaf cottonwood/red-osier dogwood community type
- Narrow-leaf cottonwood/western snowberry community type
- Peach-leaf will community type
- Russian olive community type

Northern Region Broad Potential Vegetation Type Riparian/Wetland

Northern Region Habitat Type Group Riparian Shrub

Habitat types/community types classified by Hansen et al. (1995):

Willow Communities – Northern Great Plains (Sioux and Ashland Ranger Districts)

- Yellow willow/beaked sedge habitat type
- Yellow willow/bluejoint reedgrass habitat type
- Yellow willow community type
- Bebb willow community type
- Sandbar will community type

Non-willow Communities – Northern Great Plains (Sioux and Ashland Ranger Districts)

- Shrubby cinquefoil/tufted hairgrass habitat type
- Silver sagebrush/western wheatgrass habitat type
- Black greasewood/western wheatgrass habitat type
- Thorny buffaloberry community type
- Succulent hawthorn community type
- Salt cedar community type
- Common chokecherry community type
- Woods rose community type
- Western snowberry community type

Willow Communities – Rocky Mountains, Foothills, and Intermountain Valleys (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)

- Yellow willow/beaked sedge habitat type
- Yellow willow/bluejoint reedgrass habitat type
- Yellow willow community type foil/tufted hairgrass habitat type
- Drummond will/beaked sedge habitat type
- Drummond will/bluejoint reedgrass habitat type

- Drummond willow community type
- Geyer willow/beaked sedge habitat type
- Geyer willow/bluejoint reedgrass habitat type
- Geyer willow community type
- Planeleaf willow/water sedge habitat type
- Hoary willow/beaked sedge habitat type
- Wolf's willow/water sedge habitat type
- Wolf's willow/tufted hairgrass habitat type
- Pacific willow community type
- Bebb willow community type
- Sandbar willow community type

Non-willow Communities – Rocky Mountains, Foothills, and Intermountain Valleys (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)

- Bog birch/beaked sedge habitat type
- Small-leaved laurel/Holm's Rocky Mountain sedge habitat type
- Shrubby cinquefoil/tufted hairgrass habitat type
- Silver sagebrush/Idaho fescue habitat type
- Rocky Mountain juniper/red-osier dogwood habitat type
- Black greasewood/western wheatgrass habitat type
- Water birch community type
- Mountain alder community type
- Sitka alder community type
- Thorny buffaloberry community type
- Succulent hawthorn community type
- Salt cedar community type
- Common chokecherry community type
- Red-osier dogwood community type
- Douglas's spiraea community type
- Woods rose community type
- Western snowberry community type

Northern Region Broad Potential Vegetation Type Riparian/Wetland

Northern Region Habitat Type Group Wetland Graminoid

Habitat types/community types classified by Hansen et al. (1995):

Sedge Communities – Northern Great Plains (Sioux and Ashland Ranger Districts)

- Beaked sedge habitat type, including beaked sedge phase; water sedge phase, and tufted hairgrass phase;

- Water sedge habitat type with water sedge phase and tufted hairgrass phase
- Slender sedge habitat type
- Nebraska sedge community type

Non-sedge Communities – Northern Great Plains (Sioux and Ashland Ranger Districts)

- Common cattail habitat type
- Hardstem bulrush habitat type
- Common reed habitat type
- Reed canarygrass habitat type
- Northern mannagrass habitat type
- Prairie cordgrasss (or alkali cordgrass) habitat type
- Alkali bulrush (or American bulrush) habitat type
- Common spikesedge (or need spike-rush) habitat type
- Inland saltgrass habitat type
- Western wheatgrass habitat type
- American licorice community type

Seral or Human Disturbance community types - Northern Great Plains (Sioux and Ashland Ranger Districts)

- Water smartweed
- Red glasswort
- Fowl bluegrass
- Smooth brome
- Baltic rush
- Redtop
- Foxtail barley
- Kentucky bluegrass

Sedge Communities – Rocky Mountains, Foothills, and Intermountain Valleys (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)

- Beaked sedge habitat type, including beaked sedge phase; water sedge phase, and tufted hairgrass phase;
- Water sedge habitat type with water sedge phase and tufted hairgrass phase
- Mud sedge habitat type
- Slender sedge habitat type
- Holm’s Rocky Mountain sedge habitat type
- Nebraska sedge community type

Non-sedge Communities - Rocky Mountains, Foothills, and Intermountain Valleys (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)

- Common cattail habitat type
- Hardstem bulrush habitat type
- Common reed habitat type
- Reed canarygrass habitat type
- Water horsetail habitat type
- Northern mannagrass habitat type
- Common spikesedge habitat type
- Few-flowered spikesedge habitat type
- Bluejoint reedgrass habitat type
- Inland saltrass habitat type
- Western sheatgrass habitat type

Seral or Human Disturbance community types - Rocky Mountains, Foothills, and Intermountain Valleys (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)

- Arrowleaf groundsel community type
- Red glasswort community type
- Fowl bluegrass community type
- Smooth brome community type
- Baltic rush community type
- Redtop community type
- Foxtail barley community type
- Kentucky bluegrass community type

Northern Region Broad Potential Vegetation Type Riparian/Wetland

Northern Region Habitat Type Group Riparian Deciduous Tree

Habitat types/community types classified by Hansen et al. (1995):

Rocky Mountains, Foothills, and Intermountain Valleys (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)

- Great Plains cottonwood/recent alluvial bar community type
- Great Plains cottonwood/herbaceous community type
- Great Plains cottonwood/red-osier dogwood community type
- Great Plains cottonwood/western snowberry community type
- Black cottonwood/recent alluvial bar community type
- Black cottonwood/herbaceous community type
- Black cottonwood/red-osier dogwood community type
- Black cottonwood/western snowberry community type
- Narrow-leaf cottonwood/recent alluvial bar community type

- Narrow-leaf cottonwood/herbaceous community type
- Narrow-leaf cottonwood/red-osier dogwood community type
- Narrow-leaf cottonwood/western snowberry community type
- Peach-leaf will community type
- Russian olive community type

Potential Vegetation Type Classification for Alpine Habitats

Northern Region Broad Potential Vegetation Type Alpine

Northern Region Habitat Type Group Alpine Herbaceous and Alpine Shrub

Alpine Communities from Cooper et al. (1997) (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts)

- Alpine shrublands;
- Alpine turf;
- Alpine grassland;
- Cushion plant communities;
- Alpine slope communities;
- Snowbed communities;
- Alpine wetlands

Alpine Plant Associations of the Beartooths classified by Williams (2012) (Beartooth Ranger District)

- Eight-petal mountain-avens (*Dryas octopetala var. hookeriana*)/rock sedge
- *Dryas octopetala* var. *hookeriana/Carex rupestris*
- *Helianthela uniflora-Astragalus alpinus*
- *Salix planifolia/Carex scopulorum*
- *Geum rossii* var. *turbinatum-Silene acaulis* var. *subacaulescens*
- *Carex phaeochephala/Sibbaldia procumbens*
- *Salix glauca* var*. villosa/Geum rossii* var*. turbinatum*
- *Salix reticulata* var. *nana/Polygonum viviparum*
- *Deschampsia cespitosa-Carex microptera-Carex macloviana*
- *Antennaria lanata-Hieracium triste* var. *gracile*
- *Picea engelmannii-Pinus albicaulis/Carex nardina*
- *Carex nigricans/Veronica wormskjoldii*
- *Senecio triangularis-Mertensia ciliata*
- *Senecio fremontii-Draba incerta*

Alpine Communities of Line Creek Plateau classified by Lesica (1993) (Beartooth Ranger District)

- *Festuca idahoensis/Geum rossii* community type
- *Carex elynoides* community type
- *Carex scirpoidea/Geum rossii* community type
- *Dryas octopetala/Carex rupestris* community type
- *Juncus drummondii/Antennaria lanata* community type
- *Salix glauca/Deschampsia caespitosa* community type
- *Salix planifolia/Carex paysonis* community type
- *Deschampsia caespitosa/Caltha leptosepala* community type

Potential Vegetation Type Classification for Sparsely Vegetated Habitats

Northern Region Broad Potential Vegetation Type Sparse

Northern Region Habitat Type Group Sparse

Common plant associations of Great Plains Badlands (Sioux and Ashland Ranger Districts) from Montana Natural Heritage Program online database for Ecological Systems include:

- Greasewood (*Sarcobatus vermiculatus*)
- Gardner's saltbush (*Atriplex gardneri*)
- Few-flowered buckwheat (*Eriogonum pauciflorum*)
- Threadleaf snakweed (*Gutierrezia sarothrae*).

Graminoid cover is very sparse, but may include:

- Western wheatgrass (*Pascopyrum smithii*),
- Bluebunch wheatgrass (*Pseudoroegneria spicata*), and
- Indian ricegrass (*Achnatherum hymenoides*).

Common forbs include:

- Few-flowered buckwheat (*Eriogonum pauciflorum*),
- Threadleaf snakweed (*Gutierrezia sarothrae*),
- Hooker's sandwort (*Arenaria hookeri*),
- Bud sagebrush (*Picrothamnus desertorum*),
- Curlycup gumweed (*Grindelia squarrosa*),
- Longleaf wormwood (*Artemisia longfolia*), and
- Nutall's povertyweed (*Monolepis nuttalliana*).

Other shrubs that may be present include:

- Wyoming big sagebrush (Artemisia tridentata ssp. *wyomingensis*),
- Silver sagebrush (*Artemisia cana*),
- Rabbitbrush (*Chrysothamnus viscidiflorus* and *Ericameria nauseosa*), and
- Saltbush (Atriplex species).

Common plant associations of Rocky Mountain Cliff, Canyon and Massive Bedrock (Beartooth, Yellowstone, Gardiner, Bozeman, and Hebgen Lake Ranger Districts) from Montana Natural Heritage Program online database for Ecological Systems include:

- This system usually consists of scattered trees or shrubs such as Douglas-fir (*Pseudotsuga menziesii*), Ponderosa pine (*Pinus ponderosa*), limber pine (*Pinus flexilis*), aspen (*Populus tremuloides*), or subalpine fir (*Abies lasiocarpa*).
- Juniper (*Juniperus* spp.) is common at lower elevations.
- Shrubs adapted to xeric growing conditions and rocky soils are typically present, such as currant (*Ribes* species), common ninebark (*Physocarpus malvaceus*), wild rose (*Rosa* species), common juniper (*Juniperus communis*), Lewis mock orange (*Philadelphus lewisii*), creeping Oregon grape (*Mahonia repens*), three leaf sumac (*Rhus trilobata*), American wild raspberry (*Rubus idaeus*) or serviceberry (*Amelanchier alnifolia*).
- Woody colonizing vegetation is usually limited to the toeslopes of talus and scree slides or in protected pockets beneath cliff faces.
- Herbaceous plants inhabit both the talus and scree slides and fractures in the cliff faces.
- Forbs may include penstemon (*Penstemon species*), buckwheat (*Eriogonum species*), western sagewort (*Artemisia ludovicana*), Michaux's sagewort (*Artemisia michauxiana*), and spotted saxifrage (*Saxifraga bronchialis*).
- Graminoids may include slender wheatgrass (*Elymus trachycaulus*) and bluebunch wheatgrass (*Pseudoroegneria spicata*).
- Mosses and xeric-adapted ferns such as cliff fern (*Woodsia* species), holly fern (*Polystichium lonchitis*), and fragile fern (*Cystopteris fragilis*) occur in fractures of the bedrock, cliff faces or in toeslopes of unstable talus slides.
- Lichen cover can be high on larger size talus.

Table 14 provides the proportion of each Northern Region broad potential vegetation type that occurs within the geographic areas on the Custer Gallatin National Forest. There is variation in the proportion of each geographic area in the Northern Region broad potential vegetation type groups, which provides insight into the unique pattern of environmental, site, and vegetation conditions within each geographic area, and how they differ from one another.

Table 15. Percentage of broad potential vegetation types on National Forest System lands on the Custer Gallatin National Forest by geographic area, in percentage of area[1]

Northern Region Broad Potential Vegetation Type	Custer Gallatin Total (percent)	Ashland (percent)	Sioux (percent)	Pryor Mountains (percent)	Bridger, Bangtail, and Crazy Mountains (percent)	Absaroka Beartooth Mountains (percent)	Madison, Gallatin, and Henrys Lake Mountains (percent)
Warm Dry Forest	23	50	41	43	29	15	13
Cool Moist Forest	21	0	0	17	33	20	35
Cold Forest	21	0	0	0	10	28	32
Non-forest Potential Vegetation Types	35	50	59	40	28	37	20

1. Data is from Northern Region Vegetation Map (Brown 2016).

Table 15 shows the classification for cover types, based on Reid et al. (2018).

Table 16. Vegetation cover type classification for Northern Region (Region 1) dominance types

Region 1 Cover Type	Species included	DomMid40[1]	Dom Group 6040[1]
Ponderosa Pine	Ponderosa pine with components Douglas-fir, limber pine, juniper.	MX-PIFL2, MX-PIPO, or MX-JUNIP[2]	PIFL2, PIFL2-Imix, , PIFL2-Tmix, PIFL2-Hmix, PIPO, PIPO-Imix, PIPO-Tmix, PIPO-Hmix, JUNIP-Hmix, JUNIP-Tmix, or JUNIP- Imix[2]
Dry Douglas-fir[3]	Dry Douglas-fir (potential components of ponderosa pine, limber, and juniper).	(IMIX or MX-PSME) ***AND (Jones PVT = pifl, pipo, psme1, or psme) or (Region 1 Habitat type Group = Hot Dry or Warm Dry)***	(PSME, PSME-Imix, PSME-Hmixor IMIX) ***AND (PVT = pifl, pipo, psme1, or psme3) or (Region 1 Habitat type Group = Hot Dry or Warm Dry)***
Mixed Mesic Conifer[3]	Moist Douglas-fir, cedar, white pine, grand fir, western hemlock (potential components of lodgepole pine, spruce, subalpine fir).	MX-ABGR, MX-PIMO3, MX-THPL, MX-TSHE, MX-TSME, TMIX or [(MX-PSME or IMIX ***AND (PVT NOT pifl, pipo, psme1, or psme3) or (Region 1 Habitat Type Group is NOT Hot Dry or Warm Dry)***	ABGR, ABGR-Imix, ABGR-Tmix, ABGR-Hmix, PIMO3, PIMO3-Imix, PIMO3-Tmix, PIMO3-Hmix, PSME- Tmix, THPL, THPL-Imix, THPL-Tmix, THPL-Hmix, TSHE, TSHE-Imix, TSHE-Tmix, TSHE-Hmix, TSME, TSME-Imix, TSME-Tmix, TSME-Hmix, Tmix, or [(PSME, PSME-Imix, PSME-Hmix, or IMIX) ***(PVT NOT pifl, pipo, psme1, or psme3) or (Region 1 Habitat Type Group NOT Hot Dry or Warm Dry)***
Lodgepole Pine	Lodgepole pine (other minor components)	MX-PICO	PICO, PICO-Imix, PICO-Tmix, PICO-Hmix
Spruce/fir	Subalpine fir, Engelmann spruce (minor lodgepole component)	MX-ABLA,MX-PIEN, or MX- TABR2	ABLA, ABLA-Imix, ABLA-Tmix, ABLA-Hmix, PIEN, PIEN-Imix, PIEN- Tmix, PIEN-Hmix, TABR2, TABR2-Imix, TABR2-Tmix, TABR2-Hmix
Whitebark pine	Whitebark pine	MX-LALY or MX-PIAL	LALY, LALY-Imix, LALY-Tmix, LALY- Hmix, PIAL, PIAL-Imix, PIAL-Tmix, PIAL-Hmix
Aspen/Hardwood[4]	Aspen, green ash, cottonwood, birch (other minor conifer components)	MX-BEPA, HMIX, MX-FRPE, MX-POPUL, or MX- POTR5	BEPA, BEPA-Imix, BEPA-Tmix, BEPA-Hmix, Hmix, FRPE, FRPE-Imix, FRPE-Tmix, FRPE-Hmix, POPUL, POPUL-Imix, POPUl-Tmix, POPUL- Hmix, POTR5, POTR5-Imix, POTR5-Tmix, POTR5-Hmix
Riparian Grass/Shrub	Willow, alder, deciduous shrub mix; mountain brome; smooth brome; dry sedge; Wet sedge/spikerush/juncus	Grass-Wet	Grass-Wet

Region 1 Cover Type	Species included	DomMid40[1]	Dom Group 6040[1]
Mesic Shrub	chokecherry, plum; rose; snowberry; huckleberry; mallow ninebark; white spirea; buffaloberry; evergreen shrub	Shrub-Mesic	Shrub-Mesic
Dry Shrub	sagebrush; antelope bitterbrush; skunkbush sumac; curl-leaf mountain mahogany; greasewood; rabbitbrush; Saltbush, spineless horsebrush; soapweed yucca	Shrub-Xeric; MX-CELE3	CELE3, CELE3-Imix, CELE3-Tmix, CELE3-Hmix
Dry Shrub	Juniper shrub	MX-JUNIP, JUNIP	JUNIP
Grass	Forb mixes; Idaho fescue; western wheatgrass; bluebunch wheatgrass, needle-and- thread grass; tufted hairgrass; little bluestem; prairie sandreed; green needlegrass; Timothy; crested wheatgrass; blue grama; Kentucky bluegrass; cool season short grass mix; cool season mid grass mix; warm season mid grass mix; warm season short grass mix; mixed grass	Grass-Dry; Grass-Bunch; Grass-Singlestem	Grass-Dry; Grass-Bunch; Grass- Singlestem
Sparsely Vegetated	Sparsely vegetated	Sparse	Sparse

1. See (Barber et al. 2011) for a description of DomMid40 and DomGroup6040 classifications.
2. The JUNIP dominance 6040 type is included in the dry shrub cover type given its common association with grass/shrub. However, juniper dominance types that include a mix of other tree species (JUNIP-Imix, JUNIP-Hmix, JUNIP-Tmix) include components of ponderosa pine, limber pine, or Douglas-fir, and are therefore included in the Ponderosa Pine cover type.
3. Potential vegetation type (PVT) information must be used to split the PSME dominance groups to distinguish between the dry Douglas-fir and the Mixed Mesic Conifer cover types.
4. Aspen is also depicted in potential vegetation associated with riparian types. It is included as a forested cover type to account for upland aspen that occurs outside of riparian areas.

Natural Range of Variation

The natural range of variation represents the distribution of conditions under which ecosystems developed -- it gives context for understanding resiliency, evaluating the integrity of current conditions, and identifying important compositional, structural, and functional elements that may warrant restoration. The intent of desired conditions for vegetation is to manage for ecological integrity and resiliency. Desired conditions are deeply informed by the best understanding of the natural range of variation but may also include appropriate adjustments made to incorporate additional considerations including expected future climates, long-term resilience to disturbances, sustainability of important wildlife habitats, and social and economic factors.

The factors and rationale applied in the development of natural range of variation for nonforested vegetation was derived through a review and synthesis of available information relevant to the plan area and selected key ecosystem characteristics including composition, ground cover, and effects of stressors and how they are likely to have affected ecosystem integrity. Information used included scientific journal articles, historical records and photographs, and descriptions of reference areas.

The SIMPPLLE model (Simulating Patterns and Processes at Landscape Scales) was used to generate the natural range of variation analysis for forested vegetation. This model was developed in Northern Region to answer landscape level management questions. It is a spatially explicit, dynamic landscape model used for projecting temporal changes in the spatial distribution of vegetation in response to insects, disease, wildland fire, and other disturbances (Chew et al. 2012). The SIMPPLLE model provides for interaction between disturbance processes and vegetative patterns and is designed to provide a balance between incorporating enough complexity to provide an acceptable level of realism while making enough simplifications to be a useful management tool in planning processes. The model and its results are a simplified portrayal of complex ecosystem dynamics. As such, the results should not be considered an exact representation of a historical landscape, but are a good attempt at approximating vegetation change over time in response to various disturbances and stressors, including historic climate and fire and insect regimes. The model provides useful insight into the complicated dynamics of an ecosystem over time and space, and strengthens the scientific understanding. It provides insight and a frame of reference for the evaluation of ecological integrity and conditions that have sustained the current complement of wildlife and plan species on the Custer Gallatin National Forest.

For the natural range of variation analysis, the SIMPPLLE model grows vegetation through time with parameters that reflect historic climates and disturbances. For this analysis, thirty simulations were run for 1000 years each to provide a range of possible outcomes based on stochastic disturbance events. See appendix B of the final environmental impact statement for additional detail on natural range of variation model development, parameterization and results.

Notably, additional pathways and processes in the model were calibrated to accurately reflect forested conditions on the Custer Gallatin National Forest, including:

- Successional Pathways: Successional pathways are state and transitional models for each vegetation type that provide the foundation for the model. The existing data was reviewed, and pathways for both forested and non-forested vegetation types were added or modified based on expert judgment and successional theory literature to ensure the model depicted the conditions found on the Custer Gallatin National Forest.
- Wildfire Processes: Wildfire processes, including the probability of ignition, fire sizes, fire regimes (severities), weather ending events, and effects to successional pathways are key drivers in the model. Wildfire processes were calibrated using local fire history data, applicable fire history studies and publications, previous modeling efforts, and expert judgment. Most notably, an extensive analysis of historic fire regimes using LANDFIRE reference data (Rollins and Frame 2006) was used to help parametrize historic fire regimes in SIMPPLLE.
- Insect and Disease Processes: The probability and effects of key insect and disease processes (bark beetles, defoliators, and root diseases) were also calibrated using the latest science regarding insect hazard and mortality trends, local data, and expert judgment.

The factors and rationale applied in the development of natural range of variation for forested vegetation and associated wildlife habitat in the Custer Gallatin National Forest plan addressed:

- Forest Composition: forest dominance type, tree species presence
- Forest Structure: forest size class, forest density class, forest vertical structure class, large live trees
- Landscape Pattern: patch size distribution and configuration
- Disturbance: extent, severity, and frequency

Appendix E: Eligible Wild and Scenic Rivers

Introduction

The Custer Gallatin National Forest conducted a wild and scenic river eligibility study as part of land management plan revision. This appendix contains descriptions and maps of the 30 eligible wild and scenic rivers, organized alphabetically. Please refer to the *Wild and Scenic Rivers Eligibility Study Process, 2017* for the full eligibility study.

Table 17. List of eligible rivers

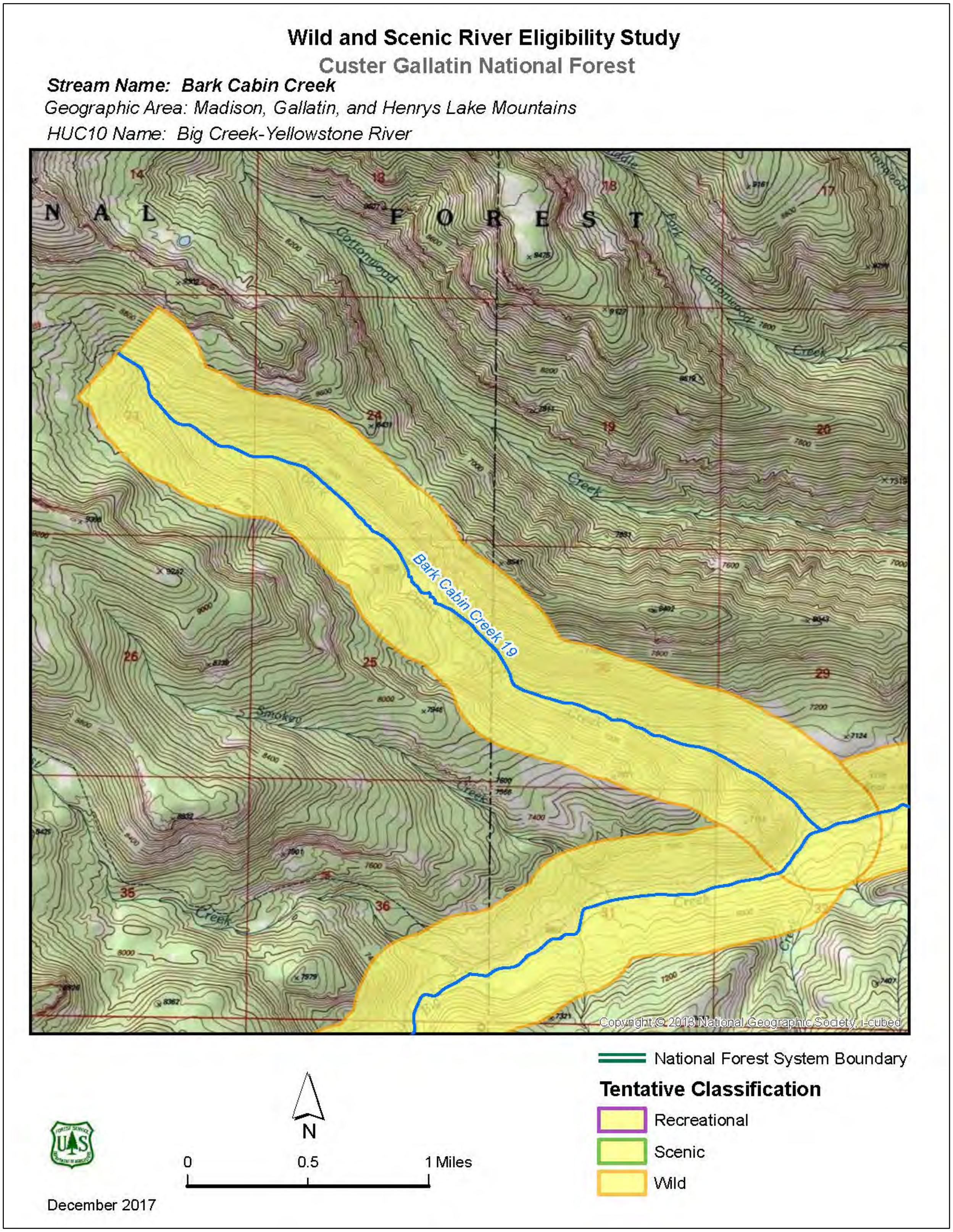
Name	Location	Outstandingly Remarkable Values	Tentative Classifications
Bark Cabin Creek	Gallatin Mountains	Fisheries	Wild
Bear Creek	Pryor Mountains	Wildlife	Scenic
Big Creek	Gallatin Mountains	Fisheries	Wild
Big Timber Creek	Crazy Mountains	Recreation, Scenery	Recreational
Boulder River	Absaroka Beartooth Mountains	Recreation, Scenery, Geology, Heritage	Recreational
Cabin Creek	Madison Mountains	Fisheries, Scenery	Scenic
Cave Creek	Pryor Mountains	Geology, Scenery	Wild
Clarks Fork Yellowstone River	Absaroka Beartooth Mountains	Scenery	Wild, Recreational
Crooked Creek	Pryor Mountains	Geology, Heritage, Scenery, Fisheries	Scenic
Gallatin River	Gallatin Mountains and Madison Mountains	Recreation, Scenery, Heritage	Recreational
Hyalite Creek	Gallatin Mountains	Recreation, Scenery	Scenic
Lake Abundance Creek	Absaroka Beartooth Mountains	Fisheries	Wild
Lake Fork of Rock Creek	Absaroka Beartooth Mountains	Recreation, Scenery	Wild, Recreational
Lost Water Creek	Pryor Mountains	Geology, Heritage, Scenery	Wild, Scenic
Madison River	Madison Mountains	Recreation, Geology, Heritage, Scenery, Wildlife	Recreational
Maid of the Mist Creek	Gallatin Mountains	Recreation, Scenery	Scenic
Middle Fork Cabin Creek	Madison Mountains	Fisheries	Scenic
Pine Creek	Absaroka Beartooth Mountains	Recreation, Scenery	Wild, Recreational
Rock Creek	Absaroka Beartooth Mountains	Recreation, Heritage, Scenery	Recreational
Rock Creek	Absaroka Beartooth Mountains	Fisheries	Wild
Shower Creek	Gallatin Mountains	Recreation, Scenery	Scenic
Slough Creek and tributaries	Absaroka Beartooth Mountains	Fisheries	Wild, Scenic
Stillwater River	Absaroka Beartooth Mountains	Recreation, Scenery	Wild, Recreational
West Boulder River	Absaroka Beartooth Mountains	Recreation	Wild
West Fork Rock Creek	Absaroka Beartooth Mountains	Heritage, Scenery	Wild, Recreational
West Fork Stillwater River	Absaroka Beartooth Mountains	Scenery	Wild
West Rosebud Creek	Absaroka Beartooth Mountains	Scenery, Recreation	Wild
Woodbine Creek	Absaroka Beartooth Mountains	Recreation, Scenery	Wild, Recreational
Wounded Man Creek	Absaroka Beartooth Mountains	Fisheries	Wild
Yellowstone River	Absaroka Beartooth Mountains and Gallatin Mountains	Recreation, Scenery, Heritage	Recreational

Individual River Descriptions and Maps

Bark Cabin Creek

Table 18. Bark Cabin Creek, Yellowstone Ranger District

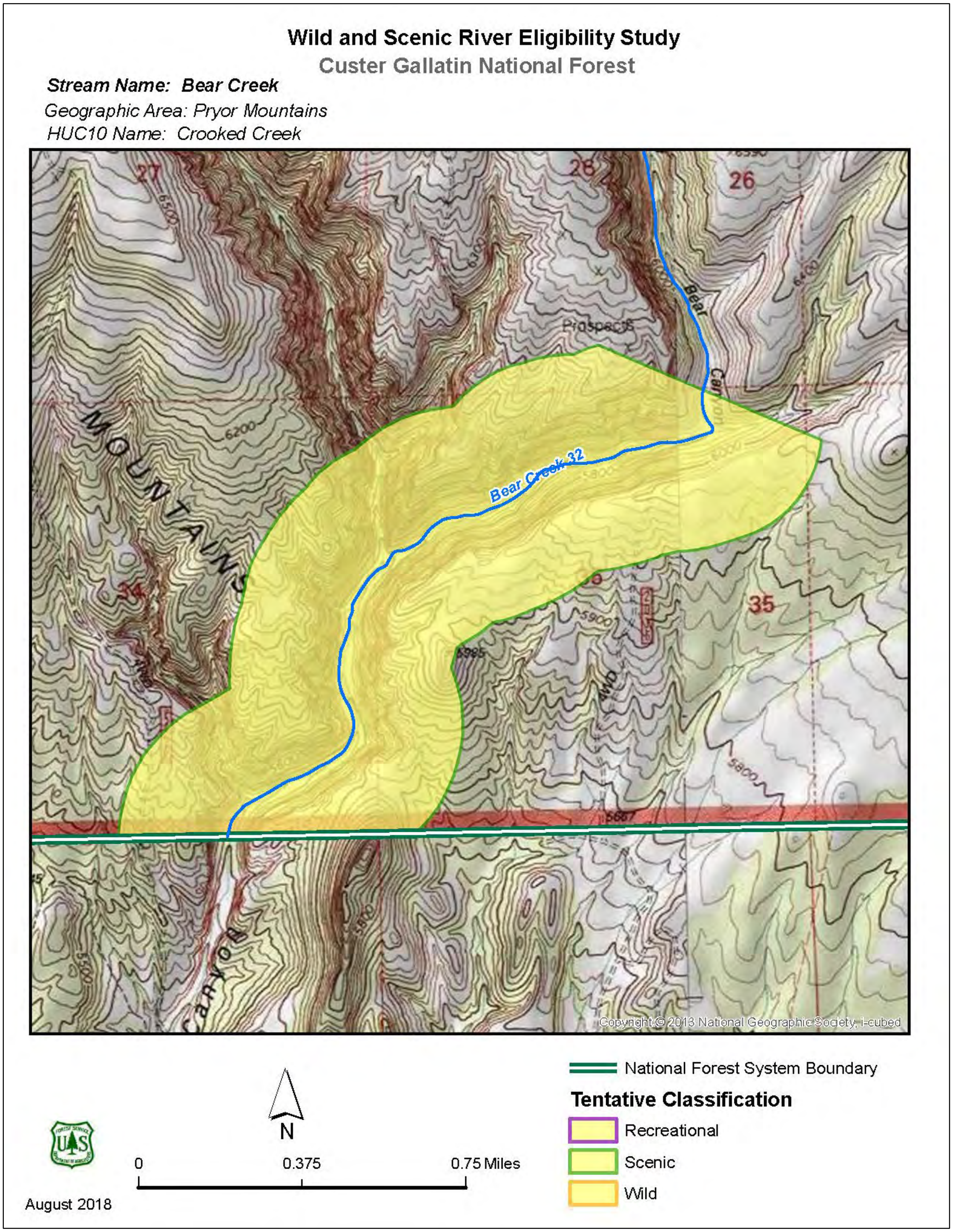
River Description	Bark Cabin Creek, Yellowstone Ranger District
Geographic Area	Madison, Henrys Lake, and Gallatin Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Fisheries
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	From headwaters to confluence with Big Creek
Miles of each Segment	Wild – 3.72 miles
Tentative Classification	Wild
Counties	Park and Gallatin Counties, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	No outstandingly remarkable value
Recreation	No outstandingly remarkable value
Fisheries	High quality habitat relative to the region of comparison. Pure Yellowstone cutthroat trout population. No exotics. A natural barrier exists to keep out non-native species on Big Creek.
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Bark Cabin Creek
Geographic Area: Madison, Gallatin, and Henrys Lake Mountains
HUC10 Name: Big Creek-Yellowstone River
Bark Cabin Creek 19
Copyright © 2013 National Geographic Society, i-cubed
National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
0.5
1 Miles
December 2017

Bear Creek

Table 19. Bear Creek, Beartooth Ranger District

River Description	Bear Creek, Beartooth Ranger District
Geographic Area	Pryor Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Wildlife
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	From national forest boundary with Bureau of Land Management to north section line of Township 8 South, Range 26 East, Section 35
Miles of each Segment	Total national forest miles = 1.75
Tentative Classification	Scenic
Counties	Carbon County, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	No outstandingly remarkable value
Recreation	No outstandingly remarkable value
Fisheries	No outstandingly remarkable value
Wildlife	This area supports a great diversity of migratory and resident bird species. There is a large, diverse riparian area associated with the creek. This area is unique in region of comparison due to contextual setting of lush riparian vegetation and water surrounded by particularly warm, dry, rocky terrain.
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Bear Creek
Geographic Area: Pryor Mountains
HUC10 Name: Crooked Creek
Bear Creek 32
MOUNTAINS
Prospects
Bear
Can
CANYON
27
26
35
6200
5900
5800
4WD
Copyright:© 2013 National Geographic Society, i-cubed
N
0
0.375
0.75 Miles
August 2018
National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild

Big Creek

Table 20. Big Creek, Yellowstone Ranger District

River Description	Big Creek, Yellowstone Ranger District
Geographic Area	Madison, Henrys Lake, and Gallatin Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Fisheries
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Wild – From headwaters to fish barrier
Miles of each Segment	Wild = 8.3 miles
Tentative Classification	Wild
Counties	Park and Gallatin Counties, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	No outstandingly remarkable value
Recreation	No outstandingly remarkable value
Fisheries	High quality habitat relative to the region of comparison. Pure Yellowstone cutthroat trout population. No exotics. A natural barrier exists to keep out non-native species.
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value

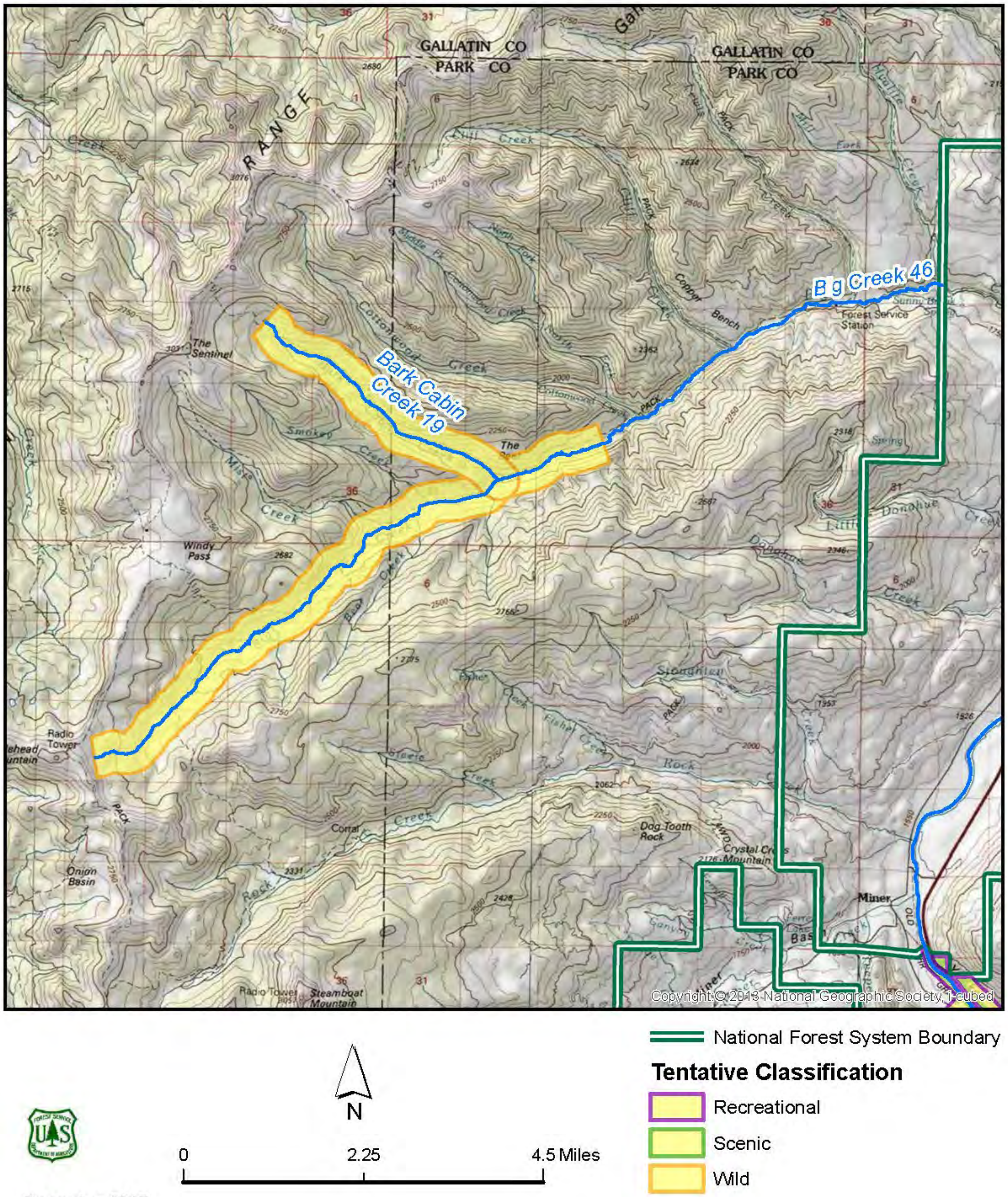
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: Big Creek

Geographic Area: Madison, Gallatin, and Henrys Lake Mountains

HUC10 Name: Big Creek-Yellowstone River



December 2017

Big Timber Creek

Table 21. Big Timber Creek, Yellowstone Ranger District

River Description	Big Timber Creek, Yellowstone Ranger District
Geographic Area	Bridger, Bangtail and Crazy Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation, Scenery
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Recreational – Contained within Township 3 North, Range 12 East, Section 4
Miles of each Segment	Recreational = 1.08 miles
Tentative Classification	Recreational
Counties	Park and Sweet Grass Counties
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	This visually exciting stretch of Big Timber Creek passes through a narrow canyon bounded by steeply-sloping, tall rock and conifer-covered sidewalls, punctuated by avalanche chutes, cliffs and outcrops. The river froths over and around large boulders and exposed bedrock. About 0.25 mile upstream of Halfmoon Campground, the dynamics of the river culminate in a series of plunges that appear as a bright white churning and thundering column zigzagging back and forth and contrasting with the confining rough, dark rock side walls and boulders.
Recreation	The Big Timber Creek Falls are a series of falls that split a narrow rock canyon. The relatively short hike to the falls on the Big Timber Canyon trail and then a user created trail, is a popular destination for hikers and photographers to view the lower portion of the falls. The area is considered a prime destination in the Crazy Mountain Range. Downstream of the falls, adjacent to the Halfmoon campground the creek is a popular destination for swimming and fly fishing. The opportunity for recreationists to experience powerful waterfalls is relatively unique on the Custer Gallatin and within the region of comparison. Big Timber Creek canyon including the falls themselves, provides a somewhat unique spring technical whitewater boating opportunity for the Custer Gallatin National Forest and within the Greater Yellowstone Area; making it an exemplary destination paddle.
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value

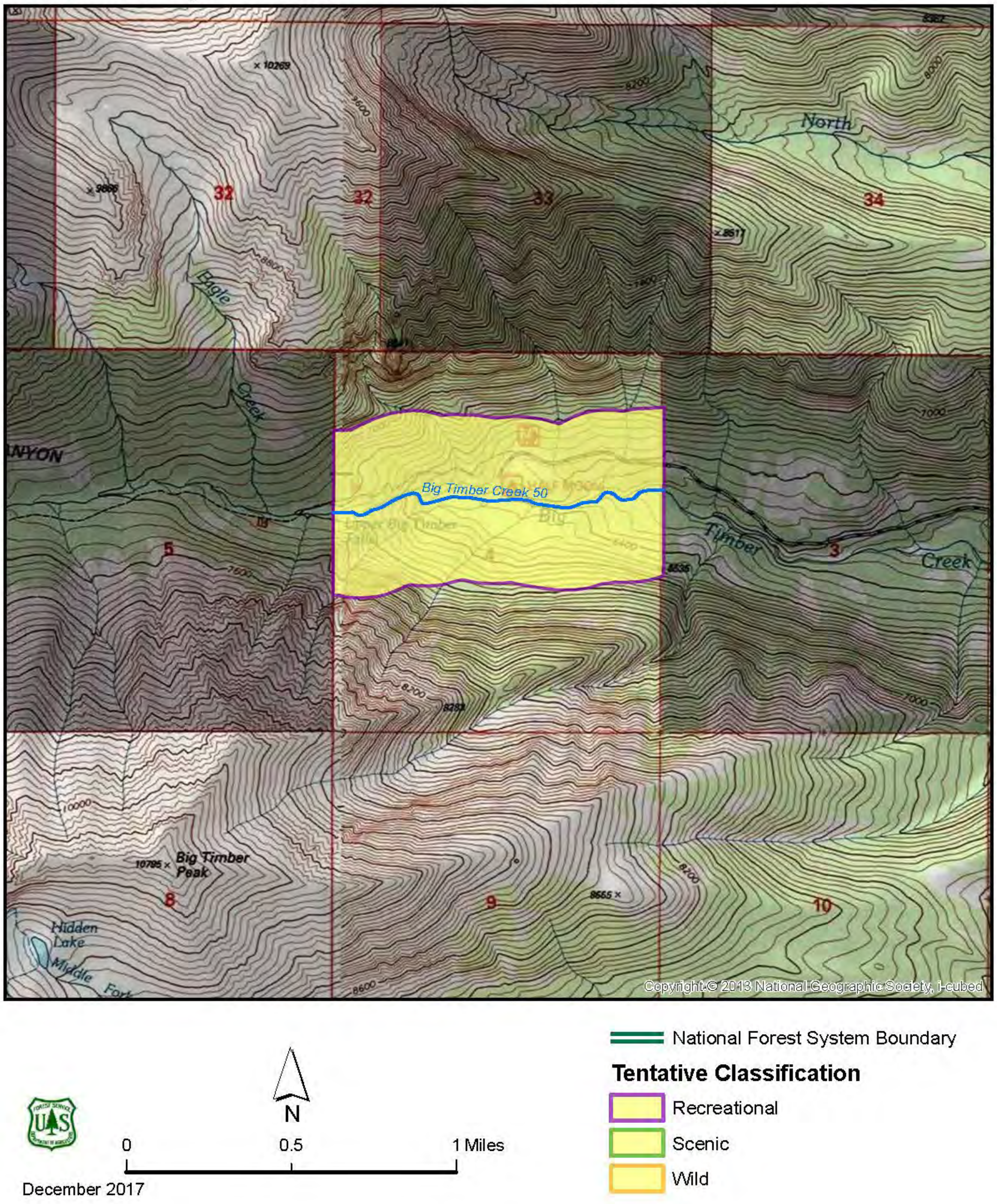
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: Big Timber Creek

Geographic Area: Bridger, Bangtail, and Crazy Mountains

HUC10 Name: Big Timber Creek

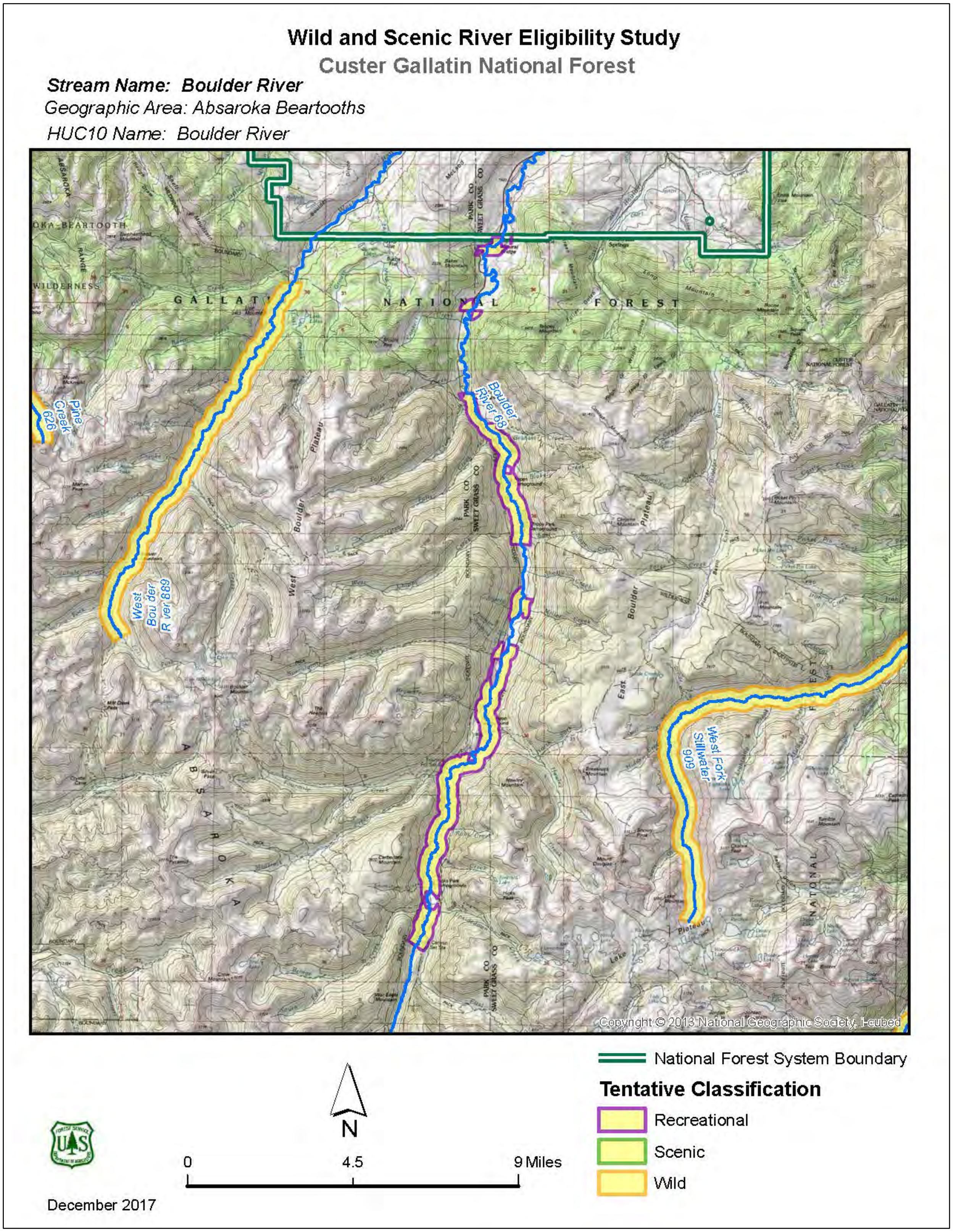


Boulder River

Table 22. Boulder River, Yellowstone Ranger District

River Description	Boulder River, Yellowstone Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation, Scenery, Geology, Heritage
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Recreational – From Box Canyon to the national forest boundary at Natural Bridge; excludes private lands.
Miles of each Segment	Total national forest miles = 15.52
Tentative Classification	Recreational
Counties	Sweetgrass and Park, Montana
Identified in Previous Eligibility Studies?	Yes
Outstandingly Remarkable Values	**Resource Description**
Scenery	The Main Boulder River flows down a steep-sided glacial valley surrounded by forested, talus-covered slopes and steep open meadows. As indicated by its name, the river is full of and lined with boulders of all sizes and thus spotted with pools, riffles, rapids and rocky islands. By contrast, in places the river flattens, forming slower, reflective meanders that double back on themselves through cottonwoods, willows, marshes, meadows or in one location, beaver ponds. Through “Hells Canyon” the river steepens and rushes through narrow sections confined by rocky banks, cliffs and large boulders. As the river approaches Natural Bridge, a former Montana state park, limestone sidewalls rise up, leading to the dramatic Natural Bridge Falls that pour over and is surrounded by 100 feet sheer and even overhung cliffs. During low flow, just above the brink of the falls, the water spectacularly disappears down erosion holes in the exposed limestone river bed and reappears – spouting out holes in the face of the cliff and dropping into the rocky pool at the base. Due to the spray from the falls, small flowering and herbaceous plants thrive in breaks along the cliff walls. The namesake “natural bridge” collapsed in the 1990s, but in reality it was only a minor visual feature at the site. During autumn, the deciduous vegetation all along the river lights up and transforms the entire drainage, strongly contrasting with the adjacent darker conifers. The Main Boulder River, with its scenic features, uniquely stunning Natural Bridge Falls, and adjacent picturesque and historic Main Boulder Ranger Station, provides scenery that is unusual and remarkable for the Greater Yellowstone Area.
Recreation	The Main Boulder River Corridor is an impressive and unique destination for recreationists to partake in river based recreation within the region of comparison. While many recreation sites do occur within river corridors on the national forest or within the region of comparison the Main Boulder River and its density and variety of recreation opportunities specifically tied to the Boulder River make it exemplary. The river corridor is home to Natural Bridge Falls, a historic ranger station and visitor center, campgrounds, church camps, recreation residences, picnic areas and rental cabins all of which rely on the river corridor for their unique opportunity. The Main Boulder River is a popular destination for most type of water based recreation including swimming, recreational boating, and fly fishing. The Main Boulder River is considered a fly fishing destination within the Greater Yellowstone Area, drawing fisherman from within and from outside of the region of comparison to experience this exemplary fishing opportunity. The Main Boulder River also provides a somewhat unique technical whitewater boating opportunity for the national forest and within the Greater Yellowstone Area; making it a destination paddle.

River Description	Boulder River, Yellowstone Ranger District
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	Within the region of comparison, the outstanding geologic resource values within this stream segment are related to unique, rare or exemplary examples of alpine glacial landscapes and processes, as well as karst features in the Region of Natural Bridge.
Heritage	Crow Name (Bilalo`ohchipee) “Where Water goes under.” Natural Bridge is an important location to the Crow. National Register Main Boulder guard station is along the corridor.
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Boulder River
Geographic Area: Absaroka Beartooths
HUC10 Name: Boulder River
Pine Creek 626
West Boulder River 869
Boulder River 68
West Fork Stillwater 909
GALLATIN NATIONAL FOREST
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National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
4.5
9 Miles
December 2017

Cabin Creek

Table 23. Cabin Creek, Hebgen Lake Ranger District

River Description	Cabin Creek, Hebgen Lake Ranger District
Geographic Area	Madison, Henrys Lake, and Gallatin Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Fisheries, Scenery
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	From headwaters to above constructed fish barrier longitude 111.341, latitude 44.875; Township 11 South, Range 3 East, Section 15
Miles of each Segment	Scenic = 7.3 miles
Tentative Classification	Scenic
Counties	Gallatin County, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	Starting approximately a half mile upstream of where the Cabin Creek Scarp (caused by the 1959 earthquake) is still visible and Cabin Creek's flow has cut a narrow canyon through a visually spectacular band of exposed limestone strata that was uplifted and tilted millions of years ago. The erosion and the remaining limestone strata in this narrow canyon form striking scenery. This visually outstanding section of the creek extends upstream for approximately one mile and meets the criteria for a scenery outstandingly remarkable value.
Recreation	No outstandingly remarkable value
Fisheries	High quality habitat relative to the region of comparison. Pure western cutthroat trout population. No exotics. A constructed barrier exists to keep out non-native species.
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value

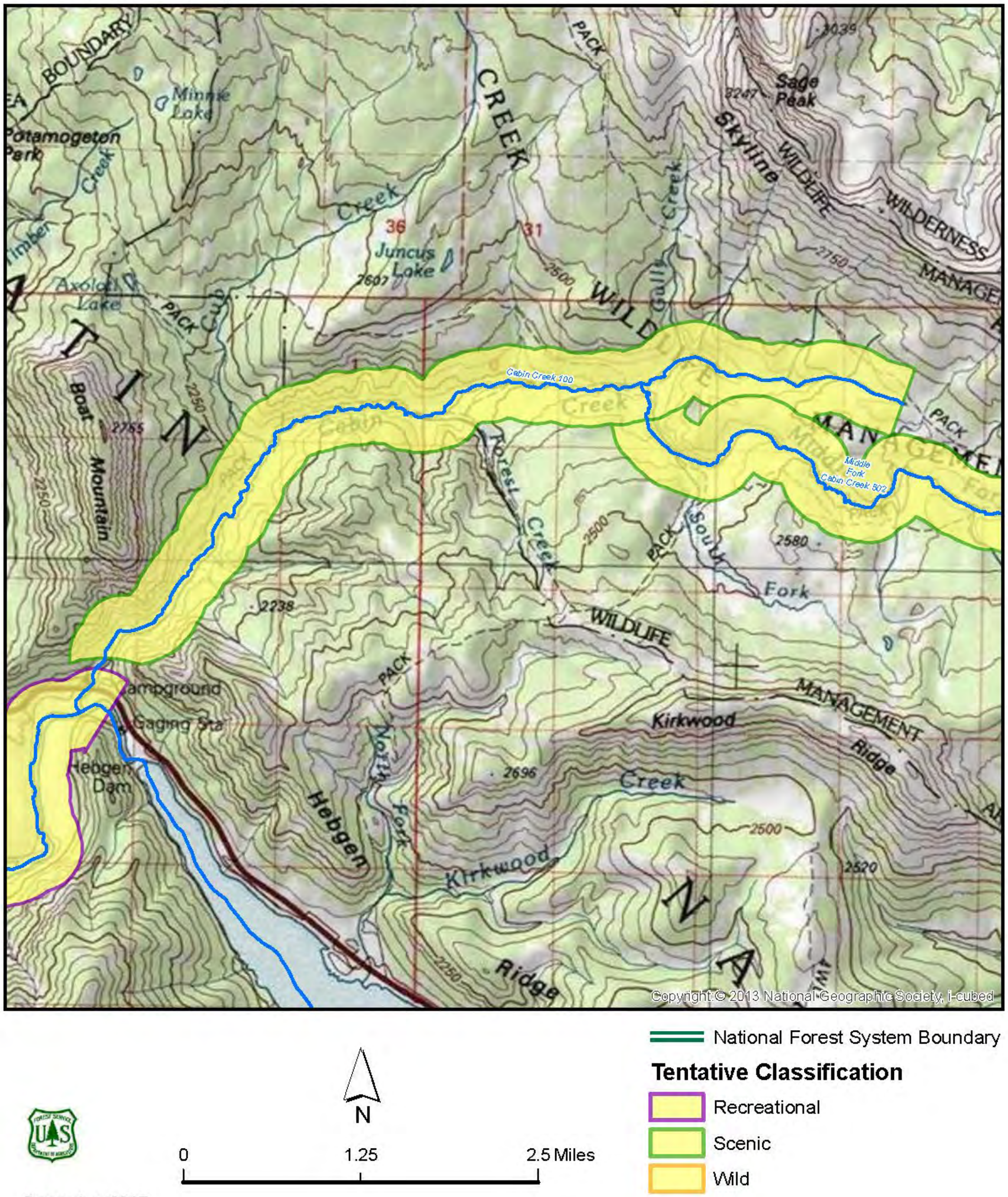
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: Cabin Creek

Geographic Area: Madison, Gallatin, and Henrys Lake Mountains

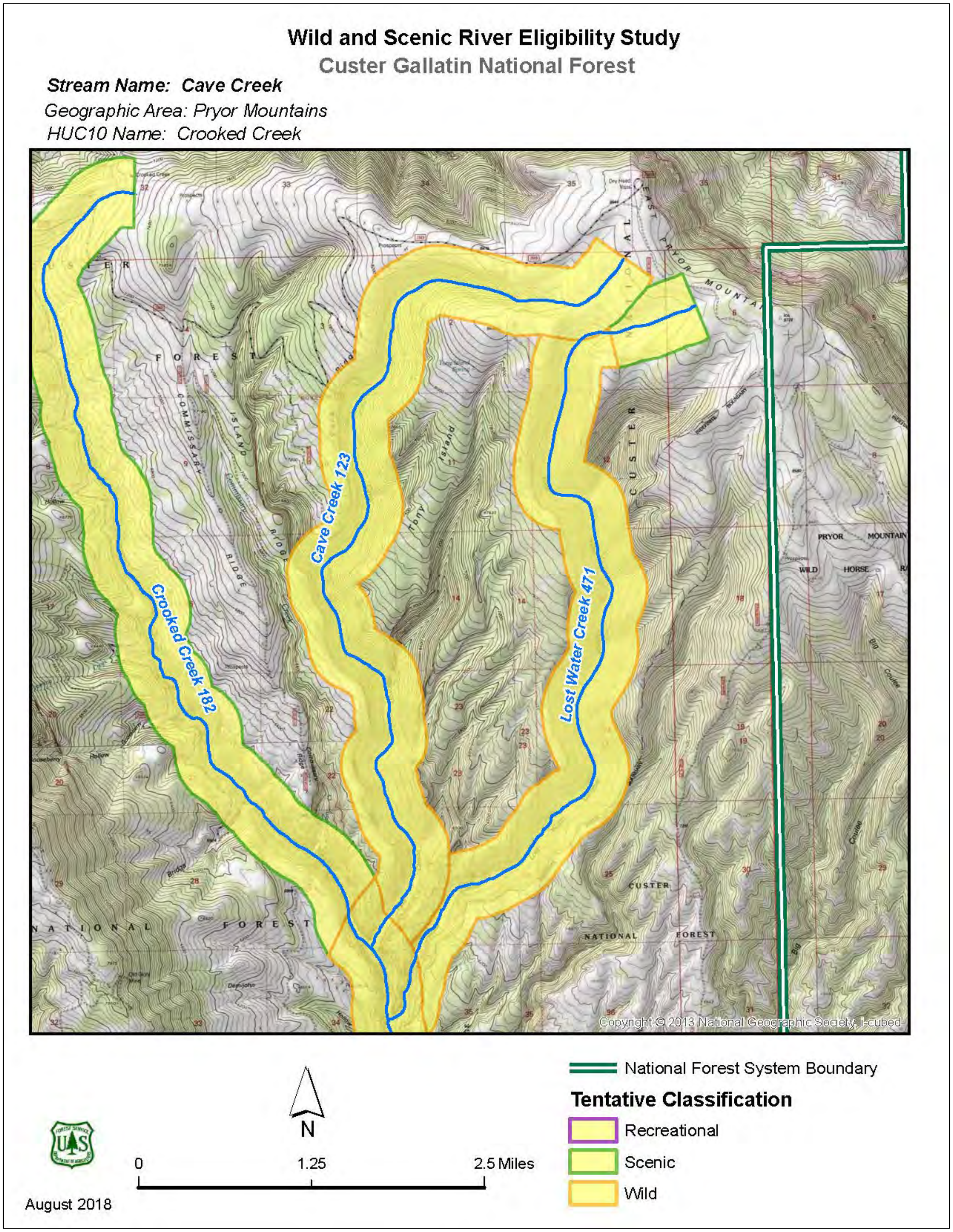
HUC10 Name: Earthquake Lake-Madison River



Cave Creek

Table 24. Cave Creek, Beartooth Ranger District

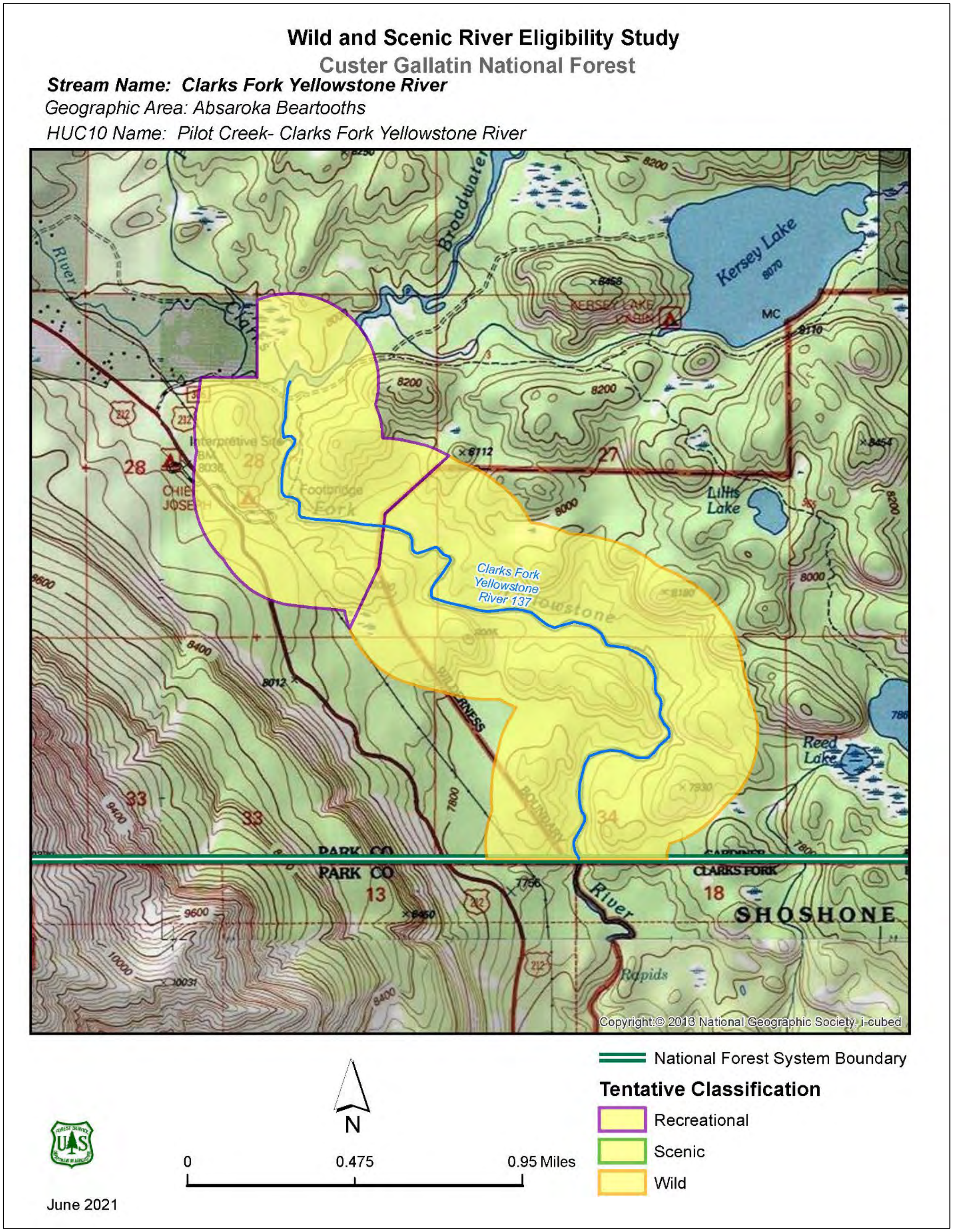
River Description	Cave Creek, Beartooth Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Geology, Scenery
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	From headwaters to junction with Crooked Creek
Miles of each Segment	Wild = 7.2 miles
Tentative Classification	Wild
Counties	Stillwater County, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	Many of the scenic qualities listed for the scenery outstandingly remarkable value of nearby Crooked Creek and Lost Water Creek also apply to Cave Creek, especially in its lowest one mile. In the lower portions of Cave Creek, the exposed, eroded, sharp-edged limestone buttresses and cliffs, with wind and water-sculpted holes and caves extend down to the bottom of the drainage. The magnitude of these features, juxtaposed against the darker conifers, meet the criteria for a scenery outstandingly remarkable value.
Recreation	No outstandingly remarkable value
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	Part of the hillside that includes Crooked Creek—outstanding geologic resource values within this stream segment are related to unique, rare or exemplary examples of a stream dissected karst landscape which has created a deeply incised stream course and vertical limestone canyons walls. The area also possesses hydrologic characteristic of karst dominated lands which serves to sustain stream functions within the Crooked Creek canyon
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Cave Creek
Geographic Area: Pryor Mountains
HUC10 Name: Crooked Creek
Crooked Creek 182
Cave Creek 123
Lost Water Creek 471
CUSTER
NATIONAL
FOREST
PRYOR MOUNTAIN
WILD HORSE
Copyright © 2013 National Geographic Society, i-cubed
National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
1.25
2.5 Miles
August 2018

Clarks Fork Yellowstone River

Table 25. Clarks Fork Yellowstone River, Gardiner Ranger District

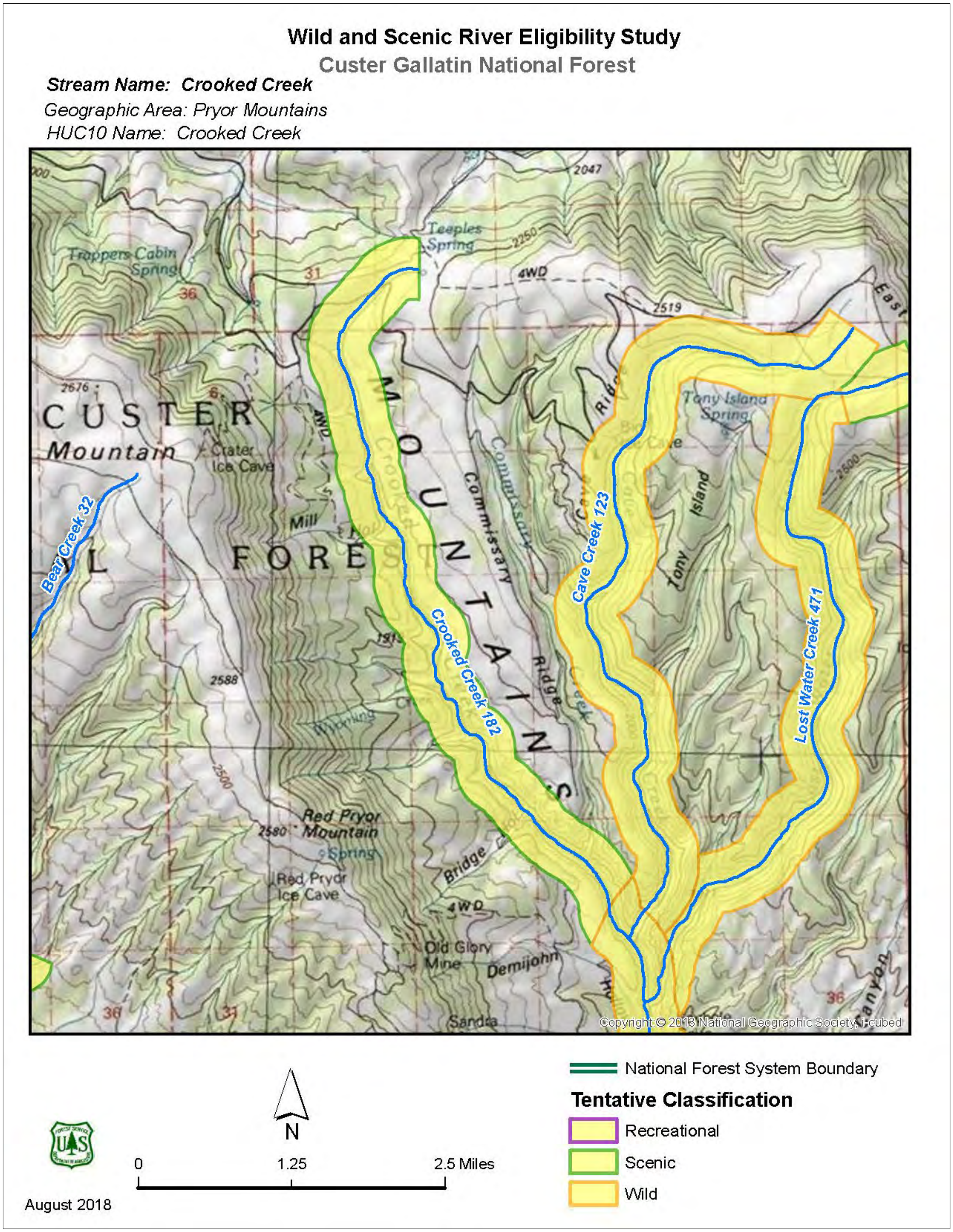
River Description	Clarks Fork Yellowstone River, Gardiner Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Scenery
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Wild – From the Shoshone National Forest boundary within the wilderness area Recreational – From wilderness boundary to confluence with the Broadwater Creek
Miles of each Segment	Wild = 1.85 miles; Recreational = 0.70 mile
Tentative Classification	Wild – From the Shoshone National Forest boundary within the wilderness area Recreational – From wilderness boundary to confluence with the Broadwater Creek
Counties	Park County, Montana
Identified in Previous Eligibility Studies?	Yes
Outstandingly Remarkable Values	**Resource Description**
Scenery	This outstandingly remarkable value is in both segments. Roughly paralleling the Beartooth Scenic Byway, the Clarks Fork of the Yellowstone, from its confluence with the Broadwater River downstream to the Wyoming border, provides an extremely unique mix of a visually thrilling river and intriguing historic features. Easily visible are remnants of the unique historic low head dam (breached long ago) and flume that formerly carried water to the 1916 power plant to supply electricity to the mining operations. At the Clarks Fork Trailhead and picnic area, the boulders and outcrops form a scenic low waterfall across the entire channel that, along with the conifer trees, frame iconic Granite Peak in the distance. Immediately below the pond at the base of that waterfall, the granite walls confine the river, forming some breathtaking cascades. As the river continues it continues to drop, winding around fir and pine-edged granite boulders, knobs and outcrops, interspersed cascades and calmer granite cliff-lined and wetland meadow stretches. The juxtaposition of easily discernible river-related historic features that add to the sense of place, with stunning natural scenery elements provide a short river segment that is outstanding and unique in the region of comparison.
Recreation	No outstandingly remarkable value
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Clarks Fork Yellowstone River
Geographic Area: Absaroka Beartooths
HUC10 Name: Pilot Creek- Clarks Fork Yellowstone River
Clarks Fork Yellowstone River 137
Kersey Lake
Lillis Lake
Reed Lake
SHOSHONE
PARK CO
CLARKS FORK
Copyright:© 2013 National Geographic Society, i-cubed
National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
0.475
0.95 Miles
June 2021

Crooked Creek

Table 26. Crooked Creek, Beartooth Ranger District

River Description	Crooked Creek, Beartooth Ranger District
Geographic Area	Pryor Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Geology, Scenery, Heritage, Fisheries
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Scenic – From the headwaters of Crooked Creek to the national forest and Bureau of Land Management boundary.
Miles of each Segment	Wild = 1.44 miles; Scenic = 6.45 miles
Tentative Classification	Wild – Where the creek enters National Forest System lands (from the southern boundary with the Bureau of Land Management), until it meets the half-mile buffer with Cave Creek. Scenic – At that junction near Cave Creek, the reminder of the Crooked Creek.
Counties	Carbon, Montana
Identified in Previous Eligibility Studies?	Yes. Also previously identified in adjacent Bureau of Land Management's wild and scenic river's evaluation as Eligible and Suitable.
Outstandingly Remarkable Values	**Resource Description**
Scenery	Crooked Creek, as one of a few perennial streams in the Pryors, flows along the bottom of an impressive deeply-incised canyon dividing the two major uplifted parts of the Pryor Mountains. While the canyon shares some visual characteristics with other canyons that cut downhill on the south and southwest side of the Pryors, the magnitude, continuity, extensive and sharp-edged, red and gray-colored limestone cliffs and buttresses make it exemplary for the region of comparison. Pocked with a variety of water and wind-sculpted holes, caves, fluting and columns, the limestone cliffs, in places up to hundreds of feet tall at the canyon's deepest, lend the canyon a sense of mystery, inaccessibility and surprise. The dark greens of the trees and shrubs that take advantage of the year-round water flow as well as some protection of the shadier alcoves formed by the canyon walls visually contrast with the exposed bright-colored limestone cliffs.
Recreation	No outstandingly remarkable value
Fisheries	High quality habitat relative to the region of comparison. Pure Yellowstone cutthroat trout population. No exotics. A barrier exists to keep out non-native species.
Wildlife	No outstandingly remarkable value
Geology	Outstanding geologic resource values within this stream segment are related to unique, rare or exemplary examples of a stream dissected karst landscape which has created a deeply incised stream course and vertical limestone canyons walls. The area also possesses hydrologic characteristic of karst dominated lands which serves to sustain stream functions within the Crooked Creek canyon.
Heritage	High concentration of cultural sites including rock shelters, aboriginal trails and historic logging camps.
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Crooked Creek
Geographic Area: Pryor Mountains
HUC10 Name: Crooked Creek
Crooked Creek 182
Cave Creek 123
Lost Water Creek 471
Bear Creek 32
Teeples Spring
Trappers Cabin Spring
Tony Island Spring
Crater Ice Cave
Red Pryor Mountain Spring
Red Pryor Ice Cave
Old Glory Mine
Demijohn
Commissary Ridge
Bridge
CUSTER
FOREST
MOUNTAINS
Copyright:© 2013 National Geographic Society, i-cubed
National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
1.25
2.5 Miles
August 2018

Gallatin River

Table 27. Gallatin River, Bozeman Ranger District

River Description	Gallatin River, Bozeman Ranger District
Geographic Area	Madison, Henrys Lake, and Gallatin Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation, Scenery, Heritage
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Recreational – The Gallatin River exits Yellowstone National Park onto the Custer Gallatin National Forest, then meanders in and out of the national park boundary until it finally stays on the national forest. There are long stretches of river shoreline that have private and other ownerships, mixed with stretches with at least one shore on national forest. The Gallatin River finally exits the Custer Gallatin National Forest near Gallatin Gateway. Segments that cross private and state lands are not included in the river Eligibility study.
Miles of each Segment	Total national forest miles = 26.02
Tentative Classification	Recreational
Counties	Gallatin County, Montana
Identified in Previous Eligibility Studies?	Yes
Outstandingly Remarkable Values	**Resource Description**
Scenery	From the point at which the Gallatin River leaves Yellowstone National Park and enters the Custer Gallatin National Forest on the south end of this segment, to where it leaves the national forest on its north end, the river passes stunning rock formations, cliffs, wetlands, open meadows and steep tree-covered or open grass slopes that visually create the intimate nature of the Gallatin Canyon. The upper stretch meanders and braids through broad, densely-covered willow meadows, edged by spectacular ochre-colored limestone cliffs that glow in late afternoon sun. This stretch also passes fence lines and some buildings of a couple historic ranches, which visually add context to the landscape. In the stretch of river close to and downstream of Big Sky, the river also is edged by a lot of residential and business development, which, in places, dominates the immediate foreground view. However, because the scenic backdrop of steep tree-covered slopes, cliffs and rock outcrops immediately behind the narrow strip of development is so outstanding, or because there is, in places, a thin band of trees or shrubs that fill the immediate foreground of viewers on the river, the development does not completely override the scenic qualities. The nature of the river itself changes, from the slower narrow braids and meanders in its upper end to a single wider channel that is pushed around rocky ridges in its path, with increasing amounts of boulders and rocks, among which eddy pools contrast with rapids and swift water, especially during spring runoff. The boulder-choked sections are interspersed, in a few places, with wider flatter sections where the river splits around islands. In places the Douglas fir trees that edge long stretches of the river, lean and curve over the river, visually framing the channel. A narrow band of cottonwoods and other deciduous vegetation add color in the fall.
Recreation	The Gallatin River is a world renowned destination for all types of water based recreation. The portions of the river of the Custer Gallatin National Forest provide tremendous opportunity for wade fishing, recreational boating, picnicking, camping, wildlife viewing, and photography. While many recreation sites do occur within river corridors on the Custer Gallatin National Forest or within the region of comparison the Gallatin River Corridor and its density and variety of recreation opportunities specifically tied to the river make it exemplary.

River Description	Gallatin River, Bozeman Ranger District
	The river corridor is home to campgrounds, organization camps, recreation residences, picnic areas and trailheads all of which rely on the river corridor for the unique opportunity they provide. The Gallatin River is known to host one of the premier whitewater runs in the Greater Yellowstone Area, a class IV section called the "Mad Mile." This section is over a mile long and contains continuous stretches of challenging whitewater. This type of opportunity is relatively rare and unique within the Greater Yellowstone Area. The Gallatin River is considered a fly fishing destination within the Greater Yellowstone Area and beyond, drawing recreationists from within and from outside of the region of comparison to experience this exemplary fishing opportunity.
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	Civilian Conservation Corps built Shenango Ranger Station with a remarkable 1930s bridge across the river.
Other	No outstandingly remarkable value

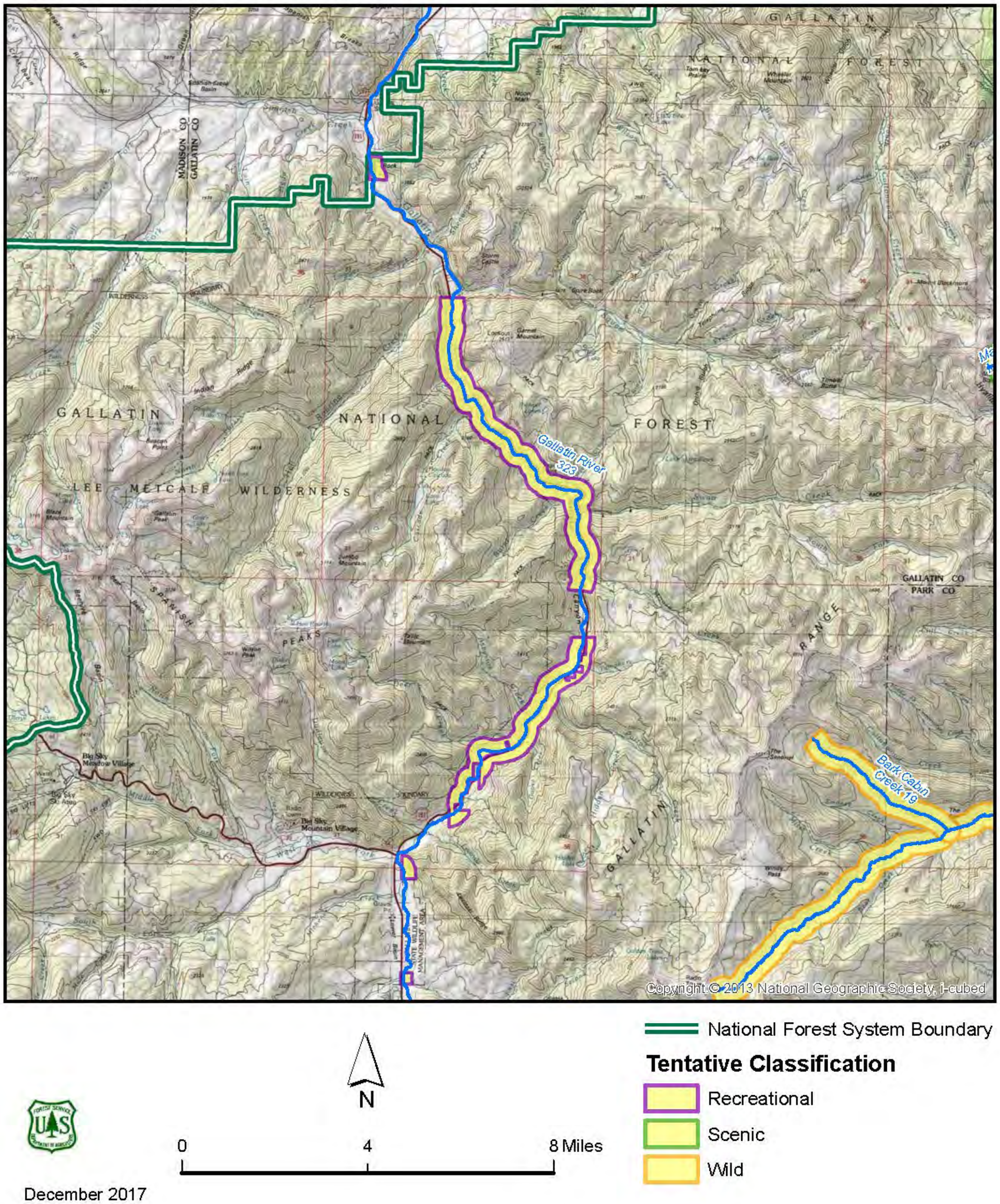
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: Gallatin River North

Geographic Area: Madison, Gallatin, and Henrys Lake Mountains

HUC10 Name: Headwaters Gallatin River



December 2017

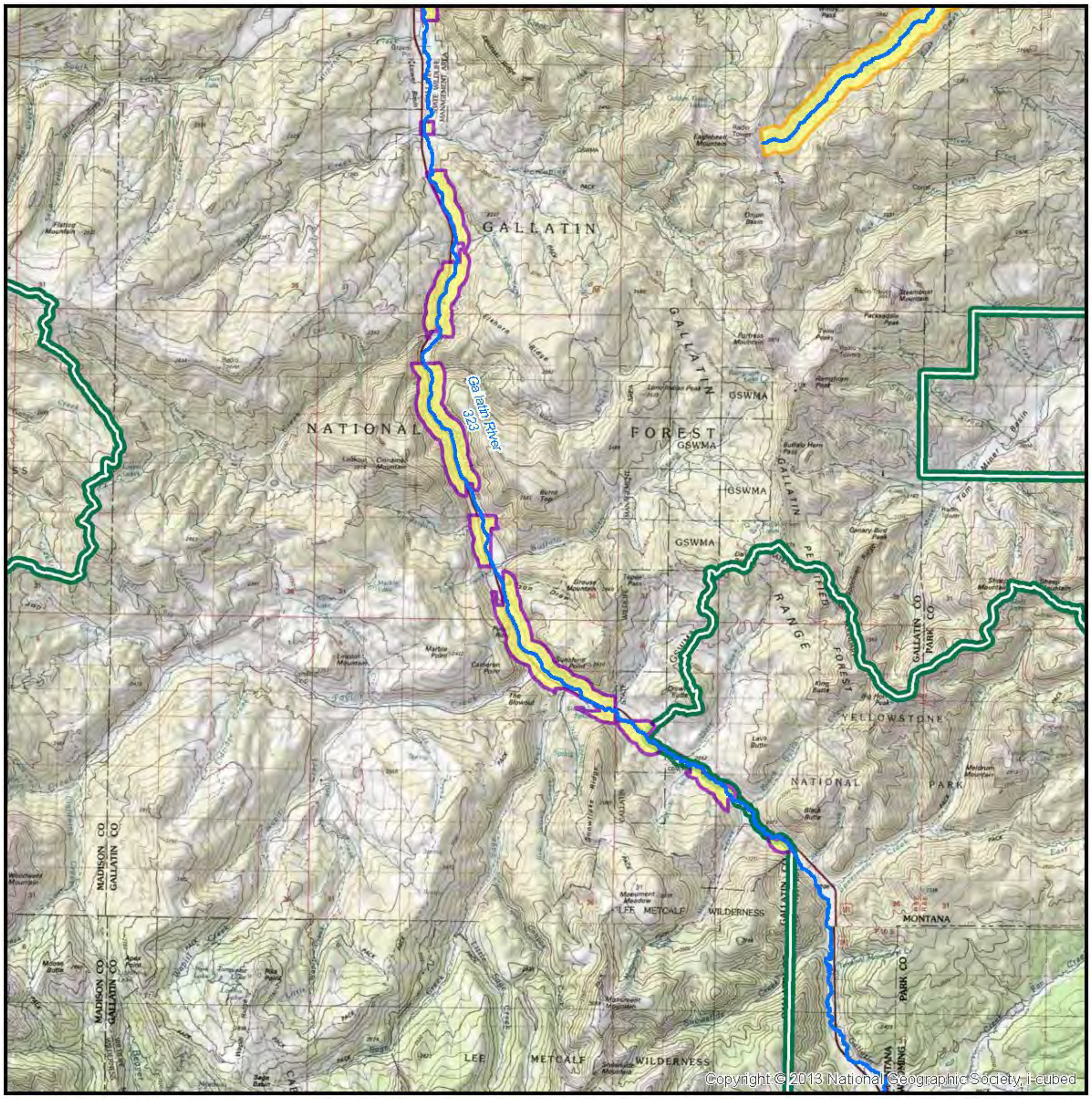
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: Gallatin River South

Geographic Area: Madison, Gallatin, and Henrys Lake Mountains

HUC10 Name: Headwaters Gallatin River

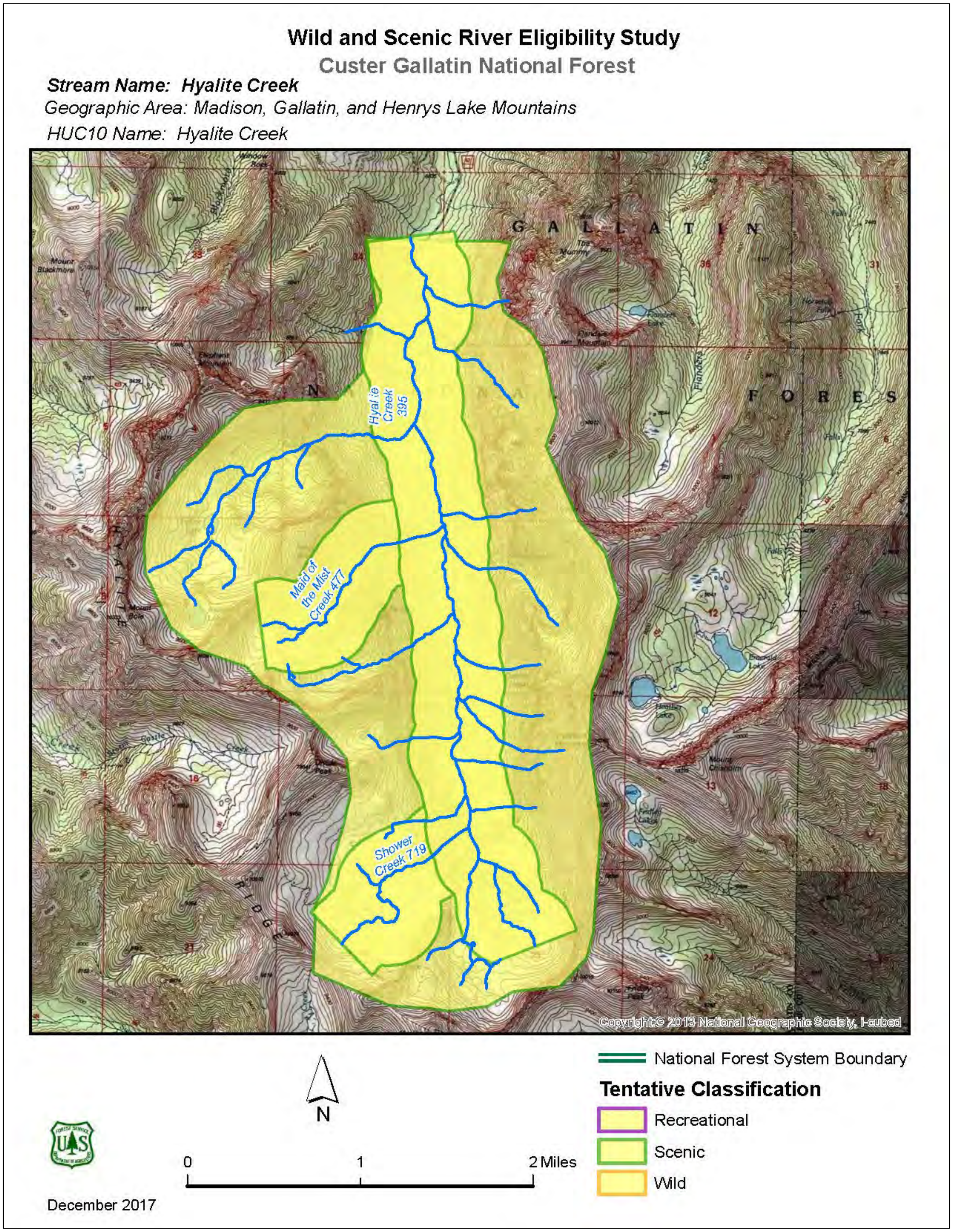


December 2017

Hyalite Creek

Table 28. Hyalite Creek, Bozeman Ranger District

River Description	Hyalite Creek, Bozeman Ranger District
Geographic Area	Madison, Henrys Lake, and Gallatin Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation, Scenery
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Scenic – From the headwaters to the West Fork/Grotto Falls Trailhead. Includes all side drainages, including un-named tributaries as mapped, along with the two named creeks, Maid of the Mist and Shower Creek which also start at their headwaters.
Miles of each Segment	Scenic = 4.64 miles
Tentative Classification	Scenic
Counties	Gallatin County, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	Upper Hyalite Creek, with all of its side tributaries that originate in lush alpine cirques spotted with sparkling lakes, walled in by tall cliffs of rough, dark volcanic rock, is a thrilling landscape with narrow U-shaped valleys, numerous spectacular waterfalls, and the main river course that is so extremely deeply incised that in one place the river flows through a unique arch, deep within the river chasm. The vegetation along the creek and tributaries varies from lush wetlands and meadows, to dense conifer forests to twisted wind-stunted trees in the higher elevations. In autumn, the area lights up with reds and yellows that contrast with the dark conifers.
Recreation	The area described as Upper Hyalite for the recreation outstandingly remarkable value includes the main stem of Hyalite Creek beginning at Grotto Falls Trailhead, and is an area that includes the named tributaries of Shower Creek and Maid of the Mist. The areas also include all of the unnamed tributaries that contribute to the unique recreation opportunity, including short off trail hikes, photography and world renowned ice climbing. The Hyalite River corridor is the most heavily visited recreation complex in Region 1 of Montana. Upper Hyalite, the area above the dam and reservoir to the headwaters provides exemplary recreation opportunity within the region of comparison. Hyalite Creek itself is a popular trail-based opportunity, with many side hikes to unique and densely concentrated waterfalls, and hike along the creek to the lake a major destination. The concentration of waterfalls create rare and exemplary conditions for ice climbing; making this area a destination in the Greater Yellowstone Area and beyond for a wide range of climbers
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Hyalite Creek
Geographic Area: Madison, Gallatin, and Henrys Lake Mountains
HUC10 Name: Hyalite Creek
G A L L A T I N
F O R E S
Hyalite Creek 395
Maid of the Mist Creek 477
Shower Creek 719
Copyright © 2013 National Geographic Society, i-cubed
National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
1
2 Miles
December 2017

Lake Abundance Creek

Table 29. Lake Abundance Creek, Gardiner Ranger District

River Description	Lake Abundance Creek, Gardiner Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Fisheries
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Wild – From the headwaters to the junction of Slough Creek. This creek is completely within the Absaroka-Beartooth Wilderness.
Miles of each Segment	Wild = 7.38 miles
Tentative Classification	Wild
Counties	Park County, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	No outstandingly remarkable value
Recreation	No outstandingly remarkable value
Fisheries	High quality habitat relative to the region of comparison. Pure Yellowstone cutthroat trout population. No exotics. A natural barrier exists to keep out non-native species.
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value

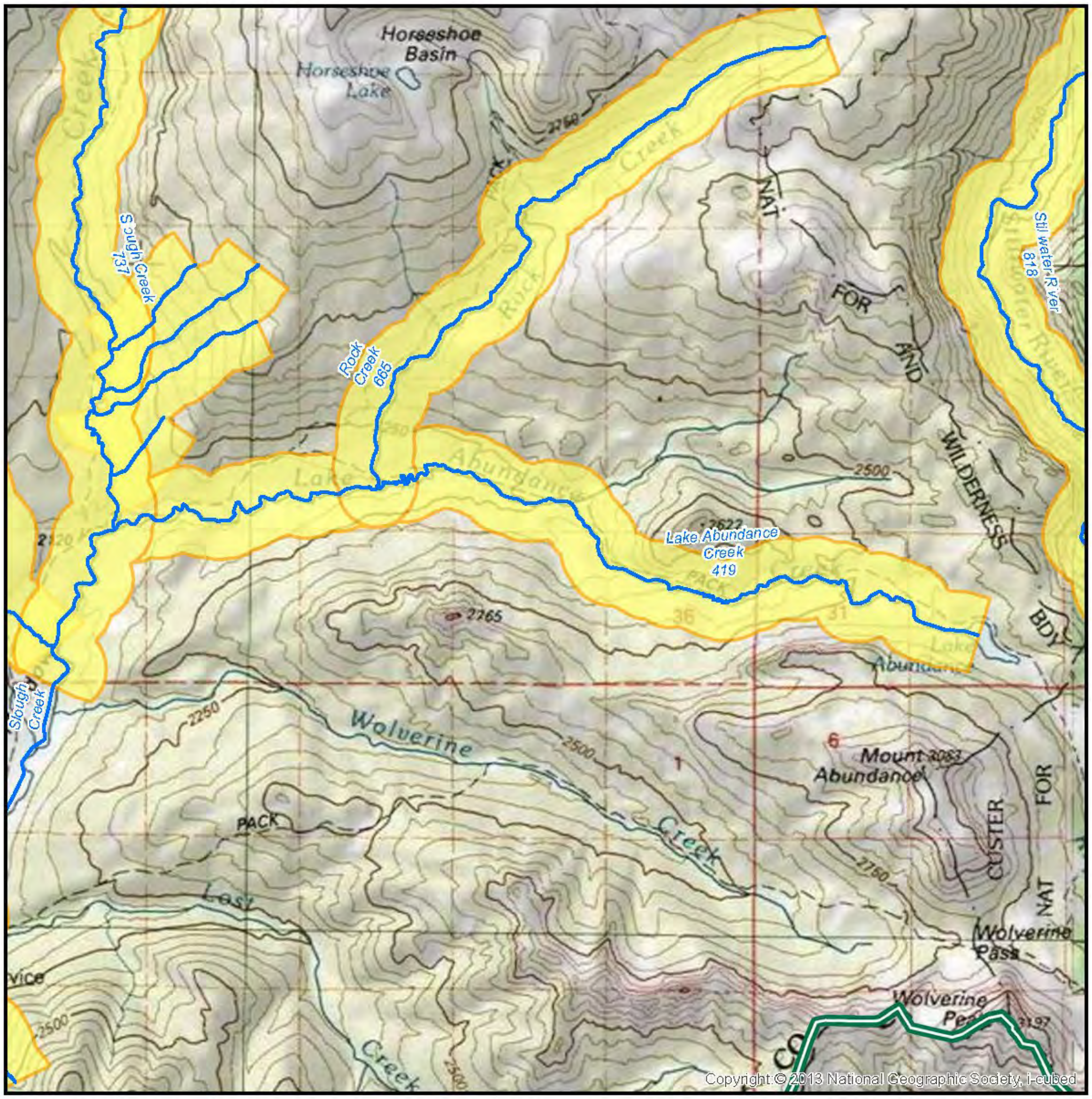
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: Lake Abundance Creek

Geographic Area: Absaroka Beartooths

HUC10 Name: Lower Lamar River



National Forest System Boundary

Tentative Classification

- Recreational
- Scenic
- Wild

N

0 1.25 2.5 Miles

December 2017

Lake Fork of Rock Creek

Table 30. Lake Fork of Rock Creek, Beartooth Ranger District

River Description	Lake Fork of Rock Creek, Beartooth Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation, Scenery
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Wild – From headwater to wilderness boundary. Recreational – From wilderness boundary to junction with main fork of Rock Creek.
Miles of each Segment	Wild = 10.94 miles; Recreational = 2.35 miles
Tentative Classification	Wild, Recreational
Counties	Carbon, Montana
Identified in Previous Eligibility Studies?	Yes, Custer National Forest Plan and Amendment #2
Outstandingly Remarkable Values	**Resource Description**
Scenery	From the Absaroka-Beartooth Wilderness boundary upstream to its headwaters: The creek has long runs of large glacial boulder-strewn whitewater, interspersed with quiet lush wetlands and meadows. In its lower sections, it passes through fairly dense forests of Douglas fir, lodgepole pine and aspen. Above its confluence with the creek from September Morn Lake, along the string of glacial lakes, which includes First and Second Rock Lakes up to the cirque that contains Sky Pilot Lake, there is an exemplary juxtaposition of the boulder-strewn creek, against expanses of steep talus, pockets and stringers of dense conifers, glacial-carved granite cliffs, alpine tarns, meadows full of alpine flowers and dotted with glacial erratic boulders. Due to the magnitude of these visual features, combined with the outstanding autumn colors provided by aspen, willow and other deciduous vegetation, the Lake Fork of Rock Creek, especially the upper part, is among the most remarkable waterways in the Greater Yellowstone Area and attracts visitors from across the Greater Yellowstone Area and beyond.
Recreation	The Lake Fork Rock Creek trail is popular recreation destination within the Absaroka-Beartooth Wilderness, the Greater Yellowstone Area and beyond for backpackers and hikers experiencing the exemplary recreation along the creek. The trail follows the Lake Fork of Rock Creek all the way up the canyon to Sundance Pass; which is also a unique and exemplary recreation destination
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value

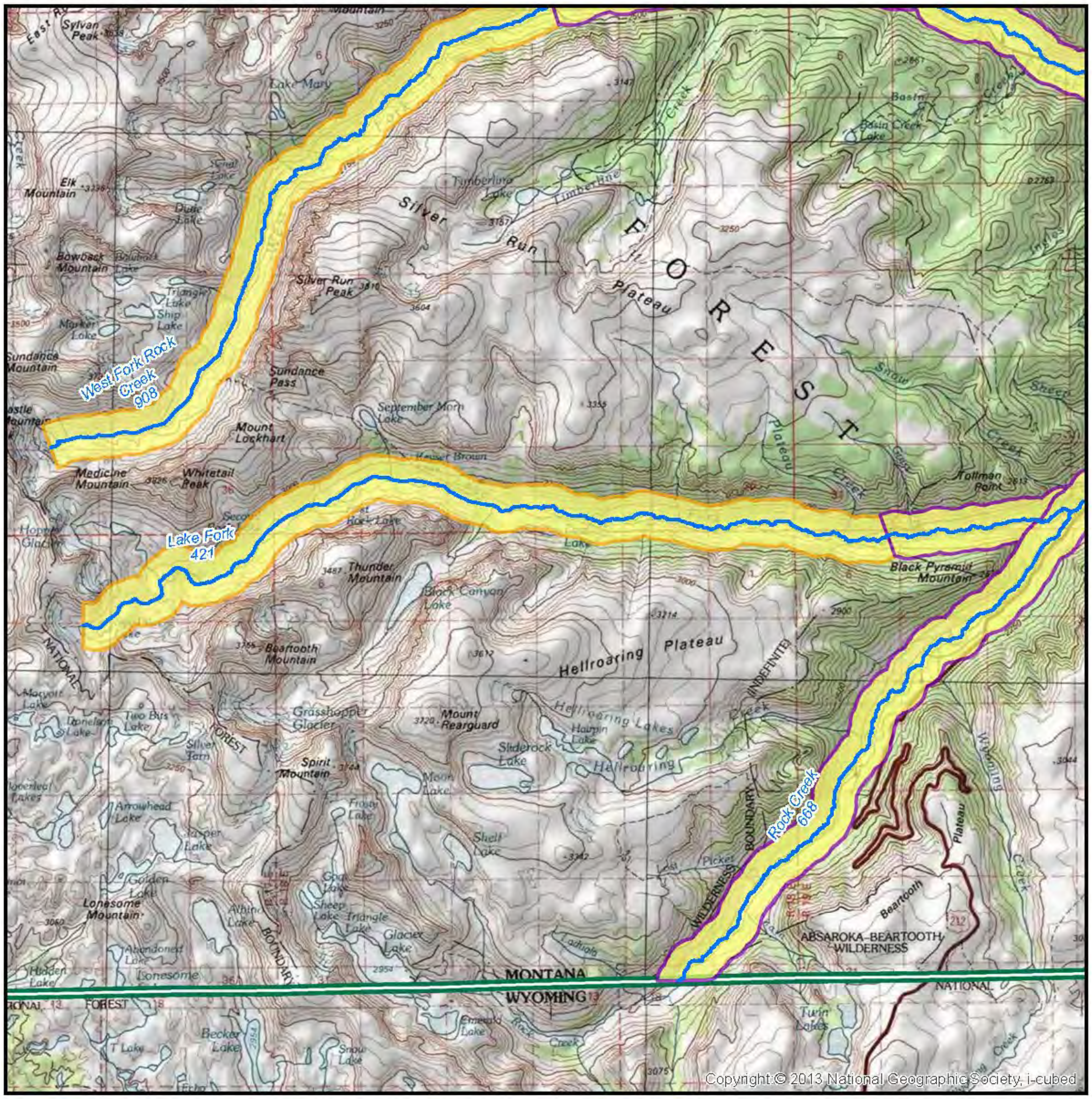
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: Lake Fork

Geographic Area: Absaroka Beartooths

HUC10 Name: Rock Creek



National Forest System Boundary

Tentative Classification

Recreational

Scenic

Wild

N

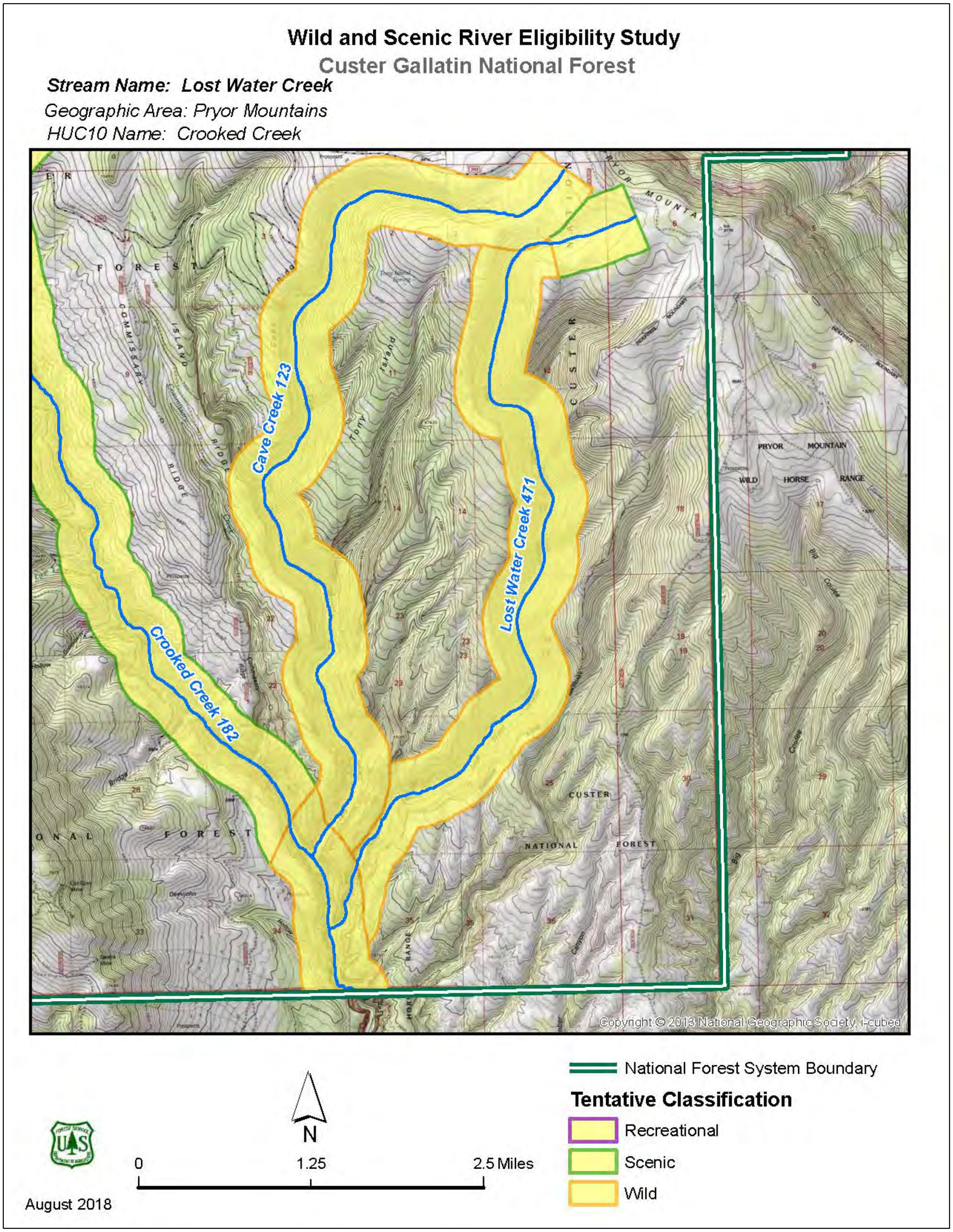
0 2.25 4.5 Miles

December 2017

Lost Water Creek

Table 31. Lost Water Creek, Beartooth Ranger District

River Description	Lost Water Creek, Beartooth Ranger District
Geographic Area	Pryor Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Scenery, Geology, Heritage
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Scenic – From the headwaters, Lost Water Canyon road 2308g, and its spur 2308g2 are Forest Service roads within the corridor. Wild – Where the roads depart from the 0.50 mile corridor, and the remaining area is undeveloped.
Miles of each Segment	Scenic = 0.64 mile; Wild = 6.25 miles
Tentative Classification	Wild, Scenic
Counties	Carbon, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description:**
Scenery	From approximately 2.5 miles above its confluence with Crooked Creek downstream to that confluence: As Lost Water Creek descends and gets close to its confluence with Crooked Creek, it becomes more incised, the sidewall cliffs become more vertical, the exposed limestone buttresses become more visually dominant, and the exemplary visual contrasts between the clusters of dark green trees juxtaposed with the startlingly reddish and gray-colored, sharp-edged limestone cliffs become stronger. Enhancing that striking scenery is the strong visible difference between the more densely vegetated canyon bottom and northeast-facing slopes, and the sparser southwest and west-facing slopes where more limestone and light-colored soil is exposed. Due to the continuity and length of the vertical sharp-edged cliffs, depth of the incised canyon, along with the vivid visual contrasts and visual dominance of the limestone buttresses, Lost Water Creek Canyon is outstanding in the Pryor Mountains and the Greater Yellowstone Area.
Recreation	No outstandingly remarkable value
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	Within the region of comparison, the outstanding geologic resource values within this stream segment are related to unique, rare or exemplary examples of a stream dissected karst landscape which has created a deeply incised stream course and vertical limestone canyons walls. The area also possesses hydrologic characteristic of karst dominated lands which serves to sustain stream functions within Lost Water Creek and Crooked Creek Cave Creek hydrologic complex of canyons.
Heritage	High concentration of cultural sites and aboriginal trails. These sites offer excellent examples of cultural use of travel routes and sites along waterways.
Other	No outstandingly remarkable value

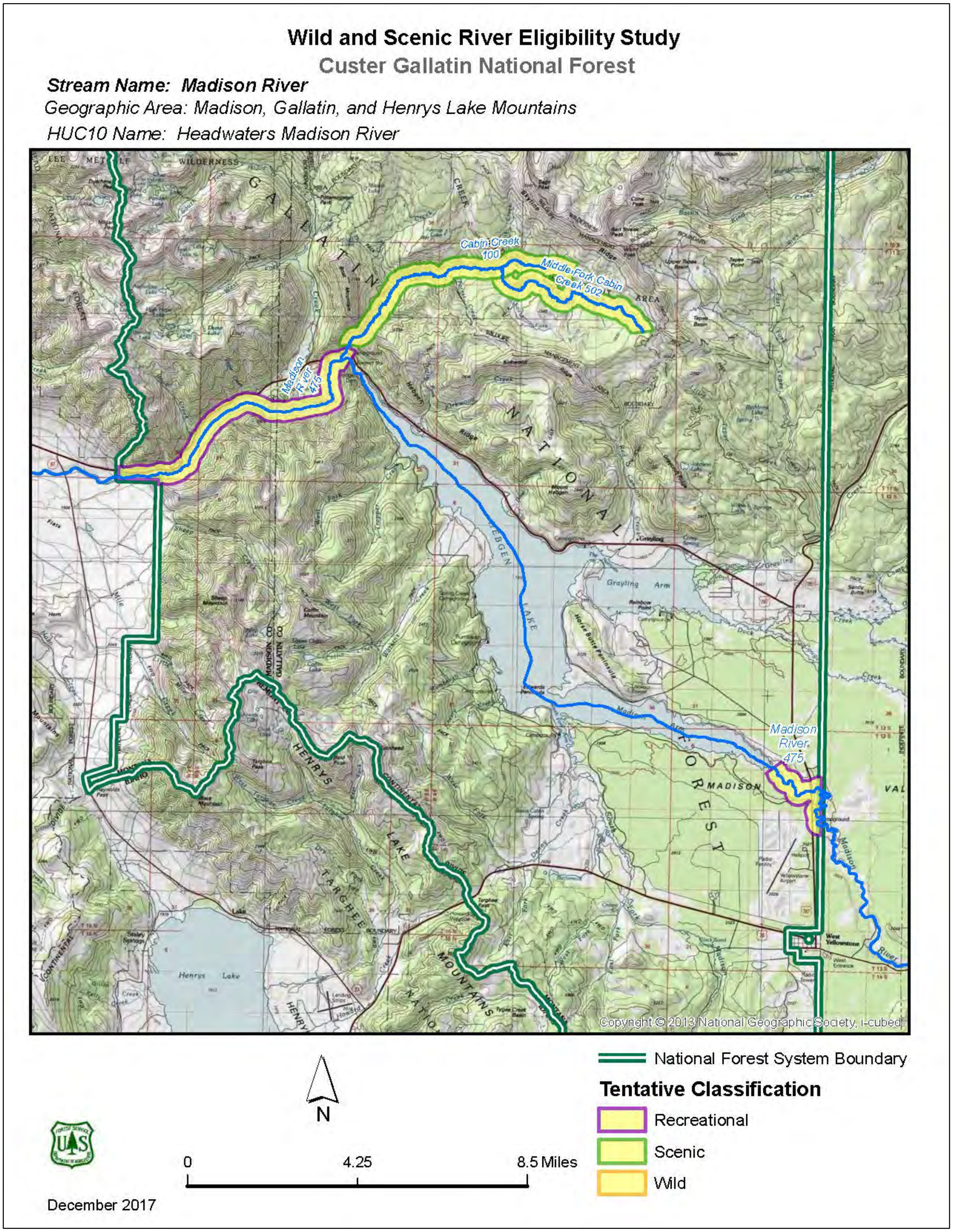

Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Lost Water Creek
Geographic Area: Pryor Mountains
HUC10 Name: Crooked Creek
Cave Creek 123
Lost Water Creek 471
Crooked Creek 182
Copyright © 2013 National Geographic Society, i-cubed
National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
1.25
2.5 Miles
August 2018

Madison River

Table 32. Madison River, Hebgen Lake Ranger District

River Description	Madison River, Hebgen Lake Ranger District
Geographic Area	Madison, Henrys Lake, and Gallatin Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation, Scenery, Geology, Heritage, Wildlife
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Segment 1 Recreational – From the boundary between Yellowstone National Park and Custer Gallatin National Forest in northeast side of Township 13 South, Range 5 East, Section 10 and Section 15 to its inlet in the Madison Arm of Hebgen Lake, excluding any segments that include Yellowstone National Park boundary. Segment 2 Recreational – From 0.50 mile below Hebgen Dam to the Custer Gallatin National Forest boundary.
Miles of each Segment	Segment 1 Recreational = 2.32 miles; Segment 2 Recreational = 8.44 miles
Tentative Classification	Recreational
Counties	Gallatin and Madison Counties, Montana
Identified in Previous Eligibility Studies?	Yes
Outstandingly Remarkable Values	**Resource Description**
Scenery	Scenery outstandingly remarkable value is in both Segments 1 and 2 – Above Hebgen Lake (reservoir), the river passes through a dense willow wetland, where uniquely compressed meanders of the river alternate between Yellowstone National Park and the Custer Gallatin National Forest. The lushness of the willows and other understory vegetation contrast sharply with the pines and firs growing on slightly higher, drier ground. In places the meanders almost double back on themselves, with smaller braided channels, abandoned meanders and dead-end channels creating exemplary visual variety along the river course. Below the Hebgen Dam the river bends almost 180 degrees around a steep forested ridge, then spreads out, flowing around islands and sandbars across a narrow flat meadow edged by steep forested slopes, forming strikingly stellar scenery. Where the river passes “Ghost Village” there are remnants of a resort and houses that were moved by the flood caused by the geologically significant 1959 earthquake and resulting landslide. The river slowly widens out as it enters the eerily stunning Earthquake Lake, confined by steep densely-covered conifer slopes along its south shore, on which the highest level of the flood is still easily discernible. Some sloping open meadows on the north side contrast with the otherwise steep conifer and avalanche-chute-lined slopes that drop right into the lake. The often-photographed feature of still-standing inundated dead trees, now bleached bright gray, usually host cormorants drying their wings – adding to the unique scenic setting. The starkness of the landslide is visually dominant on both sides of the Bureau of Reclamation-cut outlet, visually reinforcing the stunning magnitude of the geologic forces. The scenery of the landslide and the dramatically changed landscape along the Madison River, is unique not only in Greater Yellowstone Area but across the United States.
Recreation	Recreation outstandingly remarkable values are only found in Segment 2 – The Madison River is a renowned destination for all types of water based recreation. The portions of the river of the Forest provide tremendous opportunity for fishing, recreational boating, camping, wildlife viewing, and photography.

River Description	Madison River, Hebgen Lake Ranger District
	The Madison River is considered a fly fishing destination within the Greater Yellowstone Area and beyond, drawing recreationists from within and from outside of the region of comparison to experience this exemplary fishing opportunity. It is considered one of the most productive streams in Montana for brown trout, rainbow trout and mountain whitefish.
Fisheries	No outstandingly remarkable value
Wildlife	Wildlife outstandingly remarkable values are in Segment 1 and portion of Segment 2 described. Madison River inlet at Madison Arm of Hebgen Lake and the Madison River between Hebgen and Quake Lake are important wintering areas for large numbers of trumpeter swans. Within the region of comparison, this river stands out due to its strategic importance for wintering trumpeter swans.
Geology	Geology outstandingly remarkable value is located only in Segment 2. Within the region of comparison, the outstanding geologic resource values within this stream segment are related to unique, rare or exemplary examples of earthquake landslides and debris blocking a naturally flowing river and creating a lake.
Heritage	Heritage outstandingly remarkable values are in both segments. Part of the interpretive theme for the Nez Perce National Historic Trail representing “good times on the trail” for Bannock and Shoshone Tribes who were one of many groups that used the trail. The trail uses the Madison River corridor as it enters into the Hebgen Basin. This is a particularly intriguing interface of Plains and Basin artifact assemblages thought to be a crossroads for these cultures.
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Madison River
Geographic Area: Madison, Gallatin, and Henrys Lake Mountains
HUC10 Name: Headwaters Madison River
Cabin Creek 100
Middle Fork Cabin Creek 502
Madison River 475
Madison River 475
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National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
4.25
8.5 Miles
December 2017

Maid of the Mist

Table 33. Maid of the Mist, Bozeman Ranger District

River Description	Maid of the Mist, Bozeman Ranger District
Geographic Area	Madison, Henrys Lake, and Gallatin Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation, Scenery
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Scenic – Headwaters to junction with Hyalite Creek
Miles of each Segment	Total national forest miles = 1.38
Tentative Classification	Scenic
Counties	Gallatin County, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	This river is Included in scenery outstandingly remarkable value description For Hyalite Creek.
Recreation	The area described as Upper Hyalite for the recreation outstandingly remarkable value includes the main stem of Hyalite Creek beginning at Grotto Falls Trailhead, and is an area that includes the named tributaries of Shower Creek and Maid of the Mist. The areas also includes all of the unnamed tributaries that contribute to the unique recreation opportunity; including short off trail hikes, photography and world renowned ice climbing. The Hyalite River corridor is the most heavily visited recreation complex in Region one of Montana. Upper Hyalite, the area above the dam and reservoir to the headwaters provides exemplary recreation opportunity within the region of comparison. Hyalite Creek itself is a popular trail based opportunity, with many side hikes to unique and densely concentrated waterfalls, and hike along the creek to the lake a major destination. The concentration of waterfalls create rare and exemplary conditions for ice climbing; making this area a destination in the Greater Yellowstone Area and beyond for a wide range of climbers.
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value

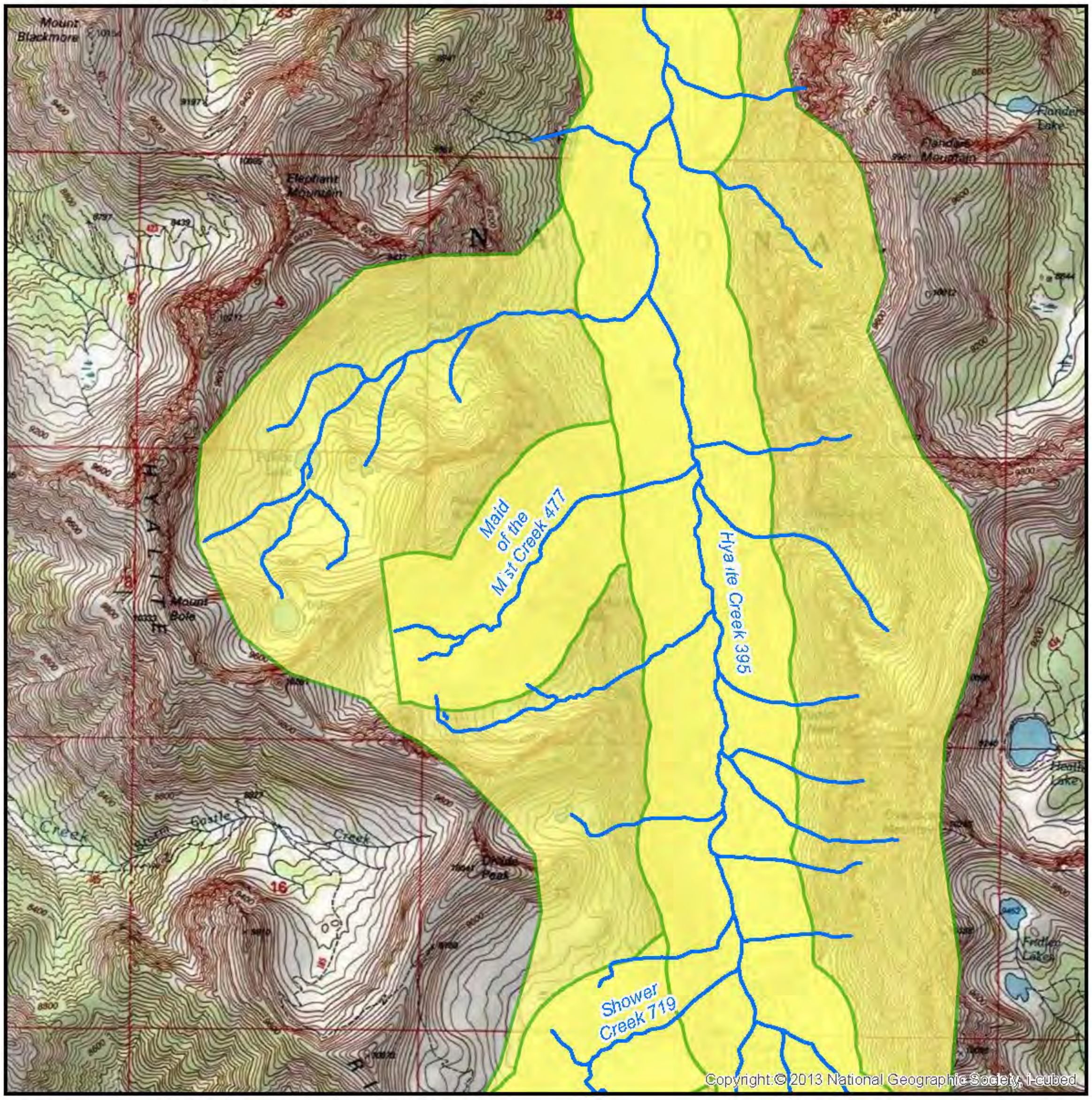
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: Maid of the Mist Creek

Geographic Area: Madison, Gallatin, and Henrys Lake Mountains

HUC10 Name: Hyalite Creek



N

0 0.5 1 Miles

December 2017

National Forest System Boundary

Tentative Classification

- Recreational
- Scenic
- Wild

Middle Fork Cabin Creek

Table 34. Middle Fork Cabin Creek, Hebgen Lake Ranger District

River Description	Middle Fork Cabin Creek, Hebgen Lake Ranger District
Geographic Area	Madison, Henrys Lake, and Gallatin Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Fisheries
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	From headwaters to confluence with main stem Cabin Creek
Miles of each Segment	Scenic = 5.1 miles
Tentative Classification	Scenic
Counties	Gallatin County, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	No outstandingly remarkable value
Recreation	No outstandingly remarkable value
Fisheries	High quality habitat relative to the region of comparison. Pure western cutthroat trout population. No exotics. A constructed barrier exists on the main stem of Cabin Creek to keep out non-native species.
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value

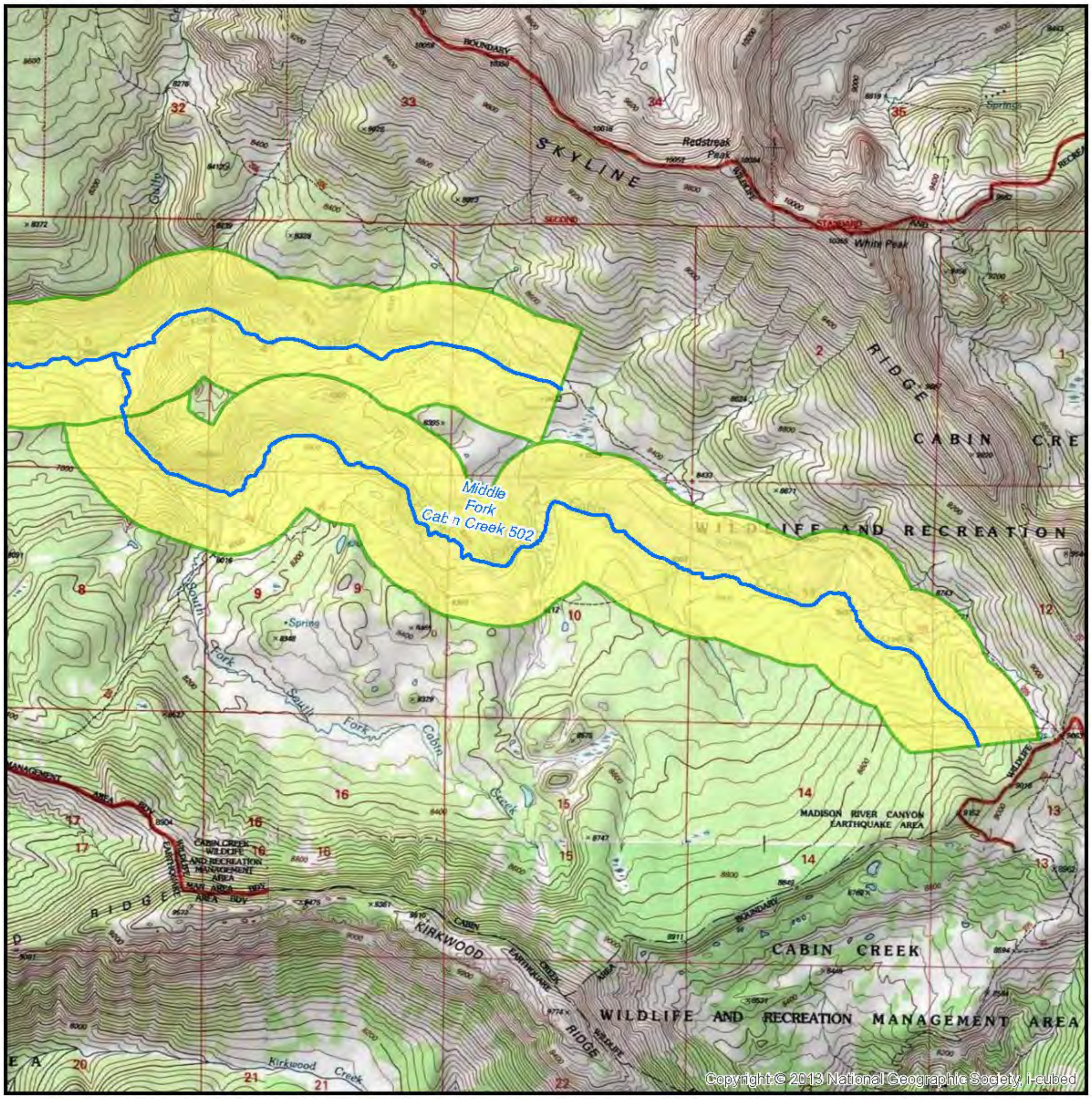
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: Middle Fork Cabin Creek

Geographic Area: Madison, Gallatin, and Henrys Lake Mountains

HUC10 Name: Earthquake Lake-Madison River



National Forest System Boundary

Tentative Classification

- Recreational
- Scenic
- Wild

N

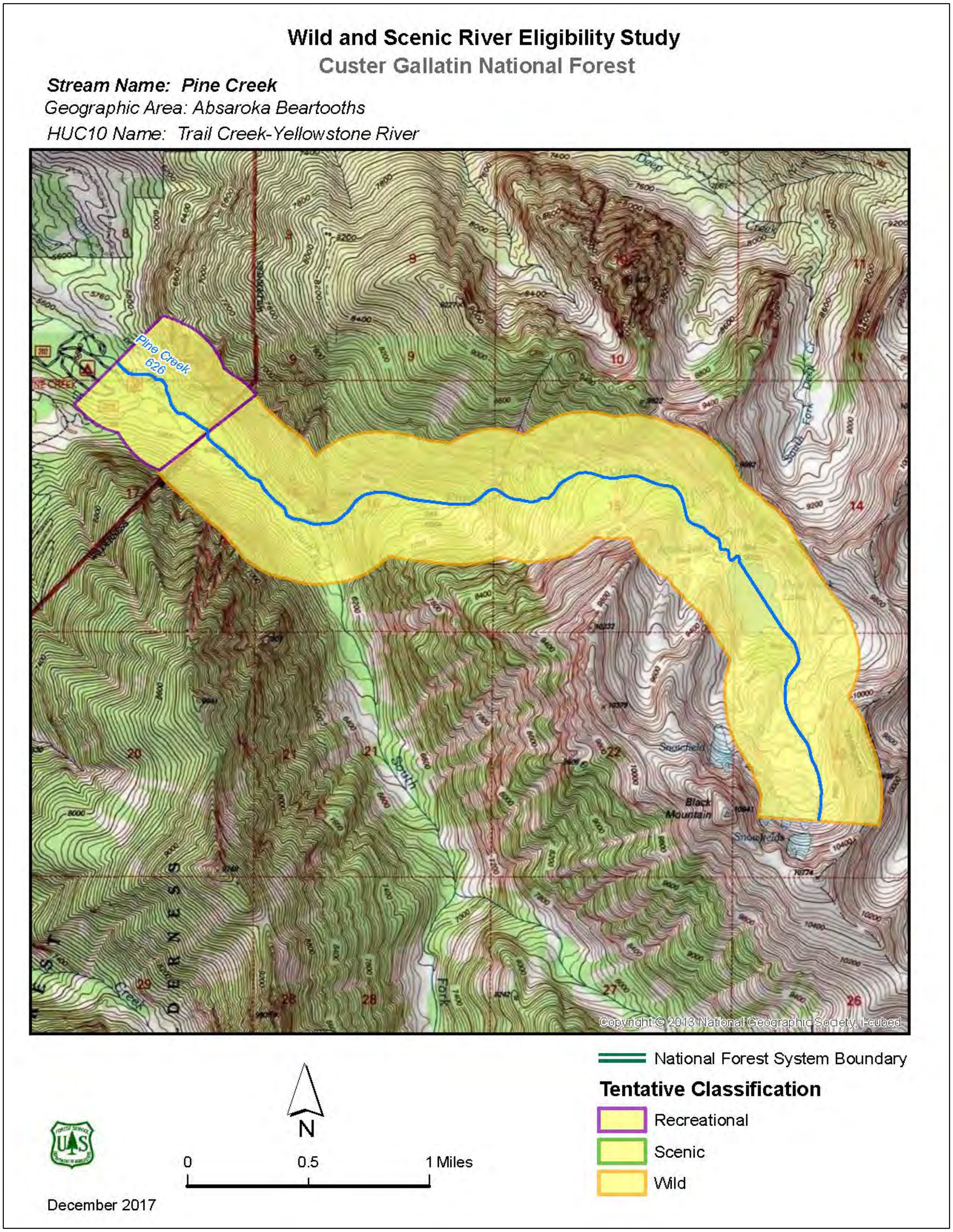
0 0.75 1.5 Miles

December 2017

Pine Creek

Table 35. Pine Creek, Yellowstone Ranger District

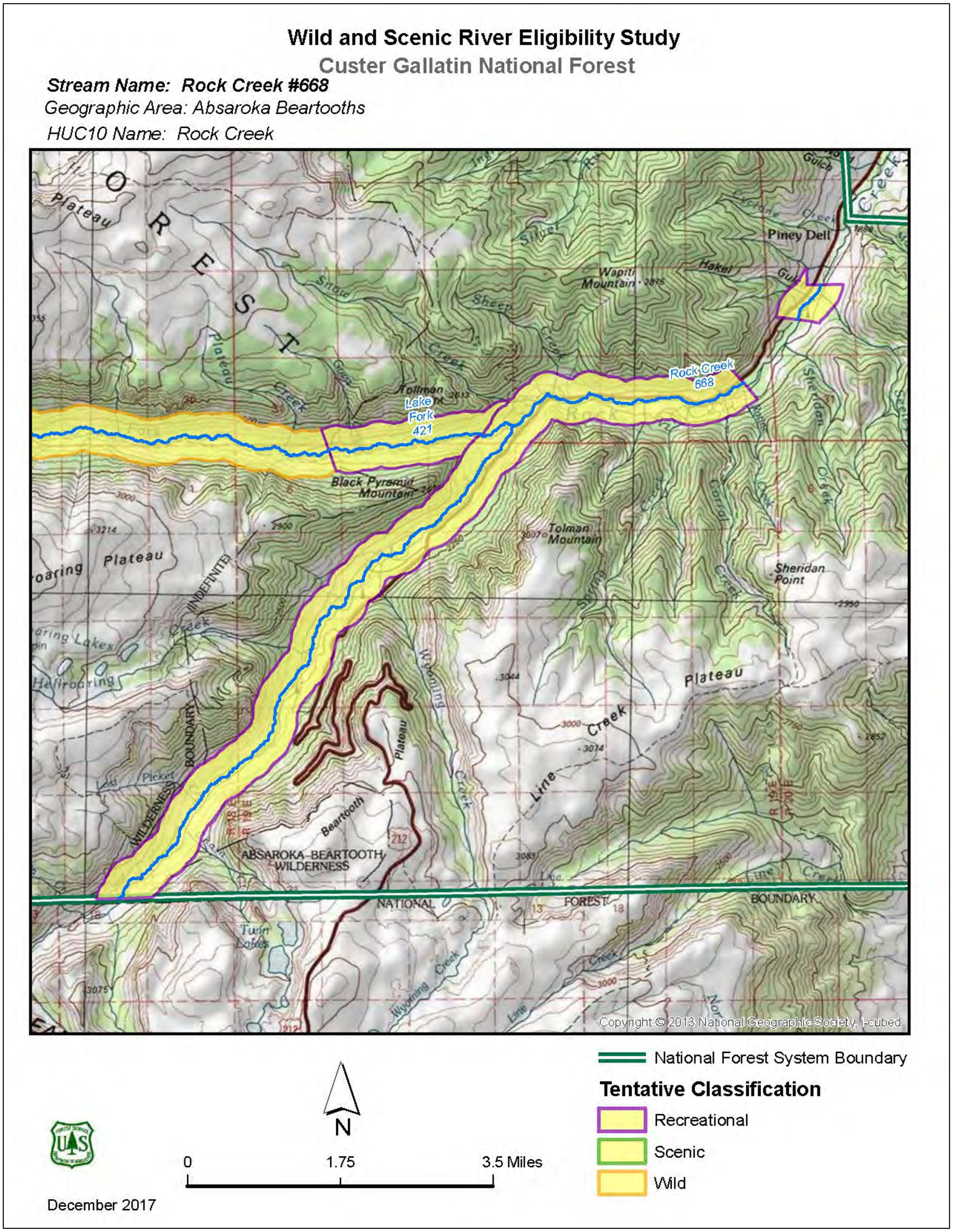
River Description	Pine Creek, Yellowstone Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation, Scenery
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Wild – from headwaters to wilderness boundary. Recreational – from wilderness boundary to Pine Creek Trailhead.
Miles of each Segment	Wild = 3.90 miles; Recreational = 0.51 mile
Tentative Classification	Wild, Recreational
Counties	Park County, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	Pine Creek is an exemplary, visually striking creek that descends from a spectacular alpine glacial cirque down to the dense conifer forest. Pine Creek Falls is a cascade that, in high water, dramatically splits and thunders around a rock outcrop, sending up mist into the surrounding dense conifers that frame the waterfall. Higher up, the creek tumbles and cascades down a steep and rugged glacial-carved valley bounded by cliffs, talus slopes and avalanche chutes. The upper part of the creek is a stunning chain of three classic glacial lakes, waterfalls, headwalls and alpine meadows, and small bands of dense conifer trees. The outlet of Pine Creek Lake is defined by a remarkable glacier-smoothed granite slabs surrounded by lush alpine tarns full of wildflowers. Scenery outstandingly remarkable value is both in Wild and Scenic
Recreation	Recreation outstandingly remarkable value applies above the falls to the trailhead. Pine Creek Falls is one of the most popular recreation destinations in the Paradise valley and leading into the Absaroka-Beartooth Wilderness. The first piece of the Pine Creek trail, leads to the falls which is a popular destination for hikers and photographers. The trail closely follows the creek and when out of view, it can still be heard cascading downstream. Pine Creek Falls is a tall, narrow waterfall that spreads out as it plunges over rock outcroppings. The opportunity for recreationists to experience powerful waterfalls after a relatively short, family friendly hike, in the Absaroka-Beartooth Wilderness is a rare and unique opportunity on the Custer Gallatin and within the region of comparison.
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Pine Creek
Geographic Area: Absaroka Beartooths
HUC10 Name: Trail Creek-Yellowstone River
Pine Creek 626
Copyright:© 2013 National Geographic Society, i-cubed
National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
0.5
1 Miles
December 2017

Rock Creek

Table 36. Rock Creek, Beartooth Ranger District

River Description	Rock Creek, Beartooth Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation, Scenery, Heritage
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Recreational – From the Montana and Wyoming state boundary to national forest boundary, excluding private lands.
Miles of each Segment	Recreational = 11.4 miles, excludes private lands
Tentative Classification	Recreational
Counties	Carbon, Montana
Identified in Previous Eligibility Studies?	Yes, Custer National Forest Plan and Amendment #2
Outstandingly Remarkable Values	**Resource Description**
Scenery	From Glacier Lake downstream to its confluence with the Lake Fork Below Glacier Lake, the creek spectacularly tumbles over steep exposed granite bedrock and boulders in a series of waterfalls and cascades. As it passes through its classic U-shaped glacially carved valley, the creek alternates from pressing up against the base of the steep slopes and talus fields of one side, then the other. It provides an exemplary variety and juxtaposition of boulder-strewn, deciduous shrub and conifer tree-lined creek with well-defined but varied edges and moderate rapids, to a meandering, often-divided creek passing through shrubs and trees that become alive with color in the autumn. Because of the vividness, magnitude and juxtaposition of these visual elements, Rock Creek, especially in its upper stretches, is among the most outstandingly scenic waterways in the Greater Yellowstone Area and draws visitors from not only the Greater Yellowstone Area but from across the country.
Recreation	The Rock Creek Corridor is an impressive and unique destination for recreationists to partake in river based recreation within the region of comparison. While many recreation sites do occur within river corridors on the forest or within the region of comparison the Rock Creek corridor and its density and variety of recreation opportunities specifically tied to the creek make it exemplary. The river corridor is home to campgrounds, organizational camps, recreation residences, picnic areas, heavy dispersed camping and trailheads all of which rely on the river corridor for their unique opportunity. The Rock Creek Corridor is a popular destination for most type of water based recreation including swimming, wading, relaxing and fly fishing.
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	Crow aboriginal trail and sites marking the Red Lodge battle between the Shoshone and Crow Tribes.
Other	No outstandingly remarkable value



Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Rock Creek #668
Geographic Area: Absaroka Beartooths
HUC10 Name: Rock Creek
Rock Creek 668
Lake Fork 421
Black Pyramid Mountain
Tolman Mountain
Wapiti Mountain
Piney Dell
Sheridan Point
Plateau
ABSAROKA-BEARTOOTH WILDERNESS
NATIONAL FOREST BOUNDARY
Twin Lakes
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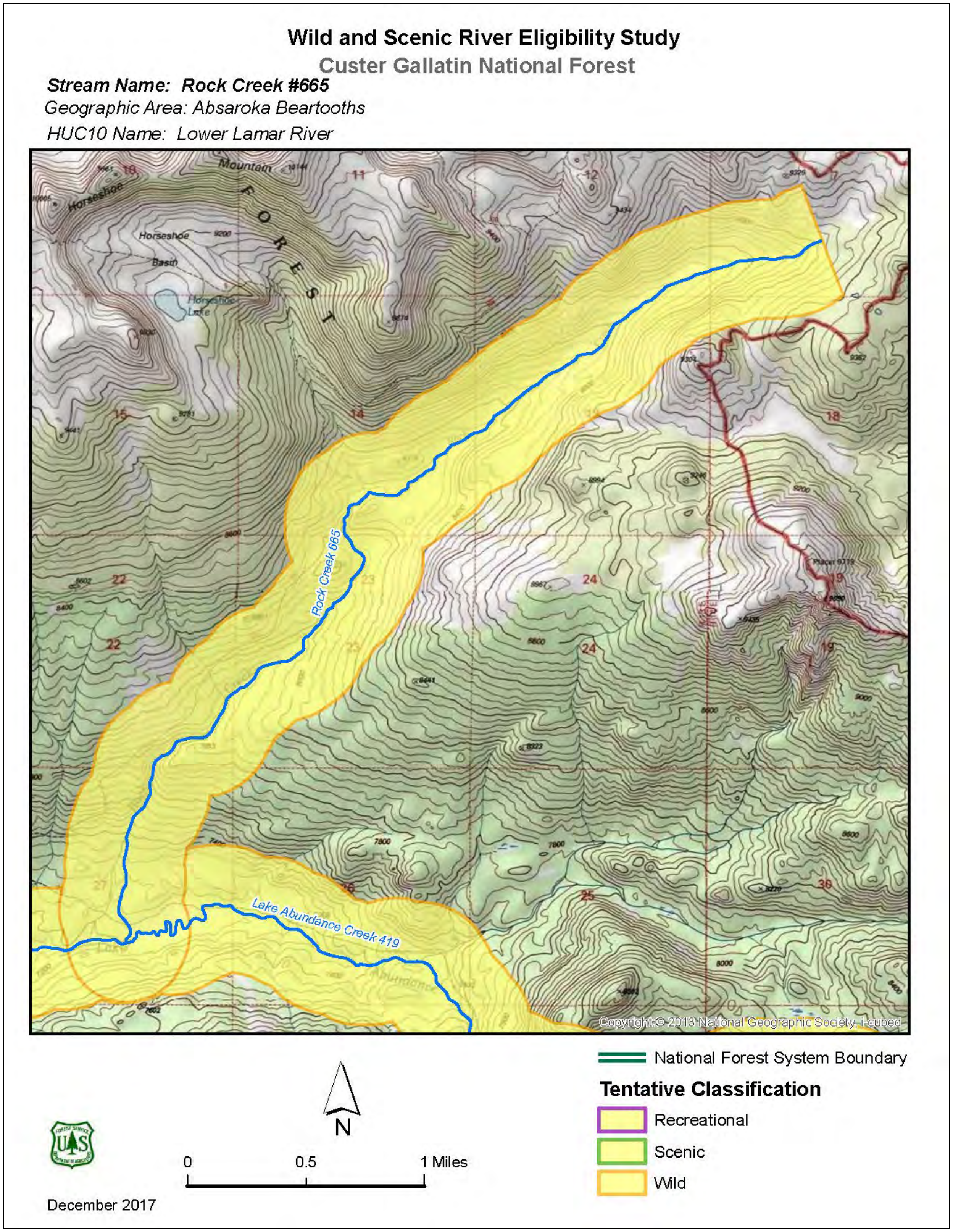
National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
1.75
3.5 Miles
December 2017

Rock Creek

Table 37. Rock Creek, Gardiner Ranger District

River Description	Rock Creek, Gardiner Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Fisheries
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Wild – From headwaters to junction with Lake Abundance Creek
Miles of each Segment	Total national forest miles = 4.83
Tentative Classification	Wild
Counties	Park County, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	No outstandingly remarkable value
Recreation	No outstandingly remarkable value
Fisheries	High quality habitat relative to the region of comparison. Pure Yellowstone cutthroat trout population. No exotics. A natural barrier exists to keep out non-native species.
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Rock Creek #665
Geographic Area: Absaroka Beartooths
HUC10 Name: Lower Lamar River
Rock Creek 665
Lake Abundance Creek 419
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National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
0.5
1 Miles
December 2017

Shower Creek

Table 38. Shower Creek, Bozeman Ranger District

River Description	Shower Creek, Bozeman Ranger District
Geographic Area	Madison, Henrys Lake, and Gallatin Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation, Scenery
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Scenic – Headwaters to junction with Hyalite Creek
Miles of each Segment	Scenic = 1.34 miles
Tentative Classification	Scenic
Counties	Gallatin County, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	This river is included in scenery outstandingly remarkable value description for Hyalite Creek.
Recreation	The area described as Upper Hyalite for the recreation outstandingly remarkable value includes the main stem of Hyalite Creek beginning at Grotto Falls Trailhead, and is an area that includes the named tributaries of Shower Creek and Maid of the Mist. The areas also includes all of the unnamed tributaries that contribute to the unique recreation opportunity; including short off trail hikes, photography and world renowned ice climbing. The Hyalite River corridor is the most heavily visited recreation complex in Region 1 of Montana. Upper Hyalite, the area above the dam and reservoir to the headwaters provides exemplary recreation opportunity within the region of comparison. Hyalite Creek itself is a popular trail based opportunity, with many side hikes to unique and densely concentrated waterfalls, and hike along the creek to the lake a major destination. The concentration of waterfalls create rare and exemplary conditions for ice climbing; making this area a destination in the Greater Yellowstone Area and beyond for a wide range of climbers.
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value

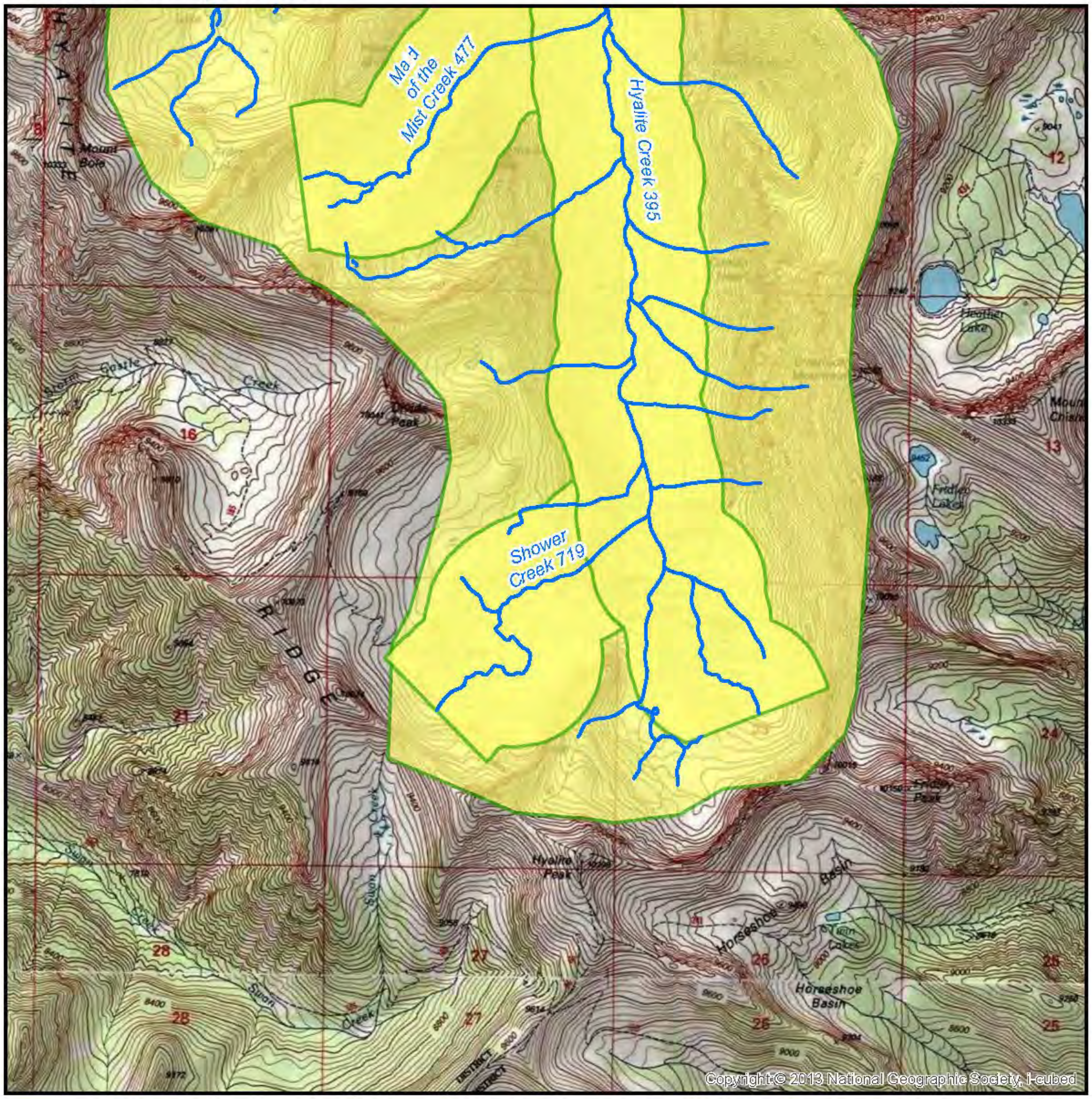
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: Shower Creek

Geographic Area: Madison, Gallatin, and Henrys Lake Mountains

HUC10 Name: Hyalite Creek



N

0 0.5 1 Miles

National Forest System Boundary

Tentative Classification

Recreational

Scenic

Wild

December 2017

Slough Creek and Un-Named Tributaries

Table 39. Slough Creek and un-named tributaries, Gardiner Ranger District

River Description	Slough Creek and un-named tributaries, Gardiner Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Fisheries
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Wild – From Headwaters to north side of private parcel known as Frenchys Meadow. Scenic – From south side of Frenchys Meadow to north side of Silver Tip Ranch located on southern boundary of Absaroka-Beartooth Wilderness. Excludes private lands.
Miles of each Segment	Total national forest miles = 16.31
Tentative Classification	Wild = 12.65 miles; Scenic = 3.66 miles
Counties	Park and Sweet Grass Counties, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	No outstandingly remarkable value
Recreation	No outstandingly remarkable value
Fisheries	High quality habitat relative to the region of comparison. Pure Yellowstone cutthroat trout population. No exotics. A natural barrier exists to keep out non-native species.
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value

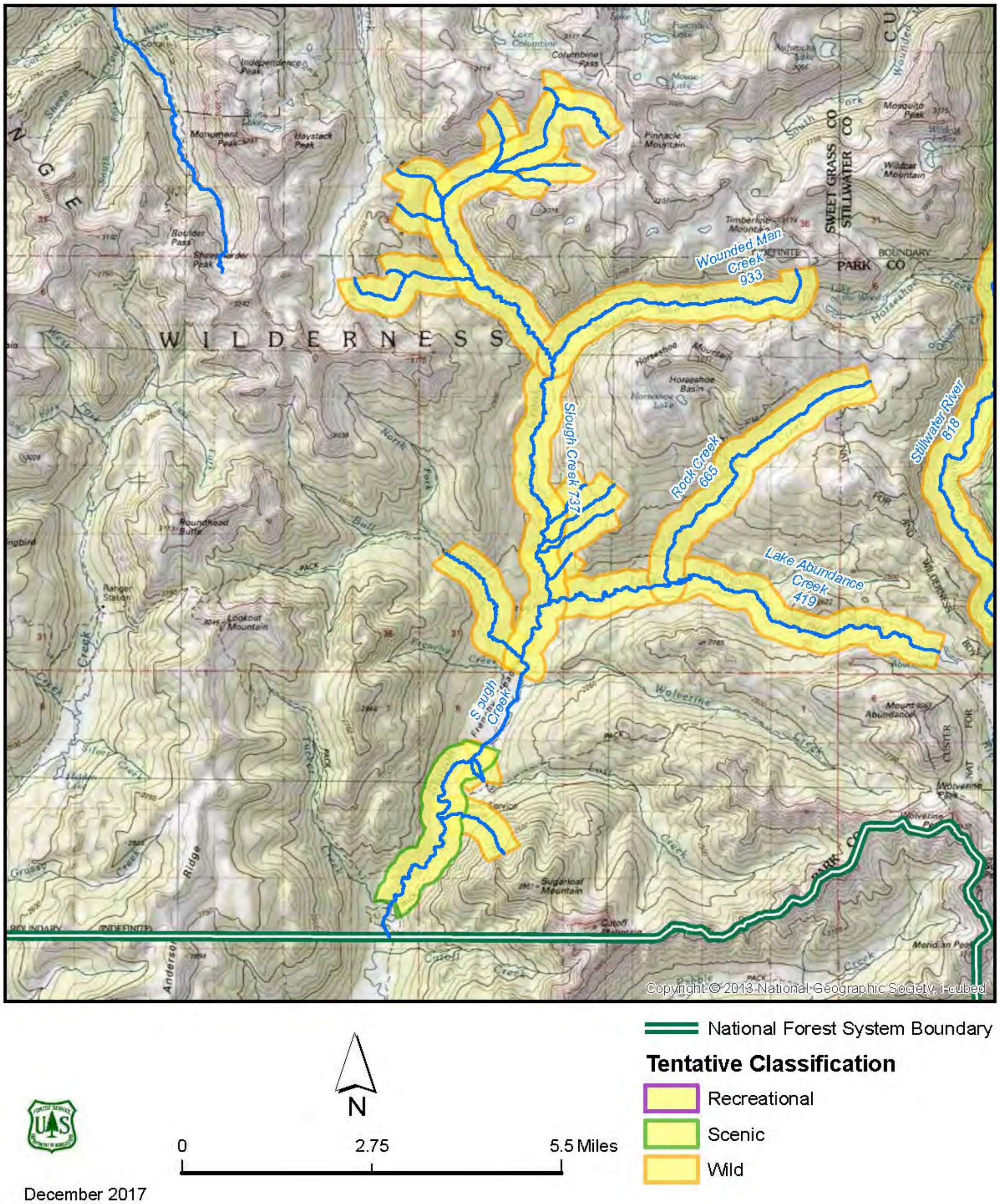
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: Slough Creek

Geographic Area: Absaroka Beartooths

HUC10 Name: Lower Lamar River

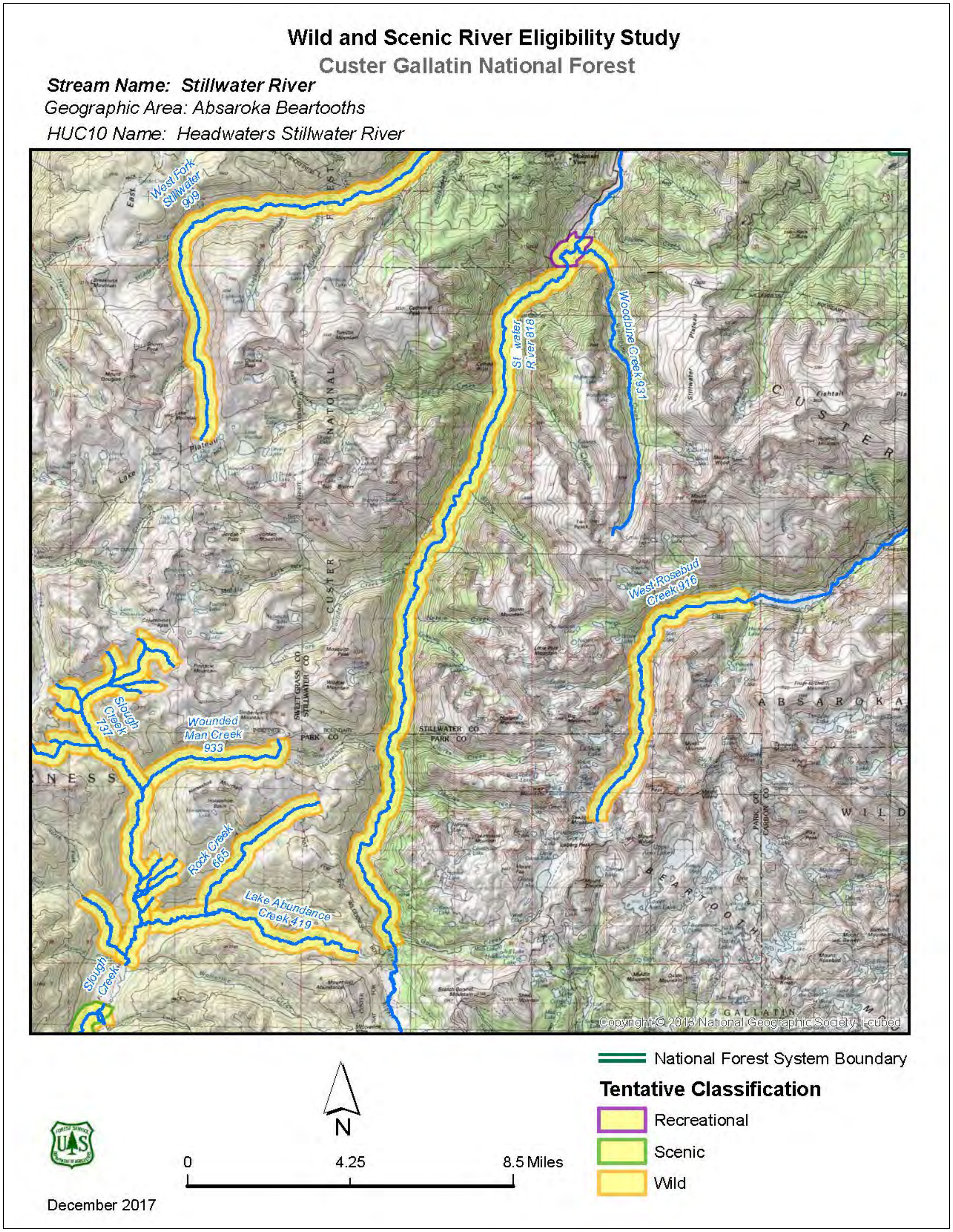


December 2017

Stillwater River

Table 40. Stillwater River, Beartooth Ranger District

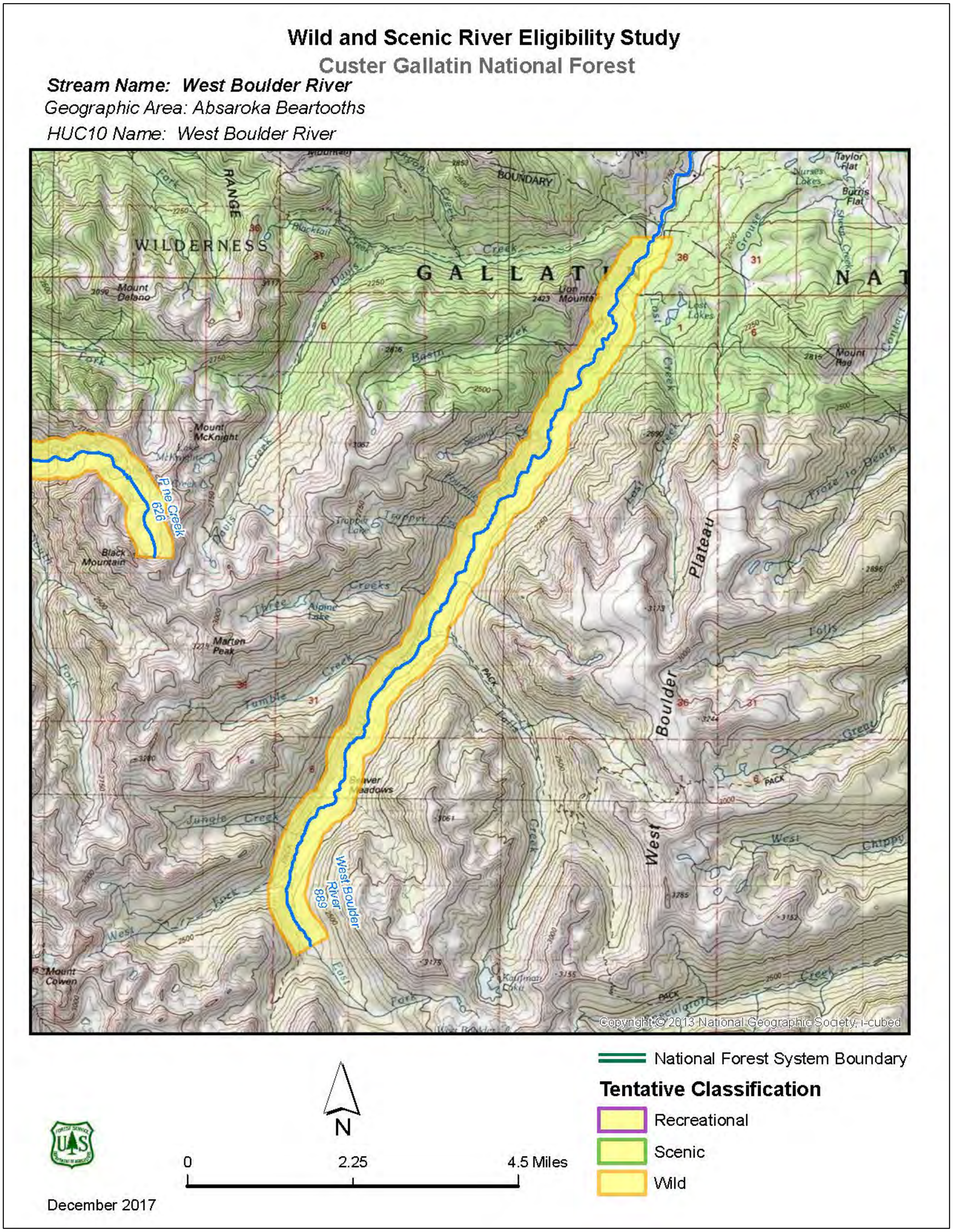
River Description	Stillwater River, Beartooth Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Wild segment – Has both Recreation and Scenery as outstandingly remarkable values. Recreational segment – Recreation outstandingly remarkable value only.
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Wild – Wilderness boundary near Cooke City to Woodbine Trailhead. Recreational – Woodbine Trailhead to Beartooth Ranch in Township 5 South, Range 15 East, Section 32.
Miles of each Segment	Wild = 22 miles; Recreational = 1.25 miles
Tentative Classification	Wild, Recreational
Counties	Stillwater and Park, Montana
Identified in Previous Eligibility Studies?	Yes, Custer National Forest Plan and Amendment
Outstandingly Remarkable Values	**Resource Description**
Scenery	Immediately upstream of the Forest Service Woodbine Trailhead, this river awes viewers with a unique narrow, rocky, cliff-confined gorge full of thundering rapids and immense boulders. Along its length, sections of rocky rapids are juxtaposed with the meandering, braiding and stillness, such as at Sioux Charley Lake and other areas where the river spreads out, slows down and is edged with deciduous shrubs and trees that light up in autumn, contrasting with the darker conifers. The Stillwater offers exemplary gorges, curving around rugged exposed rocky knobs dotted with conifer trees, choked in places with boulders, rapids and tree trunks that have been swept down the adjacent avalanche chutes. Scenery – This outstandingly remarkable value is in the Wild segment, from confluence with Horseshoe Creek to Woodbine Trailhead.
Recreation	The Stillwater River is considered a fly fishing destination within the Greater Yellowstone Area, drawing fisherman from within and from outside of the region of comparison to experience this exemplary fishing opportunity. The Stillwater also provides a somewhat unique spring technical whitewater boating opportunity for the Custer Gallatin National Forest and within the Greater Yellowstone Area; making it a destination paddle. The Upper Stillwater trail is also a popular recreation destination within the Absaroka-Beartooth Wilderness, the Greater Yellowstone Area and beyond for backpackers and hikers experiencing the exemplary recreation along the river. This outstandingly remarkable value is in both the Wild and Recreational segment.
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Stillwater River
Geographic Area: Absaroka Beartooths
HUC10 Name: Headwaters Stillwater River
West Fork Stillwater 909
Stillwater River 818
Woodbine Creek 931
West Rosebud Creek 916
Slough Creek 737
Wounded Man Creek 933
Rock Creek 665
Lake Abundance Creek 419
Slough Creek
Copyright:© 2013 National Geographic Society, i-cubed
N
0
4.25
8.5 Miles
National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
December 2017

West Boulder River

Table 41. West Boulder River, Yellowstone Ranger District

River Description	West Boulder River, Yellowstone Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Wild – From headwaters to wilderness boundary
Miles of each Segment	Wild = 12.31 miles
Tentative Classification	Wild
Counties	Park County, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	No outstandingly remarkable value
Recreation	The West Boulder River is considered a fly fishing destination within the Greater Yellowstone Area, drawing fisherman from within and from outside of the region of comparison to experience this exemplary fishing opportunity. The West Boulder also provides a somewhat unique technical whitewater boating opportunity for the Custer Gallatin National Forest and within the Greater Yellowstone Area, making it a destination paddle.
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: West Boulder River
Geographic Area: Absaroka Beartooths
HUC10 Name: West Boulder River
Pine Creek 626
West Boulder River 869
Copyright:© 2013 National Geographic Society, i-cubed
National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
2.25
4.5 Miles
December 2017

West Fork Rock Creek

Table 42. West Fork Rock Creek, Beartooth Ranger District

River Description	West Fork Rock Creek, Beartooth Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Heritage, Scenery
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Wild – From headwaters to wilderness boundary. Recreational – From wilderness boundary to national forest boundary, excluding private lands.
Miles of each Segment	Wild = 8.93 miles; Recreational = 9.23 miles
Tentative Classification	Wild, Recreational
Counties	Carbon, Montana
Identified in Previous Eligibility Studies?	Yes, Custer National Forest Plan and Amendment #2
Outstandingly Remarkable Values	**Resource Description**
Scenery	From its headwaters to the West Fork Trailhead at the Absaroka-Beartooth Wilderness boundary: This section displays an exemplary transition and variety from a small alpine stream at its headwaters at the base of Castle Mountain, with associated chain of exemplary glacially-scoured ponds, spectacular cascades and waterfalls, then down across the bases of steep rock glaciers and talus fields, through slower flatter sections in subalpine meadows and meanders, most notably Quinnebaugh Meadows. Especially in the flatter sections, the deciduous shrubs, grasses and trees provide spectacular autumn color contrast with the dark conifer trees and early season snow.
Recreation	No outstandingly remarkable value
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	Historic recreation corridor with Camp Senia National Register District, Wild Bill Lake, Timbercrest Girl Scout Camp and Rock Creek Ranger Station (Listed on the National Register). This outstandingly remarkable value is in the recreational segment.
Other	No outstandingly remarkable value

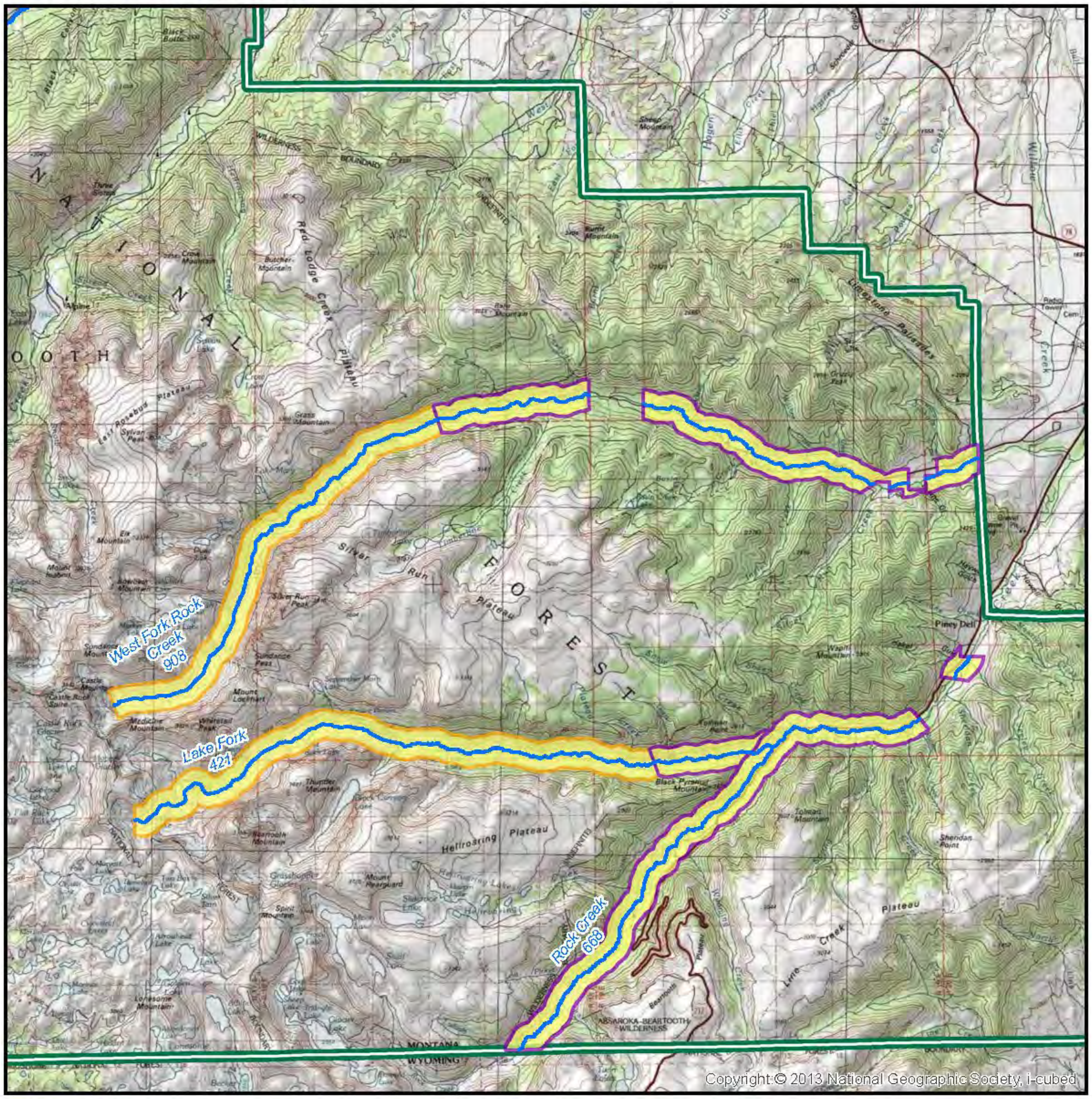
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: West Fork Rock Creek

Geographic Area: Absaroka Beartooths

HUC10 Name: Rock Creek



National Forest System Boundary

Tentative Classification

- Recreational
- Scenic
- Wild

N

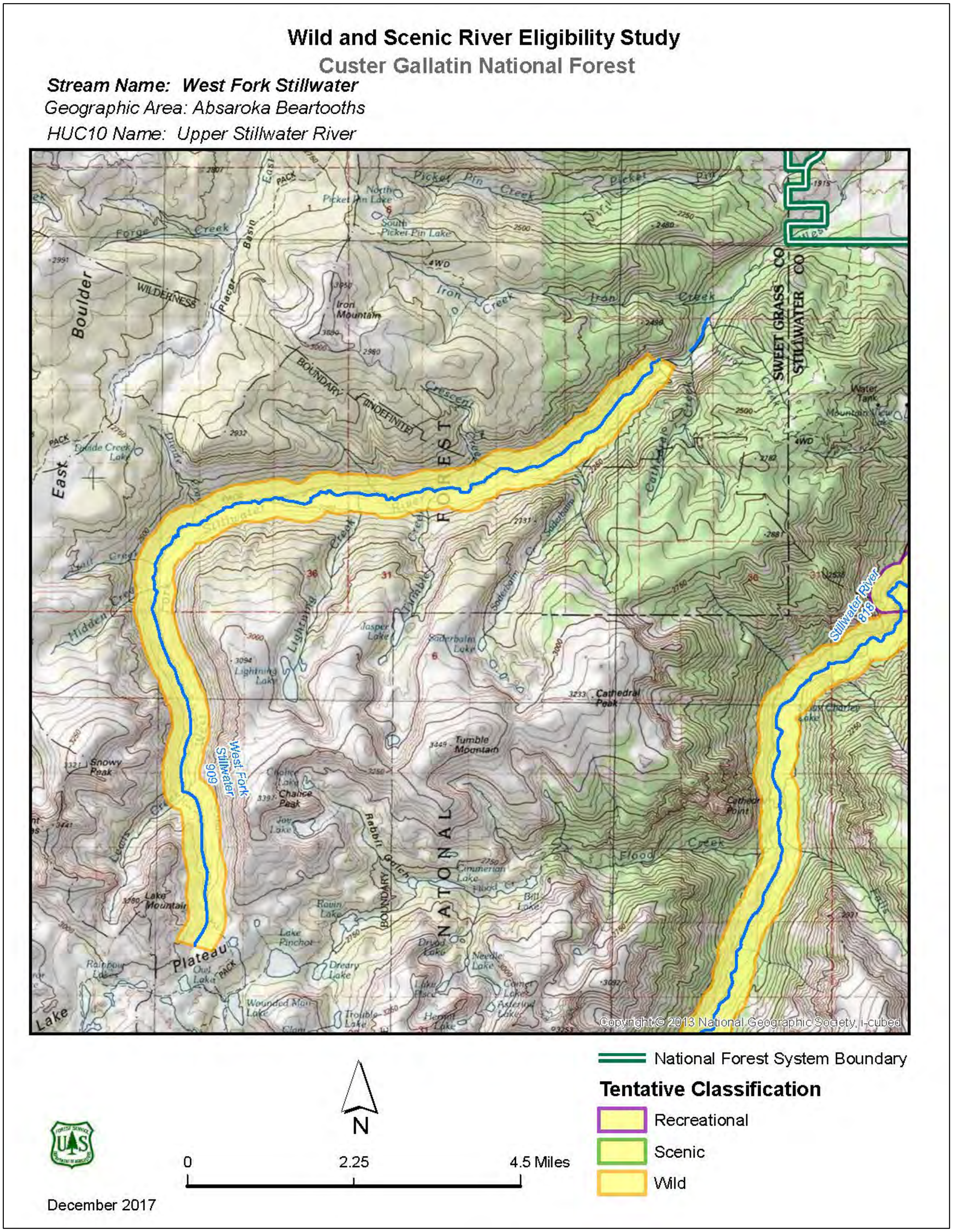
0 3.5 7 Miles

December 2017

West Fork Stillwater River

Table 43. West Fork Stillwater River, Beartooth Ranger District

River Description	West Fork Stillwater River, Beartooth Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Scenery
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Wild – Headwaters to wilderness boundary
Miles of each Segment	Wild = 14.02 miles
Tentative Classification	Wild
Counties	Stillwater, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	From its headwaters downstream to Initial Creek Campground: Exemplary display of contrast between spread-out, meandering, and braided sections through dense forests, wetlands, and open meadows, such as Breakneck Meadows, to sections where the river is confined by sheer rock cliffs, large glacial boulders along the base of steep avalanche chutes, causing dynamic water movement and cascades, with associated roaring water sounds.
Recreation	No outstandingly remarkable value
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: West Fork Stillwater
Geographic Area: Absaroka Beartooths
HUC10 Name: Upper Stillwater River
West Fork Stillwater 909
Stillwater River 818
SWEET GRASS CO
STILLWATER CO
Iron Mountain
Cathedral Peak
Tumble Mountain
Snowy Peak
Chalice Peak
Lake Mountain
Plateau
Copyright:© 2013 National Geographic Society, i-cubed
National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
2.25
4.5 Miles
December 2017

West Rosebud Creek

Table 44. West Rosebud Creek, Beartooth Ranger District

River Description	West Rosebud Creek, Beartooth Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation, Scenery
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Wild – From headwaters to wilderness boundary
Miles of each Segment	Total national forest miles = 8.9
Tentative Classification	Wild
Counties	Stillwater, Park and Carbon Counties, Montana
Identified in Previous Eligibility Studies?	Yes
Outstandingly Remarkable Values	**Resource Description**
Scenery	Inside the Absaroka-Beartooth Wilderness from its headwaters near Grasshopper Glacier, downstream to Mystic Reservoir: long stretches of dynamic, thundering whitewater and cascades, full of boulders, punctuated by tree trunks carried down adjacent avalanche chutes lined with deciduous vegetation that provide exciting autumn color contrasts. Steam channels are confined by dramatic immense rock cliffs, edged with conifers, some leaning over and visually framing the river. Whitewater sections are interspersed and contrasted with wider, slower, quieter sections that in some places spread out into lush subalpine wetlands and lakes surrounded by exemplary glacial-scoured rock cliffs and knobs and clumps of conifer trees. Viewing of this section is easy from the popular developed trail.
Recreation	The West Rosebud Creek and Mystic Lake are popular, high visitation recreation destinations on the Custer Gallatin and within the Greater Yellowstone Area and beyond for fisherman, backpackers and hikers experiencing the exemplary trail based recreation to access the chain of lakes along the creek and into the Absaroka-Beartooth Wilderness.
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value

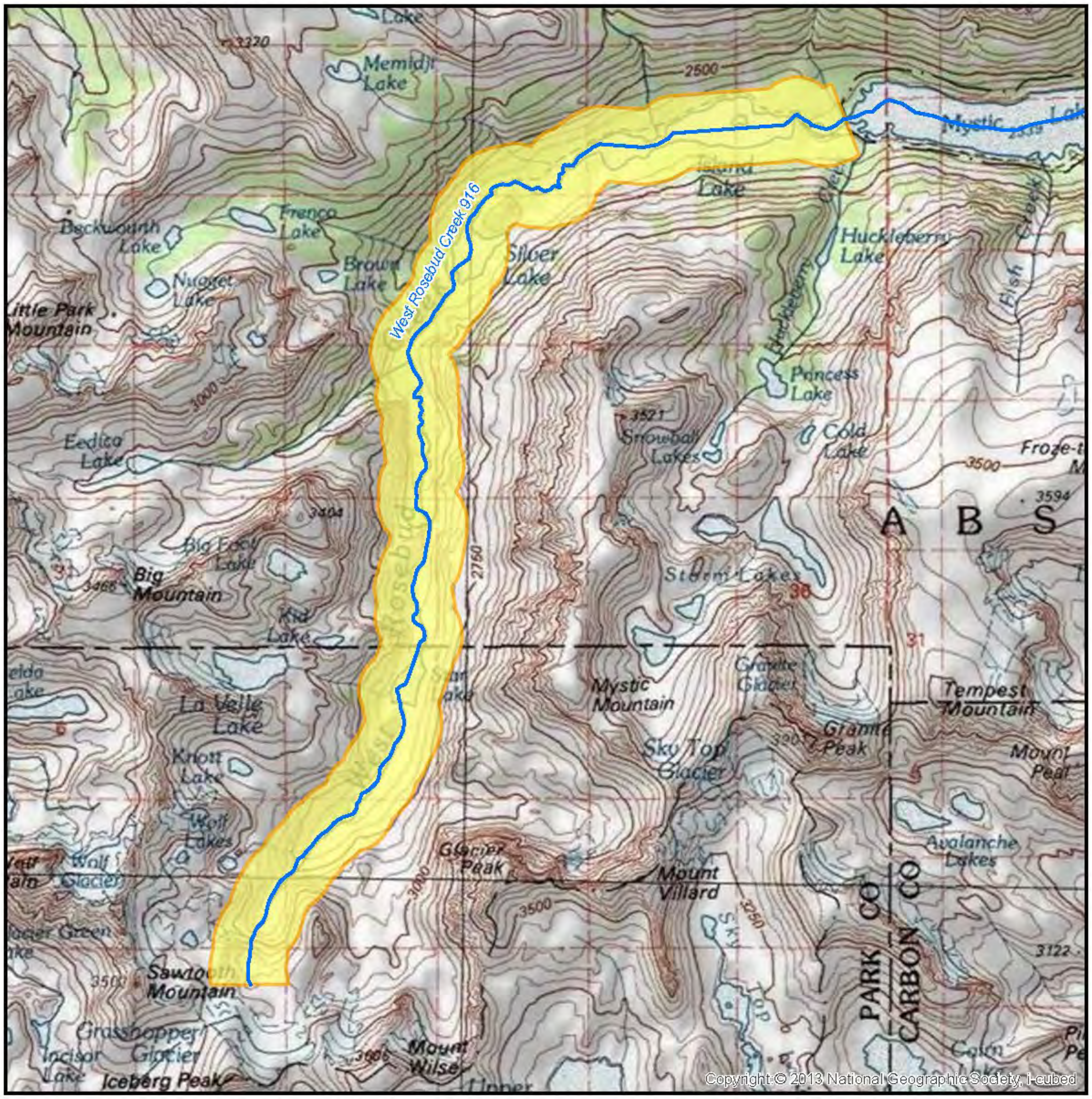
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: West Rosebud Creek

Geographic Area: Absaroka Beartooths

HUC10 Name: Rosebud Creek



National Forest System Boundary

Tentative Classification

- Recreational
- Scenic
- Wild

N

0 1.25 2.5 Miles

December 2017

Woodbine Creek

Table 45. Woodbine Creek, Beartooth Ranger District

River Description	Woodbine Creek, Beartooth Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation, Scenery
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	From 0.50 mile above Woodbine Waterfall to trailhead at confluence of Stillwater.
Miles of each Segment	Wild = 0.86 mile; Recreational = 0.39 mile
Tentative Classification	Wilderness, Recreational
Counties	Stillwater County, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	For the scenery outstandingly remarkable value, this only covers approximately 0.75 mile of Woodbine Creek above its confluence with the Stillwater River, specifically the Woodbine Falls segment: Woodbine Falls are easily accessible on the popular developed trail from adjacent Woodbine Campground. A spectacular series of thunderous drops and plunges, the falls are confined by sheer granite cliffs. The juxtaposition of the conifer and deciduous vegetation-covered cliffs on one side, the exposed granite cliffs on the other, with the boulder-studded frothy falls in between forms an exciting scene.
Recreation	Woodbine Falls is a long, stunning freefalling waterfall that plunges down Woodbine Creek, a tributary of the Stillwater River. The short trail at Woodbine Falls is a popular destination for hikers and photographers and includes a lookout below the falls, allowing recreationist to experience the thunderous falls that can be felt from the trail. The opportunity for recreationists to experience powerful waterfalls up close is relatively unique on the Custer Gallatin National Forest and within the region of comparison.
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value

Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: Woodbine Creek

Geographic Area: Absaroka Beartooths

HUC10 Name: Headwaters Stillwater River

N

0 1.5 3 Miles

National Forest System Boundary

Tentative Classification

Recreational

Scenic

Wild

December 2017

Wounded Man Creek

Table 46. Wounded Man Creek, Gardiner Ranger District

River Description	Wounded Man Creek, Gardiner Ranger District
Geographic Area	Absaroka Beartooth Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Fisheries
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	Wild – From headwaters to junction of Slough Creek. This stream is located completely within the Absaroka-Beartooth Wilderness.
Miles of each Segment	Total national forest miles = 4.48
Tentative Classification	Wild
Counties	Park County, Montana
Identified in Previous Eligibility Studies?	No
Outstandingly Remarkable Values	**Resource Description**
Scenery	No outstandingly remarkable value
Recreation	No outstandingly remarkable value
Fisheries	High quality habitat relative to the region of comparison. Pure Yellowstone cutthroat trout population. No exotics. A natural barrier exists to keep out non-native species.
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	No outstandingly remarkable value
Other	No outstandingly remarkable value

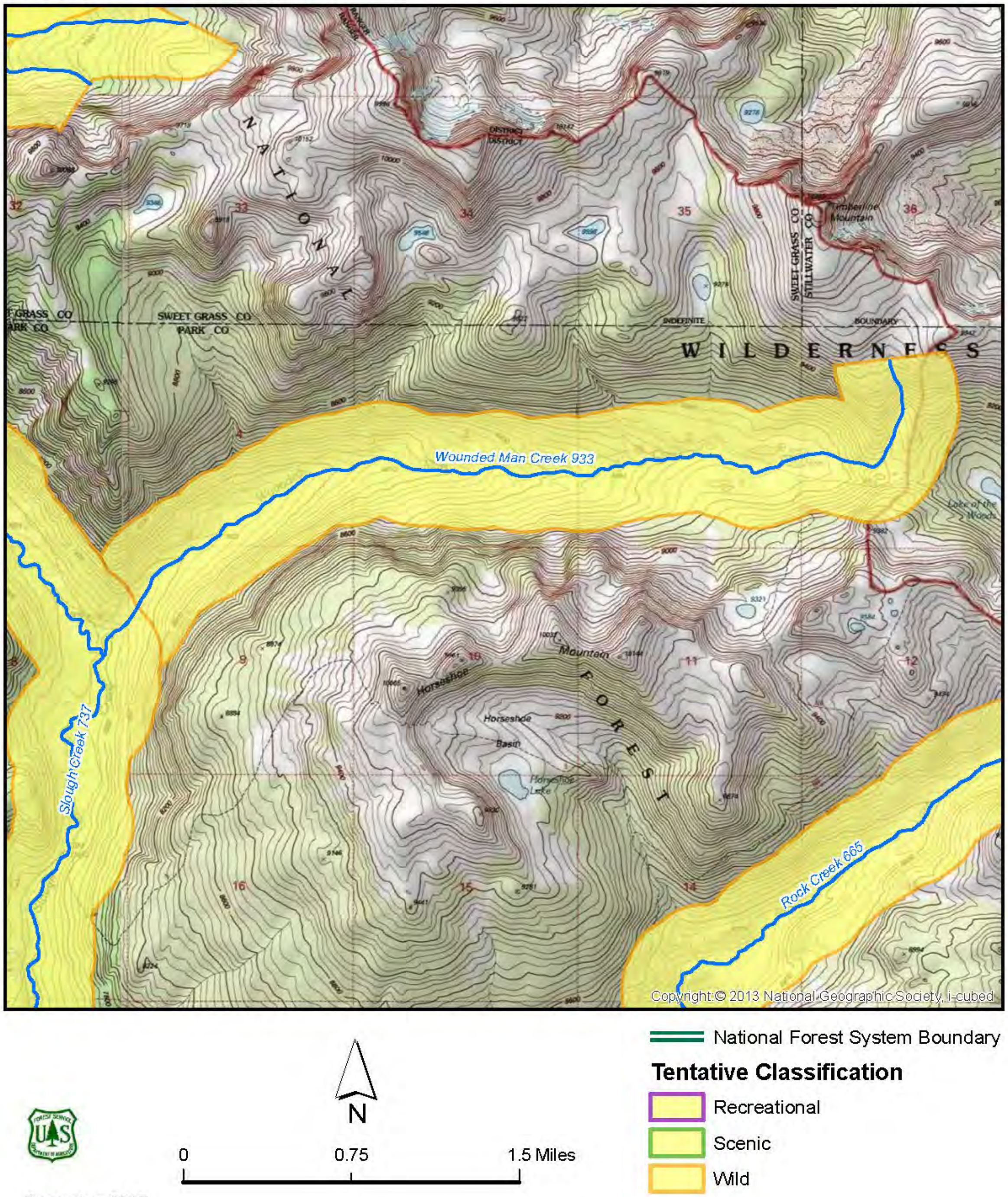
Wild and Scenic River Eligibility Study

Custer Gallatin National Forest

Stream Name: Wounded Man Creek

Geographic Area: Absaroka Beartooths

HUC10 Name: Lower Lamar River

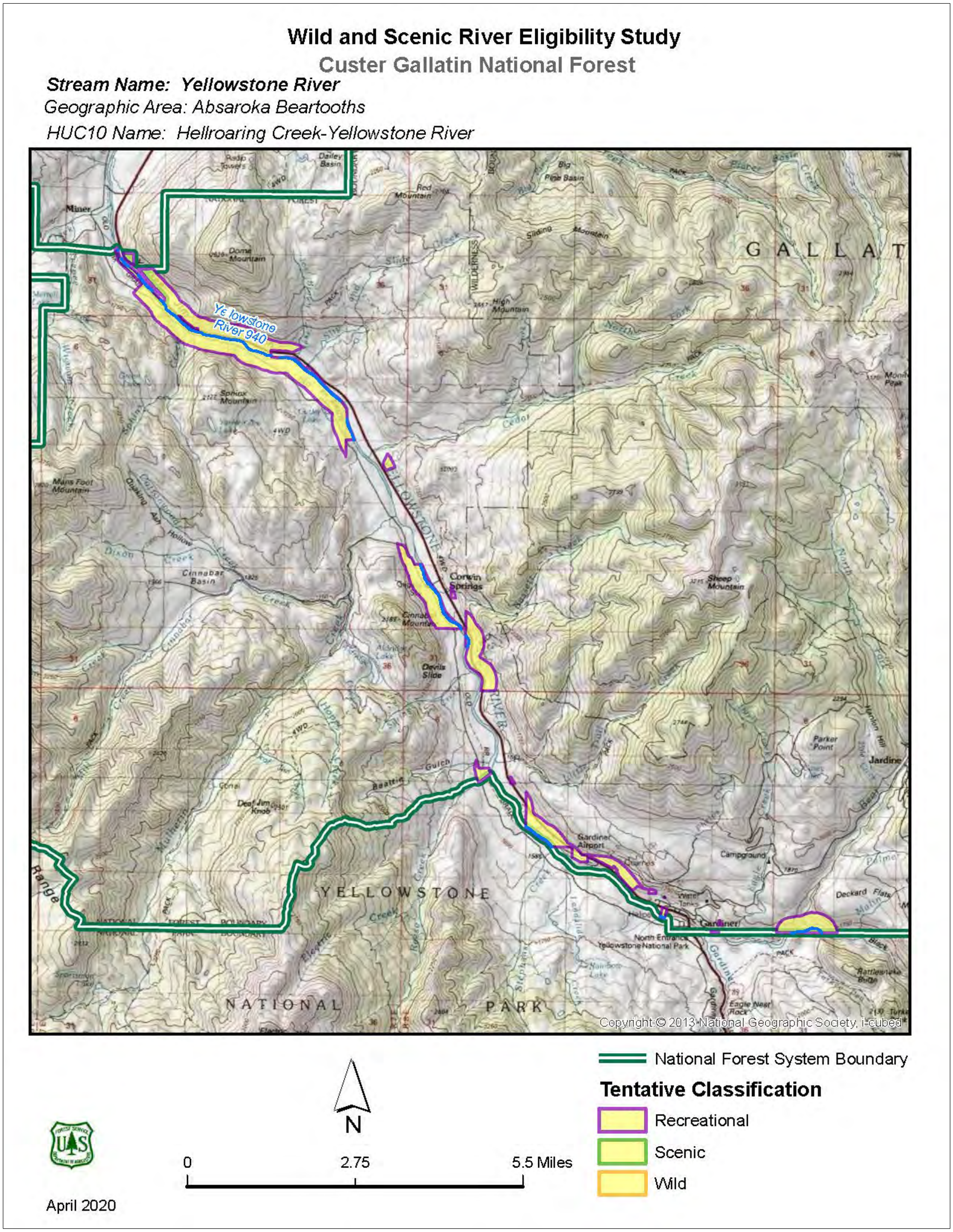


December 2017

Yellowstone River

Table 47. Yellowstone River, Gardiner Ranger District

River Description	Yellowstone River, Gardiner Ranger District
Geographic Area	Absaroka Beartooth Mountains and Gallatin Mountains
Is River Free-Flowing?	Yes
Potential Outstandingly Remarkable Value(s)	Recreation, Scenery, Heritage
Region of Comparison	Greater Yellowstone Area plus Pryor Mountains
Eligible Segments	From the boundary of Yellowstone National Park near Gardiner, Montana, downstream to national forest boundary just beyond Yankee Jim Canyon
Miles of each Segment	This river repeatedly enters and leaves the national forest boundary. In places, one shore is national forest and the other shore is other ownership. Miles were calculated where one or both shores were on national forest shorelines = 6.89 miles.
Tentative Classification	Recreational
Counties	Park County, Montana
Identified in Previous Eligibility Studies?	Yes
Outstandingly Remarkable Values	**Resource Description**
Scenery	This segment extends from where the river leaves Yellowstone National Park in the town of Gardiner, to the north where it leaves the Custer Gallatin National Forest just north of Canyon Campground. There is residential and other development visible on both sides from the river that is, however, not visually dominant due to most of it being well above viewers, blocked by vegetation or somewhat set back from the river's edge. Views of regional landmarks, such as Electric Peak and Devils Slide heighten the river experience when framed by the river banks and cottonwood trees. This upper stretch, while beautiful due to the contrast between the narrow vegetation strip right at the water's edge and the surrounding more barren sloping gravel and boulder embankments, the special visual feature along this river segment is Yankee Jim Canyon. In this stretch, the canyon walls pinch in and rise steeply on both sides of the river as spectacular broken gneiss cliffs and steep talus slopes confine the river channel. The banks and the river are choked with huge, house-size boulders, forming visually exciting rapids. Adding more unique visual character, remnants of the historic toll road rock work and rail bed are somewhat visible up along the western wall of the canyon.
Recreation	The Yellowstone River is the longest free flowing river in the lower 48 and is a world renowned destination for all types of water based recreation. The portions of the river on the national forest provide tremendous opportunity for fishing, recreational boating, picnicking, wildlife viewing, and photography. Sections of this stretch on the Custer Gallatin include beginner to intermediate boating, while Yankee Jim Canyon is perhaps the most popular and includes technical whitewater that is relatively rare and unique within the Greater Yellowstone Area and beyond. The Yellowstone River is considered a fly fishing destination within the Greater Yellowstone Area and beyond, drawing recreationists from within and from outside of the region of comparison to experience this exemplary fishing opportunity.
Fisheries	No outstandingly remarkable value
Wildlife	No outstandingly remarkable value
Geology	No outstandingly remarkable value
Heritage	Historic travel corridor along the river with historic trails and railroad that once paralleled the river, and associated historic sites, ghost towns, and mines.
Other	No outstandingly remarkable value


Wild and Scenic River Eligibility Study
Custer Gallatin National Forest
Stream Name: Yellowstone River
Geographic Area: Absaroka Beartooths
HUC10 Name: Hellroaring Creek-Yellowstone River
Yellowstone River 940
YELLOWSTONE NATIONAL PARK
Corwin Springs
Gardiner
Copyright © 2013 National Geographic Society, i-cubed
National Forest System Boundary
Tentative Classification
Recreational
Scenic
Wild
N
0
2.75
5.5 Miles
April 2020

River Classification Definitions and Outstandingly Remarkable Values Criteria

Classifications

Wild Rivers. Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

Scenic Rivers. Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

Recreational Rivers. Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some limited impoundment or diversion in the past.

Outstandingly Remarkable Values Criteria

The evaluation criteria for scenery, recreation, geology, fish populations and habitat, wildlife populations and habitat, historic and cultural resources, and other natural river related values (botany) are outlined below.

Scenery (from the Forest Service Manual). Landscape elements of landform, vegetation, water, color, and related factors result in notable or exemplary visual features or attractions. Additional factors, such as seasonal variations in vegetation, scale of cultural modifications, and the length of time negative intrusions are viewed may be considered. Scenery and visual attractions may be highly diverse over different parts of the river or river segment. Outstandingly remarkable scenic features may occupy only a small portion of a river corridor. Considerations specific to the Custer Gallatin National Forest include the following factors.

Rivers that have outstandingly remarkable scenery would draw viewers from inside and outside the region of comparison. They would have some combination of a number of the following visual attributes, or only one or a few attributes where they are very unique or visually outstanding.

Rock, land and water forms:

- Visually striking cliffs, canyons
- Visually strong and easily discernible examples of geologic forms and processes; visually distinctive strata layers or differential erosion
- Rock colors that contrast dramatically with the surrounding vegetation, adjacent rock or soil
- Exposed rocks and visually dominant rock expanses
- Dramatic topographic contrasts
- Unusually tall or spectacular waterfalls or awesomely powerful rapids surrounded by cliffs and boulders
- Striking juxtaposition of powerful whitewater and slow-moving calm sections
- Banks that exhibit a lot of variety in line and form
- Unusual and varied meanders, islands, braids and small ponds or lakes along the river

Vegetation:

- Old 'character' trees that lean over or visually frame the water channel or are rooted among or on rocks along the water's edge
- Striking seasonal color and texture variations
- Strong juxtapositions of textures, colors and shapes, such as tall conifer stands intermixed with lush willow and grass meadows
- Explosions of wildflowers
- Striking displays of plants visible in the spray of waterfalls or dynamic rapids

Visible historic and cultural features that contribute to the sense of place:

- Historic and old primitive style cabins
- Remnants of historic activities such as old water wheels, historic mines, Civilian Conservation Corps structures
- Remnants of ranching activities such as old wood fences

The role of negative visual intrusions would also be considered based upon:

- Visual dominance over scenery outstandingly remarkable values due to size, reflectivity, brightness of contrasting colors
- Movement (such as vehicles)
- Duration, permanence and proximity to viewers within the river corridor
- Magnitude of view to those within the river corridor

Geology. The river corridor contains one or more examples of a geologic feature, process, or phenomenon that is unique, rare or exemplary within the region of comparison. The feature(s) may be in an unusually active stage of development, represent a "textbook" example, or represent a unique, rare or exemplary combination of geologic features (erosional, volcanic, glacial, or other geologic structures).

Fisheries. Fisheries values may be judged on the relative merits of fish populations, habitat, or a combination of the following factors.

Populations: The river is ecologically important for native aboriginal population (s) or assemblage (s) of native fish with high conservation value.

- An important stronghold for native fish assemblages relative to others in the region of comparison
- Presence of genetically pure, or high conservation value, strains of native populations
- A lack of non-native species that would threaten the native population.

Habitat: The river provides uniquely diverse and/or high quality habitat for native aboriginal population (s) or assemblage (s) compared to the region of comparison.

- The habitat represents a pristine ecosystem relative to others in the region of comparison
- The habitat supports native aboriginal populations or assemblages of native fish with high conservation value
- Habitat is secure from invasion of non-native species

Recreation. Recreational opportunities are, or have the potential to be, popular enough to attract visitors from throughout or beyond the region of comparison or are unique or rare within the region. River-related opportunities include, but are not limited to, sightseeing, interpretation, wildlife observation, camping, photography, hiking, fishing, hunting, and boating. The river may provide settings for national or regional usage or competitive events. Considerations may include some combination of the following factors.

Visitation

1. Visitation levels of high, medium, low
2. Span of visitation of global, national, regional or local

Unique/outstanding/exemplary recreation opportunities such as premier fishing, renowned rapids, or nationally designated trails related to the river corridor.

River-related recreation opportunities: such as rivers or corridors used for premier whitewater opportunities or destination ice climbing.

Wildlife. Wildlife values may be judged on the relative merits of either terrestrial or aquatic wildlife populations or habitat, or a combination of these conditions and may include the following factors.

Populations: The river, or area within the river corridor, contains nationally or regionally important populations of indigenous wildlife species. Of particular significance are species diversity, species considered to be unique, and/or populations of Federal or State-listed or candidate threatened or endangered species, or species of conservation concern.

Habitat: The river, or area within the river corridor, provides uniquely diverse or high quality habitat for wildlife of national or regional significance, and/or may provide unique habitat or a critical link in habitat conditions for Federal or State-listed or candidate threatened or endangered species, or species of conservation concern. Contiguous habitat conditions are such that the biological needs of the species are met, particularly where such habitats meet the year-round or important seasonal biological needs of the species.

Botanical (Other). Botanical values may be judged on the relative merits of either riparian populations or plant associations, or a combination of these conditions and may include the following factors.

Populations: The river, or area within the river corridor, contains nationally or regionally important populations of plant species. Of particular significance are species considered to be unique due to their rarity based upon potential species of conservation concern that are ranked as globally imperiled or critically imperiled (G1, G2).

Habitat: The river, or area within the river corridor, provides uniquely diverse or high quality habitat of national or regional significance, and/or may provide unique habitat that are ranked as globally imperiled or critically imperiled (G1, G2).

Other botanical diversity factors are covered under scenic considerations.

Cultural and Historical. The river, or area within the river corridor, contains important evidence of historic or pre-historic occupation or use by humans. Site or features on or eligible for inclusion on the National Register of Historic Places may be of particular significance. Sites may have national or regional importance for interpreting history or prehistory. Considerations may include some combination of the following factors.

History: Sites or features are associated with a significant event, an important person, or a cultural activity of the past that is now rare or unique in the region. A historic site or feature is in most cases fifty years old or older.

Prehistory: Sites of prehistoric human use or occupation may have unique characteristics or exemplary anthropological value such as evidence of prehistoric human practices and modes of living.

Traditional Use: Areas within the river corridor may have been used and may be currently used for traditional use, may have rare sacred purposes, or represent the origin or conflict of cultures.

Appendix F: Grizzly Bear Baseline Values

Introduction

This appendix provides the baseline values for grizzly bear habitat management standards adopted from the 2016 Conservation Strategy for Grizzly Bears in the Greater Yellowstone Ecosystem. These standards pertain to secure habitat, developed sites, and permitted livestock grazing allotments (FW-STD-WLGB-01 through 06). Official baseline values are contained in the (Yellowstone Ecosystem Subcommittee 2016b) *Conservation Strategy for Grizzly Bears in the Greater Yellowstone Ecosystem, Appendix E: Habitat Baseline 1998 and Monitoring Protocol*. It is the goal of land management agencies in the Greater Yellowstone Ecosystem to maintain or improve grizzly bear habitat conditions within the recovery zone/primary conservation area at levels like, or better than, conditions existing in 1998. The year 1998 was selected as an appropriate baseline for habitat management because the Greater Yellowstone Ecosystem grizzly bear population was increasing at a robust rate between 1983 and 2001, and habitat conditions 1998 supported and contributed to this population growth. Baseline values may be adjusted over time due to corrections for data accuracy, new scientific information, improved technologies for calculating baselines, or other reasons. Changing conditions that result in modification of baseline values are typically described and reflected in Annual Reports provided by the Interagency Grizzly Bear Study Team (Yellowstone Grizzly Bear Investigations). Whenever pertinent adjustments are made to baseline values in the conservation strategy, this appendix (appendix F) of the Custer Gallatin plan should be amended accordingly.

Secure Habitat

Secure habitat is any contiguous area greater than ten acres in size and more than 500 meters from an open or gated motorized access route. Secure habitat is measured as the proportion of each bear management subunit meeting this requirement, as calculated by the Greater Yellowstone Ecosystem Motorized Access Model. Table 47 shows the secure habitat baseline values for bear management subunits intersecting the Custer Gallatin National Forest.

Table 48. Secure habitat baseline values for bear management subunits on the Custer Gallatin

Subunit Name	Baseline Percentage Secure	Subunit Name	Baseline Percentage Secure
Boulder/Slough #1	96.6	Henrys Lake #2*	52.0
Boulder/Slough #2	97.6	Hilgard #1	80.5
Crandall/Sunlight #1	81.7	Hilgard #2	80.1
Crandall/Sunlight #2	82.7	Lamar #1	89.5
Gallatin #3*	71.1	Madison #1	80.6
Hellroaring/Bear #1	80.3	Madison #2*	67.4
Hellroaring/Bear #2	99.6	Plateau #1	70.6

*Increased baseline established through implementation of Gallatin National Forest Travel Management Plan

Permitted Livestock Grazing Allotments

Permitted livestock grazing allotments tracked for purposes under the conservation strategy include both active and vacant allotments for stocking with cattle, horses, or sheep. Allotments for domestic sheep are counted separately because sheep present more of an attractant to grizzly bears and are associated with a higher proportion of grizzly bear-livestock conflicts. The number and acreage of livestock grazing allotments that were active or vacant in 1998 provide the baseline for management, and these values are shown in table 48.

Table 49. Permitted livestock grazing baseline values for bear management subunits on the Custer Gallatin National Forest

Allotment Type	Number of allotments in 1998	Acres in allotments in 1998
Active Cattle/Horse	23	91,157
Vacant Cattle/Horse	10	46,422
Active Sheep	2	91,570
Vacant Sheep	4	42,716
Totals	39	271,865

Developed Sites

Developed sites include areas on National Forest System lands that have permanent structures and facilities intended to accommodate public recreation or administrative needs. Prior to 2016, all developed sites were merely tallied, and management was restricted so as not to intentionally increase capacity at existing sites. As noted in the (2016a) conservation strategy, the Yellowstone Ecosystem Subcommittee of the Interagency Grizzly Bear Committee established a technical team to develop a “footprint approach” for managing developed sites. This approach more accurately reflects impacts to grizzly bear habitat from larger developed sites such as front country campgrounds, visitor overnight facilities (e.g., lodge or guest ranch) and administrative sites. These sites are now measured within a polygon or “footprint,” whereas smaller developed sites, such as trailheads, mining claims, picnic areas, rental cabins, etc. are still tallied (counted) as points on the landscape. Table 49 contains a list of developed sites in the 1998 baseline for the Custer Gallatin National Forest, including those with a prescribed footprint. Figure 22 through figure 26 display the developed sites in the 1998 baseline for the Custer Gallatin National Forest.

Table 50. Developed site baseline values for bear management subunits on the Custer Gallatin

Bear Management Subunit Name	Name and Type of Developed Sites Present in 1998
Boulder/Slough #1	**FOOTPRINT: Campground (1):** Hicks Park. **POINT: Trailheads (7)**: Goose Lake, Upsidedown Creek, Independence, Sheep Creek, Copper Creek, Bridge Creek, and Box Canyon. **Administrative (1):** Box Canyon administrative cabin. **Other (3):** 2 recreation residences (Rasnick and Mandeville), Independence mine site (no plan of operations). **Plans of Operation (8):** Carolyn Sluice Box, Cray Sluice, East Iron Mountain Beartooth Plateau 1, East Iron Mountain Beartooth Plateau 2, Iron Mountain Idaho Construction Metal, Crescent Creek Pan Palladium, Crescent Creek Chromium Corp America, and Crescent Creek Beartooth Platinum.
Boulder/Slough #2	**FOOTPRINT: None** **POINT: Administrative (2):** Slough Creek cabin and Buffalo Fork cabin.
Crandall/Sunlight #1	**FOOTPRINT: Campground (1):** Chief Joseph **POINT: Campground (1):** Ovis Lake Road Camp. **Trailheads (2):** Broadwater and Clarks Fork Foot. **Other (5):** Arbor Day watchable wildlife site, Kersey Lake rental cabin/boat dock, Round Lake rental cabin/warming hut, Clarks Fork fishing platform/interpretive exhibit, and 1 recreation residence (summer home).
Crandall/Sunlight #2	**No Developed Sites on Custer Gallatin National Forest**
Gallatin #3	**FOOTPRINT: Campgrounds (2):** Tom Miner and Red Cliff. **Administrative (1):** Porcupine Guard Station **POINT: Trailheads (9):** Buffalo Horn, Sphinx Creek, Elkhorn, Wilson Draw, Tom Miner, Tom Miner Horse Facilities, Sunlight, Twin Cabin, and Tepee Creek. **Administrative or Maintenance (1):** Buffalo Horn cabin. **Other (6):** Corwin Spring fishing/boat access, Yankee Jim fishing access/boat ramp, Elkhorn River Ford horse access, Windy Pass cabin, Yankee Jim picnic area, and Porcupine Creek recreation residence.
Hellroaring/Bear #1	**FOOTPRINT: Campgrounds (4):** Eagle Creek, Bear Creek, Timber Camp, and Canyon. **Administrative (5):** OTO Ranch, Blanding Station, Hayes/McPherson property, Chicken Ranch, and Gardiner Ranger District Compound. **POINT: Trailheads (11):** Cedar Creek, La Duke, Little Trail Creek, Pine Creek, Palmer Mt. (3 trailheads), North Fork Bear Creek, Joe Brown, Bear Creek, and Sixmile. **Other (8):** Eagle Creek horse facility, La Duke picnic area, La Duke bighorn sheep watchable wildlife site, 1 recreation cabin, Lonesome Pond camping area, McConnell fishing and boat access, watchable wildlife/big game winter range site, and watchable wildlife/fish site. **Plans of Operation (8):** Counts, Mineral Hill Mine (5 distinct plans), Independence, and Livingston.
Hellroaring/Bear #2	**FOOTPRINT: None** **POINT: Trailheads (1):** West Fork Mill Creek. **Administrative (1):** Hellroaring cabin/tack shed.
Henrys Lake #2	**FOOTPRINT: Campgrounds (3):** Lonesomehurst, Cherry Creek, and Spring Creek. **POINT: Summer Home Complexes (5):** Clark Springs (8 lots), Rumbaugh Ridge (5), Romsett (9), Lonesomehurst A, Lonesomehurst B. **Trailheads (4):** Basin, Watkins Creek, Targhee Pass, West Denny Creek. **Other (2):** Basin rental cabin, and Lonesomehurst boat ramp.
Hilgard #1	**FOOTPRINT: Visitor Overnight Site (1):** Covered Wagon Ranch complex. **POINT: Trailheads (6):** Upper Buck Ridge, Cinnamon, Meadow Creek Cutoff, Cache Creek, Lower Buck Ridge, and Taylor Falls/Lightning Creek. **Administrative (2):** Cinnamon cabin and Cinnamon Mountain lookout. **Other (2):** Yellow Mule rental cabin and Buck Creek recreation residence.
Hilgard #2	**FOOTPRINT: None.** **POINT: Trailheads (4):** Eldridge, Wapiti, Lower Wapiti/Albino Lake, and Sage/Elkhorn. **Administrative (1):** Eldridge Cabin. **Other (1):** Wapiti rental cabin.

Bear Management Subunit Name	Name and Type of Developed Sites Present in 1998
Lamar #1	**FOOTPRINT: Campgrounds (2):** Soda Butte and Colter. **Administrative (4):** Cooke City Guard Station, Cooke City highway borrow pit, Cooke City compacting facility, and Cooke City burn pile. **POINT: Trailheads (7)**: Abundance Lake/Upper Stillwater, Republic Creek;, Lower Lady of Lake, Lady of Lake #1, Woody Pass, Daisy Pass and Wolverine Pass. **Administrative (4):** 2nd Forest Service warehouse, mine tailings repository, old mine buildings, and mine reclamation pond. **Other (1):** Beartooth Highway interpretive site. **Plans of Operation (8)**: Cray Placer and 7 distinct New World mines.
Madison #1	**FOOTPRINT: Campground (1)** Beaver Creek – facilities outside RZ/PCA; added to baseline w/footprint approach. **Administrative (1)** Grayling gravel pit. **POINT: Campgrounds (1)** Cabin Creek. **Trailheads (11)**: Potamogeton, West Fork Beaver Creek, Whits Lake, Johnson Lake, Tepee Creek, Red Canyon, Kirkwood, Cub Creek, Fir Ridge, Hebgen Mountain and Cabin Creek. **Administrative (1):** Building destruction site. **Other (7):** Tepee Creek snowmobile parking area, Beaver Creek watchable wildlife site, Beaver Creek rental cabin, Cabin Creek rental cabin, Hebgen Dam fishing access and administrative site, Yellowstone Holiday picnic area, and North Shore picnic area.
Madison #2	**FOOTPRINT: Campgrounds (2):** Rainbow Point and Bakers Hole. **Administrative (6):** West Yellowstone Ranger Station, WY Interagency Fire Center, Bison capture facility (SUP), Solid Waste Transfer Station (SUP), Horse Butte lookout/picnic site, and Game Warden Residence. **Visitor Overnight Site (1):** Madison Arm Resort. **POINT: Summer Home Complexes (8):** California (2 lots), Lakeshore A (6 lots), Lakeshore B (8 lots), Lakeshore C (3 lots), Lakeshore E (19 lots), Baker's Hole (3 lots), Railroad (3 lots), and Horse Butte (2 lots). **Trailheads (1):** Rendezvous Ski Trail complex. **Other (3):** Madison picnic area/boat ramp, Rainbow Point picnic area/boat ramp, and South Plateau shooting range.
Plateau #1	**No Developed Sites on Custer Gallatin National Forest**

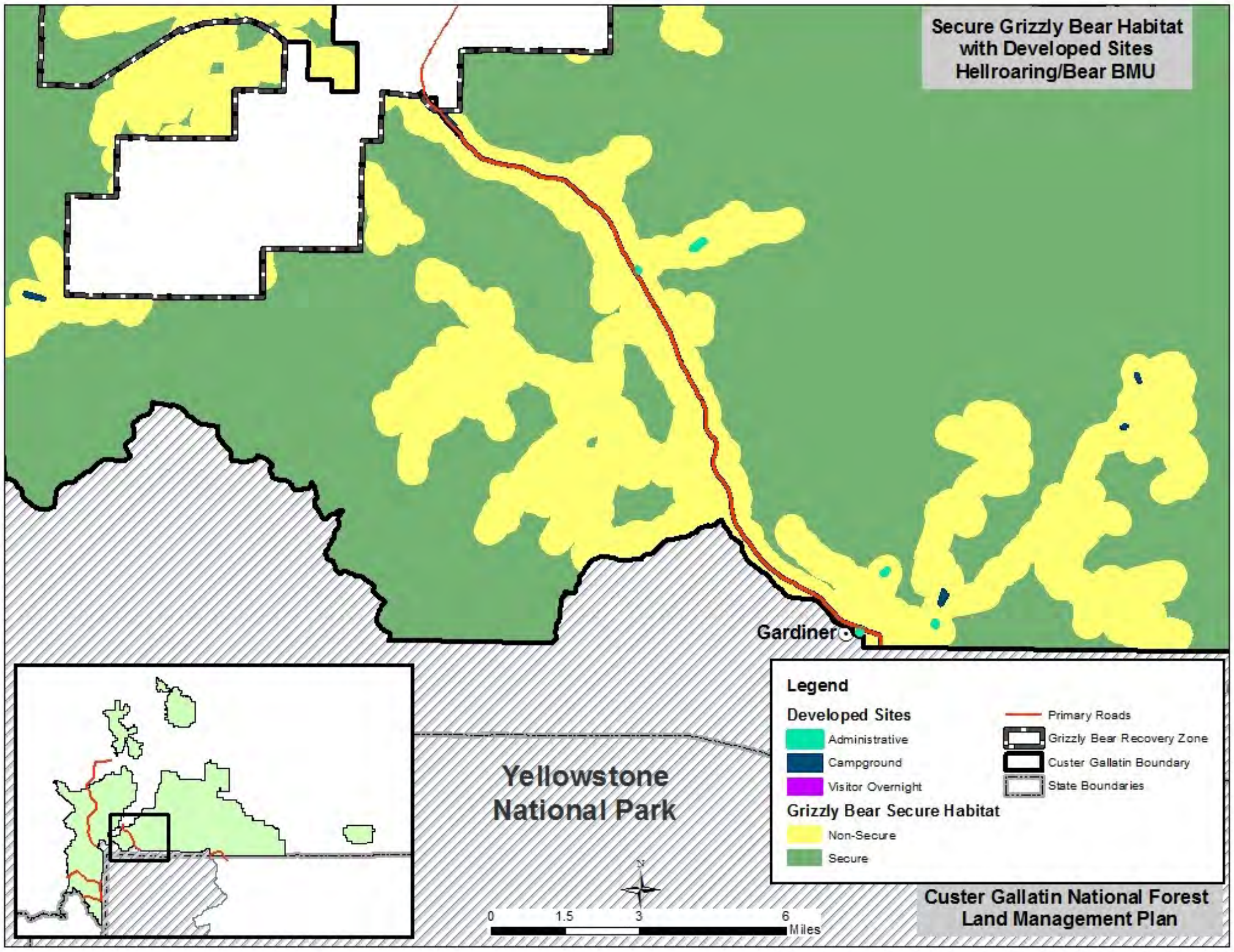


Figure 23. Developed site footprints and primary road segments, Hellroaring/Bear bear management unit (BMU)

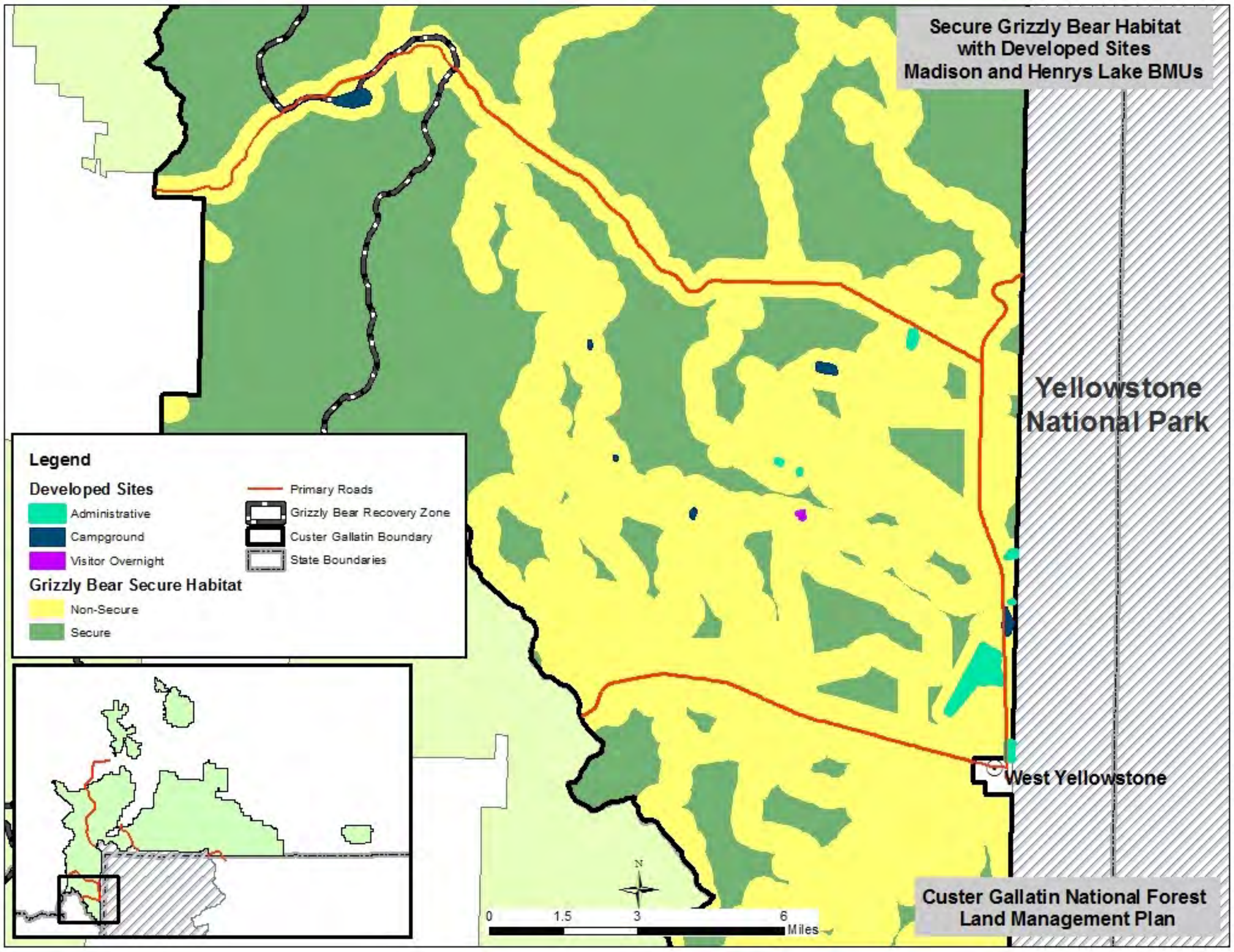


Figure 24. Developed site footprints and primary road segments, Madison and Henrys Lake bear management units (BMUs)

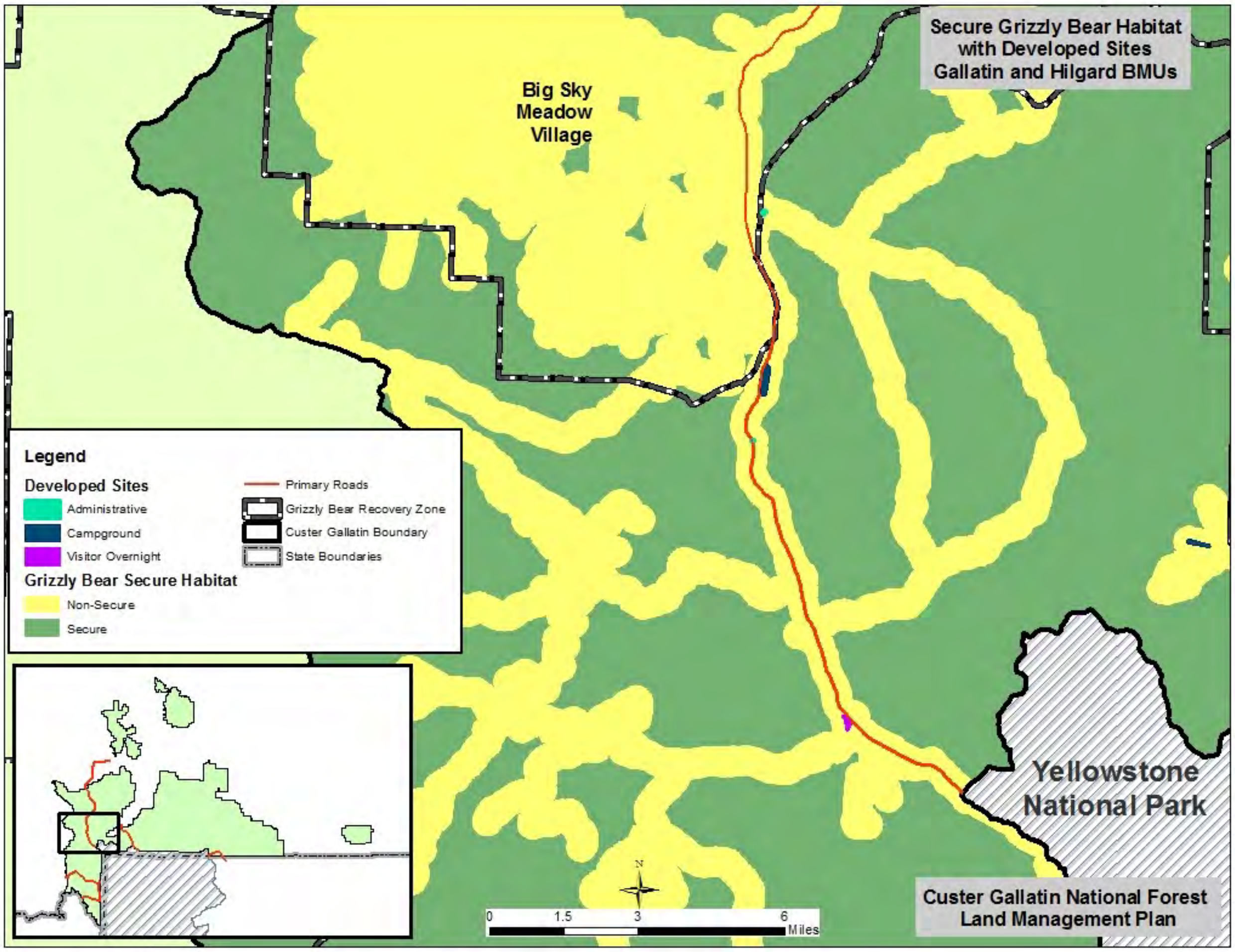


Figure 25. Developed site footprints and primary road segments, Gallatin and Hilgard bear management units (BMUs)

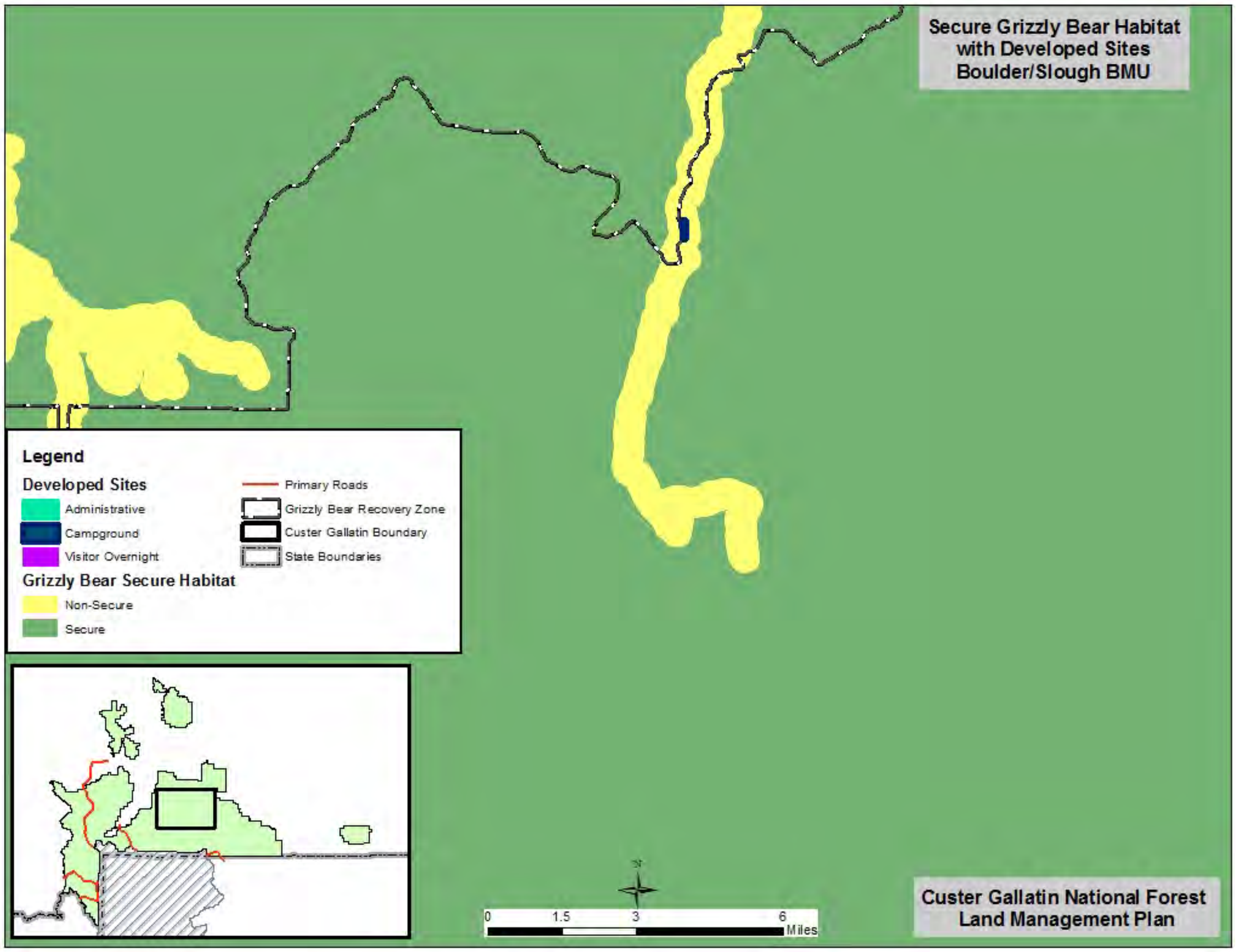


Figure 26. Developed site footprints and primary road segments, Boulder/Slough bear management unit (BMU)

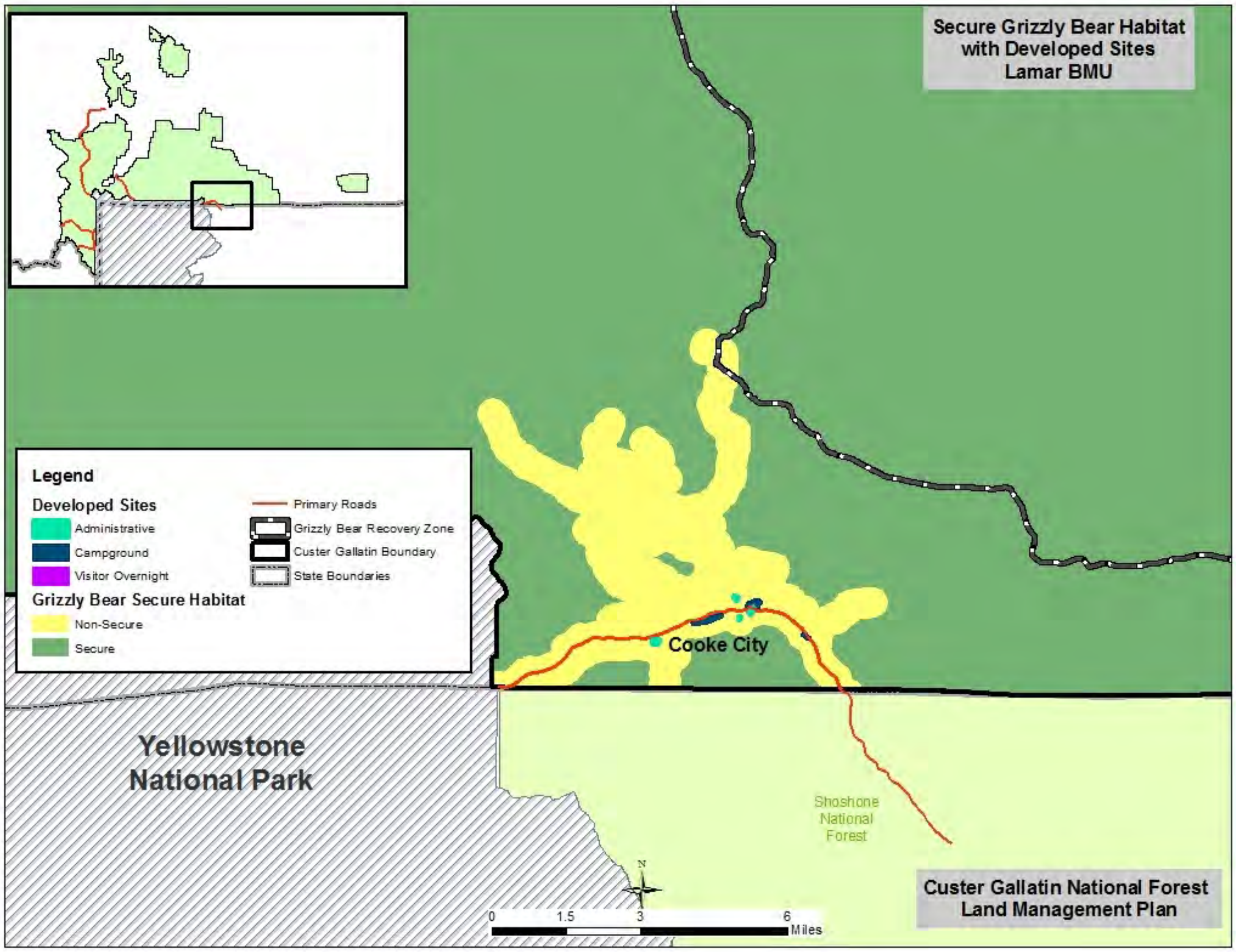


Figure 27. Developed site footprints and primary road segments, Lamar bear management unit (BMU)

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Appendix G: Northern Rockies Lynx Management Direction

The Northern Rockies Lynx Management Direction Record of Decision (U.S. Department of Agriculture 2007b) is included as appendix G of the Custer Gallatin National Forest Land Management Plan. In 2007, the Northern Rockies Lynx Management Direction amended the existing plans of 18 national forests in Montana, Idaho, Wyoming, and Utah, including the Custer Gallatin National Forest. The record of decision was signed by the regional foresters of the USDA Forest Service Northern Region, Intermountain Region, and Rocky Mountain Region on March 23, 2007.

The purpose of the Northern Rockies Lynx Management Direction was to incorporate into national forest plans management direction that conserves and promotes recovery of Canada lynx by reducing or eliminating adverse effects from land management activities on National Forest System lands, while preserving the overall multiple use direction in existing plans.

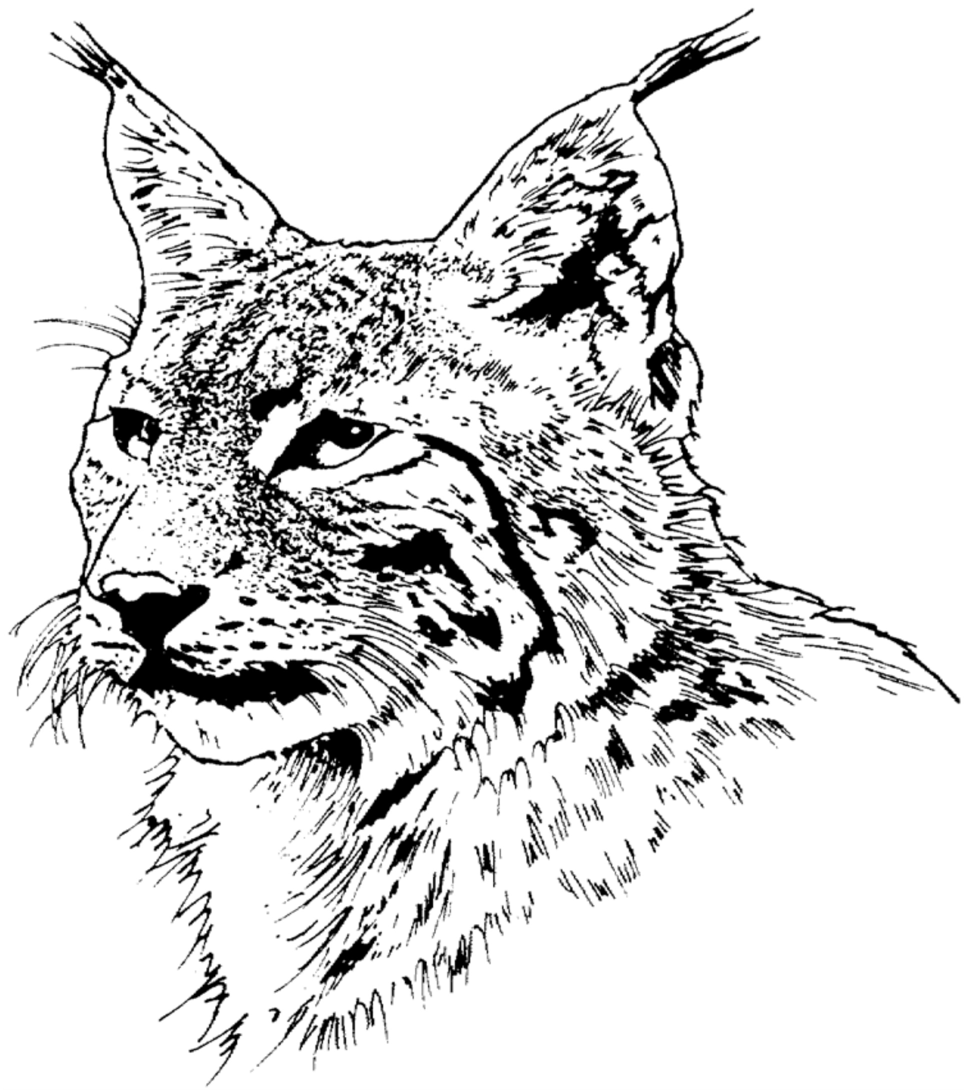
Note: The Northern Rockies Lynx Management Direction Record of Decision is a legacy document with its own internal page numbering, and it is not compliant with Section 508 of the Rehabilitation Act. If you need assistance with this document, please contact the Custer Gallatin National Forest at (406) 587-6701.

USDA
Forest
Service

National Forests in Montana, and parts of Idaho, Wyoming, and Utah

March 2007

Northern Rockies Lynx Management Direction Record of Decision



Record of Decision

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Summary of the decision

We have selected Alternative F, Scenario 2 as described in the Northern Rockies Lynx Management Direction Final Environmental Impact Statement (FEIS) (pp. 35 to 40), with modifications. We modified Alternative F, Scenario 2 and incorporated the U.S. Fish and Wildlife Service (FWS) Terms and Conditions (USDI FWS 2007), where applicable, into the management direction – see Attachment 1- hereafter called the *selected alternative*. We determined the selected alternative provides direction that contributes to conservation and recovery of Canada lynx in the Northern Rockies ecosystem, meets the Purpose and Need, responds to public concerns, and is consistent with applicable laws and policies. In the FEIS we analyzed six alternatives in detail and two scenarios for Alternative F. Of those, we determined Alternative F Scenario 2 is the best choice. With this decision, we are incorporating the goal, objectives, standards, and guidelines of the selected alternative into the existing plans of all National Forests in the Northern Rockies Lynx Planning Area – see Figure 1-1, FEIS, Vol. 1 Tables 1-1 and 1-2.

The direction applies to mapped lynx habitat on National Forest System land presently **occupied** by Canada lynx, as defined by the *Amended Lynx Conservation Agreement between the Forest Service and the FWS* (USDA FS and USDI FWS 2006). When National Forests are designing management actions in **unoccupied** mapped lynx habitat they should consider the lynx direction, especially the direction regarding linkage habitat. If and when those National Forest System lands become occupied, based upon criteria and evidence described in the Conservation Agreement, the direction shall then be applied to those forests. If a conflict exists between this management direction and an existing plan, the more restrictive direction will apply.

The detailed rationale for our decision, found further in this document, explains how the selected alternative best meets our decision criteria. Those decision criteria are: 1) meeting the Purpose and Need to provide management direction that conserves and promotes the recovery of Canada lynx while preserving the overall multiple use direction in existing plans; 2) responding to the issues; and 3) responding to public concerns.

Background

The FWS listed Canada lynx as a threatened species in March 2000, saying the main threat was "the lack of guidance for conservation of lynx and snowshoe hare habitat in National Forest Land and Resource Plans and BLM Land Use Plans" (USDI FWS 2000a). Following the listing, the Forest Service (FS) signed a Lynx Conservation Agreement with the FWS in 2001 to consider the Lynx Conservation Assessment and Strategy (LCAS) during project analysis, and the FS agreed to not proceed with projects that would be "likely to adversely affect" lynx until the plans were amended. The Conservation Agreement (CA) was renewed in 2005 and added the concept of occupied mapped lynx habitat. In 2006 the CA was amended to define occupied habitat and to list those National Forests that were occupied. In 2006 it was also extended for 5 years (until 2011), or until all relevant forest plans were revised to provide guidance necessary to conserve lynx (USDA FS and USDI FWS 2000, 2005, 2006a, 2006b). The plan direction in this decision fulfills our agreement to amend the plans. The management direction provided in this decision is based upon the science and recommendations in:

- *Ecology and Conservation of Lynx in the United States* (Ruggiero et al 2000), which summarizes lynx ecology;
- *Lynx Conservation Assessment and Strategy* (LCAS) (Ruediger et al 2000), which recommends conservation measures for activities that could place lynx at risk by altering their habitat or reducing their prey; and
- Numerous publications cited in the FEIS and found listed in the *References* section of this ROD and in the FEIS, pp. 381 to 396.

Purpose of and Need for action

The Purpose and Need is to incorporate management direction in land management plans that conserves and promotes recovery of Canada lynx, by reducing or eliminating adverse effects from land management activities on National Forest System lands, while preserving the overall multiple-use direction in existing plans (FEIS, Vol. p. 1).

Risks to lynx and lynx habitat

The overall goals of the LCAS were to recommend lynx conservation measures, provide a basis for reviewing the adequacy of Forest Service land and resource management plans with regard to lynx conservation, and to facilitate section 7 conferencing and consultation under ESA. The LCAS identified a variety of possible risks to lynx and lynx habitat.

The LCAS identified *risk factors affecting lynx productivity* (pp. 2-2 to 2-15) as:

- Timber management
- Wildland fire management
- Livestock grazing
- Recreational uses
- Forest backcountry roads and trails
- Other human developments

These are the typical types of activities conducted on federal land administered by the FS, and the FS has the authority to manage and regulate them. As such, the management direction analyzed in the Lynx FEIS and incorporated into the forest plans with this Record of Decision (ROD) focus on these types of activities.

The LCAS identified *risk factors affecting mortality* (pp. 2-15 to 2-17) as:

- Trapping
- Shooting
- Predator control
- Highways
- Predation by other species

These factors can directly cause lynx deaths. Trapping of lynx is no longer permitted in the planning area, although incidental trapping of lynx could still occur. Incidental or illegal shooting can also occur, but trapping and hunting is regulated by state agencies. Predator control activities are conducted by USDA Wildlife Services. Since the factors of trapping shooting and predator control are outside the authority of the FS to manage or regulate, this ROD does not include management direction related to them.

Highways (generally high-speed, two lane) are a known source of direct mortality (LCAS, pp. 2-16 to 2-17). Depending on the situation, this risk factor may fall under the authority of the FS. Therefore, it is addressed in the FEIS, and management direction concerning highways is incorporated into the Forest Plans through this ROD.

Other predators may affect lynx. Lynx have a competitive advantage in places where deep, soft snow tends to exclude predators in mid-winter, the time when prey is most limiting. Certain activities, such as certain types of winter recreation, may provide access to other predators (LCAS, pp. 2-6 to 2-15). The FEIS and ROD addresses this concern.

The LCAS identified *risk factors affecting movement* (pp. 2-17 to 2-19) as:

- Highways and associated development
- Private land development

Lynx are known to disperse over wide areas. Highways and the developments associated with them may affect lynx movement (LCAS, p. 2-17). The FS has only limited authority to address highways, and has no authority to manage activities on private land. Based on the limited authority the FS has in this area, only a few guidelines address these risk factors.

After the LCAS was issued the FWS published a Clarification of Findings in the *Federal Register* (FEIS, Vol. 1, Appendix P), commonly referred to as the Remand Notice. In the Remand Notice the FWS states, "We found no evidence that some activities, such as forest roads, pose a threat to lynx. Some of the activities suggested, such as mining and grazing, were not specifically addressed [in the Remand Notice] because we have no information to indicate they pose threats to lynx" (p. 40083). Further on in the Remand Notice they state, "Because no evidence has been provided that packed snowtrails facilitate competition to a level that negatively affects lynx, we do not consider packed snowtrails to be a threat to lynx at this time" (p. 40098). In regards to timber harvest the FWS states, "Timber harvesting can be beneficial, benign, or detrimental to lynx depending on harvest methods, spatial and temporal specifications, and the inherent vegetation potential of the site. Forest practices in lynx habitat that result in or retain a dense understory provide good snowshoe hare habitat that in turn provides good foraging habitat for lynx" (p. 40083). These findings by FWS narrow the focus from the concerns first published in the LCAS (discussed above) about what management direction is needed to maintain or improve Canada lynx habitat. We considered this information in the development of the selected alternative, and in our decision.

Public involvement

We involved the public in the development of the plan direction from the very beginning. In order to determine the scope of the public's interest in developing lynx direction the FS and BLM started with a notice published in the *Federal Register* (Vol. 66, No. 176, pp. 47160 to 47163) on September 11, 2001. Originally, the scoping period was scheduled to end on October 26, 2001, but we extended it to December 10, 2001. The FS and BLM gave people more time to comment, both in response to several requests for extensions, and because of the general disruption stemming from the September 11th terrorist attacks. In December 2006, the BLM elected to not be a cooperating agency in this planning effort and to undertake changes to BLM plans through a separate planning process.

We created an official website at www.fs.fed.us/r1/planning/lynx.html. The website continues to provide information, including the information used to develop the Proposed Action, the DEIS, and FEIS.

During scoping we held numerous open-house meetings to provide a better understanding of the lynx proposal and to gain an understanding of public issues and concerns (FEIS, Vol. 1, p. 18). We mailed out more than 6,000 letters about the proposal and upcoming meetings to a mailing list of people interested in land management issues. By December 17, 2001 we had received 1,890 public responses to the scoping notice. We then evaluated and summarized those responses in a report entitled *Summary of Public Comments* (see the *Scoping* section of the Project Record). Responses received after December 17, 2001, but before the release of the Draft Environmental Impact Statement (DEIS) in January 2004 were also considered. A summary of these comments can also be found in the *Scoping* section of the Project Record. In mid-May 2002 we mailed an eight-page update to the more than 2,000 addresses of those who responded to the scoping notice.

We decided to prepare an EIS because of the level of interest expressed during scoping. On August 15, 2002, we published a Notice of Intent to prepare an Environmental Impact Statement in the *Federal Register* (Vol. 67, No. 158, pp. 53334 to 53335). There were five responses to the Notice of Intent, which we also considered.

On January 16, 2004, a Notice of Availability of the DEIS was published in the *Federal Register* (Vol. 69, No. 11, p. 2619). This notice began a 90-day public comment period. At that time, we sent copies of the DEIS (either paper or CD versions), or the summary of the DEIS to a variety of interested parties (FEIS, Vol. 1 p 19). The documents are also available on the web site: www.fs.fed.us/r1/planning/lynx.html.

We hosted open-house meetings in February and March of 2004 to provide the public with a better understanding of the DEIS and its alternatives. Over 380 people attended the open houses which were held in four states and 25 communities. We accepted public comments on the DEIS either sent through the mail or via E-mail. The public comment period ended on April 15, 2004, with the agency receiving well over 5,000 comments. We used those comments, as well as late comments, to help formulate Alternative F, to help clarify and add to the analysis, to correct errors in the DEIS, and to update the FEIS. We responded to all of the comments on the DEIS in the Response to Comments (FEIS, Vol. 2).

Issues

As a result of the public participation process; review by other federal, state, tribal, and local government agencies; and internal reviews, we identified five primary issues, which are described in detail in the FEIS, Vol. 1, Chapter 2. The issues were used as a basis for developing the management direction in the alternatives, and were used to analyze effects. The issues are:

1. Over-the-snow recreation. The effects of limiting the growth of designated over-the-snow routes on opportunities for over-the-snow recreation.

2. Wildland fire risk. The effects of the management direction on the risks to communities from wildland fire.

3. Winter snowshoe hare habitat in multistoried forests. The effect on lynx of allowing projects in winter snowshoe hare habitat in multistoried forests.

4. Precommercial thinning. The effects of limiting precommercial thinning on restoring tree species and forest structures that are declining.

5. FWS Remand decision. The appropriate level of management direction applied to activities that the FWS remand notice found were not a threat to lynx populations.

Alternatives considered in detail

Alternative A, the No Action Alternative. Analyzing a no-action alternative is a requirement of NEPA at 40 CFR 1508.14(d), and of FS planning procedures. The analysis of the effects of Alternative A in the FEIS considers the effects of the forest plans as they currently exist, including any previous amendments. In this case, "no action" means no amendment to the already existing plans, and no additional specific direction to conserve Canada lynx. While the FS has been following the Conservation Agreements signed with the FWS and has considered the LCAS when evaluating projects, the LCAS measures have not been incorporated as plan direction. A decision to adopt Alternative A would not adopt the measures of the LCAS into the plans, but also would not void the existing Conservation Agreements or the consultation requirements of ESA. A decision to not adopt some of the lynx management direction in any of the action alternatives would have been a decision to select a part of Alternative A.

Alternative B, the Proposed Action. The Proposed Action was developed from conservation measures recommended in the LCAS. (See Appendix A in the FEIS, pp. 401 to 438 for a crosswalk from the LCAS, to the proposal as written in the scoping letter; the Proposed Action, Alternative B, found in the Draft and Final EISs; and

Alternative F in the FEIS.) Alternative B addresses activities on National Forest System lands that can affect lynx and their habitat. The exact language of the goal, objectives, standards, and guidelines for Alternative B and all the other action alternatives can be found in the FEIS (Table 2-1, pp. 41 to 69).

Alternative C. Alternative C was designed to respond to issues of over-the-snow recreation management and foraging habitat in multistoried forests, while providing a level of protection to lynx comparable to Alternative B, the Proposed Action. Alternative C would add direction to the plans similar to the LCAS, but would have fewer restrictions on new over-the-snow trails and more restrictions on management actions in winter snowshoe hare habitat in multistoried forests. The exact language of the goal, objectives, standards, and guidelines for Alternative C and all the other action alternatives can be found in the FEIS (Table 2-1, pp. 41 to 69).

Alternative D. Alternative D was designed to address the issues of managing over-the-snow recreation and multistoried forests, similar to Alternative C. Alternative D also allows some precommercial thinning in winter snowshoe hare habitat, while still contributing to lynx conservation. Alternative D would add direction to the plans similar to the LCAS, but having fewer restrictions on new over-the-snow trails and precommercial thinning, and more restrictions than the LCAS (Alternative B) on management actions in winter snowshoe hare habitat in multistoried forests, but less than Alternative C. The exact language of the goal, objectives, standards, and guidelines for Alternative D and all the other action alternatives can be found in the FEIS (Table 2-1, pp. 41 to 69).

Alternative E, the DEIS preferred alternative. Alternative E addresses the issue of wildland fire risk while contributing to lynx conservation. It also responds to statements made in the Remand Notice (USDI FWS, 2003) that FWS has no information to indicate grazing or snow compaction are threats to lynx at this time. This was done by changing the grazing and human uses standards to guidelines. Alternative E would add direction to the plans similar to the LCAS, but has fewer restrictions on new over-the-snow trails and on fuel reduction projects proposed in a collaborative manner, and more restrictions on management actions in winter snowshoe hare habitat in multistoried forests. The exact language of the goal, objectives, standards, and guidelines for Alternative E and all the other action alternatives can be found in FEIS (Table 2-1, pp. 41 to 69).

Alternative F, the FEIS preferred alternative. Alternative F was developed from public comments on the DEIS and by pulling together parts of the other alternatives. Since it was developed from the other alternatives, the effects of Alternative F is within the scope of the effects of the alternatives analyzed in the DEIS.

Alternative F addresses many comments about problems and concerns with Alternatives E, the DEIS preferred alternative. In particular many people and FWS felt Alternative E would not meet the purpose and need because it did not provide the regulatory mechanisms to adequately address lynx needs. Alternative F was designed to provide adequate regulatory mechanisms for those risk factors found to be a threat to lynx populations – specifically those factors related to the quantity and quality of lynx habitat as discussed in the FEIS, Vol. 1, section *Management direction considered*.

Alternative F addresses comments about where to apply the management direction. Many comments suggested the management direction should only be applied to occupied habitat. Therefore, Alternative F is evaluated under two scenarios: (1) management direction would be incorporated into all forest plans and would *apply to all mapped lynx habitat*, whether or not occupied; and (2) management direction would be incorporated into all forest plans but would only *apply to occupied habitat.* Under Scenario 2, the direction should be "considered" for unoccupied units, but would not have to be followed until such time as lynx occupy the unit. The Nez Perce, Salmon-Challis, Beaverhead-Deerlodge, Bitterroot, Ashley, and Bighorn NFs, and the disjunct mountain ranges on the Custer, Gallatin, Helena, and Lewis and Clark NFs are unoccupied based on the best scientific information available at this time (USDA FS, USDI FWS 2006a).

Other management direction considered

Comments on the DEIS identified a variety of suggestions for management direction. Some of the suggestions were incorporated into the selected alternative, others were not. The FEIS, Vol. 1 pp. 71-102 provides a thorough discussion of these comments and our considerations. The following section includes discussion of some these comments and how they were considered, but not all of the suggestions considered.

The decision

The management direction in Alternative F, Scenario 2 modified (referred from now on as the *selected alternative,* see - Attachment 1) is amended into all Forest Plans in the planning area. The management direction incorporates the terms and conditions FWS issued in their biological opinion (USDI FWS 2007). This management direction includes a goal, objectives, standards, and guidelines related to all activities (ALL), vegetation management (VEG), grazing management (GRAZ), human uses (HU), and linkage (LINK). *Goals* are general descriptions of desired results; *objectives* are descriptions of desired resource conditions; *standards* are management requirements designed to meet the objectives; and *guidelines* are management actions normally taken to meet objectives. Guidelines provide information and guidance for project and activity decision-making (FEIS, Vol. 1 p. 8). The Forest Service and FWS developed the selected alternative in a collaborative manner (Project File/Coordination/with FWS, and Project File/Alternatives/FEIS alternatives).

The selected alternative provides a balance of meeting the purpose and need, and addressing the five primary issues, including other public comments. Alternative B does not provide the management direction necessary for winter snowshoe hare habitat in multistoried forests. Alternative C, may be best for lynx, but does not address any other issues. Alternative D addresses the need to restore tree species in decline, but we have determined it may allow too much activity in winter snowshoe hare habitat and result in more extensive adverse effects. Alternative E address wildfire risk to communities, but based on our analysis and comments from FWS and the public, may not provide the necessary direction to contribute to conservation and recovery of lynx.

We determined, through our analysis and with concurrence from FWS, the selected alternative contributes to conservation and recovery of lynx, while allowing some activities to occur in lynx habitat that may have some adverse effects on lynx. We determined it was important and acceptable to restore tree species in decline and address wildland fire risks to communities. This decision allows some possible adverse effects on 6.5 percent of lynx habitat (through a combination of fuels treatment in the wildland urban interface (WUI) and precommercial thinning). However, all vegetative standards remain applicable to 93.5 percent of lynx habitat.

The following describes the risk factors, what the LCAS proposed (Alternative B), issues related to the proposed action, what Alternative E (the DEIS preferred alternative) included, comments we received on the DEIS, consideration of new information, and finally what was incorporated into the selected alternative and why.

Management direction related to vegetation

Lynx require certain habitat elements to persist in a given area. Lynx productivity is highly dependent on the quantity and quality of winter snowshoe hare habitat. Winter snowshoe hare habitat may be found in dense young regenerating forests – where the trees protrude above the snowline and in multistoried forests where limbs of the overstory touch the snowline, in addition to shorter understory trees that provide horizontal cover. Certain activities, such as timber harvest, prescribed burning and wildfires, can affect the amount and distribution of these habitat elements, which can in turn affect lynx productivity. Timber harvest can be beneficial, benign, or detrimental depending on the harvest method, the spatial and temporal occurrence on the landscape and the inherent vegetation potential of the site (FEIS, Vol. 1, Appendix P).

Objectives for vegetation management

Objectives define desired conditions for lynx habitat. The LCAS identified four primary objectives which are reflected in Alternative B as *Objectives VEG O1, VEG O2, VEG O3, and VEG O4*. These objectives essentially remain the same among all alternatives. Objectives VEG O1, VEG O2 and VEG O4 were clarified in the selected alternative based on comments on the DEIS, but their intent is the same as the in LCAS.

Standards and guidelines relating to quantity of winter snowshoe hare habitat

Standard VEG S1. In order to provide a distribution of age classes, the LCAS recommended that an lynx analysis unit (LAU) (an area the size of a female lynx home range) not have more than 30 percent of the lynx habitat in an unsuitable condition, and if an LAU was at 30 percent then vegetation management projects should not create more. Lynx habitat in an unsuitable condition includes those forests in a stand initiation structural stage that are too short to provide winter snowshoe hare habitat. These conditions are created by stand-replacing wildfires, prescribed burns that remove all of the vegetation, or regeneration timber harvest. This recommendation is reflected in Alternative B *Standard VEG S1*.

Some people felt the 30 percent criterion was too high and others said it was too low based on how fires burn in lynx habitat. In addition, some people felt that constraining the 30 percent criterion to a single LAU was too restrictive, as fires burn across vast areas. Fire is the most common disturbance in lynx habitat. Generally, large stand replacing fires burn every 40 to 200 years and smaller low intensity fires burn in the intervals between stand replacing fires (FEIS, Vol. 1, p. 72 and 213-214). The 30 percent criterion was based on a way to maintain lynx habitat over time (Brittel et al. 1989).

None of the alternatives change the 30 percent criterion. However, Alternatives C, D, and E change the area the standard would be considered from an LAU to a larger landscape. Alternatives C and E apply the standard to an LAU or in a combination of immediately adjacent LAUs; Alternative D applies the standard to a subbasin or isolated mountain range. Some people liked the idea of applying the standard to a larger area, others did not. In their comments on the DEIS FWS recommended the standard be applied to a single LAU in order to maintain a good distribution of lynx habitat at the scale of a lynx home range.

The selected alternative applies the management direction to a single LAU to ensure a variety of structural stages are provided within the home range. In addition, the selected alternative was reworded to clarify what “unsuitable habitat” entails and what types of vegetation projects create this condition.

Standard VEG S2. The LCAS also recommended that timber harvest not change more than 15 percent of lynx habitat to an unsuitable condition (stand initiation structural stage that is too short to provide for winter snowshoe hare habitat) over a decade. The purpose of this standard was to limit the rate of management induced change in lynx habitat (FEIS p. 74). This recommendation is reflected in Alternative B *Standard VEG S2*.

In 2003, the effect timber harvest historically had on creating “unsuitable habitat” on Forest Service lands in Region 1 (Hillis et al. 2003) was analyzed. The analysis was based on hydrologic unit codes (HUC) (similar to the size of a lynx home range). This analysis found only 2.5 percent of the HUCs exceeds the 15 percent criterion. Since this criterion was rarely exceeded in the past, and the amount of regeneration harvest the agency does now has been dramatically reduced over the past decade (Project File/Analysis/Vegetation/FEIS/Data), Standard VEG S2 was changed to Guideline VEG G6 in Alternative C, and dropped as a standard or guideline in Alternatives D and E.

FWS comments on the DEIS said that dropping Standard VEG S2 could allow potentially negative effects to lynx to accumulate. Removal of the standard could result in reducing the amount of lynx habitat over a short period of time. Based on these comments, Standard VEG S2 was included in the selected alternative. In addition, the standard was reworded to clarify that it only applies to timber management practices that regenerate a forest (clearcut, seed tree, shelterwood, group selection).

Guideline VEG G1. The LCAS also recommended creating forage (winter snowshoe hare habitat) where it was lacking. *This is reflected as Guideline VEG G1 in Alternative B*. This guideline is retained in the selected alternative. The wording clarifies that the priority areas for creating forage should be in those forests that are in the stem-exclusion, closed canopy structural stage to enhance habitat conditions for lynx and their prey. Basically it says we should focus regeneration efforts in pure lodgepole stands, with little understory, especially where forage is lacking.

Other related comments. Other comments we received on the DEIS relating to the amount or spatial distribution of winter snowshoe hare habitat were in regards to including a standard to limit type conversion, and limiting the size of clearcuts and other regeneration harvest units (FEIS Vol. 1 p. 75-76 and FEIS Vol. 2 27-27, 56-57, 59-60). Neither of these standards were recommended in the LCAS.

Objectives VEG O1, VEG O2, VEG O3 and VEG O4 describe the desired conditions of lynx habitat and all are consistent with the intent to minimize habitat conversions. Projects and activities should be designed to meet or move towards objectives; therefore a standard for type conversion was not necessary.

Openings created by even-aged harvest are normally 40 acres or less. Creating larger openings requires 60-day public review and Regional Forester approval, with some exceptions (R1 Supplement Forest Service Handbook 2400-2001-2; R2 Supplement 2400-99-2). Koehler (1990) speculated that openings created by regeneration harvest, where the distance-to-cover was greater than 325 feet, might restrict lynx movement and use patterns until the forest re-grows. While it is assumed lynx would prefer to travel where there is forested cover, the literature contains many examples of lynx crossing unforested openings (Roe et al. 2000).

Larger openings can often more closely resemble vegetative patterns similar to natural disturbance events (e.g. fire, windthrow, and insect outbreaks) (FEIS, Vol. 1, Appendix P). A disturbance pattern characterized by a few large blocks may be desirable if large areas of forested habitat are a management goal, or if the predation and competition that occur at the edges between vegetation types is a problem (Ruggiero et al. 2000, p. 431). While it is true lynx may not use large openings initially, once they have re-grown and can provide cover, generally after ten to 30 years, such areas may be important to lynx (FEIS, Vol. 1, Appendix P, p. 40092).

The selected alternative already contains direction to consider natural disturbances and maintain habitat connectivity. Based on this management direction and evaluating the information in the *Ecology and Conservation of Lynx in the United States* (Ruggiero et al. 2000) and the LCAS, we decided that a standard limiting the size of openings was unnecessary to improve lynx conservation.

Standards and guidelines relating to quality of winter snowshoe hare habitat

Snowshoe hare are the primary prey for lynx. Winter snowshoe hare habitat is a limiting factor for lynx persistence. Snowshoe hare habitat consists of forests where young trees or shrubs grow densely. In addition to dense young regenerating forests, multistory forests that have trees whose limbs come down to snow level and have an abundance of trees in the understory, also provide winter snowshoe hare habitat. During winter, hare forage is limited to twigs and stems that protrude above the snow and the hares can reach. The LCAS recommended management direction to address winter snowshoe hare habitat in relation to precommercial thinning. Alternative B, the proposed action, splits the management direction to address actions occurring in winter snowshoe hare habitat in young regenerating forests (Standard VEG S5) and actions occurring in winter snowshoe hare habitat found in multistory forests (Standard VEG S6).

Standard VEG S5. The LCAS recommended no precommercial thinning that reduces winter snowshoe hare habitat in the *stand initiation structural stage*. This is reflected in Alternative B *Standard VEG S5.* Precommercial thinning within 200 feet of administrative sites, dwellings, or outbuildings has been allowed under current practices because it was found to have no effect to lynx due to location near structures.

Some people said this standard should apply to all vegetation management projects, not just precommercial thinning. Precommercial thinning is the primary activity that occurs in young regenerating forests. On occasion, other activities such as fuel treatments or prescribe burning, could occur. Alternatives C and D were expanded to apply to all vegetation management projects. Alternative E, the DEIS preferred alternative, only applied it to precommercial thinning projects.

Only a few comments were received on the DEIS saying the standard should apply to all type of projects. FWS did not comment on the more narrow application of the standard.

Standard VEG S5 in the selected alternative only applies to precommercial thinning because it is the predominate activity in young regenerating forests and it is has been identified as the risk factor for reducing winter snowshoe hare habitat (LCAS, Ruggiero et al. 2000, USDA FS and USDI BLM 2000, USDI FWS 2000a, 2000b, USDI FWS 2003).

As noted earlier in the issues section, some people said precommercial thinning should be allowed to restore tree species in decline or to encourage future large trees. Alternative D addresses this issue by allowing precommercial thinning of planted western white pine, whitebark pine, aspen, and larch, ponderosa pine, and lodgepole pine in certain situations. Alternative E, the DEIS preferred alternative, only allowed precommercial thinning adjacent to structures, for research or genetic tests, or for fuel treatment projects identified in a collaborative manner.

Several comments on the DEIS said the allowances for precommercial thinning in Alternative D should be incorporated into the final alternative. Several comments said that some allowance for adaptive management should be incorporated and that thinning should be allowed where it could be done to promote or prolong winter snowshoe hare habitat.

FWS comments on the DEIS said thinning adjacent to administrative sites, dwellings, or outbuildings and for research and genetic tests would have little effect on lynx or their habitat. In addition, they said the following thinning activities would have cumulatively little effect upon lynx habitat and, in some cases, advance natural ecological conditions. These include: (1) daylight thinning of planted rust-resistant western white pine where 80 percent of winter snowshoe hare habitat is maintained; (2) thinning within whitebark pine stands; (3) western white pine pruning; and (4) thinning for Christmas trees.

We evaluated the comments and incorporated the following elements into the selected alternative:

- Since Standard VEG S5 is concerned with reduction of winter snowshoe hare habitat, western white pine pruning and thinning for Christmas trees can occur if winter snowshoe hare habitat is not reduced. Generally these activities are done on an individual tree basis and do not change the characteristics of the habitat.
- Precommercial thinning can be done adjacent to administrative sites, dwellings, or outbuildings and for research and genetic tests since these would have benign effects on lynx.
- Precommercial thinning can be done for planted rust-resistant western white pine, whitebark pine, and aspen. Thinning to enhance whitebark pine and aspen would benefit other wildlife species and effects only limited acres in lynx habitat (FEIS, Vol. 1 Lynx section). Daylight thinning will be allowed around individual planted rust-resistant western white pine where 80 percent of the winter snowshoe hare habitat is retained. This may reduce some habitat effectiveness, but since this tree species has declined 95 percent across its range, we determined it was important to allow a limited amount of thinning to retain the species on the landscape.

Under these exceptions, about 64,000 acres could be precommercial thinned in occupied lynx habitat over the next decade – assuming full funding. This is likely to affect less than 2 percent of winter snowshoe hare habitat (FEIS Vol. 1 p. 188, USDI FWS 2007).

We also considered allowing precommercial thinning in vast areas of young regenerating forests where precommercial thinning could be done to prolong winter snowshoe hare habitat. We also considered precommercial thinning in young regenerating forests composed primarily of western larch with more than 10,000 trees per acre – where larch would be removed to favor other species that provide better winter snowshoe hare habitat. In both these situations the general belief is that these activities may be beneficial to lynx in the long term, but information is not available at this time to support that hypothesis. So, the standard was modified to provide an avenue to consider new information that may in the future prove or disprove these hypotheses. The criterion provided in the selected alternative states:

Based on new information that is peer reviewed and accepted by the regional level of the Forest Service and the state level of FWS, where a written determination states:
a. that a project is not likely to adversely affect lynx; or
b. that a project is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat.

This criterion allows incorporation of new peer reviewed information, but requires agreement by FWS before it may be utilized.

Standard VEG S6. The LCAS recommended no precommercial thinning that reduces *winter snowshoe hare habitat in multistory forests*. This is reflected in Alternative B *Standard VEG S6.* Precommercial thinning within 200 feet of administrative sites, dwellings or outbuildings has been allowed under current practices because it was found to have no effect to lynx due to location near structures. The LCAS did not contain a recommendation related to other management actions.

As noted in Issue #3 some people said the management direction should preclude all activities that reduce winter snowshoe hare habitat in multistory forest. Alternatives C, D, and F would apply the management direction to all vegetation management activities in multistory forests that provide winter snowshoe hare habitat. Each alternative has different allowances for vegetation management. Alternative E, the DEIS preferred alternative, changed the management direction from a standard to Guideline VEG G8. The intent of the guideline was to direct vegetation projects to provide winter snowshoe hare habitat through time.

Multistory forest structures can develop from natural processes, such as insects and diseases and fire, or management actions like timber harvest that create small openings where trees and shrubs can grow.

Comments on the DEIS suggested that management direction for multistory forests should be in the form of a standard. FWS suggested the agencies review the latest information or research on lynx use of forests in multistoried structural stages prior to developing a final preferred alternative.

Recent research in northwest Montana demonstrates that mature multistoried forests provide important winter snowshoe hare habitat and are more important than younger stands (FEIS, Vol. 1, p. 22). In fact, the researchers questioned whether or not the LCAS would provide for lynx viability and recovery if only precommercial thinning were precluded.

Based on this new information we retained Standard VEG S6 in the selected alternative, but we preclude *all* vegetation management activities that reduce winter snowshoe hare habitat in multistory forests, not just precommercial thinning as recommended in the LCAS. We would allow minor reductions in winter snowshoe hare habitat for activities within 200 feet of structures, research or genetic tests, and for incidental removal during salvage harvest (associated with skid trails). Fuel treatment projects within the WUI are also exempt from this standard (see fuel treatment discussion further in this decision). We also allow timber harvest in areas that have the potential to improve winter snowshoe hare habitat but presently have poorly developed understories.

We believe and FWS concurred that protecting winter snowshoe hare habitat in multistoried forests will further retain and promote important lynx habitat components.

Standards and guidelines relating to denning habitat

Woody debris – piles of wind-thrown trees, root wads, or large down trees – provides lynx denning sites. Large woody debris gives kittens an escape route from predators, as well as cover from the elements. During the first few months of life, when kittens are left alone while the mother hunts, denning habitat must be available throughout the home range (Bailey 1974). The LCAS recommended two standards and two guidelines related to denning habitat. These are reflected in Alternative B as *Standards VEG S3 and VEG S4 and Guidelines VEG G2 and VEG G3*.

In Alternative B Standard VEG S3 defers vegetation management projects in places with the potential to develop into denning habitat if an LAU contains less than ten percent denning habitat. Standard VEG S4 limits salvage harvest in some situations. Guideline VEG G2 says when more denning habitat is desired to leave standing trees and coarse woody debris. Guideline VEG G3 says to locate denning habitat where there is a low probability of stand-replacing fire.

<u>Development of alternatives for the DEIS</u>

Some people said that den sites can be found in old regenerating forests and the agency should be allowed the flexibility to create denning habitat in regeneration units, especially since denning habitat should be located in or adjacent to forage. In Maine, 17 den sites were located in a variety of stand types, including 10-20 year old clearcuts adjacent to residual stands (FEIS, Vol. 1, Appendix P).

After reviewing the literature, we determined it was reasonable to have an alternative that allows for flexibility to mitigate or create denning habitat, especially when there is less than 10 percent denning habitat. Alternatives D and E modify Standard VEG S3 to say where there is less than 10 percent denning habitat either: 1) defer management, or 2) move towards 10 percent by leaving standing dead trees or piles of coarse woody debris. This combined the guidance in Alternative B, Guideline VEG G2 with the Standard VEG S3.

Some people said salvage harvest should not be singled out because it is not the only management action that removes denning habitat. Standard VEG S4 limits salvage harvest after a disturbance kills trees in areas five acres or smaller – if there is less than 10 percent denning habitat.

We evaluated whether other management actions, such as prescribed burning, chipping, piling and burning, etc. should be precluded. Salvage harvest is the primary management action that removes denning habitat because it removes dead and down timber; therefore we determined other actions did not need to be constrained. However, we determined that Standard VEG S4 should be a guideline in Alternatives D and E because it provides guidance on how to design projects. The guideline says when there is less than 10 percent denning habitat, then units should consider retaining small areas of dead trees. As noted in Alternatives D and E, Standard VEG S3, units can mitigate when there is less than 10 percent denning habitat. It is possible to create denning habitat or retain pockets, but units should be allowed to evaluate denning needs on a site specific basis.

The intent of Alternatives D and E, is where denning habitat is lacking, units should recognize it, retain large and small patches and/or mitigate, especially if it denning habitat can be created in or near new forage areas. In most areas denning habitat is likely not limiting because it is found in such a variety of stand conditions and ages.

<u>Considerations for alternatives in the FEIS</u>

In comments on the DEIS some people said there was no basis for retaining ten percent denning habitat – they wanted the standard dropped altogether. Others wanted more denning habitat required. Some people asked for an alternative to prohibit harvest in old growth or mature timber to protect denning habitat. Others said that all old growth should be protected by management direction because some administrative units do not meet old growth standards.

Some people said allowing salvage logging in disturbed areas smaller than five acres lacked a scientific basis and that all salvage harvest should be deferred. Most comments on the DEIS said that management direction for denning habitat should be in the form of standards.

In their comments on the DEIS FWS supported Standard VEG S3, including conditions 1 and 2 in Alternative E, but was concerned about changing Standard VEG S4 into Guideline VEG G7. FWS recommended development of a standard that: 1) maintains ten percent denning habitat within an individual LAU; 2) is randomly/evenly distributed across the LAU; and 3) ensures recruitment of future denning habitat.

Based on these comments, we reconsidered the management direction for denning habitat. We held discussions with the researchers, lynx biology team and FWS to further explore denning habitat – where it is found, how to measure it, and how to ensure plans provide the appropriate level of management direction.

Where denning habitat is found: Since 1989 researchers have discovered that lynx denning habitat is found in a variety of structural stages from young regenerating forests to old forests. The integral component of lynx den sites appears to be the amount of downed, woody debris, not the age of the forest stand (Mowat, et al. 2000). Research by Squires (pers. com. Oct. 30, 2006) has found that of 40 den sites in northwest Montana most were located under large logs, but "jack-strawed" small diameter wind thrown trees, root wads, slash piles, and rock piles were also used (FEIS, Vol. 1 p. 172-173). These structural components of lynx den sites can often be found in managed (logged) and unmanaged (e.g. insect damaged, wind-throw) stands.

How to measure denning habitat: Retaining ten percent denning habitat is based on maintaining lynx habitat over time (Brittel et al. 1989). Brittel recommended a balance of conditions – 30 percent forage, 30 percent unsuitable that would grow into forage, 30 percent travel, and ten percent denning.

We evaluated how to measure 10 percent denning based on where the habitat can be found. We evaluated using mature and over-mature forests as a first approximation of denning habitat. Generally mature and over-mature forests contain a component of dead and down trees which lynx use. If these two components were used then all units would show much more than ten percent denning habitat as all forests have at least twenty percent of their forest in mature stand structures (Project file/Analysis/Forests/FEIS/Data). In addition, these stand structures do not account for all the stand conditions where denning habitat can be found because denning habitat can be found in young forests with slash piles, lodgepole forests with insect and disease outbreaks, areas recently burned in wildfires, as well as variety of other forest conditions. Based on these discussions, we decided, with agreement from FWS, that using stand structures as a proxy would show an abundance of denning habitat; therefore the requirement to retain ten percent was found not to be a useful measure.

How to provide for denning habitat:

We considered restricting harvest in mature forests and old growth. The important component for all lynx den sites appears to be the amount of down woody debris present, not the age of the forest (Mowat et al. 2000, Appendix P). Old growth and mature forests can provide denning habitat, but based on review of research a variety of forest structures also provide denning habitat. We considered prohibiting timber harvest in old growth but dismissed this from detailed consideration because denning habitat is found in a variety of forest structures (FEIS, Vol. 1 p. 81).

We considered restricting salvage harvest. Standard VEG S4 in Alternatives B and C limits salvage harvest after a disturbance kills trees in areas five acres or smaller – if there is less than 10 percent denning habitat. The standard was changed to a guideline in Alternatives D and F. The guideline says that when there is less than 10 percent denning habitat, then units should consider retaining small areas of dead trees.

Salvage harvest can remove denning habitat. However, den sites are found in areas with large logs, "jack-strawed" small diameter wind thrown trees, root wads, slash piles, and rock piles. These areas need not be extensive – they are generally small areas that provide sufficient cover for lynx den sites.

We reevaluated whether or not denning habitat is a limiting factor for lynx. Based on discussions with research, we reaffirmed that denning habitat is found in a variety of forest conditions, they are found in small pockets scattered across an area and are generally found across the landscape, and lynx denning sites are not believed to be a limiting factor (J. Squires, pers. com. Oct. 30, 2006). In addition, management actions can create denning habitat by strategically leaving piles of woody debris, or leaving residual trees where denning habitat is lacking.

Therefore, we determined that restricting salvage harvest was not necessary, but that projects should consider the abundance and distribution of denning habitat in their project design and leave den site components (piles of down wood, or standing dead trees) where it is lacking.

We considered management direction in the form of standards vs. guidelines. We determined management direction for denning habitat should be incorporated into one set of management direction. Incorporating all the direction into one standard or guideline reduces the potential for conflicts between directions, focusing on the important components of denning habitat.

We determined a guideline would be best suited for this management direction because denning habitat can be found in a variety of forest structures and in small areas, is not a limiting factor for lynx, and the management direction would provide design features for projects. Therefore we developed Guideline VEG G11 in the selected alternative. The guidance is to: 1) have denning habitat distributed across an LAU (in the form of pockets of large woody debris, either down logs or root wads, or large piles of jack-strawed trees); and 2) if denning habitat is lacking, projects should be designed to retain coarse woody debris – by leaving piles or retaining residual trees that can become denning habitat later.

Objectives VEG O1, VEG O2, VEG O3, and VEG O4 and Standards VEG S1, VEG S2, and VEG S6 also indirectly promote the development and retention of the structure needed for denning habitat through vegetation management that promotes a mosaic of forest conditions across the landscape (USDI FWS 2007). Based on the above, FWS determined that projects were unlikely to reduce denning structure to levels that result in adverse effects to lynx (USDI FWS 2007).

In addition, the Lynx Biology Team (the team responsible for the LCAS) is in the process of updating the LCAS denning habitat recommendations based on this new information about where denning habitat is found and its distribution.

Consideration of fuel treatment projects

Most lynx habitat consists of high-elevation spruce/fir and lodgepole pine forests, but some lynx habitat may be found in mixed conifer forests. Generally, forests in lynx habitat are close to historic conditions, meaning the long fire return interval has not been affected to any large degree by more recent fire suppression as is the case in dryer forests with short fire return intervals. However, some stand conditions are conducive to extreme fire behavior because of insect and disease mortality or the amount of tree limbs that provide ladder fuels. Fuel treatments designed to reduce ladder fuels and/or reduce the potential size (Finney 2001) and severity of wildland fires may be proposed in lynx habitat.

After the 2000 wildfire season, which burned a substantial amount of acreage, the Forest Service began to set goals for wildfire management. Several documents serve to provide a national prioritization system for the selection of hazardous fuel treatments on Federal lands with close coordination among the Federal, State, and other agencies, as well as Tribes and communities. The criteria for prioritizing lands for hazardous fuels treatment generally correspond to: (1) closest proximity to communities at risk in the WUI; (2) strategic areas outside the WUI that prevent wildland fire spread into communities or critical infrastructure; (3) areas outside of WUI that are in Condition Classes 2 or 3; and (4) other considerations (FEIS, Vol. 1 p. 215).

The LCAS did not specifically address fuel treatments. During scoping we identified wildland fire risk as an issue, issue # 2 (FEIS, Vol. 1 p. 21-22). We developed a range of alternatives to address this issue.

In Alternative A, there would be no change in existing plan direction on the treatment of fuels.

Alternative B would allow fuel treatments to go forward if they:

- Meet the 10 percent denning standard (Standard VEG S3 and S4)
- Meet 30 percent unsuitable habitat standard (Standard VEG S1) or 15 percent unsuitable habitat created by timber harvest standard (Standard VEG S2)
- Use methods other than precommercial thinning in winter snowshoe hare habitat (Standards VEG S5 and VEG S6)

Alternatives C and D would not allow any type of fuel reduction project that reduced winter snowshoe hare habitat – except within 200 feet of structures.

Alternative E, the DEIS preferred alternative would not apply the vegetation standards (Standards VEG S1, S3, and S5) to fuel treatments developed in a collaborative manner, as described in the *10-Year Comprehensive Strategy Implementation Plan* (USDA FS 2001). This exception was used because a multi-party Memorandum of Understanding was signed in 2003 by the FS, BLM, and FWS (USDA FS et al. 2003) concerning fuel treatments and collaboration.

Many comments were received on the DEIS regarding fuel treatments. Some people suggested there be no exemptions for fuel treatments. Several groups suggested that only fuel treatments within 500 yards of human residences and other structures be allowed because these areas are generally not appropriate to restore lynx anyway. Others felt the exemptions should only apply to the WUI and that the agencies should define the WUI. Others liked the exemptions as they were written in Alternative E.

FWS cautioned against exempting a broad range and unknown number of actions from plan direction. They felt, as currently worded in Alternative E, the exemption was sufficiently vague that it did not allow an adequate analysis of potential effects upon lynx or lynx habitat and it could result in extensive adverse effects to lynx.

FWS suggested Standard VEG S5 be modified to restrict precommercial thinning to within one mile of structures. They did not believe any exemptions were needed for Standards VEG S1 or S2 since so very few LAUs were near the thresholds identified in these standards. They felt very few proposals would be constrained by the standards. They also questioned why Condition Class 1 forests were not specifically excluded from the exemptions. Condition Class 1 forests include areas where fires have burned as often as they did historically; the risk of loosing key ecosystem components is low; and vegetation composition and structure is intact and functioning. The FWS went on to say they recommended that processes, actions, or types that would be exempt be clearly identified.

We reviewed and discussed the comments with FWS and decided to modify the fuel treatment exemption for the selected alternative. We thoroughly discussed the issue of how to allow for fuel treatments to reduce the hazard to communities – while providing for the conservation and recovery of lynx (Project File/Alternatives/FEIS alternatives).

Based on our discussions we decided none of the vegetation standards will apply to fuel treatment projects within the WUI as defined by the Healthy Forests Restoration Act (HFRA), within a certain limit. We constrained the number of acres that do not meet the standards to 6 percent of lynx habitat within a National Forest, and we added the FWS term and condition that fuel treatment projects can cause no more than 3 adjacent LAUs to not meet standard VEG S1.

In addition we added Guideline VEG G10 which says fuel treatment projects within the WUI should be designed *considering* Standards VEG S1, S2, S5, and S6. The intent in adding this guideline is that although these vegetation standards do not apply to fuel treatment projects within the WUI as defined by HFRA, these projects should still consider the standards in the development of the proposal. In many cases projects can be designed to reduce hazardous fuels while providing for lynx needs. This guideline ensures lynx are considered in the project design – but allows for the flexibility of not meeting the standards in situations where meeting the standards would prevent the project from reducing the hazardous fuels in the WUI.

The following describes some of the considerations in the development of this direction.

Application to Standards VEG S1 and S2: Under Standards VEG S1 and S2 it is likely very few projects would exceed the 30 percent and 15 percent criteria because many fuel treatment projects are not regeneration harvest. If regeneration harvest is applied it is likely to be done to create a fuel break adjacent to communities or to break up the continuity of fuels (Finney 2001). Since part of our direction under the Healthy Forests Initiative is to look for ways to expedite fuel reduction projects we determined that we did not want to have to amend forest plans for the few cases where not meeting the standards may be necessary.

Application to Condition Class 1: Many forests in lynx habitat are in Condition Class 1, meaning these forests have not missed a fire cycle because large, stand-replacing fire only occurs every 100 to 200 years. However, some of these Condition Class 1 forests can still be a threat to communities. An example is lodgepole pine forests which are at the age of being susceptible to mountain pine beetle outbreaks. Regenerating lodgepole pine, adjacent to a community, may be needed to reduce the severity and size of a wildland fire. Fire is a natural process in these ecosystems; but there is a need to balance the natural process with the risk of fire destroying homes; therefore we did not limit the standard to particular condition classes.

What locations should be exempted: We evaluated various options regarding where the standards should be applied and we used a variety of criteria to evaluate which option to carry forward for detailed consideration. The criteria included: 1) is there a defined area; 2) can effects be meaningfully evaluated; 3) would it provide for community protection; and 4) does it meet the purpose and need. (For further detail see FEIS, Vol. 1 pp. 85-86 which summarizes the options and considerations and the Project File/Alternatives/FEIS Alternatives/documents July 29, 2004 through February 24, 2005).

Based on comments, national direction regarding fuel treatments, and the effects on lynx, we decided exempting fuel treatment projects within the WUI, within limits would be a reasonable balance. We decided to use the definition established by Congress in the HFRA as it established a national procedure for determining the extent of the WUI (USDI, USDA FS 2006).

What limit(s) should be applied: We elected to put a limit on the amount of fuel treatment projects that could exceed the vegetation standards, since WUI has not been mapped on all units. We evaluated the WUI based on a mile of where people live (FEIS, Vol. 1 p. 217). A one mile buffer from communities was used because HFRA describes WUI as ½ mile or 1 ½ miles depending on certain features. One mile splits this difference and is easy to approximate. Based on this analysis, we found that about 6 percent of lynx habitat is within 1 mile of communities; therefore we limited the amount of acres that can exceed the standards to 6 percent of each National Forest.

In addition, FWS identified two terms and conditions (TC) to minimize impacts of incidental take of lynx due to fuel treatment projects. TC 1 (6 percent limit) was already incorporated as described above; TC 2 says fuel treatment projects shall not result in more than three adjacent LAUs exceeding the standard. This TC has been incorporated into the management direction – see Attachment 1.

Summary: Exempting fuel treatment projects within the WUI provided a defined area, as requested by FWS; we could evaluate the effects (FEIS, Vol. 1 Lynx section); it provides for community protection by reducing delay; and meets the purpose and need by constraining the area where adverse effects could occur. In addition we compiled information from each forest's 5 year fuel treatment program to evaluate effects – FEIS, Vol. 1, Lynx section and Appendix M, and USDI FWS 2007. This information was not available for the DEIS. We found that although we would limit adverse effects to 6 percent of lynx habitat, it is more likely only 1.4 percent or less of lynx habitat would have adverse effects. This is because the fuel treatment program of work within the WUI only amounts to 1.4 percent of lynx habitat and many projects can be designed to meet the vegetation standards. Regardless, the vegetation standards would apply to fuel treatments on 94 percent of lynx habitat.

In addition, by addressing the exemption and putting a limit on where adverse effects could occur this allowed us to take a cumulative look at the effects planning area wide vs. amending standards project-by-project.

FWS findings related to the vegetation management direction

The vegetation management direction set forth in the selected alternative conserves the most important components of lynx habitat: a mosaic of early, mature, and late successional staged forests, with high levels of horizontal cover and structure. These components ensure the habitat maintains its inherent capability to support both snowshoe hare prey base and adequate lynx foraging habitat (and denning habitat) during all seasons. These standards are required for all vegetation management actions on at least 93.5 percent of lynx habitat in the planning area. Areas within the WUIs (totaling six percent of lynx habitat) are exempt from these standards; however VEG G10 would apply and at least requires some consideration of the standards in designing fuel reduction treatments. Precommercial thinning, allowed under the exceptions, may affect an additional 0.5 percent of lynx habitat. Where these standards are applied to vegetation management projects, we anticipate few, if any, would have adverse effects on lynx. Collectively, application of these standards for vegetation management is expected to avoid adverse effects on lynx and promote the survival and recovery of lynx populations (USDI FWS 2007).

Management direction related to grazing

Livestock grazing may reduce or eliminate foraging habitat in areas that grow quaking aspen and willow in riparian areas (LCAS). These localized changes in habitat may affect individual lynx; however, no information indicates that grazing poses a threat to overall lynx populations (FEIS, Vol. 1, Appendix P, p. 40083). Appropriate grazing management can rejuvenate and increase forage and browse in key habitats such as riparian areas. Grazing was not mentioned in the original listing decision as a threat to lynx, nor is it discussed in *the Ecology and Conservation of Lynx in the United States* (Ruggiero et al. 2000). In addition, FWS noted that they have found no research that provides evidence of lynx being adversely affected by grazing within the planning area or elsewhere, or of lynx movements within home ranges being impeded by grazing practices (USDI FWS 2007).

The LCAS recommended four standards for grazing management. These are reflected in Alternative B. *Standards GRAZ S1, GRAZ S2, GRAZ S3, and GRAZ S4* provide management direction for grazing in fire and harvest created openings, aspen stands, riparian areas and willow carrs, and shrub-steppe habitat. Alternatives C and D retain the management direction as standards. Alternative E changes the management direction to Guidelines GRAZ G1, GRAZ G2, GRAZ G3, and GRAZ G4 because neither the Remand Notice nor the *Ecology of Conservation of Lynx in the United States* recognized grazing as a threat to lynx.

Many people commented on Alternative E, the preferred alternative in the DEIS, and said the guidelines should be standards in the final alternative. Others said grazing should not be allowed at all, while two said the grazing guidelines should be retained. The FWS did not comment on the level of grazing management direction in Alternative E. We considered these comments in the FEIS Vol. 1 pp. 86-87, as well as Vol. 2, 75-76.

We decided the management direction for grazing in the selected alternative should be in form of guidelines, Guidelines GRAZ G1 through GRAZ G4 because there is no evidence grazing adversely affects lynx. These guidelines provide project design criteria for managing grazing in fire and harvest created openings, aspen, willow, riparian areas, and shrub-steppe habitats. The guidelines are designed to minimize potential adverse effects and improve habitat conditions. FWS found that with the application of these measures in most cases, there would be no effects or discountable effects to lynx (USDI FWS 2007). In addition, the Lynx Biology Team is in the process of updating the LCAS grazing recommendations.

Management direction related to human uses

Over-the-snow winter recreation

Lynx have very large feet in relation to their body mass, providing them a competitive advantage over other carnivores in deep snow. Various reports and observations have documented coyotes using high elevation, deep snow areas (Buskirk et al. 2000). Coyotes use open areas because the snow is more compacted there, according to research conducted in central Alberta (Todd et al. 1981). In another study in Alberta, coyotes selected hard or shallow snow more often than lynx did (Murray et al. 1994).

The LCAS recommended two objectives and two standards relating to winter dispersed recreation. These are reflected in Alternative B, *Objectives HU O1 and HU O3, and Standards HU S1 and HU S3*. In Alternative B, Standard HU S1 would maintain the existing level of groomed and designated routes. All action alternatives contain

Objectives HU O1 and HU O3 that discourage expanding snow-compacting human activities. Alternatives B, C, and D contain Standard HU S1 that would allow existing over-the-snow areas to continue but not expand into new, un-compacted areas. Alternative E, the DEIS preferred alternative, contains Guideline HU G11 that discourages the expansion of designated over-the-snow routes and play areas into uncompacted areas. All alternatives would allow existing special use permits and agreements to continue.

In comments on the DEIS some people asked that no dispersed over-the-snow use be allowed off groomed or designated trails and areas, saying the no net increase in groomed or designated routes did not go far enough. Others said the management direction should be in the form of a standard, not a guideline.

Some people said standards related to over-the-snow use should be removed. They said there is no evidence to show that coyotes and other predators use packed snow trails to compete with lynx for prey, and the amount of compaction created by snowmobiles is insignificant compared to the compaction created naturally by the weather. They were particularly concerned that if such language was introduced into plans, it could be difficult to change, incrementally restricting the places where snowmobiling is allowed. Others wanted an allowance made to increase use. These comments were considered for management direction – see FEIS Vol. 1 pp. 90-93.

In their comments on the DEIS the FWS agreed it is prudent to maintain the status quo and restrict expansion of over-the-snow routes until more information is available because of the possibility that, over time, unregulated expansion could impair further conservation efforts. They also said current, ongoing research in Montana may shed some information on the effects of snow compaction on lynx. They suggested careful consideration of the most recent information and the reality of possible impairment of options for the future. They suggested considering language that could provide more guidance on conditions where the expansion of over-the-snow routes would be warranted and acceptable.

We reviewed the results of research conducted since the DEIS was released. In northwestern Montana (within the northern lynx core area) Kolbe et al. (in press) concluded there was “little evidence that compacted snowmobile trails increased exploitation competition between coyotes and lynx during winter on our study area.” Kolbe et al. (in press) suggested that compacted snow routes did not appear to enhance coyotes’ access to lynx and hare habitat, and so would not significantly affect competition for snowshoe hare. They found that coyotes used compacted snow routes for less than 8 percent of travel, suggesting normal winter snow conditions allowed access by coyotes, regardless of the presence or absence of compacted snow routes. Kolbe was able to directly measure relationships between coyotes, compacted snow routes and snowshoe hare in an area that also supports a lynx population (USDI FWS 2007). In this study coyotes primarily scavenged ungulate carrion that were readily available while snowshoe hare kills comprised only three percent of coyote feeding sites (Kolbe et al. in press).

In the Uinta Mountains of northeastern Utah and three comparative study areas (Bear River range in Utah and Idaho, Targhee NF in Idaho, Bighorn NF in Wyoming) Bunnell (2006) found that the presence of snowmobile trails was a highly significant predictor of coyote activity in deep snow areas.

From track surveys it was determined the vast majority of coyotes (90 percent) stayed within 350 meters of a compacted trail and snow depth and prey density estimates (snowshoe hares and red squirrels) were the most significant variable in determining whether a coyote returned to a snowmobile trail (Bunnell 2006). Of the four study areas recent lynx presence has only been documented on the Targhee NF. Bunnell indicated that "circumstantial evidence" suggested the existence of competition.

To date, research has confirmed lynx and coyote populations coexist, despite dietary overlap and competition for snowshoe hare, the primary prey of lynx, and alternate prey species. In some regions and studies, coyotes were found to use supportive snow conditions more than expected, but none confirm a resulting adverse impact on lynx populations in the area. The best scientific information (Kolbe's study) is from an occupied core area within our planning area. Radio-collared lynx and coyotes were monitored in this study, unlike the Bunnell study. This area is occupied by both lynx and coyotes and the study concludes coyotes did not require compacted snow routes to access winter snowshoe hare habitat.

Based on this information, we reevaluated management direction related to over-the-snow activities. An alternative to prohibit all snow-compacting activities or to limit dispersed use was evaluated, but not considered in detail because current research indicates this level of management direction is unwarranted (USDI FWS 2000a; FEIS, Vol. 1, Appendices O and P).

An alternative to drop all direction limiting snow compaction was not developed in detail because there is evidence competing predators use packed trails, suggesting a potential effect on individual lynx. We decided it was prudent to maintain the status quo and not let over-the-snow routes expand. However, we also decided it was reasonable to retain the direction as a guideline in the selected alternative which can be used in project design. The intent is to follow the management direction in guidelines. However, there may be some cases where expansion of over-the-snow routes would be warranted and acceptable, or where research indicates there would be no harm to lynx. Guidelines are better suited to adaptive management.

There is also no basis to establish any particular threshold of allowable increases. However, the selected alternative allows expanding winter recreation in some places where heavy public use existed in 1998, 1999, or 2000 – see Guideline HU G11.

The FWS concluded the Objectives HU O1 and O3, and Guideline HU G11 would be sufficient to maintain habitat effectiveness for lynx by limiting the expansion of compacted snow routes and this conclusion would be tested through monitoring required in this decision. The best information available has not indicated compacted snow routes increase competition from other species to levels that adversely affect lynx populations, and under the selected alternative the amount of areas affected by snow compacted routes would not substantially increase (USDI FWS 2007).

Developed recreation

The LCAS identified risk factors associated with ski areas, including *short-term effects* on denning, foraging, and diurnal security habitat and *long-term effects* on movement within and between home ranges (LCAS, p. 2-10). Ski areas may eliminate habitat and pose a threat to movements; but most were constructed before lynx became a conservation issue (Hickenbottom et al. 1999, p. 70). Mitigation measures can be developed at the project level to lessen the effects of existing developments.

The LCAS recommended various objectives, standards, and guidelines in relation to developed recreation, specifically ski areas. These are reflected Alternative B*, Objectives ALL O1, HU O2, HU O3, and HU O4; Standards ALL S1 and HU S2; and Guidelines HU G1, HU G2, HU G3, and HU G10.* Objectives and standards *(LINK O1 and LINK S1)* regarding habitat connectivity also address concerns about developed recreation. These objectives, standards, and guidelines provide management direction about ski area development, expansion, and operations to provide for lynx movement, security, and habitat needs.

The alternatives retain similar management direction as Alternative B, except Alternatives C, D, and E changed Standard HU S2 to Guideline HU G10. Standard HU S2 requires diurnal habitat to be maintained, if needed. There is no evidence that diurnal security habitat is required by, or where it occurs on ski areas is used by lynx (USDI FWS 2007). Since the need to provide diurnal habitat is questionable, we determined it was better suited as a guideline.

In commenting on the DEIS some people said ski areas should be removed or at least prevented from expanding. Others recommended the final preferred alternative retain Standard HU S2. There are 24 existing down hill and cross country ski areas in occupied habitat in the planning area, which affect about 17,500 acres out of the 12.5 million acres of occupied habitat. Eight down hill ski areas are planned for expansion. One new ski area is proposed. Most of the ski areas are located on individual mountain ranges, not several together as in other areas in the west (FEIS, Vol. 1 p. 285). There is no indication these ski areas affect lynx travel because these ski areas are spread across the planning area. There is no information that indicates removal of ski areas is warranted, nor is limiting their expansion, as long as lynx needs are considered. The selected alternative includes standards to provide for lynx habitat connectivity, and includes guidelines to be use in the development of ski area expansion. Many adverse effects of developed recreation will be minimized under the selected alternative (USDI FWS 2007).

Minerals and energy

The LCAS said the main risk factors associated with minerals and energy development is related to the potential for plowed roads to provide access for lynx competitors.

These recommendations are reflected in Alternative B, *Objectives ALL O1, HU O1, and HU O5, Standards ALL S1 and HU S3, and Guidelines HU G4, and HU G5* which provide management direction for mineral and energy development. All except standard HU S3 remain essentially the same in all alternatives. Standard HU S3 says to keep mineral and energy development to designated routes. This standard was changed to Guideline HU G12 in Alternative E and in the selected alternative to be consistent with the application of management direction regarding over-the-snow routes discussed above.

In commenting on the DEIS some people said lease stipulations identifying constraints on developing oil and gas, coal, or geothermal resources should be one of the decisions made as a part of the management direction. This comment is addressed in the FEIS, Vol. 1 p. 94-95. FWS did not comment on the management direction related to minerals and energy development.

Forest roads

Lynx are known to have been killed by vehicle-collisions in Colorado (reintroduced population; paved, high-speed highways), in Minnesota (paved, high-speed highways) and in Maine (high-speed, relatively straight gravel roads on flatter terrain). The best information suggests that the types of roads managed by the Forest Service do not adversely affect lynx (USDI FWS 2007). Lynx mortality from vehicle strikes are unlikely, and to date none have been documented on National Forest System lands within the planning area, given the relatively slow speeds at which vehicles travel on these roads (due to topography and road conditions) and generally low traffic volumes.

Roads may reduce lynx habitat by removing forest cover. Along less-traveled roads where the vegetation provides good hare habitat, sometimes lynx use the roadbeds for travel and foraging (Koehler and Brittell 1990; LCAS, p. 2-12). A recent analysis on the Okanogan NF in Washington showed lynx neither preferred nor avoided forest roads, and the existing road density does not appear to affect lynx habitat selection (McKelvey et al. 2000; USDI FWS 2000a, p. 39).

Although many species of wildlife are disturbed when forest roads are used (Ruediger 1996), preliminary information suggests lynx do not avoid roads (Ruggiero et al. 2000) except at high traffic volumes (Apps 2000). In denning habitat, when roads are used during summer, lynx may be affected if they move their kittens to avoid the disturbance (Ruggiero et al. 2000; LCAS, p. 2-12).

The LCAS recommended several guidelines to address potential impacts of forest roads, including upgrading, cutting and brushing, and public use. These guidelines generally discourage improving access for people or reduce the likelihood people would see lynx near roads. These guidelines are reflected in Alternative B, *Guidelines*

HU G6, HU G7, HU G8, and HU G9. All the alternatives, including the selected alternative retain these guidelines.

In commenting on the DEIS some people said more restrictions on roads were needed to conserve lynx. They wanted new road construction halted, road densities identified and existing roads closed or eliminated, or they wanted the roads guidelines turned into standards. Other people said there should be no road-related standards or guidelines, saying no evidence exists that roads harm lynx. Some people said Guideline HU G9 should be deleted because there are no compelling reasons to close roads. The FEIS, Vol. 1, pp. 95 to 96 describes how these were considered in the development of the management direction. FWS had no comments related to these guidelines.

Based on our review we found no information indicating road building should be banned or that further restrictions were needed. The guidelines adequately address the known risks associated with roads. We determined guidelines were the appropriate level of management direction because guidelines provide information and guidance for project design and decision-making. Some guidance on how to design projects is warranted because roads may affect individual lynx.

Management direction related to linkage areas

Highways and connectivity

Highways impact lynx by fragmenting habitat and impeding movement. As traffic lanes, volumes, speeds, and rights-of-way increase, the effects on lynx are increased. As human demographics change, highways tend to increase in size and traffic density.

The LCAS recommended one objective, two standards, and a guideline directly or indirectly related to highways and connectivity. These are reflected in Alternative B, *Objective ALL O1*, *Standards ALL S1* and *LINK S1,* and *Guideline ALL G1*. Objective ALL O1 and Standard ALL S1 are intended to maintain connectivity. Standard LINK S1 is intended to provide a process for identifying wildlife crossings across highways.

Alternatives C, D, E and the selected alternative have the same objective and standards.

In comments on the DEIS some people said more should be done than just identifying highway crossings. FWS did not comment on management direction related to highways.

The LCAS recommended project standards for highways. It says to "Identify, map and prioritize site-specific locations, using topographic and vegetation features, to determine where highway crossings are needed to reduce highway impacts on lynx and other wildlife". Alternatives B, C, D, E and the selected alternative include Standard LINK S1 which reflects the intent of the LCAS recommendations. In addition, Guideline ALL G1 says "Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways or forest highways across federal land. Methods could include fencing, underpasses or overpasses."

As noted in Chapter 3, Transportation Section, portions of three highways are likely to be reconstructed in linkage areas in the next ten years. State agencies in Wyoming, Idaho, and Montana are incorporating wildlife crossings into their highway design packages (Wyoming Department of Transportation, 2005; Idaho Transportation Department 2004; Montana DOT, FHWA, Confederated Kootenai and Salish Tribes 2006). Therefore no further management direction regarding wildlife crossings in the form of standards was found to be warranted.

Other considerations in linkage areas

Coordination among different land management agencies is important to the recovery of lynx because lynx have large home ranges and may move long distances. The LCAS recommended guidance for working with landowners to pursue solutions to reduce potential adverse effects. This recommendation is reflected in Alternative B, *Objective LINK O1*. This objective is the same among all alternatives, including the selected alternative.

In addition, it is important to mention the Forest Service is a lead member in the interagency Lynx Steering Committee and the Lynx Biology Team (FEIS, Vol. 1 Chapter 4), and played a key coordination role for the Lynx Science Team. These efforts facilitate relationships with other Federal and non-Federal landowners, including the States and provide a source for non-Federal land management guidance, through products such as the LCAS and Forest Plans. The Steering Committee would also provide a forum to build and sustain cooperative efforts with Canada to maintain lynx connectivity across the international border, if and when the need arises (USDI FWS 2007). The Forest Service also led the interagency effort to identify linkage areas.

Use of standards and guidelines

The selected alternative incorporates standards for those risk factors found to threaten lynx populations. Standards are management requirements used to meet desired conditions. Standards were used in those situations where we wanted to provide sideboards for project activities. Guidelines were used for those risk factors that may have possible adverse affects on individual lynx. Guidelines are management actions normally taken to meet objectives. They provide design criteria to meet lynx objectives. We expect guidelines to be followed in most cases, however based on site-specific conditions there may be reason not to follow a guideline.

FWS found guidelines would be implemented in most cases and adverse effects would not always occur where guidelines are not implemented. Effects would be based on site-specific conditions, with compliance with Section 7 consultation for each project. The FWS does not expect adverse effects as a result of changes of LCAS standards to guidelines to reach levels that impact lynx populations. Changes from standards to guidelines occurred when the best available information indicated the action was not likely to adversely affect lynx, or not likely to adversely affect lynx in most cases (i.e. where no conclusive or reliable information supported the standard in the LCAS).

Application of the standards, and for the most part guidelines, in core and occupied secondary areas substantively reduce the potential for adverse effects on lynx over the existing plans (USDI FWS 2007).

In addition, we will monitor the application of guidelines to see if our assumption they are normally applied is correct. Annually we will review the monitoring results to determine if further consideration is warranted.

Where to apply the decision

The selected alternative is incorporated into all forest plans in the planning area (FEIS, Vol. 1, Table 1-1 p. 5 and Figure 1-1). However, the management direction only applies to occupied lynx habitat. Those National Forests (the Beaverhead-Deerlodge, Bitterroot, Nez Perce in Region 1; the Bighorn in Region 2; and the Ashley, and Salmon-Challis in Region 4), or isolated portions of National Forests (the Custer, Gallatin, Helena and Lewis and Clark in Region 1), that presently are unoccupied by Canada lynx should consider the management direction that is now incorporated into their Forest Plans when developing projects, but are not required to follow the management direction until such time as they are occupied by Canada lynx.

According to the Conservation Agreement (USDA FS, USDI FWS 2006a), an area is considered occupied when: (1) there are at least 2 verified lynx observations or records since 1999 on the national forest, unless they are verified to be transient individuals; or (2) there is evidence of reproduction on the national forest.

This direction is in keeping with the current Conservation Agreement which only applies to projects and activities in occupied habitat. The FWS species lists on those forests and portions of forests that are unoccupied do not show lynx as a species for consideration. However, as noted in the Biological Opinion, the FWS said, and we agree that lynx detection is needed to assess whether further management direction is warranted (USDI FWS 2007). Therefore, we agree to work with the FWS to develop and complete an acceptable protocol to survey currently unoccupied lynx habitat in secondary areas as described in the Biological Opinion, Term and Condition #4.

Incorporation of terms and conditions

On March 16, the FWS issued its Biological Opinion on the Northern Rockies Lynx Management Direction (USDI FWS 2007). In the opinion the FWS concluded that the management direction would overall be beneficial, but that some adverse effects to lynx would still be anticipated. It determined the management direction would not jeopardize the continued existence of lynx. The opinion also provides an incidental take statement which specifies the impact of any incidental taking of lynx. It also provides reasonable and prudent measures that are necessary to minimize the impacts of the take and sets forth terms and conditions which must be complied with in order to implement the reasonable and prudent measures.

The opinion identified three reasonable and prudent measures (RPM) with four associated terms and conditions (TC). We incorporated TC 1 through 3 into the management direction. The TCs are shown in italics in Attachment 1. TC #4 is agreed to as described below.

RPM #1: Minimize harm from fuels management by ensuring the acres impacted are not concentrated in a geographic area or several adjacent LAUs

Ensure fuels management projects conducted under the exemptions from Standards VEG S1, S2, S5 and S6 in occupied habitat:

TC 1. do not occur in greater than 6 percent of lynx habitat on any forest; and

TC 2. do not result in more than 3 adjacent LAUs not meeting the VEG S1 standard.

TC 1 was already part of the management direction. TC 2 has been added to Standard VEG S1.

RPM #2: Minimize harm from precommercial thinning and vegetation management by ensuring that LAUs either retain sufficient foraging habitat, or do not substantially reduce foraging habitat.

TC 3. In occupied habitat, precommercial thinning and vegetation management projects allowed per the exceptions listed under VEG S5 and S6, shall not occur in any LAU exceeding VEG S1, except for projection of structures. This requirement has been added to Standards VEG S5 and VEG S6.

RPM #3: On those Forests with currently unoccupied lynx habitat, lynx detection is needed to assess whether further management direction is warranted, including application of the management direction.

TC 4. Within 18 months of the date of the Biological Opinion, the Forest Service shall work with the Service to develop and complete an acceptable protocol to survey currently unoccupied lynx habitat in secondary areas. We agree to work with the FWS to develop and complete the protocol in unoccupied secondary areas.

The FWS also identified several monitoring and reporting requirements related to the above terms and conditions. We have incorporated these elements in the selected alternative – see Attachment 1, page 9.

Consideration of conservation recommendations

The FWS also identified three conservation recommendations which are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery programs, or to develop information.

Recommendation 1. The FS should ensure to the extent possible, that unoccupied habitat continues to facilitate and allow dispersal of lynx into the future. Therefore the

FWS recommends the management direction regarding linkage areas and connectivity by applied in the unoccupied areas (ALL O1, ALL S1, ALL G1; LINK O1, LINK S1 and LINK G1). The Forest Service already considers and applies this management direction in our current program of work; therefore we have decided to not apply the direction in unoccupied areas until such time the areas are occupied.

Habitat connectivity is considered in the design of permanent developments and vegetation management. Few, if any, vegetation projects affect habitat connectivity. Most, if not all units, have some level of riparian area protection requirements in their existing plans. This direction facilitates movement of lynx through riparian areas.

The greatest risk to impeding connectivity is in relation to roads and highways. The Forest Service already works with the State and Federal Highway agencies and is part of the steering team that produced the document *Eco-logical: An Ecosystem Approach to Developing Infrastructure Projects* (USDOT, 2006), FEIS Transportation Section. Also noted in this section is the highway work planned and projected in all lynx habitat and how the states have incorporated wildlife crossings into the design of those future projects. The FEIS p. 198 evaluated the effects of not applying the management direction to unoccupied areas and discloses that there would be minimal effects, especially to linkage areas because similar management direction or the intent of the direction already exists.

Recommendation 2. The Forest Service should coordinate with the Service to develop, within 18 months a method to monitor the amount and condition of lynx habitat in unoccupied secondary habitat. The Forest Service agrees to this recommendation.

Recommendation 3. The Forest Service should continue to be a leader in lynx conservation and understanding. The Forest Service agrees to this recommendation.

Canada Lynx Recovery Outline

On September 12, 2005 the FWS issued a Recovery Outline for Canada lynx (USDI FWS 2005). The outline is to serve as an interim strategy to guide and encourage recovery efforts until a recovery plan is completed. In the Recovery Outline, FWS categorized lynx habitat as: 1) core areas; 2) secondary areas; and 3) peripheral areas. The areas with the strongest long-term evidence of the persistence of lynx populations within the contiguous United States are defined as "**core areas**." As we discuss below and illustrated on the enclosed map (Figure 1-1), we have two core areas in the analysis area. Core areas have both persistent verified records of lynx occurrence over time and recent evidence of reproduction. According to FWS, focusing lynx conservation efforts on these core areas will ensure the continued persistence of lynx in the contiguous United States by addressing fundamental principles of conservation biology (USDI FWS 2007). The Recovery Outline says "Recovery of lynx will be achieved when conditions have been attained that will allow lynx populations to persist long-term within each of the identified core areas." (USDI FWS 2005).

At this time, the role of areas outside of these core areas in sustaining lynx populations is unclear. The fluctuating nature of lynx population dynamics and the ability of lynx to disperse long distances have resulted in many individual occurrence records outside of core areas, without accompanying evidence of historic or current presence of lynx populations. Areas classified as "**secondary areas**" are those with historical records of lynx presence with no record of reproduction; or areas with historical records and no recent surveys that document the presence of lynx and/or reproduction. We have one area of secondary habitat in the analysis area (Figure 1-1). Much of the secondary habitat is unoccupied. FWS hypothesizes that secondary areas may contribute to lynx persistence by providing habitat to support lynx during dispersal movements or other periods, allowing animals to then return to "core areas."

In "**peripheral areas**" the majority of historical lynx records are sporadic and generally corresponds to periods following cyclic lynx population highs in Canada. There is no evidence of long-term presence or reproduction that might indicate colonization or sustained use of these areas by lynx. However, some of these peripheral areas may provide habitat enabling the successful dispersal of lynx between populations or subpopulations. We have four areas of peripheral habitat in the analysis area (Figure 1-1). At this time, FWS does not have enough information to clearly define the relative importance of secondary or peripheral areas to the persistence of lynx in the contiguous United States (USDI FWS 2005, USDI FWS 2007).

In the Recovery Outline, FWS presented four preliminary recovery objectives. Below, we summarize FWS findings (USDI FWS 2007) of how the selected alternative meets the recovery objectives.

Preliminary recovery objective 1: *Retain adequate habitat of sufficient quality to support the long-term persistence of lynx populations within each of the identified core areas.*

FWS concludes the selected alternative fulfills this objective and adequately manages the two core areas within the planning area to support lynx recovery. The selected alternative supports the long-term persistence of lynx populations within the Northwestern Montana/Northeastern Idaho and Greater Yellowstone core areas, which constitutes one third of the core areas nationwide (USDI FWS 2007).

Preliminary recovery objective 2: *Ensure that sufficient habitat is available to accommodate the long-term persistence of immigration and emigration between each core area and adjacent populations in Canada or secondary areas in the United States.*

FWS concludes the selected alternative contributes to this recovery objective in part.

Lynx have the ability to move great distances, through varied terrain and habitat. Dispersing lynx use a variety of habitats and prey resources compared to lynx attempting to establish a home range and territory (USDI FWS 2007).

Connectivity between the United States and Canada appears intact thus far, as the Northwestern Montana/Northeastern Idaho core area is directly adjacent to Canada and includes Glacier Park along its northeastern edge. The selected alternative provides and conserves core area lynx habitat directly adjacent to and contiguous with lynx habitat in Canada. Such habitat should accommodate both immigration of lynx from Canada and emigration from core areas to secondary areas or Canada.

The selected alternative applies to all core areas and occupied secondary areas. The direction includes objectives, standards, and guidelines to actively maintain or restore lynx habitat connectivity in and between linkage areas and LAUs (lynx home ranges). Because these measures apply in both core and occupied secondary areas, the selected alternative clearly meets the recovery objective of accommodated long-term connectivity across these broad areas.

The selected alternative is less clear in its effects in unoccupied secondary areas between the Northwestern Montana/Northeastern Idaho and Greater Yellowstone core areas. The management direction will not be applied to these areas until they become occupied. In the meantime existing plan direction will be followed.

Information indicates the likely impact of projected vegetation management on connectivity in this area may not be excessive. Fuel treatment projects in unoccupied habitat would likely occur in no more than two to three percent of all lynx habitat on any forest in secondary areas (FEIS Vol. 1, p. 195, USDI FWS 2007). In unoccupied areas precommercial thinning could occur on about 67,000 acres (about 1 percent) with full funding and 23,000 acres (0.4 percent) or less with projected funding. Timber harvest in unoccupied areas could result in creating stand initiation openings in more than 30 percent of an LAU. However, very few LAUs exceed this amount now and those that were in excess were in that condition due to past wildfires (FEIS, Vol. p. 155). Information regarding projected timber harvest was not available, but based on the past harvest history (Project File/Forests/FEIS/Data) it is unlikely regeneration harvest will occur to the same levels it did historically (1970s and 1980s). Based on this, FWS found vegetation management, under existing plan direction, would not preclude connectivity or opportunistic foraging conditions (USDI FWS 2007).

Development is another factor that may impede lynx movement. Four ski areas, affecting about 3,800 acres occur on National Forest System lands, in unoccupied secondary habitat; two of the four are planning expansions. None of these ski areas impede connectivity of lynx habitat at this time (USDI FWS 2007).

Connectivity for lynx could be more impacted by development such as highway expansions. Under existing plans and national efforts, methods to provide for safe wildlife crossings are currently being researched by all state highway departments and are being incorporated into highway improvements (FEIS, Vol. 1 p. 294-295).

In secondary unoccupied habitat, units should consider the management direction until such time the area becomes occupied. Given the estimates of projected impacts and the best information available regarding lynx dispersal movements, FWS concluded that under existing plan direction, these unoccupied secondary areas would reasonably be expected to provide adequate connectivity and opportunistic foraging habitat for lynx to allow dispersal (USDI FWS 2007).

Preliminary recovery objective 3: *Ensure habitat in secondary areas remain available for continued occupancy by lynx.*

FWS found the selected alternative contributes to this recovery objective in part.

The recovery outline discusses the relative importance of core and secondary areas to lynx recovery. The selected alternative will fully provide management direction in occupied lynx habitat – both core and secondary. This measure ensures habitat in currently occupied secondary habitat remains available for continued occupancy by lynx.

The forests should consider the management direction in currently unoccupied secondary habitat. As noted in Objective 3, management actions could adversely affect unoccupied secondary lynx habitat. If and when lynx attempt to establish home ranges in secondary areas, individual lynx could be affected. It is also important to note that about 70 percent of unoccupied secondary lynx habitat in the planning area is in roadless or wilderness status where forest management actions are minimal and natural processes predominate.

Occupancy could occur if lynx populations in core areas were to expand, as periodically happens in lynx populations in Canada. However, given the projected impacts described in Objective 3, non-developmental areas, and existing habitat conditions, FWS believes it is reasonable to expect some lynx would occupy these secondary areas despite lack of mandatory direction in plans, but at a lower density than core. Further, if detected, once lynx occupy a previously unoccupied area, the management direction will apply. In the meantime, our vegetation management actions may degrade lynx habitat, but resulting conditions are typically temporary, not permanent. The risks of most vegetation management actions, such as timber harvest, precommercial thinning and other modifications of habitat, are reversible since typically forests regenerate overtime, with or without active restoration. Based on this FWS found lynx habitat on National Forests System lands in secondary areas will likely remain available for recovery of lynx over time (USDI FWS 2007).

The Opinion goes on to say the selected alternative does not fulfill Objective 3 entirely, as it lacks requirements for further or continued monitoring or surveying of unoccupied secondary areas for the amount and condition of lynx habitat and lynx presence, as recommended in the recovery outline.

However, through this decision we agree to work with the FWS to develop and complete a protocol to survey and to develop a method to monitor the amount and condition of lynx habitat in unoccupied secondary habitat. Our agreement to these items will aid in fulfilling Objective 3.

Preliminary recovery objective 4: *Ensure threats have been addressed so that lynx populations will persist in the contiguous United State for at least the next 100 years.*

FWS found that although plans do not apply for 100 years and thus cannot directly fulfill this objective, the selected alternative will allow lynx populations to persist on lands within core areas in the planning area within the foreseeable future. The selected alternative addresses the threat to the distinct population segment (DPS), inadequate regulatory measures, within core areas in the planning area by limiting, reducing or avoiding major adverse impacts of federal land management on lynx, as well as several other impacts or influences that do not rise to the level of a threat to the DPS. Further, a large portion of lynx habitat within the planning area (67 percent) remains in non-developmental status, where natural processes predominate. Finally, unoccupied lynx habitat within secondary and peripheral lynx areas is likely to retain habitat that provides opportunistic foraging habitat and connectivity adequate for dispersal of lynx, despite the lack of specific direction for lynx habitat management (USDI FWS 2007).

Findings Required by Laws, Regulation, and Policies

National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires analysis of decisions to ensure the anticipated effects on the environment within the analysis area are considered prior to implementation (40 CFR 1502.16). The analysis for the Northern Rockies Lynx Management Direction followed the NEPA guidelines as provided by the Council on Environmental Quality. Alternatives were developed based on the Purpose and Need, the primary issues, public comments, lynx needs as identified by the LCAS, research, and other publications. A total of six alternatives were considered in detail, including the No Action Alternative as required by NEPA (FEIS, pp. 26 to 69 and 107 to 134). Additional management direction was considered but eliminated from detailed study (FEIS, pp. 71 to 106). The range of alternatives is appropriate given the scope of the proposal, the public issues expressed, and the Purpose and Need for action (FEIS, Chapter 1).

Unavoidable adverse effects

The selected alternative does not represent an irreversible or irretrievable commitment of resources. Any disturbance to resources cannot occur without further site-specific analyses, section 7a consultation required under ESA and decision documents. For a detailed discussion of effects of this decision, see Chapter 3 of the FEIS (pp. 135 to 350).

Environmentally preferable alternative(s)

Regulations implementing NEPA require agencies to specify "the alternative or alternatives which are considered to be environmentally preferable" (40 CFR 1505.2(b)). The environmentally preferable alternative causes the least damage to the biological and physical environments and best protects, preserves, and enhances historical, cultural, and natural resources. Based on the description of the alternatives considered in detail in the FEIS and in this ROD, we determined the selected alternative best meets the goals of Section 101 of the NEPA, and is therefore the environmentally preferable alternative for this proposed federal action.

FWS found timber harvest can be beneficial, benign, or detrimental depending on harvest method, and the spatial and temporal occurrence on the landscape (FEIS, Vol. 1, Appendix P). The vegetation standards in the selected alternative ensure the timber management program is beneficial to lynx. Standard VEG S1 limits the amount of lynx habitat that is in the stand initiation stage to 30 percent of each LAU at any time, ensuring a continuous rotation of all forest stages through time that supply lynx habitat in each LAU (FEIS, Vol. 2, p. 60). Standard VEG S2 allows no more the 15 percent of the lynx habitat to change to the stand initiation stage through timber harvest in a 10-year period. This limits the rate of change within an LAU to ensure sufficient habitat for lynx through time.

Precommercial thinning can impact lynx habitat. Standard VEG S5 precludes precommercial thinning except in certain situations that FWS has determined would have little effect upon lynx or their habitat, but would advance natural ecological conditions (FWS comment letter on the DEIS, pp. 8 and 9). While these exceptions have little effect on lynx (0.5 percent of lynx habitat) they have important positive impacts on other resources and situations such as maintaining aspen, western white pine, and whitebark pine, and fuel reduction near buildings.

Since the LCAS was published it has become clear that multistory mature stands with dense horizontal cover are important to lynx. In the selected alternative, Standard VEG S6 is instrumental in maintaining winter snowshoe hare habitat in multistoried forests which will aid in lynx persistence.

The selected alternative allows for management of fuels in the WUI under Guideline VEG G10, rather than standards. Under VEG G10 fuel reduction projects in the WUI should consider the VEG standards, but may deviate from them, up to a cap of 6 percent of the lynx habitat on each National Forest. Lynx habitat is still considered; however, if the fuel reduction needs are such that any of the four VEG standards cannot be met while at the same time meeting fuel treatment objective, the project may proceed under Guideline VEG G10. Fuel treatment actions in 94 percent of the lynx habitat must follow the VEG standards, while at the same time fuel treatment projects in the WUI can protect other valuable resources.

The selected alternative contains guidelines for the various activities on National Forest System land that may have possible adverse affects on individual lynx. Standards were changed to guidelines when the best available information indicated the action was not likely to adversely affect lynx, or not likely to adversely affect lynx in most cases (i.e. where no conclusive or reliable information supported the standard in the LCAS).

The selected alternative contributes to lynx conservation and recovery on National Forest System lands, but allows for management of other resources. Considering all this, the selected alternative is the environmentally preferred alternative because it causes the least damage to the biological and physical environments and best protects, preserves, and enhances natural resources.

National Forest Management Act

Significance determination: The purpose of this proposal is to incorporate management direction into plans for the conservation and recovery of Canada lynx.

In January 2005, the Forest Service removed the November 9, 2000 National Forest System Land and Resource Management Planning Regulations at 36 CFR 219, subpart A and replaced them with newly adopted regulations. The new regulations set forth a process for land management planning, including the process for developing, amending, and revising land management plans (36 CFR 219.1). These regulations also incorporate effective dates and transition periods. Section 219.4(e) says "Plan development, plan amendments or plan revision initiated before the transition period (starting January 5, 2005) may continue to use the provisions of the planning regulations in effect before November 9, 2000" – in this case the 1982 regulations. This proposal was initiated on September 11, 2001, which is before the transition period; therefore it is being completed under the requirements of the 1982 regulations.

The National Forest Management Act (NFMA) provides that forest plans may be amended in any manner, but if the management direction results in a significant change in the plan, the same procedure as that required for development and approval of a plan shall be followed. The 1982 regulations at 36 CFR 219.10(f) requires the agency to determine whether or not a proposed amendment will result in a significant change in the plan. If the change resulting from the amendment is determined not to be significant for the purposes of the planning process, then the agency may implement the amendment following appropriate public notification and satisfactory completion of NEPA procedures.

Forest Service Manual (FSM) 1920, section 1926.5 (Jan. 31, 2006) identifies factors to consider in determining whether an amendment is significant or non-significant for those plans using planning regulations in effect before November 9, 2000.

Changes to the land management plan that are not significant can result from:

1. Actions that do not significantly alter the multiple-use goals and objectives for long-term land and resource management.
2. Adjustments of management area boundaries or management prescriptions resulting from further on-site analysis.
3. Minor changes in standards and guidelines.
4. Opportunities for additional projects or activities.

Examples of significant changes include:

1. Changes that would significantly alter the long-term relationship between levels of multiple-use goods and services originally projected.
2. Changes that may have an important effect on the entire land management plan or affect land and resources throughout a large portion of the planning area during the planning period.

The selected alternative will change in plans similar to examples of non-significant changes #1 and #3. The effects of this decision are not similar to either example of significant plan changes. These findings are discussed in further detail below.

Under the selected alternative the management direction will only apply to occupied habitat. At this time the Beaverhead-Deerlodge, Bitterroot, Nez Perce, Salmon-Challis, Ashley and Bighorn NFs are unoccupied; therefore these units should consider the management direction but will not have to apply it. Several mountain ranges on the Custer, Gallatin, Helena, and Lewis and Clark NFs are also unoccupied and the management direction will not have to be applied in these areas until lynx occupy the site. However, since the selected alternative could be applied to all units at some point in time, the following analyzes the effects on the planning area as a whole.

Changes in standards and guidelines are minor

The selected alternative adds one goal to forest plans; conserve Canada lynx. This goal is consistent with other goals in existing plans and other legal requirements to provide for habitat needs for threatened and endangered species. The selected alternative adds several objectives to the plans. These objectives require consideration of natural ecosystem process and functions, and consideration of lynx habitat needs. The additional objectives provide more species-specific guidance but do not alter the overall objectives to provide for habitat needs for threatened and endangered species. The proposal does not change any Management Area (MA) designation.

The selected alternative adds seven standards and twenty-four guidelines. The addition of these new standards and guidelines are minor as discussed below.

Changes would not significantly alter the long-term relationship between levels of multiple-use goods and services originally projected.

The management direction would not substantially alter outputs for grazing, minerals, energy, transportation systems, developed recreation areas, such as ski areas or winter recreation. These activities will not be prohibited by the management direction; however, habitat needs for lynx will need to be considered when managing these resources. The new direction will also not substantially alter timber outputs, even though it may affect growth and yield.

The selected alternative limits precommercial thinning in winter snowshoe hare habitat in young regenerating forests, with some exceptions – see Standard VEG S5. Precommercial thinning is allowed to restore aspen, whitebark pine and planted rust-resistant western white pine. Precommercial thinning will also be allowed if new research indicates it will benefit or only have short-term adverse effects to lynx. Precommercial thinning is not allowed in young regenerating lodgepole pine forests, unless new research indicates it is beneficial or benign. Limiting precommercial thinning in lodgepole pine forests could affect growth and yield, and the potential to produce some products in the future, because these forests tend to stop growing if not thinned; however overall cubic foot volume would not be affected.

The Beaverhead-Deerlodge and the Bridger-Teton are the only units that have a majority of their precommercial thinning identified over the next ten years in lynx habitat and in lodgepole pine; therefore they are the only units that could see a reduction to growth and yield (FEIS, Vo1. 1, Appendix K-5). Under current programs, the units only have accomplished a portion of their thinning program (approximately 34 percent) due to budgets, so it is difficult to tease out the effects from the management direction in this proposal from effects of budgets. In addition, Standard VEG S5 allows for consideration of new information. Over the next ten to fifteen years information may become available that indicates some precommercial thinning in lodgepole pine forests may be beneficial to snowshoe hare (see DEIS comment letter #505).

Limiting precommercial thinning is unlikely to affect long-term sustained yield (LTSY), as defined by NFMA and FSH 1909.12, Chapter 60.5, because the cubic foot volume on the site does not substantially change. The volume is spread among more, smaller trees without thinning versus fewer, larger diameter trees with thinning. In addition, some precommercial thinning may be allowed in the future if new information becomes available. Timber outputs have never been at the level of LTSY over the life of these plans, so changes in LTSY are unlikely to lead to changes in outputs, especially if outputs are measured in cubic feet, which is the appropriate measure of LTSY.

In addition, the ASQ should not be affected on any units because the management direction does not preclude timber harvest. Standards VEG S1 and S2 may defer regeneration harvest in some areas, but Guideline VEG G1 encourages projects creating winter snowshoe hare habitat where it is lacking. It is likely there would be no change in overall timber outputs, but there may be changes in what material is harvested and where.

Changes would not have an important effect on the entire land management plan or affect land and resources throughout a large portion of the planning area during the planning period.

There are approximately 38.5 million acres within the 18 National Forests in the planning area. Of this, approximately 18 million acres or 48 percent has been mapped as lynx habitat (see table 3.1). Of the 18 million acres of mapped lynx habitat, approximately 8 million acres are in land allocations that allow for management actions. Therefore the management direction only potentially affects about 20 percent of the planning area. The most noticeable effects are likely to be the location and amount of precommercial thinning. The potential acreage that could be affected is between 11,000 to 15,000 acres per year. This is less than one percent of the planning area. It should be noted that precommercial thinning is not constrained on an additional 18,000 acres per year outside lynx habitat (FEIS, Vol. 1 p 247-248).

Summary: Considering the three factors, we determined this management direction is not a significant change under NFMA to the 18 forest plans because it imposes minor changes over a limited area of these national forests.

While this amendment is not significant, the planning process necessary for significant amendments is ongoing or will begin soon on most units affected by this decision. In particular interest to the precommercial thinning discussion on the previous page, both the Beaverhead-Deerlodge and Bridger-Teton National Forests are being revised. The Beaverhead-Deerlodge should complete the revision process in 2007. Their DEIS for the Forest Plan recognizes the cumulative contribution the Northern Rockies Lynx Amendment may have on reducing growth and yield (DEIS, page 326). The Bridger-Teton should complete its revision in 2008.

Viability determination: This management direction is being adopted in accordance with the 1982 NFMA regulations for amending land and resource management plans. Plan amendments initiated before January 5, 2005 may proceed using the provisions of these regulations. The transition period to regulations implementing the 2005 planning rule ends on a unit's establishment of an Environmental Management System, or no later than January 7, 2008.

According to the 1982 NFMA regulations, fish and wildlife habitat shall be managed to maintain viable populations of Canada lynx in the planning area (36 CFR 219.19, 2000). For the purpose of this decision, the planning area is the range of lynx encompassed by the national forests subject to this decision. This is based on a biological delineation of the Northern Rockies made in the LCAS.

A viable population is, "one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well-distributed in the planning area." It is not possible to reliably predict future population demographics for lynx, and continued existence of lynx may be dependent on threats that exist outside of the planning area (health of Canadian populations, or linkage across other ownerships).

The national forests subject to this new direction will provide habitat to maintain a viable population of lynx in the Northern Rockies by maintaining the current distribution of occupied lynx habitat, and maintaining or enhancing the quality of that habitat. Based on the best scientific information available, and for the specific reasons provided below, this management direction will provide habitat to support persistence of lynx in the Northern Rockies in the long-term.

The LCAS was used as the basis for developing the selected alternative. The FWS Remand Notice (FEIS, Vol. 1, Appendix P), and other new information and research were also evaluated, and became the basis for updating standards and guidelines based upon the current state of knowledge regarding threats to lynx since the LCAS was compiled.

The greatest threats to lynx persistence and reproduction are from changes in vegetation structures that provide snowshoe hare habitat during summer and winter. Standards were developed under the selected alternative to provide direction for a variety of vegetation management activities that are most likely to affect lynx habitat (fuel treatments, precommercial thinning, timber harvest, etc.). These include standards for connectivity (ALL S1), habitat mapping (LAU S1), regeneration harvesting (VEG S2), precommercial thinning (VEG S5), and management of multistory mature and late successional forests (VEG S6). These standards are equal to or more protective than similar recommendations provided in the LCAS. In the Seeley Lake area of Montana, mature, spruce-fir forests with high horizontal cover are particularly important as winter foraging habitat and are more important than younger stands (Squires pers. com., Oct. 30, 2006) and the LCAS provides no specific management recommendations for these vegetative conditions within lynx habitat.

All of the core and secondary lynx habitat (100%) as defined in the *Recovery Outline* (USDI FWS 2005) that is occupied by lynx as defined in the *Occupied Mapped Lynx Habitat Amendment to the Canada Lynx Conservation Agreement* (USDA FS and USDI FWS 2006a) will be managed to conserve lynx.

The value of secondary habitat is unclear. The *Recovery Outline* (UDSI FWS 2005) states "Compared to core areas, secondary areas have fewer and more sporadic current and historical records of lynx and, as a result, historical abundance has been relatively low. Reproduction has not been documented." There currently is no evidence that suggest that unoccupied secondary habitat is considered necessary for a viable population of lynx. Secondary, unoccupied lynx habitat will have management direction implemented to conserve lynx if and when those administrative units become occupied. These National Forests (Beaverhead-Deerlodge, Bitterroot, Salmon-Challis and Nez Perce) which have secondary, unoccupied lynx habitat account for only about 30 percent of the total acres of core and secondary lynx habitat.

Even though the 6 percent limit (reflected in the vegetation standards) does not currently apply to unoccupied lynx habitat, those unoccupied forests would treat an average of 3.2 percent of lynx habitat within the WUI for fuel reduction over the next ten years (FEIS, Vol. 1, Lynx Section, and Appendix M). This is well below the 6 percent cap provided in the Biological Opinion (USDI FWS 2007). Overall fuel treatments, in and outside the WUI, in lynx habitat, average 5 percent within lynx habitat on these Forests.

In addition, The FWS Biological Opinion (2007) concluded that the proposed action is not likely to jeopardize the continued existence of lynx within the contiguous United States DPS. It also found the selected alternative will allow lynx populations to persist on lands in occupied core and secondary areas within the foreseeable future, and unoccupied secondary and peripheral habitat is likely to retain habitat that provides opportunistic foraging habitat and connectivity adequate for dispersal of lynx, despite the lack of specific direction for lynx management. The opinion goes on to say the incorporation of the management direction over the large geographic area occupied by lynx within 12 of the 18 National Forests (12,150,000 acres) contributes to the landscape level direction necessary for the survival and recovery of lynx in the northern Rockies ecosystem.

Endangered Species Act

The Endangered Species Act creates an affirmative obligation ". . . that all federal departments and agencies shall seek to conserve endangered and threatened species" of fish, wildlife, and plants. This obligation is further clarified in a National Interagency Memorandum of Agreement (August, 2000) which states our shared mission is to ". . . enhance conservation of imperiled species while delivering appropriate goods and services provided by the lands and resources."

We completed biological assessments (BAs) for all listed species; one for wildlife and fish, and one for plants. For all listed species, except for Canada lynx, we determined the preferred alternative would have "no effect" or would be "not likely to adversely affect" them. The determination for Canada lynx was that, while the management direction in selected alternative would improve lynx conservation, the plans amended by selected alternative would still be "likely to adversely affect" lynx because individuals could be adversely affected as a result of the exemptions and exceptions to the vegetation standards for fuel treatments projects and precommercial thinning. The BAs were submitted to the FWS. The FS consulted with the FWS on the determinations and they concurred with the "no effect" and "not likely to adversely affect" determinations. The FWS provided written review as required by Section 7 of the ESA (USDI FWS 2007).

FWS issued a Biological Opinion on the "likely to adversely affect" determination on lynx (USDI FWS 2007). The opinion acknowledges the beneficial and adverse effects of the selected alternative. The opinion states that given the large number of acres covered by the proposed action, the existing plan language, and the beneficial effects of the management direction in the balance of these acres, the selected alternative is likely to have overall beneficial effects to lynx by addressing the primary threat identified at the time of listing: the inadequacy of existing regulatory mechanisms. Even acknowledging some adverse effects could still occur, primarily due to the allowance for fuel treatment projects and precommercial thinning, the opinion found the selected alternative is not likely to jeopardize the continued existence of Canada lynx. The Opinion identifies incidental take and reasonable and prudent measure, with associated terms and conditions to reduce take. These measures have either been incorporated into the management direction (TC 1, 2, and 3) or agreed to in this decision (TC 4).

Further section 7a consultation will occur on future site-specific projects and activities if they result in adverse affects to lynx. Future consultation will reference back to the BO issued on this decision to ensure the effects of the specific projects are commensurate with the effects anticipated in the opinion issued on this decision (USDI FWS 2007).

Critical habitat

On November 9, 2006, FWS published the final rule for the designation of Canada lynx critical habitat (Federal Register, Vol. 71, No. 217, pp. 66008 to 66061). National Forest System lands were not included in the critical habitat designation. There is no adverse modification to designated critical habitat from implementation of selected alternative.

National Historic Preservation Act

This decision is a programmatic action and does not authorize site-specific activities. Projects undertaken following the management direction will comply fully with the laws and regulations that ensure protection of cultural resources. It is our determination this plan direction complies with the National Historic Preservation Act and other statutes that pertain to the protection of cultural resources.

Clean Air Act

This decision is a programmatic action and does not authorize site-specific activities. Projects undertaken following the management direction will comply fully with the laws and regulations that ensure protection of air quality. It is our determination this plan direction complies with the Clean Air Act and other statutes that pertain to the protection of air quality.

Clean Water Act

This decision is a programmatic action and does not authorize site-specific activities. Projects undertaken following the management direction will comply fully with the laws and regulations that ensure protection of water quality. It is our determination this plan direction complies with the Clean Water Act and other statutes that pertain to the protection of water quality.

Invasive Species (Executive Order 13112)

Executive Order 13112 directs federal agencies not to authorize any activities that would increase the spread of invasive species. This decision is a programmatic action and does not authorize site-specific activities. We determined this plan direction complies with Executive Order 13112.

Environmental Justice (Executive Order 12898)

Executive Order 12898 directs federal agencies to identify and address, as appropriate, any disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. We determined from the analyses disclosed in the FEIS that this plan direction complies with Executive Order 12898.

Prime Farmland, Rangeland, and Forest Land

We determined from the analyses disclosed in the FEIS that prime farmland, rangeland, and forest land will not be affected by this decision because the selected alternative is a programmatic action and does not authorize site-specific activities.

Equal Employment Opportunity, Effects on Minorities, Women

The FEIS describes the impacts to social and economic factors in Chapter 3. The selected alternative will not have a disproportionate impact on any minority or low-income communities. We determined the selected alternative will not differentially affect the civil rights of any citizens, including women and minorities.

Wetlands and Floodplains (Executive Orders 11988 and 11990)

The selected alternative is a programmatic action and does not authorize site-specific activities. We determined the selected alternative will not have adverse impacts on wetlands and floodplains and will comply with Executive Orders 11988 and 11990.

Other policies

The existing body of national direction for managing National Forest System lands remains in effect.

Implementation and appeal provisions

The management direction will become effective 30 days after publication of the notice of availability of the FEIS in the Federal Register. Requests to stay implementation of the amended plans shall not be granted pursuant to 36 CFR 217.10.

This decision is subject to review pursuant to 36 CFR 217.3 (available at http://www.fs.fed.us/r1/planning/lynx.html). Any appeals must be postmarked or received by the Appeal Reviewing Officer within 45 days of the date the legal notices are published in the The Missoulian, the newspaper of record.

Appeals sent through the US Postal Service must be sent to:

USDA Forest Service
Attn: EMC Appeals
Mail Stop 1104
1400 Independence Ave., SW
Washington, DC 20250-1104

Appeals sent through FedEx, UPS, or a courier service must be sent to:

USDA Forest Service
Ecosystem Management Coordination
Attn: Appeals
Yates Bldg., 3CEN
201 14th Street, SW
Washington, DC 20250

Appeals may be hand-delivered to the above address during regular business hours, 8:00 AM to 4:30 PM Monday through Friday, excluding holidays; or sent by fax to (202) 205-1012; or by email to appeals-chief@fs.fed.us. Emailed appeals must be submitted in rich text format (.rtf) or Word (.doc) and must include the decision name in the subject line. Any notice of appeal must be fully consistent with 36 CFR 217.9 and include at a minimum:

- A statement that the document is a Notice of Appeal filed pursuant to 36 CFR Part 217;
- The name, address, and telephone number of the appellant;
- Identify the decision to which the objection is being made;
- Identify the document in which the decision is contained, by title and subject, date of the decision, and name and title of the Deciding Officer;
- Specifically identify the portion(s) of the decision or decision document to which objection is made;
- The reasons for the appeal, including issues of fact, law, regulation, or policy and, if applicable, specifically how the decision violates law, regulation, or policy; and
- Identification of the specific change(s) in the decision that the appellant seeks.

Further information and contact person

The Northern Rockies Lynx Management Direction FEIS, the Summary, this ROD and the FWS Biological Opinion, as well as other background documents are available on the Web at http://www.fs.fed.us/r1/planning/lynx.html.

For further information regarding the FEIS, ROD, or the plan direction for Canada lynx contact:

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Missoula, MT 59807
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I am the Responsible Official for incorporating the Northern Rockies Lynx Management Direction into the Land and Resource Management Plans for the Bighorn and Shoshone National Forests in the Rocky Mountain Region of the Forest Service.

Rick D. Cables   March 21, 2007

Rick D. Cables   Date

Regional Forester, Rocky Mountain Region

I am the Responsible Official for incorporating the Northern Rockies Lynx Management Direction into the Land and Resource Management Plans for the Ashley, Bridger-Teton, Targhee, and Salmon-Challis National Forests in the Intermountain Region of the Forest Service.

March 23, 2007

Jack G. Troyer
Regional Forester, Intermountain Region

Date

I am the Responsible Official for incorporating the Northern Rockies Lynx Management Direction into the Land and Resource Management Plans for the Beaverhead-Deerlodge, Bitterroot, Clearwater, Custer, Flathead, Gallatin, Helena, Idaho Panhandle, Kootenai, Lewis & Clark, Lolo, and Nez Perce National Forests in the Northern Region of the Forest Service.

Kathleen A. McAllister
March 23, 2007

Kathleen A. McAllister
Acting Regional Forester, Northern Region

Date

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ATTACHMENT 1

Northern Rockies Lynx Management Direction

The following management direction applies to all National Forest System lands that are known to be **occupied** by Canada lynx. At the time of this decision the following National Forests in the Northern Rockies lynx planning area are known to be occupied: Bridger-Teton, Clearwater, Custer, Flathead, Idaho Panhandle, Kootenai, Lolo, Shoshone, Targhee. Portions of the Custer, Gallatin, Helena, and Lewis & Clark are also occupied.

The following National Forests in the Northern Rockies lynx planning area are **not occupied** by Canada lynx: Ashley, Beaverhead-Deerlodge, Bighorn, Bitterroot, Nez Perce, Salmon-Challis. In addition, isolated mountain ranges on the Custer, Gallatin, Helena and Lewis and Clark are unoccupied – see Figure 1-1. Until such time as these National Forest System lands become occupied they should consider the following management direction, but are not required to follow it.

GOAL[14]

Conserve the Canada lynx.

ALL MANAGEMENT PRACTICES AND ACTIVITIES (ALL). The following objectives, standards, and guidelines apply to all management projects in lynx habitat in lynx analysis units (LAUs) in occupied habitat and in linkage areas, subject to valid existing rights. They do not apply to wildfire suppression, or to wildland fire use.

Objective[30] ALL O1

Maintain[26] or restore[40] lynx habitat[23] connectivity[16] in and between LAUs[21], and in linkage areas[22].

Standard[44] ALL S1

New or expanded permanent development[33] and vegetation management[49] projects[36] must maintain[26] habitat connectivity[16] in an LAU[21] and/or linkage area[22].

Guideline[15] ALL G1

Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways[18] or forest highways[12] across federal land. Methods could include fencing, underpasses, or overpasses.

Standard[44] LAU S1

Changes in LAU[21] boundaries shall be based on site-specific habitat information and after review by the Forest Service Regional Office.

VEGETATION MANAGEMENT ACTIVITIES AND PRACTICES (VEG). The following objectives, standards, and guidelines apply to vegetation management projects[36] in lynx habitat within lynx analysis units (LAUs) in occupied habitat. With the exception of Objective VEG O3 that specifically concerns wildland fire use, the objectives, standards, and guidelines do not apply to wildfire suppression, wildland fire use, or removal of vegetation for permanent developments such as mineral operations, ski runs, roads, and the like. None of the objectives, standards, or guidelines apply to linkage areas.

<u>Objective[30] VEG O1</u>

Manage vegetation[49] to mimic or approximate natural succession and disturbance processes while maintaining habitat components necessary for the conservation of lynx.

<u>Objective VEG O2</u>

Provide a mosaic of habitat conditions through time that support dense horizontal cover[19], and high densities of snowshoe hare. Provide winter snowshoe hare habitat[51] in both the stand initiation structural stage and in mature, multi-story conifer vegetation.

<u>Objective VEG O3</u>

Conduct fire use[11] activities to restore[40] ecological processes and maintain or improve lynx habitat.

<u>Objective VEG O4</u>

Focus vegetation management[49] in areas that have potential to improve winter snowshoe hare habitat[51] but presently have poorly developed understories that lack dense horizontal cover.

<u>Standard[44] VEG S1</u>

Where and to what this applies: Standard VEG S1 applies to all vegetation management[49] projects[36] that regenerate[38] forests, except for fuel treatment[13] projects[36] within the wildland urban interface[50] (WUI) as defined by HFRA[17], subject to the following limitation:

Fuel treatment projects[36] within the WUI[50] that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest). *In addition, fuel treatment projects may not result in more than three adjacent LAUs exceeding the standard.*

For fuel treatment projects[36] within the WUI[50] see guideline VEG G10.

The standard: Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages[45] limit disturbance in each LAU as follows:

If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects[36].

Standard VEG S2

Where and to what this applies: Standard VEG S2 applies to all timber management[47] projects[36] that regenerate[38] forests, except for fuel treatment[13] projects[36] within the wildland urban interface[50] (WUI) as defined by HFRA[17], subject to the following limitation:

Fuel treatment projects[36] within the WUI[50] that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest).

For fuel treatment projects[36] within the WUI[50] see guideline VEG G10.

The standard: Timber management[47] projects[36] shall not regenerate[38] more than 15 percent of lynx habitat on NFS lands within an LAU in a ten-year period.

Standard VEG S5

Where and to what this applies: Standard VEG S5 applies to all precommercial thinning[35] projects[36], except for fuel treatment[13] projects[36] that use precommercial thinning as a tool within the wildland urban interface[50] (WUI) as defined by HFRA[17], subject to the following limitation:

Fuel treatment projects[36] within the WUI[50] that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest).

For fuel treatment projects[36] within the WUI[50] see guideline VEG G10.

The Standard: Precommercial thinning projects[36] that reduce snowshoe hare habitat may occur from the stand initiation structural stage[45] until the stands no longer provide winter snowshoe hare habitat only:

1. Within 200 feet of administrative sites, dwellings, or outbuildings; or
2. For research studies[39] or genetic tree tests evaluating genetically improved reforestation stock; or
3. Based on new information that is peer reviewed and accepted by the regional level of the Forest Service, and state level of FWS, where a written determination states:
   a. that a project[36] is not likely to adversely affect lynx; or
   b. that a project[36] is likely to have short term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx and its habitat; or
4. For conifer removal in aspen, or daylight thinning[5] around individual aspen trees, where aspen is in decline; or

5. For daylight thinning of planted rust-resistant white pine where 80 % of the winter snowshoe hare habitat[51] is retained; or
6. To restore whitebark pine.

Exceptions 2 through 6 shall only be utilized in LAUs where Standard VEG S1 is met.

Standard VEG S6

Where and to what this applies: Standard VEG S6 applies to all vegetation management[49] projects[36] except for fuel treatment[13] projects[36] within the wildland urban interface[50] (WUI) as defined by HFRA[17], subject to the following limitation:

Fuel treatment projects[36] within the WUI[50] that do not meet Standards VEG S1, VEG S2, VEG S5, and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest).

For fuel treatment projects[36] within the WUI[50] see guideline VEG G10.

The Standard: Vegetation management projects[36] that reduce snowshoe hare habitat in multi-story mature or late successional forests[29] may occur only:

1. Within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; or
2. For research studies[39] or genetic tree tests evaluating genetically improved reforestation stock; or
3. For incidental removal during salvage harvest[42] (e.g. removal due to location of skid trails).

Exceptions 2 and 3 shall only be utilized in LAUs where Standard VEG S1 is met.
(NOTE: Timber harvest is allowed in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover [e.g. uneven age management systems could be used to create openings where there is little understory so that new forage can grow]).

Guideline VEG G1

Vegetation management[49] projects[36] should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage[46] stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands). Winter snowshoe hare habitat[51] should be near denning habitat[6].

Guideline VEG G4

Prescribed fire[34] activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.

Guideline VEG G5

Habitat for alternate prey species, primarily red squirrel[37], should be provided in each LAU.

Guideline VEG G10

Fuel treatment projects[36] within the WUI[50] as defined by HFRA[17] should be designed considering Standards VEG S1, S2, S5, and S6 to promote lynx conservation.

Guideline VEG G11

Denning habitat[6] should be distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads, or large piles of small wind thrown trees ("jack-strawed" piles). If denning habitat appears to be lacking in the LAU, then projects[36] should be designed to retain some coarse woody debris[4], piles, or residual trees to provide denning habitat[6] in the future.

LIVESTOCK MANAGEMENT (GRAZ): The following objectives and guidelines apply to grazing projects in lynx habitat in lynx analysis units (LAUs) in occupied habitat. They do not apply to linkage areas.

Objective[30] GRAZ O1

Manage livestock grazing to be compatible with improving or maintaining[26] lynx habitat[23].

Guideline[15] GRAZ G1

In fire- and harvest-created openings, livestock grazing should be managed so impacts do not prevent shrubs and trees from regenerating.

Guideline GRAZ G2

In aspen stands, livestock grazing should be managed to contribute to the long-term health and sustainability of aspen.

Guideline GRAZ G3

In riparian areas[41] and willow carrs[3], livestock grazing should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages[28], similar to conditions that would have occurred under historic disturbance regimes.

Guideline GRAZ G4

In shrub-steppe habitats[43], livestock grazing should be managed in the elevation ranges of forested lynx habitat in LAUs[21], to contribute to maintaining or achieving a preponderance of mid- or late-seral stages, similar to conditions that would have occurred under historic disturbance regimes.

HUMAN USE PROJETS (HU): The following objectives and guidelines apply to human use projects, such as special uses (other than grazing), recreation management, roads, highways, and mineral and energy development, in lynx habitat in lynx analysis units (LAUs) in occupied habitat, subject to valid existing rights. They do not apply to vegetation management projects or grazing projects directly. They do not apply to linkage areas.

Objective[30] HU O1

Maintain[26] the lynx's natural competitive advantage over other predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat[23].

Objective HU O2

Manage recreational activities to maintain lynx habitat and connectivity[16].

Objective HU O3

Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat.

Objective HU O4

Provide for lynx habitat needs and connectivity when developing new or expanding existing developed recreation[9] sites or ski areas.

Objective HU O5

Manage human activities, such as special uses, mineral and oil and gas exploration and development, and placement of utility transmission corridors, to reduce impacts on lynx and lynx habitat.

Objective HU O6

Reduce adverse highway[18] effects on lynx by working cooperatively with other agencies to provide for lynx movement and habitat connectivity[16], and to reduce the potential of lynx mortality.

Guideline[15] HU G1

When developing or expanding ski areas, provisions should be made for adequately sized inter-trail islands that include coarse woody debris[4], so winter snowshoe hare habitat[51] is maintained.

Guideline HU G2

When developing or expanding ski areas, lynx foraging habitat should be provided consistent with the ski area's operational needs, especially where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes.

Guideline HU G3

Recreation developments and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat[23].

Guideline HU G4

For mineral and energy development sites and facilities, remote monitoring should be encouraged to reduce snow compaction.

Guideline HU G5

For mineral and energy development sites and facilities that are closed, a reclamation plan that restores[40] lynx habitat should be developed.

Guideline HU G6

Methods to avoid or reduce effects on lynx should be used in lynx habitat[23] when upgrading unpaved roads to maintenance levels 4 or 5, if the result would be increased traffic speeds and volumes, or a foreseeable contribution to increases in human activity or development.

Guideline HU G7

New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity[16]. New permanent roads and trails should be situated away from forested stringers.

Guideline HU G8

Cutting brush along low-speed[25], low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.

Guideline HU G9

On new roads built for projects[36], public motorized use should be restricted. Effective closures should be provided in road designs. When the project[36] is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.

Guideline HU G10

When developing or expanding ski areas and trails, consider locating access roads and lift termini to maintain and provide lynx security habitat[10], if it has been identified as a need.

Guideline HU G11

Designated over-the-snow routes or designated play areas should not expand outside baseline areas of consistent snow compaction[1], unless designation serves to consolidate use and improve lynx habitat. This may be calculated on an LAU basis, or on a combination of immediately adjacent LAUs.

This does not apply inside permitted ski area boundaries, to winter logging, to rerouting trails for public safety, to accessing private inholdings, or to access regulated by Guideline HU G12.

Use the same analysis boundaries for all actions subject to this guideline.

Guideline HU G12

Winter access for non-recreation special uses and mineral and energy exploration and development, should be limited to designated routes[8] or designated over-the-snow routes[7].

LINKAGE AREAS (LINK): The following objective, standard, and guidelines apply to all projects within linkage areas in occupied habitat, subject to valid existing rights.

Objective[30] LINK O1

In areas of intermingled land ownership, work with landowners to pursue conservation easements, habitat conservation plans, land exchanges, or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat.

Standard[44] LINK S1

When highway[18] or forest highway[12] construction or reconstruction is proposed in linkage areas[22], identify potential highway crossings.

Guideline[15] LINK G1

NFS lands should be retained in public ownership.

Guideline LINK G2

Livestock grazing in shrub-steppe habitats[43] should be managed to contribute to maintaining or achieving a preponderance of mid- or late-seral stages[28], similar to conditions that would have occurred under historic disturbance regimes.

REQUIRED MONITORING

Map the location and intensity of snow compacting activities and designated and groomed routes that occurred inside LAUs during the period of 1998 to 2000. The mapping is to be completed within one year of this decision, and changes in activities and routes are to be monitored every five years after the decision.

When project decisions are signed report the following:

1. Fuel treatments:
   a. Acres of fuel treatment in lynx habitat by forest and LAU, and whether the treatment is within *or outside* the WUI as defined by HFRA.
   b. Whether or not the fuel treatment met the vegetation standards or guidelines. If standard(s) are not met, report which standard(s) are not met, why they were not met, and how many acres were affected.
   c. *Whether or not 2 adjacent LAUs exceed standard VEG S1 (30% in a stand initiation structural stage that is too short to provide winter snowshoe hare habitat), and what event(s) or action(s) caused the standard to be exceeded.*
2. *Application of exception in Standard VEG S5*
   a. *For areas where any of the exemptions 1 through 6 listed in Standard VEG S5 were applied: Report the type of activity, the number of acres, and the location (by unit, and LAU) and whether or not Standard VEG S1 was within the allowance.*
3. *Application of exceptions in Standard VEG S6*
   a. *For areas where any of the exemptions 1 through 3 listed in Standard VEG S6 were applied: Report the type of activity, the number of acres, and the location (by unit, and LAU) and whether or not Standard VEG S1 was within the allowance.*
4. *Application of guidelines*
   a. *Document the rationale for deviations to guidelines. Summarize what guideline(s) was not followed and why.*

Directions in italics were terms and conditions that were incorporated from the FWS Biological Opinion (USDI FWS 2007).

GLOSSARY

[1] *Area of consistent snow compaction* – An area of consistent snow compaction is an area of land or water that during winter is generally covered with snow and gets enough human use that individual tracks are indistinguishable. In such places, compacted snow is evident most of the time, except immediately after (within 48 hours) snowfall. These can be areas or linear routes, and are generally found in or near snowmobile or cross-country ski routes, in adjacent openings, parks and meadows, near ski huts or plowed roads, or in winter parking areas. Areas of consistent snow compaction will be determined based on the acreage or miles used during the period 1998 to 2000.

[2] *Broad scale assessment* – A broad scale assessment is a synthesis of current scientific knowledge, including a description of uncertainties and assumptions, to provide an understanding of past and present conditions and future trends, and a characterization of the ecological, social, and economic components of an area. (LCAS)

[3] *Carr* – Deciduous woodland or shrub land occurring on permanently wet, organic soil. (LCAS)

[4] *Course woody debris* – Any piece(s) of dead woody material, e.g., dead boles, limbs, and large root masses on the ground or in streams. (LCAS)

[5] *Daylight thinning* – Daylight thinning is a form of precommercial thinning that removes the trees and brush inside a given radius around a tree.

[6] *Denning habitat (lynx)* – Denning habitat is the environment lynx use when giving birth and rearing kittens until they are mobile. The most common component is large amounts of coarse woody debris to provide escape and thermal cover for kittens. Denning habitat must be within daily travel distance of winter snowshoe hare habitat – the typical maximum daily distance for females is about three to six miles. Denning habitat includes mature and old growth forests with plenty of coarse woody debris. It can also include young regenerating forests with piles of coarse woody debris, or areas where down trees are jack-strawed.

[7] *Designated over-the-snow routes* – Designated over-the-snow routes are routes managed under permit or agreement or by the agency, where use is encouraged, either by on-the-ground marking or by publication in brochures, recreation opportunity guides or maps (other than travel maps), or in electronic media produced or approved by the agency. The routes identified in outfitter and guide permits are designated by definition; groomed routes also are designated by definition. The determination of baseline snow compaction will be based on the miles of designated over-the-snow routes authorized, promoted or encouraged during the period 1998 to 2000.

[8] *Designated route* – A designated route is a road or trail that has been identified as open for specified travel use.

[9] *Developed recreation* – Developed recreation requires facilities that result in concentrated use. For example, skiing requires lifts, parking lots, buildings, and roads; campgrounds require roads, picnic tables, and toilet facilities.

[10] *Security habitat (lynx)* – Security habitat amounts to places in lynx habitat that provide secure winter bedding sites for lynx in highly disturbed landscapes like ski areas. Security habitat gives lynx the ability to retreat from human disturbance. Forest structures that make human access difficult generally discourage human activity in security habitats. Security habitats are most effective if big enough to provide visual and acoustic insulation and to let lynx easily move away from any intrusion. They must be close to winter snowshoe hare habitat. (LCAS)

[11] *Fire use* – Fire use is the combination of wildland fire use and using prescribed fire to meet resource objectives. (NIFC) Wildland fire use is the management of naturally ignited wildland fires to accomplish resource management objectives in areas that have a fire management plan. The use of the term wildland fire use replaces the term prescribed natural fire. (Wildland and Prescribed Fire Management Policy, August 1998)

[12] *Forest highway* – A forest highway is a forest road under the jurisdiction of, and maintained by, a public authority and open to public travel (USC: Title 23, Section 101(a)), designated by an agreement with the FS, state transportation agency, and Federal Highway Administration.

[13] *Fuel treatment* – A fuel treatment is a type of vegetation management action that reduces the threat of ignition, fire intensity, or rate of spread, or is used to restore fire-adapted ecosystems.

[14] *Goal* – A goal is a broad description of what an agency is trying to achieve, found in a land management plan. (LCAS)

[15] *Guideline* – A guideline is a particular management action that should be used to meet an objective found in a land management plan. The rationale for deviations may be documented, but amending the plan is not required. (LCAS modified)

[16] *Habitat connectivity (lynx)* – Habitat connectivity consists of an adequate amount of vegetation cover arranged in a way that allows lynx to move around. Narrow forested mountain ridges or shrub-steppe plateaus may serve as a link between more extensive areas of lynx habitat; wooded riparian areas may provide travel cover across open valley floors. (LCAS)

[17] *HFRA (Healthy Forests Restoration Act)* - Public Law 108-148, passed in December 2003. The HFRA provides statutory processes for hazardous fuel reduction projects on certain types of at-risk National Forest System and Bureau of Land Management lands. It also provides other authorities and direction to help reduce hazardous fuel and restore healthy forest and rangeland conditions on lands of all ownerships. (Modified from Forest Service HFRA web site.)

[18] *Highway* – The word highway includes all roads that are part of the National Highway System. (23 CFR 470.107(b))

[19] *Horizontal cover* – Horizontal cover is the visual obscurity or cover provided by habitat structures that extend to the ground or snow surface primarily provided by tree stems

and tree boughs, but also includes herbaceous vegetation, snow, and landscape topography.

[20] *Isolated mountain range* – Isolated mountain ranges are small mountains cut off from other mountains and surrounded by flatlands. On the east side of the Rockies, they are used for analysis instead of sub-basins. Examples are the Little Belts in Montana and the Bighorns in Wyoming.

[21] *LAU (Lynx Analysis Unit)* – An LAU is an area of at least the size used by an individual lynx, from about 25 to 50 square miles (LCAS). An LAU is a unit for which the effects of a project would be analyzed; its boundaries should remain constant.

[22] *Linkage area* – A linkage area provides connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas, where basins, valleys, or agricultural lands separate blocks of lynx habitat, or where lynx habitat naturally narrows between blocks. (LCAS updated definition approved by the Steering Committee 10/23/01)

[23] *Lynx habitat* – Lynx habitat occurs in mesic coniferous forest that experience cold, snowy winters and provide a prey base of snowshoe hare. In the northern Rockies, lynx habitat generally occurs between 3,500 and 8,000 feet of elevation, and primarily consists of lodgepole pine, subalpine fir, and Engelmann spruce. It may consist of cedar-hemlock in extreme northern Idaho, northeastern Washington and northwestern Montana, or of Douglas-fir on moist sites at higher elevations in central Idaho. It may also consist of cool, moist Douglas-fir, grand fir, western larch and aspen when interspersed in subalpine forests. Dry forests do not provide lynx habitat. (LCAS)

[24] *Lynx habitat in an unsuitable condition* –Lynx habitat in an unsuitable condition consists of lynx habitat in the stand initiation structural stage where the trees are generally less than ten to 30 years old and have not grown tall enough to protrude above the snow during winter. Stand replacing fire or certain vegetation management projects can create unsuitable conditions. Vegetation management projects that can result in unsuitable habitat include clearcuts and seed tree harvest, and sometimes shelterwood cuts and commercial thinning depending on the resulting stand composition and structure. (LCAS)

[25] *Low-speed, low-traffic-volume road* – Low speed is less than 20 miles per hour; low volume is a seasonal average daily traffic load of less than 100 vehicles per day.

[26] *Maintain* – In the context of this decision, maintain means to provide enough lynx habitat to conserve lynx. It does not mean to keep the status quo.

[27] *Maintenance level* – Maintenance levels define the level of service provided by and maintenance required for a road. (FSH 7709.58, Sec 12.3) Maintenance level 4 is assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most level 4 roads have double lanes and an aggregate surface. Some may be single lane; some may be paved or have dust abated. Maintenance level 5 is assigned to roads that provide a high degree of user comfort and convenience.

Normally, level 5 roads are have double lanes and are paved, but some may be aggregate surfaced with the dust abated.

[28] *Mid-seral or later* – Mid-seral is the successional stage in a plant community that is the midpoint as it moves from bare ground to climax. For riparian areas, it means willows or other shrubs have become established. For shrub-steppe areas, it means shrubs associated with climax are present and increasing in density.

[29] *Multi-story mature or late successional forest* – This stage is similar to the *old multistory structural* stage (see below). However, trees are generally not as old, and decaying trees may be somewhat less abundant.

[30] *Objective* – An objective is a statement in a land management plan describing desired resource conditions and intended to promote achieving programmatic goals. (LCAS)

[31] *Old multistory structural stage* – Many age classes and vegetation layers mark the old forest, multistoried stage. It usually contains large old trees. Decaying fallen trees may be present that leave a discontinuous overstory canopy. On cold or moist sites without frequent fires or other disturbance, multi-layer stands with large trees in the uppermost layer develop. (Oliver and Larson, 1996)

[32] *Old growth* – Old growth forests generally contain trees that are large for their species and the site, and are sometimes decadent with broken tops. Old growth often contains a variety of tree sizes, large snags, and logs, and a developed and often patchy understory.

[33] *Permanent development* – A permanent development is any development that results in a loss of lynx habitat for at least 15 years. Ski trails, parking lots, new permanent roads, structures, campgrounds, and many special use developments would be considered permanent developments.

[34] *Prescribed fire* – A prescribed fire is any fire ignited as a management action to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements met, before ignition. The term prescribed fire replaces the term management ignited prescribed fire. (NWCG)

[35] *Precommercial thinning* – Precommercial thinning is mechanically removing trees to reduce stocking and concentrate growth on the remaining trees, and not resulting in immediate financial return. (Dictionary of Forestry)

[36] *Project* - All, or any part or number of the various activities analyzed in an Environmental Impact Statement, Environmental Analysis, or Decision Memo. For example, the vegetation management in some units or stands analyzed in an EIS could be for fuel reduction, and therefore those units or stands would fall within the term *fuel treatment project* even if the remainder of the activities in the EIS are being conducted for other purposes, and the remainder of those units or stands have other activities prescribed in them. All units in an analysis do not necessarily need to be for fuel reduction purposes for certain units to be considered a *fuel reduction project*.

[37] *Red squirrel habitat* – Red squirrel habitat consists of coniferous forests of seed and cone-producing age that usually contain snags and downed woody debris, generally associated with mature or older forests.

[38] *Regeneration harvest* – The cutting of trees and creating an entire new age class; an even-age harvest. The major methods are clearcutting, seed tree, shelterwood, and group selective cuts. (Helms, 1998)

[39] *Research* – Research consists of studies conducted to increase scientific knowledge or technology. For the purposes of Standards VEG S5 and VEG S6, research applies to studies financed from the forest research budget (FSM 4040) and administrative studies financed from the NF budget.

[40] *Restore, restoration* – To restore is to return or re-establish ecosystems or habitats to their original structure and species composition. (Dictionary of Forestry)

[41] *Riparian area* – An area with distinctive soil and vegetation between a stream or other body of water and the adjacent upland; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation. (LCAS)

[42] *Salvage harvest* – Salvage harvest is a commercial timber sale of dead, damaged, or dying trees. It recovers economic value that would otherwise be lost. Collecting firewood for personal use is not considered salvage harvest.

[43] *Shrub steppe habitat* – Shrub steppe habitat consists of dry sites with shrubs and grasslands intermingled.

[44] *Standard* – A standard is a required action in a land management plan specifying how to achieve an objective or under what circumstances to refrain from taking action. A plan must be amended to deviate from a standard.

[45] *Stand initiation structural stage* – The stand initiation stage generally develops after a stand-replacing disturbance by fire or regeneration timber harvest. A new single-story layer of shrubs, tree seedlings, and saplings establish and develop, reoccupying the site. Trees that need full sun are likely to dominate these even-aged stands. (Oliver and Larson, 1996)

[46] *Stem exclusion structural stage (Closed canopy structural stage)* – In the stem exclusion stage, trees initially grow fast and quickly occupy all of the growing space, creating a closed canopy. Because the trees are tall, little light reaches the forest floor so understory plants (including smaller trees) are shaded and grow more slowly. Species that need full sunlight usually die; shrubs and herbs may become dormant. New trees are precluded by a lack of sunlight or moisture. (Oliver and Larson, 1996)

[47] *Timber management* – Timber management consists of growing, tending, commercially harvesting, and regenerating crops of trees.

[48] *Understory re-initiation structural stage* – In the understory re-initiation stage, a new age class of trees gets established after overstory trees begin to die, are removed, or no longer fully occupy their growing space after tall trees abrade each other in the wind. Understory seedlings then re-grow and the trees begin to stratify into vertical layers. A

low to moderately dense uneven-aged overstory develops, with some small shade-tolerant trees in the understory. (Oliver and Larson, 1996)

[49] *Vegetation management* – Vegetation management changes the composition and structure of vegetation to meet specific objectives, using such means as prescribed fire or timber harvest. For the purposes of this decision, the term does not include removing vegetation for permanent developments like mineral operations, ski runs, roads and the like, and does not apply to fire suppression or to wildland fire use.

[50] *Wildland urban interface (WUI)* – Use the definition of WUI found in the Healthy Forests Restoration Act. The full text can be found at HFRA § 101. Basically, the wildland urban interface is the area adjacent to an at-risk community that is identified in the community wildfire protection plan. If there is no community wildfire protection plan in place, the WUI is the area 0.5 mile from the boundary of an at-risk community; or within 1.5 miles of the boundary of an at-risk community if the terrain is steep, or there is a nearby road or ridgetop that could be incorporated into a fuel break, or the land is in condition class 3, or the area contains an emergency exit route needed for safe evacuations. (Condensed from HFRA. For full text see HFRA § 101.)

[51] *Winter snowshoe hare habitat* – Winter snowshoe hare habitat consists of places where young trees or shrubs grow densely – thousands of woody stems per acre – and tall enough to protrude above the snow during winter, so snowshoe hare can browse on the bark and small twigs (LCAS). Winter snowshoe hare habitat develops primarily in the stand initiation, understory reinitiation and old forest multistoried structural stages.