Helena – Lewis and Clark Forest Plan Revision
Elk Information and Status Report

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Section 1 – Overview and Summary of 1986 Plans and Compliance

Purpose

The purpose of this report is to provide a summary of the status of and issues regarding elk habitat management on lands managed by the Helena-Lewis and Clark National Forest (HLC NF). This information was used in the development of plan components for the 2020 forest plan for the HLC NF, as well as to support the analysis in the accompanying Environmental Impact Statement (EIS).

This document may also be used to inform future management of elk habitat on the HLC NF, and to support analysis of effects of other management actions on elk and elk habitat. This document may be updated periodically to incorporate additional data and to consider new research as well as both ongoing and new management issues.

Introduction

This document describes the status of elk and their habitat on NFS lands managed by the HLC NF. Elk are an important component of native wildlife diversity, although viability of elk and the persistence of elk populations are not currently of concern in Montana or on the HLC NF (U.S. Department of Agriculture, Forest Service, 2013; U.S. Department of Agriculture, Forest Service and Montana Department of Fish,, Wildlife & Parks, 2013). Elk are socially and economically important in Montana for a variety of reasons, including the contributions elk hunters make to local and area economies, and because of the impacts elk can potentially have on private lands. Elk and the management of elk populations and habitat generate a great deal of public interest, and management of elk and elk habitat has consequently generated comparable attention from land and wildlife managers.

MFWP manages elk populations, largely through establishing hunting seasons and limits. The Forest Service (FS) manages some of the habitat used by elk. Management of NFS lands has the potential in some areas to influence elk numbers or distribution, or elk hunting and viewing opportunities. Management activities on NFS lands are guided by land and resource management plans called Forest Plans, which establish desired conditions for various components of elk habitat, set management goals and objectives, and require constraints on specific actions where needed to protect resources or to achieve desired conditions. This document discusses past and present management issues in the context of the management framework provided under the 1986 HLC NF plans, which are currently being revised. This document also provides context for future analysis and guidance regarding elk habitat management on the HLC NF, and is intended to be a complement to the 2013 Forest Service – Montana Fish, Wildlife and Parks (MFWP) management recommendations (U.S. Department of Agriculture & Montana Fish Wildlife and Parks, 2013) and the related 2013 framework for project-level analysis (U.S. Department of Agriculture, Forest Service, 2013).

Background

The Helena NF and the Lewis and Clark NF were administratively combined in 2016 to form the HLC NF. Prior to that they operated as two separate NFs, guided by two separate Forest Plans, both of which were completed and signed in 1986. Those Forest Plans will remain in effect until the 2020 forest plan is completed, which is anticipated in late 2020. Meanwhile the 1986 plans are more than 30 years old and therefore are based on information that is in many cases now outdated, they do not incorporate current best available scientific information, they have not considered current management issues that have emerged in the past 30 years, and they do not comply with recent changes to regulations. Components in the 1986 plans were developed in response to elk management concerns and priorities identified in the

1970s and early 1980s. Although some of those issues remain relevant, some have changed, and new issues have emerged in the more than 30 years since those plans were developed. We provide a brief summary here regarding management issues identified as key in the 1986 planning process, in order to provide context for information presented in this document regarding 1986 plan requirements and compliance with those plans.

Defining 'Elk Security'

The terms 'elk security' and 'security area' have been used as general concepts as well as to describe very specific habitat conditions defined for specific areas. To promote consistency in use of terms, Lyon and Christensen (J. L. Lyon & Christensen, 1992) define 'elk security' as "the protection inherent in any situation that allows elk to remain in a defined area despite an increase in stress or disturbance associated with the hunting season or other human activities". They define 'security area' as "any area that will hold elk during periods of stress, because of geography, topography, vegetation, or a combination of those features" (ibid). The 1986 Helena NF plan includes specific, numeric parameters with which to achieve an identified harvest objective, and the areas managed under those parameters are in practice usually referred to as 'security areas' or 'secure areas'. For the purposes of general discussion we will use the term 'elk security' as defined by Lyon and Christensen (J. L. Lyon & Christensen, 1992). For the purposes of indicating existing condition relative to compliance with standards in the 1986 Helena NF plan, 'security areas' will refer to areas meeting the numeric parameters called for in that plan. The terms 'hiding cover' and 'thermal cover' will be defined and discussed under the appropriate sections below.

Key Management Issues Prior to 1986

During the late 1970s elk populations throughout the western U.S. were below estimated historic levels after being reduced in the late 1800s and early 1900s by the combined impacts of excessive hunting and widespread habitat alteration (Montana Fish Wildlife and Parks, 2004, 2015b). During the 1970s and early 1980s the pace and scale of logging activity had increased on NFS lands. Land and wildlife managers in western Montana had become concerned about possible low or declining numbers of elk and the possible contribution of logging activity to those numbers and trends (L. J. Lyon et al., 1985). Managers felt that in areas where significant logging activity was occurring, the combination of reduced hiding cover and increased road access may have been increasing elk vulnerability to harvest (ibid). In response to ongoing questions raised by the pubic and by wildlife managers regarding the impacts of logging activity on elk numbers and distribution, the Montana Cooperative Elk-Logging Study was initiated.

The study took place in 7 areas in Montana, including in the Judith River basin of the Little Belt Mountains on the Lewis and Clark NF. The study was specifically focused on the interaction between logging activity and elk habitat (L. J. Lyon et al., 1985) and designed to answer specific questions about the impacts of industrial scale logging activities and infrastructure on elk. The recommendations resulting from the study were intended to guide the planning of forest management in such a way that would maintain elk populations, elk hunting, and relatively large-scale timber production. The study's authors cautioned that recommendations they made regarding elk habitat quality could not be directly correlated with elk population numbers. They also cautioned that literal application of their recommendations should not be substituted for detailed, on-site analysis, recognizing that in some areas one or more of the recommendations may not be applicable to local conditions. Throughout the final report and other documentation, the authors emphasized that the studies and recommendations were specifically aimed at the management of elk habitat in areas where logging at the scale occurring in their study has occurred or will occur (L. J. Lyon et al., 1985).

At the same time the elk-logging studies were being carried out, the FS developed the Northern Regional Plan (U.S. Department of Agriculture, 1981), which was based in part on the 1978 Montana Statewide Comprehensive Outdoor Recreation Plan (Montana Fish Wildlife and Parks, 1978). The latter (hereafter

referred to as the SCORP) included a goal of maintaining "an available supply of big game to meet demand for all types of big game oriented recreation while insuring the protection and perpetuation of all big game species and their ecosystems"(Montana Fish Wildlife and Parks, 1978). Statewide goals specifically for elk included protecting and perpetuating "elk and their habitat and to increase the supply of available, harvestable elk to meet demands for hunting and non-hunting recreation" (Montana Fish, 1978). In sum, the management emphasis was on maintaining a supply of elk and other big game species on NFS lands in order to maintain current hunting and other recreational opportunities. Additional management concerns identified at the time included maintaining habitat and limiting disturbance on winter range, based on concerns that those factors could impact elk population potential as well (J. L. Lyon, 1979).

As a result of the Montana Cooperative Elk-Logging Study, management of elk habitat on NF lands in Montana since the mid-1980s has focused heavily on retaining or creating habitat security through management of hiding cover and/or through management of open road densities during the hunting season. Furthermore, as a result of public concerns and management issues identified in the SCORP (Montana Fish Wildlife and Parks, 1978) and the Northern Regional Plan (U.S. Department of Agriculture, 1981) elk habitat management on NF lands in central Montana has placed emphasis on maintaining a desired type and level of hunting opportunity on NFS lands. Hillis and others (Hillis et al., 1991) observed that some NFs in Montana, including the Helena NF, had established elk habitat objectives that included maintaining the "current, relatively unregulated, 5-week hunting season", distributing bull harvest throughout that hunting season, and maintaining a desired level of mature bulls after the hunting season. They noted that agencies, including the Forest Service, had chosen to limit harvest of mature bulls by providing habitat security rather than by restricting hunters through shorter hunting seasons or imposing antler-point restrictions or limiting licenses.

Key Management Issues in early 2020

Over the past 30 years the scale and pace of logging activity on the HLC NF has generally declined, while elk numbers have increased, and distribution of elk has changed. Elk remain a highly desired component of biological diversity and are important as a native wildlife species, but their presence on NFS lands is not threatened, and their viability throughout the HLC NF or statewide is not of concern. Elk presence on private land during the hunting season and through the winter has increased in many areas, and has become a significant management concern (Montana Fish Wildlife and Parks, 2015a; U.S. Department of Agriculture & Montana Fish Wildlife and Parks, 2013). When substantial numbers of elk are unavailable for harvest, particularly during the general rifle season, it becomes increasingly difficult to achieve population objectives.

Currently, the primary elk management issues in central Montana are 1) the overall distribution of elk on public vs. private lands, 2) the presence of increasing numbers of elk spending significant amounts of time on private land (Montana Fish Wildlife and Parks, 2015a; U.S. Department of Agriculture, Forest Service and Montana Department of Fish,, Wildlife & Parks, 2013), and 3) elk numbers exceeding desired population objectives in some areas (Montana Fish Wildlife and Parks, 2004, 2015a). These issues are, of course, interrelated. The role of NFS lands in either contributing to or resolving these management issues has been the subject of discussion among biologists, land managers, and others for several years.

Recent research into this issue has shown that the presence of fall "refuges", or areas on private or public lands that are inaccessible to hunters, can effectively pull elk from surrounding areas and preclude effective population management (Montana Fish Wildlife and Parks, 2015a; Proffitt, Gude, Hamlin, & Messer, 2013; Ranglack et al., 2017). Some of that research (Ranglack et al., 2017) has shown that the "pull" of refuges can outweigh other factors that often influence habitat selection, including forage quantity and quality. Forage quality and availability is a strong driver of elk distribution, however (ibid).

Private land areas adjacent to NFS lands are often at lower elevation, meaning they often have less snow cover, and may provide superior forage in the form of irrigated meadows or crop fields. These areas may provide an additional attraction that draws elk from public lands by providing high quality forage in addition to refuge from hunting pressure occurring on adjacent public lands (Devoe, Proffitt, Mitchell, Jourdonnais, & Barker, 2019).

The study by Ranglack and others (Ranglack et al., 2017), while acknowledging that lack of hunting pressure on adjoining private lands may outweigh other factors in determining elk movements and distribution during hunting season, recommended continued management for cover and security on NFS lands because those things have the potential to reduce the draw of forage and security provided by private lands, and are important in areas further from private lands and anywhere that hunting pressure exists. Most of the early research on the influence of logging and secure habitat was done in more heavily forested areas of western Montana. Studies assessing the influence of private land refuges have mostly been carried out in southwestern Montana, which has a somewhat different arrangement of private and public lands than that of the HLC NF. Whereas in southwestern Montana large blocks of contiguous NF land are separated generally by often linear bands of low-elevation private lands along major river courses, the HLC NF includes several isolated mountain ranges of varying sizes that are entirely surrounded by low-elevation private lands. The relative availability of private land "refuges" may therefore be greater on parts of the HLC NF than in southwestern Montana, and in some areas the innate ability of NFS lands to provide cover or refuge may be limited; these factors may both affect elk movements and distribution and therefore the scope and scale of the management issue.

In order to meet the desired condition of elk availability for hunting as identified in the 1986 Helena and Lewis and Clark forest plans and supporting documentation, there need to be adequate numbers of elk in areas available to hunters at the right time of year. The measure of whether we achieve that condition is whether some number of people have an opportunity to hunt and harvest an elk on NFS lands, recognizing that both hunter numbers and hunter success are influenced by variables such as hunter effort, choice of location and hunting method, weather, economic and social factors, and others. In order to provide adequate numbers of elk in areas available to hunters at the right time of year, NFS lands need to provide habitat for elk to use that meets their requirements throughout the year, as well as lands that are accessible to hunters. Elk habitat needs include forage, and some amount and distribution of areas secure from disturbance by humans. The need for elk to have security from disturbance, and the need for hunters to access elk to achieve a desired hunting and harvest opportunity are somewhat at odds and require careful management balance. For the past 30 years the Helena NF and Lewis and Clark NF have been working to achieve that balance through combinations of travel management and vegetation management.

Although specific elk harvest levels and types (e.g., either-sex, brow-tined only, etc.) may vary in some hunting districts, the overall length of hunting season and general opportunity to hunt elk have remained the same since the 1986 forest plans were implemented. In some hunting districts "shoulder seasons" have been added before and/or after the general rifle hunting season, in order to attempt to bring elk numbers closer to population objectives and/or to attempt to reduce the number of elk wintering on private land.

Elk/Big Game Habitat Management in the 1986 Forest Plans

The 1986 Helena NF and Lewis and Clark NF plans identified elk population potential as a major issue during plan development and discussed elk populations relative to hunting opportunity. The elk population potential identified for both plans was based on population goals identified in the Northern Regional Plan, which were in turn based on the 1978 Montana Statewide Comprehensive Outdoor Recreation (Montana Fish Wildlife and Parks, 1978). The latter included goals of protecting and perpetuating "elk and their habitat and to increase the supply of available, harvestable elk to meet demands for hunting and nonhunting recreation" (ibid). All of these plans were developed at a time when elk numbers were markedly lower than they are currently (roughly 30%-40% of current numbers

statewide), logging was increasing on NFS lands particularly in western Montana, and concerns were being raised by the public and biologists about the potential impacts to elk of logging and of roads created for logging and used by hunters (refer to section above on management issues prior to 1986).

Because the existing science was specific to the effects of logging on elk, the hiding cover standard included in the 1986 Lewis and Clark NF plan was specific to "projects involving significant vegetative removal" (U.S. Department of Agriculture, Forest Service, Lewis and Clark National Forest, 1986). For the same reasons, the 1986 Helena NF plan required analysis of cover during project planning and implementation, particularly during timber sale and road construction projects, and also identified the timber sale unit as one possible appropriate scale at which to analyze elk security (U.S. Department of Agriculture, Forest Service, 1986b). The result has been that habitat management to support objectives for elk and other big game species and the opportunities they provide has occurred almost entirely in the context of constraints applied at the time of timber harvest or other vegetation management projects.

1986 Helena National Forest Plan

The 1986 Helena NF plan (U.S. Department of Agriculture, Forest Service, 1986b) identified elk population potential as a major issue during plan development (ibid, p. II/8). Elk population potential for the Helena NF was based on goals identified in the Northern Regional Plan (U.S. Department of Agriculture, 1981), as described in the preceding section. The plan also identified a goal of maintaining a specific maximum level of bull harvest during the first week of the general hunting season (U.S. Department of Agriculture, Forest Service, 1986b). In order to achieve those goals, standards were included in the 1986 Helena NF Plan as follows (U.S. Department of Agriculture, Forest Service, 1986b):

- Maintain adequate hiding and thermal cover on summer and winter ranges, respectively (Big Game Standard 1), at:
    - $\geq$ 35% of summer range in a drainage or elk herd unit in hiding cover (Big Game Standard 3), in blocks of $\geq$ 40 acres (Big Game Standard 5)
    - $\geq$ 25% of winter range in a drainage or elk herd unit in thermal cover (Big Game Standard 3), in blocks of $\geq$ 15 acres (Big Game Standard 5)
- Carry out a cover analysis on a drainage or elk herd unit scale for project work (Big Game Standard 2)
- Implement "an aggressive road management program to maintain or improve elk security" (Big Game Standard 4), with numerically specific ratios of cover to road-density (Big Game Standard 4a) to be applied at the scale of a timber sale analysis unit, third order drainage, or an elk herd unit.
- Close elk calving grounds, nursery areas, and winter ranges to motorized use during peak elk use times (Big Game Standards 4b and 4c)
- Use recommendations from the Montana Cooperative Elk-Logging Study during timber sale and road construction projects (Big Game Standard 6)

Big Game Standard 4a specifically identifies that its purpose is to limit bull elk harvest to not exceed a specific level early in the hunting season (U.S. Department of Agriculture, Forest Service, 1986, p. II/17). Big Game Standard 3 recognizes that the target levels of hiding and thermal cover are subject to constraints related to hydrology or other resources (i.e. the inherent vegetation potential of a given area) (ibid). The Helena NF Plan also includes additional standards with specific instructions regarding methods of closing and signing closed roads, enforcing closures, etc.

Compliance with 1986 Helena Forest Plan Standards

As of 2018, compliance with the elk-related Big Game standards in the Helena NF plan is as follows:

- 23 (55%) of 42 elk herd units comply with the Helena forest plan Big Game Standard 3 summer range hiding cover requirement (refer to Section 2, Table 1). Calculations are made for entire herd

units, which in many cases extend beyond the NF boundary and therefore include lands not under NFS management authority.

- No elk herd units comply with the Helena NF plan Big Game Standard 3 winter range thermal cover requirement. Calculations are made for entire herd units, which in many cases extend beyond the NF boundary and therefore include lands not under NFS management authority. (refer to Section 2, Table 4).
- 15 (38%) of 40 elk herd units currently meet Helena NF plan Big Game Standard 4a for elk security during the fall hunting season (refer to Section 2, Table 6).
- Compliance with standards 4b and 4c are reflected in travel plans, and compliance with standard 6 occurs during site-specific project planning.

In the three decades during which the Helena NF plan has been implemented, there have been several site-specific amendments that allowed certain management activities to occur that did not achieve or maintain the hiding cover, thermal cover, and/or road density standards. These exceptions have occurred where conditions were already outside the standard due to topography, vegetation, or past disturbance (such as fire or insect-related mortality), or where site-specific conditions made it impossible to achieve the project purpose and need while still meeting the standards. These exceptions have highlighted the difficulty of applying a single set of numeric standards across a large and highly varied landscape subject to processes not under human control.

As indicated by elk population trend and by hunter numbers (refer to the next section), the amount of hiding cover and level of elk security on NFS lands is not a reliable indicator of overall elk availability to hunters, elk distribution on public lands during the hunting season, nor of overall elk population trend.

Predicted and Actual Outcomes

The FEIS for the 1986 Helena NF plan used elk population potential/habitat capacity, the number of elk wintering on HNF lands, and annual hunter-days as indicators of the relative success of forest plan components for elk habitat. Unfortunately, these are not reliable indicators of the specific impacts of implementing hiding cover, thermal cover, or security standards. Elk numbers and distribution are influenced by a variety of things, including hunting, forage quality and availability, climate (which influences both forage and distribution), land management on both NFS and adjoining lands, predation, etc. Hunter-days are influenced by elk numbers, season structure, weather, elk distribution, access, economic and social factors, and others. Nevertheless, elk population numbers and trend, and hunter-days are the best indicator available as to whether the original objectives of protecting and perpetuating elk and elk habitat, and increasing the supply of available, harvestable elk to meet demands for recreation opportunities (Montana Fish Wildlife and Parks, 1978) are being achieved. Furthermore, looking at the trend in elk numbers and hunter-days relative to levels of compliance with elk habitat standards may shed some light on the question of whether those standards contribute to the objectives.

Elk Habitat Capacity, Population Potential, and Population Trend

Elk population potential estimates are based on elk habitat capacity (U.S. Department of Agriculture, 1981). The habitat capacity of lands under management by the Helena NF at the time the 1986 plan was written was estimated at approximately 6,300 elk in summer and 3,300 in winter, with a maximum capacity estimated at 8,500 for both seasons (USDA 1986b, FEIS, p. II/6-7). The 1986 Helena NF plan FEIS (USDA 1986c, FEIS, Appendix B, B/31-32) predicted that the elk population using NF land during the summer would likely decrease slightly with implementation of the plan, based on the assumptions that a predicted loss of hiding cover and predicted increase in roads associated with timber harvest would have a negative impact on the number of elk using Helena National Forest lands during summer.

Elk population size and trend are estimated by MFWP generally at the scale of entire Hunting Districts. Estimating the size and trend of the elk population using lands managed by the Helena NF is made difficult by the fact that the Forest is within 17 elk/deer hunting districts, all of which extend to varying

degrees beyond the NF boundaries. Montana Fish, Wildlife and Parks counts from 2019 showed more than 17,000 elk within the hunting districts that largely overlap the Helena NF (see data in project record and at http://fwp.mt.gov/fishAndWildlife/management/elk/). While not all of these elk use NFS lands, this is more than double the target identified in the 1986 Helena NF plan of 6,400 elk on NF land by the year 2000 (U.S. Department of Agriculture, Forest Service, 1986b). It is also well above the elk population potential anticipated in the Record of Decision and FEIS for the 1986 forest plan (USDA 1986d, p. 13 and USDA 1986b, pp. II/56-60, respectively). More than half of the hunting districts are over the elk population objective as established by MFWP (Montana Fish Wildlife and Parks, 2015b). Elk population objectives are established based on several factors, including estimated habitat capacity. Habitat capacity is an estimate of the number of elk that a given area may sustain without risking loss of forage productivity or other components that would result in a decline in capacity. Although viability of the elk population is clearly not of concern, a population that is persistently above the objective represents as much a management concern as a population that is persistently below.

The Helena NF plan FEIS predicted that the number of elk wintering on Helena National Forest lands would increase roughly 25% after implementation of the plan, based on the assumptions that improved livestock management would result in more forage available to elk, and that fewer open roads and acres of timber harvested than in other alternatives analyzed would allow more elk to overwinter on NF lands (U.S. Department of Agriculture, Forest Service, 1986a) (p. II/30). Elk distribution during winter is heavily dependent on weather and snow cover, as well as on forage availability both on and off NFS lands, presence of large predators such as wolves, and other factors. Although forage availability may be influenced by livestock management as recognized in the 1986 FEIS, things such as climate, vegetation management activities, fire, use by wildlife such as elk, etc. also influence forage quantity, quality, and annual variability in both.

Elk Hunting Opportunity

The goal for hunting opportunity stated in the 1986 Helena NF Plan was to maintain the existing hunting opportunity, and to limit bull harvest below a specified limit during the first week of the general rifle season (U.S. Department of Agriculture, Forest Service, 1986b). The FEIS for Helena NF plan anticipated that elk hunting opportunity would decline to 43,100 hunter visitor days by the fifth decade (U.S. Department of Agriculture, Forest Service, 1986a) (pp. II/46-47) due to a decline in hiding cover and increase in open road densities. Elk hunter-days on hunting districts that include the Helena National Forest have increased, however, to an average of over 156,000 days as between 2004 and 2018 (see data in project record and http://fwp.mt.gov/hunting/planahunt/harvestReports.html). This includes the non-NFS lands portions of many hunting districts but shows an overall increase of hunting activity during the period since the 1986 Helena NF plan was first implemented. Data are not available to separate hunter-days on NFS lands from those on other lands, but most elk hunting in Montana occurs on public lands (Montana Fish Wildlife and Parks, 2004). Hunter days may increase if game is more difficult to obtain, but only up to the point where hunters continue to perceive that game are available and accessible. Total hunter-days are also influenced by other, but as an indicator of the recreational opportunity associated with elk hunting, they show that this opportunity has increased since the 1986 Helena NF plan was first implemented.

1986 Helena National Forest Plan Summary

In summary, the Helena NF plan included standards and guidelines intended to maintain elk numbers and hunter opportunity on NF lands, but the accompanying analysis of the plan predicted that even with those standards in place, elk numbers on NF lands in summer would decrease over time. Although the Helena National Forest has not fully met the standards in all areas, elk numbers in the areas that include Helena National Forest lands are more than double the objective identified in the plan. Furthermore, elk numbers as of 2017 for hunting districts that include Helena National Forest lands are generally at or above population objectives established by Montana Department of Fish, Wildlife and Parks. Similarly, although analysis of the 1986 Helena NF plan predicted that hunter-days would decrease with

implementation of the plan, hunter opportunity as measured by hunter-days on hunting districts that include the Helena NF lands has increased since 1986.

1986 Lewis and Clark National Forest Plan

The 1986 Lewis and Clark NF plan included as a long-range goal "special emphasis to elk habitat management", with an objective of "maintenance of current populations of elk" (U.S. Department of Agriculture, Forest Service, Helena National Forest, 1986). The focus at the time the 1986 Lewis and Clark National Forest plan was written was on maintaining overall elk numbers, and on maintaining existing hunting opportunity (expressed as hunter-days) on NFS lands (ibid). In response to the concerns discussed above regarding the potential impacts of logging and roads on elk, the Lewis and Clark NF plan included a standard that requires managers to incorporate recommendations from the Montana Cooperative Elk-Logging Study in the planning of timber sales and road construction projects (U.S. Department of Agriculture, Forest Service, Lewis and Clark National Forest, 1986). In addition to that requirement, the plan included the following numeric standards for elk and other big game species' habitat (U.S. Department of Agriculture, Forest Service, Lewis and Clark National Forest, 1986):

- Require a big-game cover analysis, at the drainage or elk herd unit scale, of projects having significant vegetative removal, and maintain hiding cover at 30% or greater in units with summer/fall range (forestwide standard C-1(5)).
- In Management Area C, maintain hiding cover at an average of 40% per timber compartment, with a minimum of 35% for any sub-compartment, and manage habitat effectiveness through road management and other controls (MA-C was delineated on 87,110 acres in the Jefferson Division in identified important deer and elk habitat)

Additional forestwide standards and Management Area direction guide managers to maintain forage for wildlife, prioritizing it where competition with livestock is a concern and on wildlife winter ranges. Management Area I was delineated on "very important wildlife habitat, especially for big-game species" , generally "near the Forest boundary and adjacent to State Game Management Areas" (U.S. Department of Agriculture, Forest Service, Lewis and Clark National Forest, 1986). Management direction in this MA is to "maintain or enhance important big-game habitat" (ibid), although it does not identify specific numeric objectives or practices for doing so.

Compliance with 1986 Lewis and Clark Forest Plan Standards

As of 2018, compliance with the elk-related forestwide standards in the Lewis and Clark NF plan is as follows:

- 162 (74%) of 218 drainages (6^{th} or 7^{th} code hydrologic units) comply with forestwide standard C1(5). Note, however, that this standard is not intended to be applied across all drainages, but rather in areas with projects involving "significant vegetative removal" (refer to Section 2, Table 2).
- Compliance with the Management Area C standards is carried out at the project level; data on compliance was unavailable at the time this report was prepared.

To date, there have been no site-specific amendments to the Lewis and Clark NF plan to create exceptions to the hiding cover standards, although there have been changes to Management Area allocations that have resulted in some site-specific changes to hiding cover standards. Compliance with standards that don't include specific numeric objectives are difficult to measure, and are generally documented in project analysis documents and monitoring reports.

Predicted and Actual Outcomes

The FEIS for the Lewis and Clark NF plan used elk population potential/habitat capacity and annual hunter-days as indicators of the relative success of forest plan components for elk habitat (U.S. Department of Agriculture, Forest Service, Helena National Forest, 1986). As noted above, these are not

reliable indicators of the specific impacts of implementing hiding cover standards. Nevertheless, elk population numbers and trend, and hunter-days are the best indicator available as to whether the original objectives of protecting and perpetuating elk and elk habitat, and increasing the supply of available, harvestable elk to meet demands for recreation opportunities (Montana Fish Wildlife and Parks, 1978) are being achieved. Furthermore, looking at the trend in elk numbers and hunter-days relative to levels of compliance with elk habitat standards may shed some light on the question of whether those standards contribute to the objectives.

Elk Habitat Capacity, Population Potential, and Population Trend

Elk population potential is based on estimated elk habitat capacity (U.S. Department of Agriculture, 1981).The habitat capacity of lands under management by the Lewis and Clark NF at the time the 1986 plan was written was estimated at approximately 8,500 elk, with a maximum capacity estimated at 12,500 (U.S. Department of Agriculture, Forest Service, 1986c) (Vol.1, p. 2-8/9). The Lewis and Clark NF plan FEIS (ibid; Table S-1, pp. 1-26/27; 2-62) predicted that the elk population using NF land would remain the same with implementation of the plan, based on the assumption that plan guidance for wildlife habitat improvement, livestock grazing management, and security provided by hiding cover and road management would continue to provide for roughly the same elk habitat capacity.

Elk population size and trend are estimated by MFWP generally at the scale of entire Hunting Districts. Estimating the size and trend of the elk population using lands managed by the Lewis and Clark NF is made difficult by the fact that the Forest is within 22 elk/deer hunting districts, nearly all of which extend to varying degrees beyond the NF boundaries. Montana Department of Fish, Wildlife and Parks estimates that as of 2019 there are over 28,000 elk within the hunting districts that largely overlap the Lewis and Clark NF (see data in project record and at http://fwp.mt.gov/fishAndWildlife/management/elk/). While not all of those elk use NFS lands, this is more than double the maximum capacity identified in the 1986 Lewis and Clark NF plan of 12,500 elk on NF land (U.S. Department of Agriculture, Forest Service, 1986c) (Vol. 1, 2-8/9). More than 75% (14 of 18) of the hunting districts are over the elk population objective as established by MFWP. The remaining 25% (4 hunting districts) are currently within the established objectives. Although viability of the elk population is clearly not of concern, a population that is persistently above the objective represents as much a management concern as a population that is persistently below.

The Lewis and Clark NF Plan stated that the Forest provided, and would continue to provide about 50 percent of the winter-spring habitat (forage) needs of elk (U.S. Department of Agriculture, Forest Service, 1986c) (Vol. 1, 3-25 and 4-34). Whether this estimate was correct or continues to be the case is not possible to determine. Elk distribution during winter is heavily dependent on weather and snow cover, forage availability both on and off NFS lands, level and type of human disturbance, presence of large predators such as wolves, and other factors. As discussed elsewhere in this document, elk distribution during fall and winter is an increasing management issue, in which private lands appear to be playing an increasingly prominent role.

Elk Hunting Opportunity

The goal for hunting opportunity stated in the 1986 Lewis and Clark NF Plan was to maintain the existing hunting opportunity, estimated at the time to be approximately 63,700 hunter-days. The FEIS for the Lewis and Clark NF plan anticipated that elk hunting opportunity would decline to 60,200 hunter visitor days by the fifth decade (U.S. Department of Agriculture, Forest Service, 1986c) (Table S-1, pp. 1-26/27, 2-62, and Vol. 1, 4-60) due to a decline in hiding cover and increase in open road densities as a result of anticipated timber harvest. Elk hunter-days on hunting districts that include the Lewis and Clark NF have increased, however, to an average of 96,700 hunter days as from 2004- 2018 2018 (see data in project record and http://fwp.mt.gov/hunting/planahunt/harvestReports.html). This includes the non-NFS lands portions of many hunting districts, but shows an overall increase of hunting activity during the period since the 1986 Helena NF plan was first implemented. Data are not available to separate hunter-days on

NFS lands from those on other lands, but most hunting in Montana occurs on public lands. Hunter days may increase if game is more difficult to obtain, but only up to the point where hunters continue to perceive that game are available and accessible. Total hunter-days are also influenced by other, but as an indicator of the recreational opportunity associated with elk hunting, they show that this opportunity has increased since the 1986 Lewis and Clark NF plan was first implemented.

1986 Lewis and Clark National Forest Plan Summary

In summary, the 1986 Lewis and Clark National Forest plan included standards and guidelines intended to maintain elk numbers and hunter opportunity on NF lands. Analysis of the plan estimated that with those standards in place, elk numbers on NF lands would remain relatively stable, but that elk hunting opportunity would decrease. Although the Lewis and Clark NF has not met in all areas the numeric guidance set by the standards (compliance is required only in certain types of projects), elk numbers in the areas that include Lewis and Clark NF lands are more than double the objective identified in the plan, and well over the maximum anticipated based on habitat capacity. Furthermore, elk numbers for hunting districts that include Lewis and Clark NF lands are generally at or above population objectives established by Montana Department of Fish, Wildlife and Parks (Montana Fish Wildlife and Parks, 2004). Similarly, although analysis of the 1986 Lewis and Clark NF plan predicted that hunter-days would decrease with implementation of the plan, hunter opportunity as measured by hunter-days on hunting districts that include the Lewis and Clark NF lands has increased since 1986.

U.S. Forest Service and Montana Department of Fish, Wildlife, and Parks Collaborative Recommendations for Big Game Habitat Management on the Custer, Gallatin, Helena, and Lewis and Clark National Forests (2013)

A group of wildlife biologists from the Forest Service (FS) and Montana Department Fish, Wildlife, and Parks (MFWP) considered contemporary issues and circumstances such as increases in recreation of all types on these National Forests, changes in the numbers and distribution of elk (including the use of private lands where hunting is limited or not allowed), the restoration of large predators, the current mountain pine beetle epidemic, and small and large fires on the Custer, Helena, Lewis and Clark, and Gallatin National Forests in the Northern Region of the Forest Service. The group compiled their collective recommendations, along with a discussion of their conversations and the relevant literature, for elk habitat management (U.S. Department of Agriculture & Montana Fish Wildlife and Parks, 2013). The overview and recommendations address an appropriate elk analysis unit, management of cover and recreation on winter ranges, security during the archery and rifle hunting seasons, motorized route management relative to habitat effectiveness, cover on spring-summer-fall ranges, cover patch size, forage, calving areas, and migration corridors. These recommendations include some adjustments to the methods and metrics included in the 1986 Helena and Lewis and Clark NF plans regarding hiding and thermal cover and fall security.

Partly as a result of the development of the 2013 recommendations, the FS developed a framework of analytical methods to address the potential effects of proposed Forest Service project activities on elk habitat, for the Custer, Gallatin, Helena and Lewis and Clark National Forests (U.S. Department of Agriculture, Forest Service, 2013). The framework was prepared in response to: (a) a desire to narrow the varied interpretations of available information regarding elk; (b) improve the consistency on how potential effects are assessed among the four above-mentioned National Forests; (c) and provide a clear understanding of potential effects to better collaborate with Montana Fish, Wildlife and Parks (MFWP) in providing for elk and elk habitat.

Biologists on the HLC NF have applied recommendations and methods from these documents to some project analyses in recent years. In some cases these methods are consistent with methods used in the past for such analyses, or provide clarification about using updated data sources, but in other cases they represent a change from 'traditional' analyses or management. Where they differ, we chosen to not use updated methods from the 2013 recommendations and framework in order to display the existing condition and compliance with the 1986 plans in a way that is most comparable to the majority of past project analyses.

Section 2 – Hiding and Thermal Cover and Secure Areas 2018 Data

Hiding Cover

Methods

The following methods, assumptions, and information have been used to describe the existing condition for elk hiding cover under the Helena National Forest Plan.

- Elk herd units serve as the basis for the analysis; these have been developed in conjunction with Montana Fish, Wildlife, and Parks. Elk herd units may extend beyond the NF boundary.
- Summer range comprises the entire elk herd unit
- The methodology for modeling hiding cover is described in the document *Criteria for Wildlife Models* (U.S. Department of Agriculture, 2009). Hiding cover calculations include only those forest types that are prone to dense canopy cover (i.e. Douglas-fir, subalpine fir, spruce, and lodgepole pine). Stands meeting the definition of hiding cover must be:
    - $\geq$ 15 years old
    - >40% crown closure (based on the MFWP definition of hiding cover, per the Helena NF Plan (U.S. Department of Agriculture, Forest Service, 1986b)
    - $\geq$40 acres in size

The following methods, assumptions, and information have been used to describe the existing condition for elk habitat under the Lewis and Clark National Forest Plan. See also the *Process for Analyzing Big Game Cover*, 2016 (U.S. Department of Agriculture, 2016b).

- Sixth and 7th code subwatersheds are the basis for the cover analysis under the Lewis and Clark plan. A subwatershed is from 10,000 to 40,000 acres in size and is called a sixth code HUC (HUC6). Seventh code subwatersheds (HUC7) are 3,000 to 10,000 acres in size.
- Vegetation data are used to develop the photo interpretive (PI) types as defined in the Montana Elk/Logging Study (L. J. Lyon et al., 1985). Vegetation data from R1-VMap has been used to assign PI type. The process is described in *"Lewis and Clark National Forest Photo Interpretation Assignments"* (U.S. Department of Agriculture, 2016a). The output of that process provides PI Types to a distance approximately 1 mile outside the forest boundary.
- Effective hiding cover is based on the "Montana Rule" (U.S. Department of Agriculture, 2016b) that assigns a hiding cover percent to specific stand characteristics. Percent effective hiding cover is then determined by dividing the acres of Effective Hiding Cover by the total acres

We used R1-VMap data to calculate existing (2018) hiding cover for both the Helena and the Lewis and Clark portions of the HLC NF and to estimate compliance with standards in each 1986 forest plan. R1-VMap data are remotely sensed and represent a broad-scale, coarse filter depiction of actual vegetation. R1-VMap relies on satellite imagery that is classified into three main vegetation components—canopy

cover, tree dominance type, and stand size. We used VMap 14, which is based on 2011 imagery, to model and map elk cover. For background documentation on R1-VMap and the associated classification system, see *The Region 1 Existing Vegetation Classification System and its Relationship to Region 1 Inventory Data and Map Products* (Barber, Bush, & Berglund, 2011) and *R1 Multi-level Vegetation Classification* (Berglund, Bush, Barber, & Manning, 2009*)*. Recent wildfires are not reflected in these data, nor do these data reflect project level analyses that may have been derived from previous VMap versions or that may have been modified based on site-specific data. Nevertheless, the information presented here represents the best estimate of hiding cover available as of 2018.

Status as of 2018

Table 1 summarizes the status of the each elk herd unit relative to the hiding cover provision of big game standard 3 in the Helena Forest Plan (U.S. Department of Agriculture, Forest Service, 1986b). Hiding cover calculations are derived for the entire herd unit which extends outside of the National Forest boundary.

Table 1. Helena National Forest Plan hiding cover on summer range by elk herd unit[1]

Elk herd unit	Total herd unit acres	Acres forest plan hiding cover on summer range[2]	Percent forest plan hiding cover on summer range	Complies with Helena Forest Plan big game standard 3
Arrastra Creek	27,738	20,572	74%	Yes
Atlanta	20,517	14,366	70%	Yes
Battle Mountain	33,967	10,730	32%	No
Beaver Creek	64,870	26,288	41%	No
Beaver Creek – Lincoln	32,406	22,892	71%	Yes
Beaver Creek – Gates	16,943	3,730	22%	No
Birch Creek	17,293	13,276	77%	Yes
Black Mountain – Brooklyn Bridge	53,840	30,608	57%	Yes
Boulder Baldy	22,056	14,365	65%	Yes
Cabin Creek	37,618	17,440	46%	No
Confederate	18,762	5,976	32%	No
B-D Elkhorn	22,500	14,379	64%	Yes
B-D Prickly Pear	13,006	6,788	52%	Yes
B-D Devil's Fence	16,409	10,795	66%	Yes
Devil's Fence	20,245	7,093	35%	No
Dry Range	25,310	10,610	42%	No
Elk Ridge	23,733	8,981	38%	No
Flesher Pass	91,093	55,531	61%	Yes
Greenhorn	56,314	18,039	60%	Yes
Greyson	33,894	4,947	15%	No
Hedges	52,368	20,673	39%	No
Hellgate	32,000	9,149	29%	No

Elk herd unit	Total herd unit acres	Acres forest plan hiding cover on summer range[2]	Percent forest plan hiding cover on summer range	Complies with Helena Forest Plan big game standard 3
Jericho	35,345	25,810	73%	Yes
Keep Cool	44,325	16,825	38%	No
Kimber	29,675	13,751	46%	No
Landers Fork	136,516	67,924	50%	Yes
Little Blackfoot – Spotted Dog	82,315	53,149	65%	Yes
Little Prickly Pear - Ophir	87,022	52,754	61%	Yes
Nevada Creek	38,824	26,922	69%	Yes
North Crow	42,724	21,777	51%	Yes
North Fork	25,828	7,491	29%	No
Ogden Mountain	56,310	32,266	57%	Yes
Poorman Creek	67,425	43,965	65%	Yes
Prickly Pear	32,376	20,042	62%	Yes
Quartz	36,733	20,849	57%	Yes
Ray Creek	44,885	18,117	40%	No
Sheep East	15,055	5,478	36%	No
Sheep West	36,218	19,785	55%	Yes
Sixmile	41,912	8,679	21%	No
South Crow	32,587	19,574	60%	Yes
Wagner/Thomas	48,619	14,473	30%	No
White's Gulch	25,798	11,610	45%	No

[1]Calculations are based on September 1, 2017 data runs; activities (e.g. wildfire, harvest) that have occurred since that date are not reflected in hiding cover acres.

[2]Summer range encompasses the entire herd unit except for the Greenhorn herd unit where summer range is a subset of the entire herd unit. Summer range in the Greenhorn herd unit covers 30,173 acres.

Table 2 summarizes the status of hiding cover within each 6th or 7th code watershed in accordance with standard C-1 in the Lewis and Clark Forest Plan (U.S. Department of Agriculture, Forest Service, Lewis and Clark National Forest, 1986). Hiding cover estimates include private land with the respective watershed.

Table 2. Lewis and Clark National Forest Plan effective hiding cover by watershed

Watershed[1]	Total acres	Acres effective hiding cover	Percent effective hiding cover	Complies with Lewis and Clark Forest Plan hiding cover standard C-1(5)
100301020101	24,052	8,656	36%	Yes
100301020102	19,407	7,467	38%	Yes
100301020103	25,615	7,028	27%	No
100301020201	9,901	3,439	35%	Yes

Watershed[1]	Total acres	Acres effective hiding cover	Percent effective hiding cover	Complies with Lewis and Clark Forest Plan hiding cover standard C-1(5)
100301020202	9,230	1,612	17%	No
100301021301	16,040	6,202	39%	Yes
100301021302	18,906	4,505	24%	No
10030103010201	8,329	2,626	32%	Yes
10030103010202	3,189	1,171	37%	Yes
10030103010203	2,417	925	38%	Yes
10030103010204	871	278	32%	Yes
10030103010205	2,722	867	32%	Yes
10030103010206	1,281	290	23%	No
10030103010207	3,537	1,168	33%	Yes
10030103010208	1,001	245	25%	No
10030103010301	2,233	722	32%	Yes
10030103010401	5,079	1,954	38%	Yes
10030103010402	2,968	949	32%	Yes
10030103010403	2,918	863	30%	Yes
10030103010501	6,780	2,107	31%	Yes
10030103020301	4,591	1,659	36%	Yes
10030103030101	5,078	2,067	41%	Yes
10030103030102	4,168	1,275	31%	Yes
10030103030103	2,856	964	34%	Yes
10030103030104	368	144	39%	Yes
10030103030105	1,536	551	36%	Yes
10030103030106	2,884	1,138	39%	Yes
100301030401	27,663	12,312	45%	Yes
100301030402	23,245	10,178	44%	Yes
100301030403	22,686	7,512	33%	Yes
100301030404	21,214	8,469	40%	Yes
10030103040501	5,935	1,314	22%	No
10030103040502	2,316	421	18%	No
10030103050501	7,182	1,904	27%	No
10030103050502	2,335	703	30%	Yes
100301030701	13,292	5,364	40%	Yes
100301030801	26,105	12,681	49%	Yes
100301030802	24,288	12,191	50%	Yes
10030103080301	2,942	1,330	45%	Yes
10030103080302	758	404	53%	Yes
10030103080303	331	168	51%	Yes
10030103080304	1,150	533	46%	Yes

Watershed[1]	Total acres	Acres effective hiding cover	Percent effective hiding cover	Complies with Lewis and Clark Forest Plan hiding cover standard C-1(5)
10030103080305	3,424	1,551	45%	Yes
10030103080306	805	442	55%	Yes
10030103080307	1,102	454	41%	Yes
10030103080308	1,218	459	38%	Yes
10030103080312	4,435	1,837	41%	Yes
100301030903	11,267	5,269	47%	Yes
10030103090401	5,636	2,420	43%	Yes
100301040101	12,206	4,186	34%	Yes
100301040102	10,681	3,595	34%	Yes
100301040103	14,935	4,404	29%	No
100301040104	9,654	4,084	42%	Yes
100301040105	9,135	1,884	21%	No
100301040106	27,913	11,676	42%	Yes
100301040107	17,688	5,868	33%	Yes
100301040108	12,124	3,691	30%	Yes
100301040109	21,443	9,306	43%	Yes
100301040110	12,892	4,343	34%	Yes
100301040111	21,346	9,338	44%	Yes
100301040201	24,831	6,719	27%	No
100301040202	19,052	8,586	45%	Yes
100301040203	30,319	10,303	34%	Yes
100301040204	10,588	3,226	30%	Yes
100301040205	14,889	2,432	16%	No
100301040206	23,063	8,077	35%	Yes
100301040207	15,701	3,751	24%	No
100301040208	22,610	7,449	33%	Yes
100301040401	23,697	8,223	35%	Yes
100301040402	13,338	5,748	43%	Yes
100301040403	21,697	6,972	32%	Yes
10030104050101	1,543	544	35%	Yes
10030104050102	2,211	878	40%	Yes
10030104050103	114	58	51%	Yes
10030104050104	1,064	368	35%	Yes
10030104050105	768	359	47%	Yes
10030104050203	2,992	1,184	40%	Yes
10030104050204	3,460	985	28%	No
10030404050205	2,599	719	28%	No
10030104050206	1,206	336	28%	No

Watershed[1]	Total acres	Acres effective hiding cover	Percent effective hiding cover	Complies with Lewis and Clark Forest Plan hiding cover standard C-1(5)
10030104050207	1,441	424	29%	No
10030104050208	2,459	627	26%	No
10030104050302	1,834	478	26%	No
10030104050403	1,787	514	29%	No
10030104050404	4,159	1,081	26%	No
10030104050405	466	161	35%	Yes
10030104050406	415	104	25%	No
10030104050407	1,075	367	34%	Yes
10030104050408	484	140	29%	No
10030104050409	1,074	339	32%	Yes
10030104050410	234	81	34%	Yes
10030104050411	637	134	21%	No
10030104050412	1,114	283	25%	No
100301050101	20,793	9,617	46%	Yes
100301050102	26,105	11,544	44%	Yes
100301050103	18,512	7,869	43%	Yes
10030105010401	4,341	1,879	43%	Yes
10030105010402	1,706	705	41%	Yes
10030105010403	1,094	561	51%	Yes
10030105010404	718	341	47%	Yes
10030105010405	988	504	51%	Yes
10030105010407	3,827	1,476	39%	Yes
10030105010408	2,055	735	36%	Yes
10030105010409	5,769	2,016	35%	Yes
10030105010501	1,022	433	42%	Yes
10030105010502	1,983	605	31%	Yes
10030105010503	1,186	505	43%	Yes
10030105010504	8,369	3,966	47%	Yes
10030105010505	2,739	752	27%	No
10030105010507	2,376	719	30%	Yes
10030105010508	11,775	4,893	42%	Yes
10030105020101	6,623	1,892	29%	No
100301050301	22,191	8,852	40%	Yes
100301050302	18,259	8,859	49%	Yes
100301050303	27,092	13,657	50%	Yes
100301050304	15,689	5,936	38%	Yes
100301050402	24,525	4,737	19%	No
100302010103	22,836	6,699	29%	No

Watershed[1]	Total acres	Acres effective hiding cover	Percent effective hiding cover	Complies with Lewis and Clark Forest Plan hiding cover standard C-1(5)
100302010104	42,986	9,405	22%	No
100302010105	24,028	2,960	12%	No
100302010201	38,358	15,832	41%	Yes
100302010202	20,891	8,442	40%	Yes
100302010204	34,528	7,266	21%	No
100302010601	8,505	2,608	31%	Yes
100302010602	16,420	5,432	33%	Yes
100302010603	22,926	8,186	36%	Yes
100302050101	13,318	3,429	26%	No
100302050102	27,339	7,171	26%	No
100302050103	17,717	5,860	33%	Yes
100302050104	11,082	3,824	35%	Yes
100302050301	34,171	9,111	27%	No
10040102010101	2,356	953	40%	Yes
10040102020101	2,082	895	43%	Yes
10040102020102	1,411	536	38%	Yes
10040102020201	9,793	3,986	41%	Yes
10040102020202	700	372	53%	Yes
10040102020203	1,655	739	45%	Yes
10040102020204	2,576	1,010	39%	Yes
10040102020205	719	295	41%	Yes
10040103010201	2,786	610	22%	No
10040103010301	3,356	907	27%	No
10040103010302	2,325	458	20%	No
10040103010401	2,663	719	27%	No
10040103010402	3,597	1,513	42%	Yes
10040103010403	2,090	532	25%	No
100401030204	37,639	12,599	33%	Yes
100401030301	32,866	14,346	44%	Yes
100401030302	23,041	8,392	36%	Yes
10040103030301	894	387	43%	Yes
10040103030302	2,002	919	46%	Yes
10040103030303	4,733	2,037	43%	Yes
10040103030304	1,353	562	42%	Yes
10040103030305	5,531	2,485	45%	Yes
10040103030306	3,773	1,594	42%	Yes
10040103030307	8,756	4,046	46%	Yes
100401030304	24,116	10,707	44%	Yes

Watershed[1]	Total acres	Acres effective hiding cover	Percent effective hiding cover	Complies with Lewis and Clark Forest Plan hiding cover standard C-1(5)
100401030401	35,258	16,056	46%	Yes
100401030402	21,777	9,478	44%	Yes
10040103050101	3,345	1,476	44%	Yes
10040103050401	1,789	657	37%	Yes
10040103050402	1,986	768	39%	Yes
10040103050501	10,468	4,521	43%	Yes
10040103050502	3,255	915	28%	No
10040103050503	2,489	795	32%	Yes
10040103060101	3,665	1,075	29%	No
10040103060102	2,258	1,056	47%	Yes
10040103060301	5,671	1,641	29%	No
100401030702	34,528	9,912	29%	No
100401030709	37,238	10,152	27%	No
100401031101	28,732	13,159	46%	Yes
10040103110201	18,949	6,468	34%	Yes
10040103120101	4,634	2,216	48%	Yes
10040103120102	5,716	2,827	49%	Yes
10040201010101	7,469	2,678	36%	Yes
10040201010102	4,872	2,365	49%	Yes
10040201010103	2,897	1,175	41%	Yes
10040201010201	6,367	1,920	30%	Yes
10040201010203	6,021	1,358	23%	No
10040201010301	4,147	1,050	25%	No
10040201010302	3,057	932	30%	Yes
10040201010303	3,078	719	23%	No
10040201010401	3,471	1,727	50%	Yes
10040201010402	1,000	548	55%	Yes
10040201010403	2,923	1,299	44%	Yes
10040201010404	5,596	2,356	42%	Yes
10040201010405	6,807	3,054	45%	Yes
10040201010407	3,849	1,448	38%	Yes
10040201010601	3,037	1,504	50%	Yes
10040201020101	3,792	1,527	40%	Yes
10040201020301	4,004	1,854	46%	Yes
10040201020302	3,099	1,032	33%	Yes
10040201020303	3,377	1,429	42%	Yes
10040201020304	3,376	735	22%	No
10040201020305	3,192	594	19%	No

Watershed[1]	Total acres	Acres effective hiding cover	Percent effective hiding cover	Complies with Lewis and Clark Forest Plan hiding cover standard C-1(5)
10040201020501	4,949	1,181	24%	No
100402010208	29,661	11,700	39%	Yes
10040201040101	12,521	5,089	41%	Yes
10040201040102	2,619	1,025	39%	Yes
10040201040104	2,318	688	30%	Yes
10040201040105	4,831	1,984	41%	Yes
10040201050201	5,429	2,393	44%	Yes
10040201050202	2,304	924	40%	Yes
10040201050203	3,533	789	22%	No
100402010601	32,791	6,453	20%	No
10040201070101	4,835	2,322	48%	Yes
10040201070102	5,654	2,638	47%	Yes
10040201070103	12,117	4,891	40%	Yes
10040201080101	5,769	2,580	45%	Yes
10040201130101	3,702	937	25%	No
10040201130102	678	239	35%	Yes
10040201130301	13,493	5,068	38%	Yes
100402011304	9,286	3,027	33%	Yes
100402011401	37,080	7,720	21%	No
100402011405	20,492	5,290	26%	No
10040201210101	4,912	1,936	39%	Yes
10040202010101	11,271	4,921	44%	Yes
100402030401	32,587	10,356	32%	Yes
100402030403	37,327	12,695	34%	Yes
[1]12 digit numbers reflect 6th code watersheds; 14 digit numbers reflect 7th code watersheds				

Table 3 summarizes the status of hiding cover by geographic area for use in the analysis for the 2020 Forest plan. While this scale may dilute the availability of cover by herd unit or local groupings of elk, it allows for an analysis of the ability of coarse filter plan components (refer to the 2020 Forest Plan and FEIS) to provide for elk cover.

Table 3. Elk hiding cover by geographic area (refer to 2020 HLC NF plan and FEIS)

Geographic area	Total acres - all ownerships	Total acres hiding cover - all ownerships (% of GA)
Big Belts	452,292	130,595 (29%)
Castles	79,862	32,716 (41%)
Crazies	70,036	17,658 (25%)
Divide	232,890	76,015 (33%)
Elkhorns	175,259	65,876 (38%)

Geographic area	Total acres - all ownerships	Total acres hiding cover - all ownerships (% of GA)
HIghwoods	44,495	3,251 (7%)
Little Belts	900,961	554,599 (62%)
Rocky Mountain Range	782,986	263,367 (34%)
Snowies	121,897	68,862 (56%)
Upper Blackfoot	348,185	127,697 (37%)

Thermal Cover

Methods

The following methods, assumptions, and information have been used to describe the existing condition for big game thermal cover under the Helena National Forest Plan.

- Elk herd units serve as the basis for the analysis; these have been developed in conjunction with Montana Fish, Wildlife, and Parks.
- Winter range is based on MFWP range maps updated in 2008 (http://fwp.mt.gov/fishAndWildlife/management/elk/).
- ≥ 60% canopy cover
- ≥ 15 acres in size

Table 4 summarizes the status of the each elk herd unit relative to the thermal cover provision of Big Game standard 3 in the Helena Forest Plan. Thermal cover calculations are derived for the portion of the herd unit on winter range, which generally extends beyond the National Forest boundary.

Table 4. Helena National Forest Plan thermal cover on winter range by elk herd unit

Elk herd unit	Total herd unit acres	Total winter range acres	Thermal cover acres on winter range	Percent thermal Cover on winter range	Complies with Helena Forest Plan big game standard 3
Arrastra Creek	27,738	7,504	1,408	19%	No
Atlanta	20,517	11,141	2,005	18%	No
Battle Mountain	33,967	27,855	2,565	9%	No
Beaver Creek	64,870	39,603	2,454	6%	No
Beaver Creek – Lincoln	32,406	17,787	3,623	20%	No
Beaver Creek – Gates	16,943	497	4	1%	No
Birch Creek	17,293	3,726	462	12%	No
Black Mountain – Brooklyn Bridge	53,840	53,444	9,306	17%	No
Boulder Baldy	22,056	14,154	2,973	21%	No
Cabin Creek	37,618	18,952	1,422	8%	No

Elk herd unit	Total herd unit acres	Total winter range acres	Thermal cover acres on winter range	Percent thermal Cover on winter range	Complies with Helena Forest Plan big game standard 3
Confederate	18,762	16,481	2,083	13%	No
B-D Elkhorn	22,500	11,955	2,136	18%	No
B-D Prickly Pear	13,006	11,417	1,024	9%	No
B-D Devil's Fence	16,409	9,621	1,848	19%	No
Devil's Fence	20,245	17,853	1,680	9%	No
Dry Range	25,310	15,680	1,329	8%	No
Elk Ridge	23,733	5,007	322	6%	No
Flesher Pass	91,093	49,356	2,437	5%	No
Greenhorn	56,314	55,244	4,283	8%	No
Greyson	33,894	27,361	283	1%	No
Hedges	52,368	31,053	3,292	11%	No
Hellgate	32,000	19,035	1,497	8%	No
Jericho	35,345	17,419	1,660	10%	No
Keep Cool	44,325	13,754	1,142	8%	No
Kimber	29,675	17,443	978	6%	No
Landers Fork	136,516	38,206	3,721	10%	No
Little Blackfoot – Spotted Dog	82,315	24,753	2,156	9%	No
Little Prickly Pear - Ophir	87,022	58,420	8,451	14%	No
Nevada Creek	38,824	29,815	2,360	8%	No
North Crow	42,724	30,001	2,896	10%	No
North Fork	25,828	20,190	758	4%	No
Ogden Mountain	56,310	46,415	3,327	7%	No
Poorman Creek	67,425	53,149	4,127	8%	No
Prickly Pear	32,376	17,697	2,299	13%	No
Quartz	36,733	29,603	3,920	13%	No
Ray Creek	44,885	35,195	2,277	6%	No
Sheep East	15,055	12,820	1,628	13%	No
Sheep West	36,218	23,237	3,614	16%	No
Sixmile	41,912	28,049	1,704	6%	No
South Crow	32,587	17,762	2,670	15%	No
Wagner/ Thomas	48,619	35,495	2,080	6%	No
White's Gulch	25,798	17,620	3,054	17%	No

Elk herd unit	Total herd unit acres	Total winter range acres	Thermal cover acres on winter range	Percent thermal Cover on winter range	Complies with Helena Forest Plan big game standard 3
*Calculations are based on September 1, 2017 data runs; activities (e.g. wildfire, harvest) that have occurred since that date are not reflected in hiding cover acres.					

The 1986 Lewis and Clark NF plan does not include a standard for thermal cover. In order to allow for an analysis of the ability of coarse filter plan components (refer to the 2020 Forest Plan and FEIS) to provide for thermal cover, we calculated thermal cover at the scale of the Geographic Area across the entire HLC NF, using the methods described above.

Table 5 summarizes the status of thermal cover by winter range and geographic area. Although winter range extends outside of the National Forest boundary, only that portion within the boundary is considered in the analysis. Private land on winter range within the Forest boundary is included in the calculations.

Table 5. Elk thermal cover on winter range by geographic area (refer to 2020 HLC NF plan and FEIS)

Geographic area	Total acres (all ownerships)	Total acres winter range (all ownerships)	Total acres thermal cover winter range (all ownerships)	Percent thermal cover on winter range (all ownerships)
Big Belts	452,292	223,000	85,466	19%
Castles	79,862	25,892	10,889	14%
Crazies	70,036	40,378	22,927	33%
Divide	232,890	130,005	96,503	41%
Elkhorns	175,259	90,136	50,629	29%
HIghwoods	44,495	40,619	25,778	58%
Little Belts	900,961	152,694	87,937	10%
Rocky Mountain Range	782,986	167,150	71,568	9%
Snowies	121,897	11,775	8,938	7%
Upper Blackfoot	348,185	131,825	99,910	29%

Fall Security Areas

Big Game Standard 4a in the 1986 Helena forest plan requires that the forest manage roads during the fall elk hunting season to maintain open road densities according to the following limits:

Existing Percent Hiding Cover (FS definition)[1]	Existing Percent Hiding Cover (MFWP definition)[2]	Maximum Open Road Density
56	80	2.4 mi/mi^2
49	70	1.9 mi/mi^2
42	60	1.2 mi/mi^2
35	50	0.1 mi/mi^2

[1] A timber stand which conceals ≥ 90% or more of a standing elk at 200 feet (see methods in 'Hiding Cover' section above)

[2] A stand of coniferous trees having a crown closure of ≥40% (see methods in 'Hiding Cover' section above

Methods

In order to calculate the amount of area that meets the 1986 Helena NF plan criteria for fall security, we used the following methods, assumptions, and information:

- Elk herd units serve as the basis for the analysis; these have been developed in conjunction with Montana Fish, Wildlife, and Parks
- Hiding cover is calculated as described above
- Road density information is derived from transportation database. Private and administrative roads are assumed to have less impact on elk than public roads (Rowland, Wisdom, Johnson, & Kie, 2000). Based on this and other research (Perry and Overly1976, Lyon 1983, Witmer and deCalesta 1985) this analysis assigns a weight of 0.25 to private roads.
- A secure area is defined as an area at least 250 acres and at least one half-mile from an open motorized route (Hillis et al., 1991). Open motorized routes during the time period 9/1 to 12/1 are used in this analysis, and are buffered by one half-mile. Areas that are buffered or that are not buffered but are <250 acres are designated as not secure.

Table 6 summarizes the status of elk security by elk herd units for the Helena NF based on the 1986 Helena NF plan.

Table 6. Helena National Forest Plan hiding cover and open road densities by elk herd unit[1]

Elk herd unit	Total herd unit acres	Acres forest plan hiding cover	Percent forest plan hiding cover	Open road density[2]	Complies with Helena Forest Plan big game standard 4a
Arrastra Creek	27,738	20,572	74%	0.93	Yes
Atlanta	20,517	14,366	70%	0.27	Yes
Battle Mountain	33,967	10,730	32%	0.77	No
Beaver Creek	64,870	26,288	41%	1.01	No
Beaver Creek – Lincoln	32,406	22,892	71%	1.24	Yes
Beaver Creek – Gates	16,943	3,730	22%	0.00[3]	No
Birch Creek	17,293	13,276	77%	0.74	Yes
Black Mountain – Brooklyn Bridge	53,840	30,608	57%	0.80	Yes
Boulder Baldy	22,056	14,365	65%	0.57	Yes
Cabin Creek	37,618	17,440	46%	0.65	No
Confederate	18,762	5,976	32%	0.42	No
B-D Elkhorn	22,500	14,379	64%	0.03	Yes

Elk herd unit	Total herd unit acres	Acres forest plan hiding cover	Percent forest plan hiding cover	Open road density[2]	Complies with Helena Forest Plan big game standard 4a
B-D Prickly Pear	13,006	6,788	52%	0.23	Yes
B-D Devil's Fence	16,409	10,795	66%	0.05	Yes
Devil's Fence	20,245	7,093	35%	0.91	No
Dry Range	25,310	10,610	42%	0.12	No
Elk Ridge	23,733	8,981	38%	0.84	No
Flesher Pass	91,093	55,531	61%	0.77	Yes
Greenhorn	56,314	23,059	41%	0.90	No
Greyson	33,894	4,947	15%	1.12	No
Hedges	52,368	20,673	39%	1.14	No
Hellgate	32,000	9,149	29%	0.55	No
Jericho	35,345	25,810	73%	1.00	Yes
Keep Cool	44,325	16,825	38%	1.00	No
Kimber	29,675	13,751	46%	0.47	No
Landers Fork	136,516	67,924	50%	0.40	No
Little Blackfoot – Spotted Dog	82,315	53,149	65%	0.81	Yes
Little Prickly Pear - Ophir	87,022	52,754	61%	1.10	Yes
Nevada Creek	38,824	26,922	69%	0.59	Yes
North Crow	42,724	21,777	51%	0.66	No
North Fork	25,828	7,491	29%	0.65	No
Ogden Mountain	56,310	32,266	57%	1.03	No
Poorman Creek	67,425	43,965	65%	1.02	Yes
Prickly Pear	32,376	20,042	62%	0.64	Yes
Quartz	36,733	20,849	57%	1.10	No
Ray Creek	44,885	18,117	40%	0.58	No
Sheep East	15,055	5,478	36%	0.35	No
Sheep West	36,218	19,785	55%	0.84	No
Sixmile	41,912	8,679	21%	0.68	No
South Crow	32,587	19,574	60%	0.76	Yes
Wagner/ Thomas	48,619	14,473	30%	0.73	No
White's Gulch	25,798	11,610	45%	0.49	No

[1]Calculations are based on September 1, 2017 data runs; activities (e.g. wildfire, harvest) that have occurred since that date are not reflected in hiding cover acres.

[2]Open road density calculations are based on the most recent analysis for the respective herd unit to reflect the most up-to-date motorized route data for a given area. See the *Methodology and Scientific Accuracy* section.

Elk herd unit	Total herd unit acres	Acres forest plan hiding cover	Percent forest plan hiding cover	Open road density[2]	Complies with Helena Forest Plan big game standard 4a
[3]All of the Beaver Creek – Gates herd unit is within the Gates of the Mountains wilderness; hence no roads.					

The 1986 Lewis and Clark NF plan does not include a standard for fall security areas. In order to allow for analysis of the 2020 Forest Plan (refer to the 2020 HLC NF Forest Plan FEIS) we calculated elk habitat security areas at the scale of the Geographic Area across the entire HLC NF, using the methods described above.

Table 7 summarizes the status of elk security by geographic area according to the methods described above.

Table 7. Elk security areas by geographic area (refer to 2020 HLC NF plan and FEIS)

Geographic area	Total acres (all ownerships)	Secure acres	Percent security
Big Belts	452,292	116,977	26%
Castles	79,862	15,796	20%
Crazies	70,036	26,240	37%
Divide*	232,890	69,224	30%
Elkhorns	175,259	73,629	42%
HIghwoods	44,495	25,713	58%
Little Belts	900,961	281,663	31%
Rocky Mountain Range	782,986	608,475	78%
Snowies	121,897	82,607	68%
Upper Blackfoot*	348,185	187,255	54%

Section 3 – Elk Management Issues by Geographic Area

Each Elk Management Unit (EMU), and associated Hunting Districts (HDs), has its unique challenges that relate to management of elk. Although varied by Hunting District, overall challenges include the impacts of predation on elk populations, the amount of public land in the unit, the level of restricted hunting access on private land, extent of motorized use, and inherent differences in the landscape and vegetation of each unit. Following is a brief synopsis of the factors influencing elk management in the GAs and respective HDs on the HLC NF as of 2018. For all areas, refer to the *Montana Final Elk Management Plan* (Montana Fish Wildlife and Parks, 2004) for more information.

Big Belts

The Big Belts GA is located within four EMUs: West Big Belt (HD 392); Bridger (HDs 390, 391); East Big Belt (HD 446) and Devil's Kitchen (HDs 445, 455). A majority (74%) of the West Big Belt EMU is public land. Management challenges, however, are due to limited hunter access to that public land from Whites Gulch to Duck Creek which has made it difficult to manage elk through hunting. Noxious weeds on winter range have reduced the quality of forage (Montana Fish Wildlife and Parks, 2004).

A majority of the Bridger EMU (HDs 390, 391) is in private ownership; only 17% of this EMU is in public land (MFWP 2005, p. 253). Management challenges in the Big Belts are related to limited public access to private land, making management of elk numbers difficult. Noxious weed infestations on public winter range are also an issue (Montana Fish Wildlife and Parks, 2004).

Management challenges in the East Big Belt EMU (HD 446) are similar to those described for the West Big Belt and Bridger EMUs. Over 70% of this EMU is on private land where hunting access is limited (Montana Fish Wildlife and Parks, 2004).

The Devil's Kitchen EMU (HDs 445, 455) is at the northern end of the Big Belts GA and includes the Beartooth Wildlife Management Area and a portion of the Gates of the Mountain Wilderness. Although a majority of this EMU is in private ownership, public access is widely available on the private land (Montana Fish Wildlife and Parks, 2004). Management challenges here have centered on declines in elk wintering in the Beartooth Management Area due perhaps to distributional changes from lack of heavy snow, high hunting pressure, and/or movement to private land (Montana Fish Wildlife and Parks, 2004).

Recent discussions with MFWP as a part of the forest plan revision process indicate that elk distribution may be the biggest issue in the Big Belts GA (see project record notes). The elk are spending most of their time, year-round, on private land and are not being harvested due to a lack of public access to private land. Security as currently mapped may not be actually providing security opportunities because of topography and other factors. Beetle-killed trees and fire have reduced cover. In the south end of the Big Belts competition with livestock is a concern particularly in the Grassy Mountain area. There is also a lack of vegetative diversity in terms of successional stages. Weed infestations continue to compromise habitat particularly from Confederate Gulch to the north.

Refer to Tables 1, 3, 4, 6 and 7 in Section 2 above for specific information about quantities of hiding cover, thermal cover, and secure habitat in this GA.

Castles

The Castles GA is in the Castle Mountains EMU, HDs 449 and 452. Approximately 45% of this EMU is public land (Montana Fish Wildlife and Parks, 2004). Large concentrations of elk in this EMU are located on private land to which public access, and hunting, is limited (Montana Fish Wildlife and Parks, 2004).

Recently, a lack of security primarily as a result of relatively high motorized route densities in the eastern portion of the GA has been identified as a management challenge (see project record notes). Elk distribution is also an issue with more elk occurring on private land than on the National Forest. The west side of the Castles includes an Inventoried Roadless Area which could provide elk security if the current closed canopy forest were to be thinned.

Refer to Tables 2, 3, 5, and 7 in Section 2 above for specific information about quantities of hiding cover, thermal cover, and secure habitat in this GA.

Crazies

The Crazies GA is in the Crazy Mountains EMU, HDs 315 and 580. As with several of the previous EMUs, over 70% of the Crazy Mountain EMU is comprised of private land most of which serves as elk winter range (Montana Fish Wildlife and Parks, 2004). Limited public access to hunt on the National Forest and on private land has reduced elk harvest and has made it difficult to achieve elk population objectives (Montana Fish Wildlife and Parks, 2004). During discussions that were part of the forest plan revision process, security as currently mapped and a checkerboard ownership pattern were also noted as a management challenge (see notes from November 16, 2015 in project record).

Refer to Tables 2, 3, 5, and 7 in Section 2 above for specific information about quantities of hiding cover, thermal cover, and secure habitat in this GA.

Divide

The Divide GA is in the Deerlodge EMU (HDs 215, 318, and 335) and the Granite Butte EMU (HD 343). The Granite Butte EMU is described in the Upper Blackfoot GA section. The Deerlodge EMU is managed primarily by the USDA Forest Service (45%); the remaining EMU is managed by the USDI Bureau of Land Management, Department of Natural Resources and Conservation, and private landowners (Montana Fish Wildlife and Parks, 2004). As with the Granite Butte EMU, housing developments on winter range in this EMU are identified as a management challenge (Montana Fish Wildlife and Parks, 2004). Snowmobile use may be also be an issue here by redistributing elk from public land to private land[1].

Recent management challenges in the Divide GA are similar to those described for the Upper Blackfoot GA. The Divide GA includes several private land inholdings; the checkerboard ownership pattern makes management of elk difficult (see notes in project record). Maintenance of cover, especially in the southern portion of the GA, will be key to offsetting habitat losses on private land.

Refer to Tables 1, 3, 4, 6 and 7 in Section 2 above for specific information about quantities of hiding cover, thermal cover, and secure habitat in this GA.

Elkhorns

The Elkhorn GA is located within the Elkhorn EMU, HD 380. About 40% of the EMU is publicly owned. The Elkhorn GA is currently a Wildlife Management Unit on both the HLC and B-D National Forests. Because of its status, the Elkhorn GA has been the subject of extensive research and monitoring of elk beginning in 1982. The Elkhorn EMU is one of two special hunting districts on the HLC NF; the other being the Bob Marshall EMU. Here, branched antler bulls can only be harvested under a special permit available through drawing (Montana Fish Wildlife and Parks, 2004).

About 70% of big game winter range in the EMU is on NFS land. The number of elk in this EMU has been controversial particularly with regard to forage allocation between elk and livestock. Portions of this EMU have limited public access to private land which then serve as refuges to elk during hunting. Housing development is ongoing in the foothills surrounding the Elkhorns which has in turn affected winter range in some portions of the EMU and which have provided de facto security during the hunting season (Montana Fish Wildlife and Parks, 2004).

Recent issues in this EMU include forage availability for elk, particularly on winter range. Security may be in issue on the B-D National Forest and in the southeast portion of the Elkhorns. Non-motorized disturbance has become a management concern, particularly with respect to antler hunting in the southeast/eastern sections. Conifer colonization has also become an issue in the open grass/shrubland areas along the eastern flanks of the GA (see project record notes).

Refer to Tables 1, 3, 4, 6 and 7 in Section 2 above for specific information about quantities of hiding cover, thermal cover, and secure habitat in this GA.

Highwoods

The Highwoods GA is in the Highwood EMU, HD 447. Most of this EMU is in private ownership (79%) (Montana Fish Wildlife and Parks, 2004). The primary management challenge in this EMU is equal

[1] The *Montana Final Elk Management Plan* also predates travel planning in the Divide GA completed by the Forest Service in 2016).

harvest of elk throughout the entire EMU. While the west and northwest portions of the Highwoods have good access to public land, limited access to private land in the eastern portion of the EMU has resulted in elk 'refuges' during the hunting season (Montana Fish Wildlife and Parks, 2004).

Recent management challenges in the Highwoods include conifer colonization especially along ridges and lack of public access to hunt on private land (see project record notes).

Refer to Tables 2, 3, 5, and 7 in Section 2 above for specific information about quantities of hiding cover, thermal cover, and secure habitat in this GA.

Little Belts

The Little Belts GA is located within the Little Belt EMU which is comprised of several HDs: 413, 416, 418, 420, 448, 432, 454, and 540. Approximately 65% if this EMU is public land (Montana Fish Wildlife and Parks, 2004). Management challenges in this EMU include limited public access to private land where elk, particularly bulls, concentrate during the hunting season (Montana Fish Wildlife and Parks, 2004).

MFWP has recently identified elk distribution in the Little Belts as a management concern (see project record notes). Beginning at the start of archery season, elk are shifting land use patterns in response to the archery season. Habitat security has been identified as a management issue in some parts of this GA, particularly in the southern Little Belts. There is a paucity of early successional habitat overall, and on winter range colonizing conifers are reducing habitat such that elk are moving to private land. Lack of public access to private land during the hunting season is also an issue.

Refer to Tables 2, 3, 5, and 7 in Section 2 above for specific information about quantities of hiding cover, thermal cover, and secure habitat in this GA.

Rocky Mountain Range

The Rocky Mountain Range GA is with the Bob Marshall EMU which comprises HDs 415, 422, 424, 425, 441, and 442. Most of this EMU (about 73%) is public land. According to the *Montana Final Elk Management Plan* (Montana Fish Wildlife and Parks, 2004), management challenges in this EMU are related to the ability to manage habitat given that a large percentage of this EMU is designated wilderness. At the time the plan was developed, much of the vegetation in this EMU was not at a successional stage "conducive to producing abundant forage" (Ibid, p. 113). Since then, several large forest fires in this EMU have created early successional habitat that, in time, will be benefit elk.

Other challenges in this EMU include potential impacts of large predators - i.e. mountain lions, grizzly bears, and wolves - to calf survival and recruitment. Limited hunter access to private property particularly in HDs 422 and 441 has affected elk harvest and subsequently the ability of MFWP to manage the elk population within established objectives. Overuse of forage by elk on the state owned and managed Sun River Wildlife Management Area and adjacent areas have affected forage availability.

More recently, MFWP area biologists, as part of conversations with FS biologists leading up to revision of the HLC NF forest plan, have identified current challenges associated with their respective HD and GA (see project record notes). In the Rocky Mountain Range GA portion of the Bob Marshall EMU, management challenges have shifted to concerns about the extent of fire on the landscape (compared with concerns identified in the 2005 plan) and reduction in cover as a result of those fires. Specifically in HD 415, elk forage is an issue due to competition with livestock and in part due to competition from trespass horses. There is also concern about the extent of burned areas as a result of several recent large wildfires in the Bob Marshall Wilderness Complex. In HD 441, most of the elk winter off of National Forest lands, and distribution of elk is changing due to lack of hunting on private lands. Currently cover is providing

security and should be maintained. Refer to Tables 2, 3, 5, and 7 in Section 2 above for specific information about quantities of hiding cover, thermal cover, and secure habitat in this GA.

Snowies

The Snowies GA is in the Snowy EMU which includes HDs 411, 511, and 530. A majority of occupied elk habitat – and elk - in this EMU are located on private land (Montana Fish Wildlife and Parks, 2004) to which public access is limited. Because of this the primary management challenge is to increase elk distribution to include other portions of the EMU which in turn would facilitate attainment of management goals (Montana Fish Wildlife and Parks, 2004). To that end, habitat (vegetation) management on public lands has been identified as needed to change distribution of elk from private land to public land.

Management opportunities identified in the Snowies GA include aspen enhancement and forest thinning (see project record notes).

Refer to Tables 2, 3, 5, and 7 in Section 2 above for specific information about quantities of hiding cover, thermal cover, and secure habitat in this GA.

Upper Blackfoot

The Upper Blackfoot GA is located within several EMUs: Bob Marshall EMU (HD 281); Granite Butte EMU (HDs 293, 339, and 343); Garnet EMU (HD 298) and the Birdtail Hills EMU (HDs 421 and 423). The Bob Marshall EMU is described under the Rocky Mountain GA section for HDs 415, 422, 424, 425, 441, and 442). Management challenges in the Upper Blackfoot portion of the Bob Marshall EMU at the time the plan was crafted included disposition of Plum Creek Timber lands, which had been historically open to the public (Montana Fish Wildlife and Parks, 2004). Plum Creek has since divested themselves of their parcels; it's unknown whether the new landowners are providing the same level of public access. Snowmobile use of elk winter range has also been identified as an issue[2].

The Granite Butte EMU comprises approximately 60% public land (Montana Fish Wildlife and Parks, 2004). Housing development on winter range has been identified as an issue, as is elk security on both public and private land where timber harvest has reduced cover and road use has increased elk vulnerability and redistributed elk to private property (Montana Fish Wildlife and Parks, 2004). Noxious weeds are reducing forage availability for elk and although public access is generally not limited, some parcels of private land are closed to hunting creating elk refuges.

The Garnet EMU includes about 30% public land (Montana Fish Wildlife and Parks, 2004); the rest is primarily in private ownership following the recent divestment of Plum Creek timber lands. Management challenges in this EMU include limited public access to private land, the disposition of Plum Creek lands to other private landowners, increases in off-highway vehicle use, low calf survival and recruitment rates, and predation (Montana Fish Wildlife and Parks, 2004).

The Birdtail Hills EMU is almost exclusively comprised of private land (90%) (Montana Fish Wildlife and Parks, 2004). As with other EMUs, the primary management challenge here is lack of public access to private land (Montana Fish Wildlife and Parks, 2004).

Recently, MFWP identified the loss of migratory behavior throughout the entire Blackfoot drainage due to fire suppression on summer range[3] and a subsequent need to open up forested stands to enhance forage as an issue in this EMU (see notes in project record). There is also a concern that the extensive beetle

[2] Note that the *Montana Final Elk Management Plan* predates winter travel management in the Upper Blackfoot completed by the Forest Service in 2013.
[3] This predates the 2017 fire season.

killed forests will comprise even-aged dense stands upon regeneration the uniformity of which could reduce elk habitat. Although livestock competition is not currently an issue, flexibility is needed during dry years to manage timing and numbers of livestock.

Refer to Tables 1, 3, 4, 6 and 7 in Section 2 above for specific information about quantities of hiding cover, thermal cover, and secure habitat in this GA.

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