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Supplemental Environmental Assessment

Smith Creek Vegetation Treatment Project

Yellowstone Ranger District
Livingston Office
Gallatin National Forest
Meagher County, Montana

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Introduction

Abstract

As a result of the September 15, 2010 opinion (Case 09-35896) of the 9th Circuit Court of Appeals regarding the Smith Creek Vegetation Treatment Project, additional information and analysis is being provided in this second Supplemental EA to address the court's holding that "*the Service violated the Gallatin Plan and NFMA by not ensuring that the Project complies with the current Gallatin Plan elk-cover requirement. We remand to the Service to remedy this error*."

The opinion further states that "Plaintiffs' single meritorious argument on appeal concerns the Gallatin Plan's elk-cover requirement". The direction applicable to meeting the remand conclusion is one specific to the Gallatin Forest Plan Standard for Wildlife and Fish, page II-18, section 6.a.5 – "Maintain at least two thirds of the hiding cover associated with key habitat components over time. Subsequent timber sale activity will be allowed after regeneration provides hiding cover." Elk are designated in the Plan as an indicator species for the Gallatin National Forest for which two-thirds cover must be maintained.

In summary, the Court found that:

1) ***The Forest did not measure elk cover according to the definition provided in the Gallatin Plan (i.e. 90% at <=200 feet)***
2) ***The Forest Plan requires that 2/3 cover be maintained "over time" and not just at the time of a proposed Forest Service action.***
3) ***State management objectives for big game populations cannot replace federal management objectives.***

This analysis serves to remedy the error and is tiered to the Smith Creek Vegetation Treatment Project EA (USDA 2007) and the first Supplemental EA (USDA 2008). For more background specific to this issue, please see Appendix A-Gallatin Forest Plan Hiding Cover Standard Assessment (USDA Forest Service, unpublished paper).

The Smith Creek Vegetation Treatment Project is part of a continuing effort by Federal, State, and local agencies and groups to address the risk of wildfire in the wildland urban interface (WUI). The proposed actions include vegetative and fuel treatment activities designed to modify potential wildfire behavior by creating vegetation and fuel conditions that provide for safer firefighter response and public evacuation in the event of a wildfire. The Forest Service has prepared this Supplemental Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations.

Project History

The initial scoping letter for the Smith Creek Vegetation Treatment Project was sent to interested parties on February 22, 2006. A public meeting regarding the project was held at the Wilsall Community Center on June 29, 2006. A public field trip was held on July 9, 2006. A public meeting/workshop sponsored by the Northern Rocky Mountain Resource and Conservation Development Center (RC&D) in conjunction with the Gallatin National Forest was held on July 19th, 2006 at the Wilsall Community Center.

A second scoping letter was sent to interested individuals on September 29, 2006 as a follow-up to the original scoping letter that sought public comments on the preliminary proposed action. A public meeting was held at the Clyde Park Community Center on November 6, 2006. Another public field trip was held in July 2007.

The Environmental Assessment for the Smith Creek Vegetation Treatment Project was released to the public for a 30 day comment period on August 15, 2007. The subsequent Decision Notice and Finding of No Significant Impact (FONSI) was released to interested parties on December 19, 2007.

Three appeals of the decision were received. The appeals were reviewed by a Northern Regional Office appeal panel pursuant to and in accordance with 36 CFR 215.18 to ensure the analysis and decision for the project complied with applicable laws, regulations, policy, and orders. An appeal disposition letter affirming the decision to implement the Smith Creek Vegetation Project was mailed to the three appellants on March 12, 2008. The project was advertised for sale with a scheduled bid opening on July 7, 2008. One sealed bid was received, but was left unopened in a locked safe.

Several of the commercial treatment units included in the timber sale contract became smaller on the ground than what was analyzed in the Environmental Assessment. This is due to implementation of the numerous mitigation measures associated with the project and actual topographic features (See Table 2). The resulting units still fully meet the purpose and need for the project but environmental effects would be expected to be somewhat less than those displayed in the original EA.

A lawsuit challenging the project was filed jointly by the three appellants on July 18, 2008 in the United States District Court for the District of Montana, Missoula Division. On October 30, 2008 the District Court issued an order (CV 08-92-M-DWM) enjoining the project and remanding the matter to the Forest Service to conduct mapping of key habitat components for elk as required by the 1987 Gallatin Forest Plan. The order required the FS to map key habitat components per Forest Plan standard 6.a.5. (p. II-18, Gallatin FP). Elk hiding cover was previously mapped through Timber Stand Management Record System (TSMRS) and this information was presented in the Smith Creek Vegetation Treatment Environmental Assessment (EA) (USDA 2007) (refer to Map 5). The Court's order on page 17 stated "The EA does not comply with mapping requirements for elk, but does comply with hiding cover and security cover requirements." On page 20, the order stated "The Forest Service has complied with the limited part of the Forest Plan's requirement to maintain two-thirds elk hiding cover." On

page 22, the order stated "Therefore the agency's determination that the project would not violate standards for elk security is not in error."

In response to the District Court's order, key habitat components were mapped by the Forest Service. Effects to elk were re-evaluated by analyzing project impacts to elk hiding cover associated with key habitat components and a Supplemental EA was issued to interested parties on November 20, 2008 for a 30 day comment period. Comments were received from six interested parties and were responded to by the appropriate resource specialist. The responsible official, District Ranger Archuleta, reviewed the Supplemental EA, public comments, and FS responses, coming to the conclusion that new information gave him no reason to supplement, correct, or revise the December 18, 2007 decision for the project. Therefore a Decision Notice/Affirmation of Prior Decision and Revised Finding of No Significant Impact was released on March 6, 2009, which re-affirmed that the original decision should remain in effect and unchanged.

The decision was appealed in April of 2009 by the Native Ecosystems Council, the Alliance for the Wild Rockies, and Sharon Hapner. On June 5, 2009 a new lawsuit was filed (CV 09-79-M-DWM) in the US District Court of Missoula reasserting the claims set forth in the original complaint that the Forest Service failed to comply with the Court's order to map elk habitat. The Court entered an order consolidating the plaintiffs' two actions and stated that it retained jurisdiction to modify or dissolve its earlier Order enjoining the project.

On October 8, 2009 the District Court issued an Order (CV-00092) and final judgment in favor of the Forest Service regarding the project, stating that the Forest Service had complied with the terms of the Court's Order requiring the agency to map the "key components" of elk habitat. The Order went on to state that the injunction formerly entered by the Court was dissolved and the Forest Service may proceed with the Smith Creek Vegetation Project.

On October 9, 2009 the Plaintiffs filed an appeal to the Ninth Circuit Court of Appeals and once again moved the District Court for interim injunctive relief which was denied on November 9, 2009. The Plaintiffs then sought injunctive relief from the Ninth Circuit Court, which was granted in part and denied in part on December 21, 2009. The sealed bid for the timber contract was removed from the locked safe, opened, and awarded on January 25, 2010. The Plaintiffs' filed a motion for clarification of the December Order and on February 4, 2010 the case was heard in the Ninth District Court. After consideration of the records and briefs of both parties, as well as the oral arguments the Ninth Circuit Court reversed the District Court's Order dissolving the permanent injunction and granted a stay on the entire project on February 8, 2010.

On September 15, 2010 an Opinion (Case 09-35896) regarding the Project was issued by the Ninth Circuit Court of Appeals. The opinion affirmed the District Court's grant of summary judgment to the Forest Service in almost all respects; however, it stated that the Forest Service failed to ensure that the project was in compliance with the Gallatin Forest Plan's elk-cover requirements, which is a NFMA violation. The Ninth Circuit Court remanded to the Forest Service to remedy the error. This Supplemental EA addresses the Ninth Circuit remand.

Elk Hiding Cover

Analysis Methodology

To address the 9th Circuit's opinion, additional information was gathered and reviewed. In order to evaluate the Gallatin's method of measuring hiding cover *(Court Finding #1*) and the maintenance of hiding cover "over time" (*Court Finding #2*), data was collected in field visits to the Smith Creek project area. (*Court Finding #3*) State management objectives for big game can't replace Federal management objectives was also addressed.

Court Finding #1-The Forest did not measure elk cover according to the definition provided in the Gallatin Plan (i.e. 90% at <=200 feet)

A field protocol was developed as described in Appendix A–Gallatin Forest Plan Hiding Cover Standard Assessment (USDA Forest Service, unpublished paper) to establish the relationship between hiding cover, as represented by photo-interpreted models and the literal definition of hiding cover as defined by the Gallatin Forest Plan Amendment No. 14 Big Game Cover Definitions on page 1 (Vegetation capable of concealing 90% of an adult standing big game animal from the view of a human at a distance equal to or less than 200 feet). Elk are identified as the "indicator species" for big game in the Forest Plan (p. II-19). For the Smith Creek project area, a representative sample of forested areas (stands) corresponding to each photo-interpretation (PI) type (by conifer tree species, size class, and canopy cover) were targeted and randomly selected for field sampling.

The first sample was drawn from stands that were characterized as hiding cover based on their PI label (forest stands with at least 40% tree canopy cover) within the proposed treatment units, some of which had previous harvest activity (recorded since 1950). The quantitative analysis completed to check consistency with the Forest Plan standard considered all proposed treatment units to be devoid of hiding cover after implementation, so it was important to determine if they were providing hiding cover prior to implementation. Based on field samples, all PI types representing >=40% tree canopy cover were shown to meet the literal definition of hiding cover in the Forest Plan. On average forest cover concealed 90% of a cover board in less than 200 feet and 100% of an elk decoy (See Appendix A, pp. 31-34).

Forested stands with PI types representing <40% tree canopy cover were also reviewed with 1-meter resolution (NAIP) photography. Although they were not initially considered as hiding cover, we wanted to test the hypothesis that they were inherently open and it was not due to past timber harvest activities (i.e., tree thinning). It was recognized that these more open, park-like tree stands do not currently provide hiding cover and would not ever be capable due to site characteristics (e.g. dry, south-facing slopes). These <40% tree canopy cover PI type stands were carefully reviewed using NAIP imagery, and intersected with maps, and the Forest Activity Tracking System (FACTS) database to determine which stands were naturally open and would never provide hiding cover, and which were capable of providing hiding cover over time and should be included in the baseline hiding cover layer. Of the total 1,918 acres of PI types with <40% tree canopy cover, 695 acres were considered to be naturally open. These acres were not included in the hiding cover baseline of 1,223 acres.

In addition to the methodology of determining if field samples of forested stands providing >=40% tree canopy cover were actually providing hiding cover, the protocol for assessing hiding cover outlined in Smith and Long (1987) was conducted for the Smith Creek Project. Using total live tree data only, the average calculated value of diameter at breast height (DBH) and trees per acre (TPA) across most strata far exceeded the 4,729" needed to represent the predicted hiding cover relationship to these attributes. There were exceptions, some of which could be explained on the basis of the strata label. For example, based on one sample, LP11 would not be predicted to be hiding cover using the TSMRS PI types of >=40% tree canopy cover and it also did not have a large enough value to be hiding cover per Smith and Long (1987). Conversely, two strata had opposite expected results: LP22 strata models as TSMRS hiding cover but three stand exam samples did not give it a high enough value to be Smith and Long (1987) hiding cover and LP31 would not have modeled using TSMRS but did have a high enough Smith and Long (1987) value. Similarly, across three other project areas on the Gallatin National Forest (Appendix A – Gallatin Forest Plan Hiding Cover Standard Assessment) found that the Smith and Long (1987) calculation was not as consistent or as reliable as field sampling.

Court Finding #2-The Forest Plan requires that 2/3 cover be maintained "over time" and not just at the time of a proposed Forest Service action.

The second sample was generated to represent forested stands throughout the project area that had previous timber harvest activity to test the hypothesis that forested stands harvested post-1990 would not meet the definition of hiding cover and vice versa. This timeframe was based on the Forest Vegetation Simulation (FVS) model (Novak, 2010) that looked at stand exam data to determine growth rates, the results of which showed that at around twenty years post-harvest, trees could be expected to be 11-13 feet tall. Smith and Long (1987) suggested that sapling trees 5 feet in height provide enough structure to be hiding cover. Using this correlation, additional FVS results indicated trees would be 5-6 feet tall after eight years post-harvest. When viewing these forested stands with some level of harvest activity since 1990 with National Agriculture Imagery Program (NAIP) imagery, some appeared to have a tree canopy closure of 40%. Those forested stands harvested post-1990 were included as baseline acres capable of providing hiding cover at some point in time, but were identified as not currently providing hiding cover.

In order to generate a sample of those forested stands with some level of harvest activity prior to 1990, each forested stand was also viewed with NAIP imagery to determine which stands appeared to have less than 40% canopy cover, and therefore, least likely to be regenerated. From this subsample, those forested stands on southerly aspects were identified and the same sampling methodology applied to generate sample sites in the field. Based on the field data, two forested stands within two different PI types were not capable of hiding 90% of a cover board, which lowered the average for the sample to 87%. However, in all cases, the elk decoy was completely hidden at <200 feet, except for one stand where the vegetation concealed 90% of the elk decoy.

As mentioned in court finding #1, forested stands with PI types representing <40% canopy cover were examined relative to their capability to provide hiding cover and were also to examined to see if they had recovered from past harvest activity enough to provide hiding cover. Any stands capable of providing hiding cover were included in the

baseline of 1,223 acres. Based on field sampling, we determined that approximately 634 acres of those PI types provide hiding cover currently (existing) and are part of the baseline. The remaining 589 acres had harvest activity at some point in time, and had not recovered the ability to provide hiding cover. These were subtracted from the allowable modification of one third of the overall hiding cover at any point in time, along with the hiding cover within all of the proposed treatment unit acres.

Sampling Results Related to Court Findings #1 & #2

Field sampling results from the Smith Creek project were further supported by similar sampling in three other project areas on the Gallatin National Forest (pp. 37-40). All field data supports the validity of using PI types with >=40% canopy cover as a proxy for vegetation capable of hiding 90% of an elk at <=200 feet.

Given this field validation, a new hiding cover analysis was conducted for this Smith Creek Vegetation Treatment Supplemental EA. The analysis followed the example found in Appendix A–Gallatin Forest Plan Hiding Cover Standard Assessment (USDA Forest Service, unpublished paper).

Court Finding #3-State management objectives for big game populations cannot replace federal management objectives.

To address the 9th Circuit opinion regarding State management objectives for big game (*Finding #3*), some additional context was provided. In addition, the Montana Fish, Wildlife, and Parks (MFWP) office memorandum(s) for Hunting District 315 that document winter elk population surveys conducted after the original decision were reviewed.

Scale of Analysis

The appropriate analysis area for hiding cover was defined in the Smith Creek Vegetation Treatment EA (USDA 2007) and has not changed for this supplemental EA.

The temporal scale defined for the EA for determining compliance with the Forest Plan Standard was based on the timeframes proposed for the implementation of the various project activities. Because the appeal and litigation process has influenced this timing, the temporal scale has shifted. The duration of the effects would remain the same.

Another temporal consideration for this analysis was the use of an established baseline from which to measure hiding cover. The baseline used for this hiding cover analysis includes all forested stands capable of providing 40% tree canopy cover “over time”. This is different than the baseline used in the original analysis, which did not consider the recovery potential of some forested stands to become hiding cover.

The geographic analysis area for determining compliance with the Forest Plan requirement for elk-cover was based on known occurrence within the influence of the project vegetation treatment units and any surrounding landscape that defines specific species management analysis units. The appropriate analysis area was defined in the original EA (USDA 2007) and has not changed for the either the first Supplemental EA (UDSA 2008) or this Supplemental EA.

Hiding Cover Effects Analysis

The analysis and conclusions presented in this Supplemental EA are based on and does not change the Smith Creek Vegetation Treatment EA (2007) or Supplemental EA (2008) analysis for big game except for the new hiding cover analysis which specifically addresses the court findings required for resolution of the remand. The remainder of this report is organized as such.

Hiding Cover Measurements

Court Finding #1-The Forest did not measure elk cover according to the definition provided in the Gallatin Plan (i.e. 90% at <=200 feet)

The Analysis Methodology section above describes in detail how the "measure" of elk cover in the original EA (USDA 2007) was tested per a field sampling protocol as described in Appendix A – Gallatin Forest Plan Hiding Cover Standard Assessment (USDA Forest Service, unpublished paper). The use of the PI types that represent forest stands with at least 40% tree canopy cover was shown to be a reliable and valid proxy for the literal definition of hiding 90% of an elk at <=200 feet. The PI type from which the model was derived, the field sampling and results, are described in Appendix A.

The standard includes consideration of habitat components that are associated with hiding cover. This was discussed in detail on pages 2-5 in the first Supplemental EA (USDA 2008), which is incorporated by reference. The analysis in the first Supplemental EA is further validated by the analysis presented herein.

Hiding Cover Maintained "Over Time"

Court Finding #2-The Forest Plan requires that 2/3 cover be maintained "over time" and not just at the time of a proposed Forest Service action.

Effects of activities, including timber harvest and associated road building on both National Forest and private lands within the project area, resulting in various age classes of regenerated forest, were considered in the Smith Creek Vegetation Treatment EA (USDA 2007). Past and current activities in both the Smith Creek and Shields River watersheds include approximately 3,300 acres of timber harvest on private and public lands in the last 40+ years. The 2005 Smith/Shields Watershed Risk Assessment (Project File) also documented past activities in the Smith Creek area. The assessment estimates that in the Smith Creek area there was about twice as much seed/sapling tree age class in the spruce/subalpine fir forested types historically than there is today. Furthermore, approximately 7% of this forest type consisted of shrubland. In the lodgepole forested type there was some disturbance prior to any timber harvest in the area. This disturbance was most likely due to stand replacement fire(s). In the Douglas-fir forested types, pole and seedling/ sapling age classes were about the same historically as under the existing situation. This comparison provides some context regarding what vegetative conditions, both forested and non-forested, were like in the past.

The Smith Creek Vegetation Treatment EA (USDA 2007) indicated that hiding cover was not limiting in the Smith Creek watershed. It referenced the vegetative structure diversity

analysis which stated that approximately 70-90% of the area provides forested hiding cover. It went on to state that additional modeling indicated that approximately 62% of the area is at or above 40% tree canopy cover. What the original analysis did not explicitly demonstrate was how the project would meet the 2/3 hiding cover standard "over time" – and how it measured this from a baseline of forested acres capable of providing hiding cover. Table 1displays the quantitative calculations of how the hiding cover standard will be met "over time" with the implementation of Alternative 3 (Selected Alternative).

Table 1-Quantitative Measure of Elk Hiding Cover Overtime Including the Original Planned and Actual Implementation Layout Acres for Alternative 3 (Selected Alternative)

Quantitative Measure of Hiding Cover Over time	2007 EA HC Analysis	2010 Supplemental EA	
Total Project Area Acres	17,168	17,168	
Acres of Forested Stands Capable of Providing Hiding Cover (HC), i.e. Baseline HC	NA[1]	11,349	
Acres of Baseline HC not currently recovered	NA	641	
Existing Hiding Cover Acres	10,635	10,708	
Percent of Baseline serving as Existing HC	NA	94%	
Acres Needed to Maintain 2/3 HC	7,090	7,566	
	HC Calculations Original 2007[2]	**HC Calculations Planned Treatment Acres[3]**	**HC Calculations Implementation Layout Acres**
Acres of HC Post-treatment	9,492	9,598	9,879
Percent of HC Post-treatment	89%	85%	87%
Meets FP standard?	Yes	Yes	Yes

Using the new information of what constituted the hiding cover baseline, and following the process from Appendix A – Gallatin Forest Plan Hiding Cover Standard Assessment (USDA Forest Service, unpublished paper), hiding cover was re-calculated for before and after the vegetation treatments. Approximately 11,349 acres of the total 17,168 acres within the project area (Compartment 221) is forested cover capable of providing hiding

[1] NA – NA indicates this analysis was not conducted in the Original EA (USDA 2007)
[2] A preliminary hiding cover analysis, i.e., prior to the release of the 2007 EA analysis estimated 1,143 treatment acres (10,635-1,143=9,492).
[3] The planned treatment acres are the 1,110 acres identified in the Original EA (USDA 2007)

cover. The remainder of the 17,168 acres (or 5,819 acres) are not capable of providing hiding cover. To meet the FP standard, the project would have to maintain 2/3 (>=67%) of the 11,349 acres or 7,566 acres as hiding cover.

Approximately 641 acres of the established baseline were found to be capable of, but not currently, providing hiding cover, and therefore are subtracted from the acres capable of providing hiding cover. This equates to 94% of the baseline hiding cover currently serving as existing hiding cover (11,349 – 641 = 10,708; 10,708 / 11,349 = 94%). In addition, all of the 1,110 planned treatment acres in the selected alternative are subtracted. So 9,598 acres or 85% would still be retained as hiding cover, meeting the Forest Plan standard (10,708 – 1,110 = 9,598; 9,598 / 11,349 = 85%).

As indicated in the EA (USDA 2007) and the first Supplemental EA (USDA 2008), this is a conservative analysis in that individual unit prescriptions would not all necessarily reduce hiding cover. Thinning in some units would retain a canopy cover and structure of various age classes that would still serve as hiding cover. Also, as noted in the EA and first Supplemental EA, various mitigation measures would be implemented to maintain hiding cover and minimize disturbance in or near key habitat components.

In addition, per the Supplemental EA (USDA 2008) and Table 2 below-Smith Creek Planned and Actual Layout Acres for Alternative 3 (Selected Alternative), the actual units delineated and marked on the ground (and under timber sale contract) are somewhat smaller than the units planned and analyzed due to actual topographic features and stringent application of the various mitigation measures associated with the project. The final marked units still fully meet the purpose and need for the project. Using the actual layout acres in the hiding cover calculations would result in a smaller reduction in hiding cover and maintenance of 87% of the baseline hiding cover (10,708 – 829 = 9,879; 9,879 / 11,349 = 87%).

Table 2-Smith Creek Planned Treatment vs. Implementation Layout Unit Acres for Alternative 3 (Selected Alternative)

Unit #	Planned Treatment Acres	Implementation Layout Acres
A1	52	37
A2	15	0
B	165	119 (Split into B & B1)
C	112	112
D	125	66
E1	34	34
E2	50	17
F	60	30 (Split into F1 & F2)
G	28	11
H	103	103
I	66	0
J	300	300
Totals	**1110**	**829**

Federal vs. State Management Objectives

Court Finding #3-State management objectives for big game populations cannot replace federal management objectives.

Clearly, the Forest has an obligation to follow the Forest Plan standards regarding big game habitat management. The big game analysis was never intended to suggest or imply that using State management population objectives over habitat objectives would be reasonable or appropriate. Management of big game populations is the sole responsibility of the MFWP.

While management goals and habitat objectives are identified in the Montana State Elk Plan (MFWP 2004), they also recognize the land management agencies (like the Forest Service) role for providing habitat for a variety of wildlife species. Conversely, land management agencies recognize the opportunity to assist in meeting mutually beneficial objectives. The MFWP and the Forest Service (along with other Federal agencies) continue to work together to address the many issues surrounding sustainable big game populations.

The Environmental Assessment (USDA 2007) provided elk population management direction for Hunting District (HD) 315 and the Crazy Mountain Elk Management Unit (EMU). Elk population goals have been met and are considered to be healthy and widely distributed. Subsequent elk survey data indicates that the population continues to remain above objectives (Paugh 2010, Lemke 2008 & 2009, office memorandums).

Conclusions

Based on the sampling protocol developed in the Gallatin Forest Plan Hiding Cover Standard Assessment (USDA Forest Service, unpublished paper), the field sampling, and the additional screening, the PI types representing >=40% tree canopy cover model serve as a valid proxy for the literal definition of hiding cover from the Gallatin Forest Plan (90% of an elk at <=200 feet) and are therefore a valid way to show compliance with the Forest Plan standard in question.

The sampling protocol used from the Hiding Cover Standard Assessment (USDA Forest Service, unpublished paper) includes methodology for developing a hiding cover baseline. The methodology also identifies acres of that baseline not currently serving as hiding cover; thus providing a way to document the temporal portion of the standard (i.e., maintaining 2/3 hiding cover over time). Stands that had past harvest activity, as well as stands with <40% tree canopy cover were evaluated to determine if they were capable of, and currently providing hiding cover. Approximately 94% of the existing baseline hiding cover is currently serving as hiding cover. A quantitative analysis of those stand acres deemed capable (part of the baseline) but not currently providing hiding cover, were counted against the baseline, along with all of the proposed treatment unit acres. Implementation of the selected alternative (Implementation Layout Acres) would retain approximately 87% of the baseline hiding cover.

Therefore, the hiding cover analysis appropriately used the >=40% canopy cover model to determine potential and existing hiding cover. No substantial changes (85% to 87%) were noted in the relative amounts of baseline or existing hiding cover between the original EA (USDA 2007) and this Supplemental EA. Mitigation measures and design criteria outlined in the original EA and the Supplemental EA (USDA 2008) would still apply to habitat components, ensuring the retention of hiding cover. This supplemental analysis demonstrates compliance with the Forest Plan standard for maintaining "at least two-thirds of the hiding cover associated with key habitat components over time".

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Maps

Map 1-Map of Smith Creek Vegetation Treatment Project Baseline and Existing Cover

Map 2-Map of Smith Creek Vegetation Treatment Project Post-Treatment Hiding Cover

Map 1- Insert Here

Map2 -Insert Here

Appendix A-Gallatin Forest Plan Hiding Cover Standard Assessment

The purpose of this document is to provide interpretation and guidance on compliance of an existing Forest Plan standard for use in project analyses.

The Gallatin Forest Plan Hiding Cover Standard

Maintain at least two thirds of the hiding cover associated with key habitat components over time. Subsequent timber sale activity will be allowed after regeneration provides hiding cover. Key habitat components are important features for wildlife. They include moist areas (wallows etc.); foraging areas (meadows and parks); critical hiding cover (see Glossary in Chapter VI for definition); thermal cover; critical hiding cover, migration routes, and staging areas. These areas will be mapped on a site-by-site basis during project area analysis (Forest Plan, page II-18).

Discussion:

- The standard does not reference big game, but rather "wildlife", although hiding cover as a concept is generally associated with big game and specifically elk.
- The standard refers to the design and effects of timber harvest, and acknowledges that once cutting units regenerate, they again provide hiding cover. The standard does not specifically reference other types of vegetation treatments such as prescribed burning or thinning.
- There are Forest Plan Glossary definitions for "hiding cover" and "thermal cover" in the Forest Plan (amendment 14), but not for "critical hiding cover" (although the standard references the Glossary). There is a term "Critical Habitat" in the glossary; this is a technical term used in the ESA for threatened or endangered species. Because it does not make biological sense to provide hiding cover around critical hiding cover, and because there is no definition for critical hiding cover in the Forest Plan glossary, this term is not carried forward in the discussion.
- Amendment 14 revised Big Game Cover Definitions; these revised definitions are referenced below.
- The interpretation of this standard became an issue with the Smith Creek Project (2007). Prior to this court case, Gallatin NF project level analyses for big game were focused on biologists' interpretation that the "best science", available resulted from the proceedings published from an elk vulnerability symposium in 1991. Many of the papers published in that proceedings considered hiding cover as just one component of what was a more complex issue regarding the relationship of elk and hunting; areas that provided relief for elk because of low road density, topography, and/or cover were considered "security areas".

- There were not big concerns about elk and other big game over the past decade because the Forest Service was not clearcutting as a practice and elk population trends on the Gallatin NF are generally increasing based on Montana Fish Wildlife and Park's (FWP) survey data.

Definitions:

Cover: (added as part of Amendment 14) Vegetation used by wildlife for protection from predators, disturbance, to ameliorate weather conditions, or in which to reproduce.

Hiding Cover: Vegetation capable of concealing 90% of a standing adult big game animal from view of a human at a distance equal to or less than 200 feet; generally, any vegetation used by big game for security or escape from danger. Hiding cover is a site specific component of security (Forest Plan, Amendment 14; the first part is also cited as a "structural" definition in Lyon and Christensen 1992). Lyon and Christiansen (1992) state that the "functional definition" of hiding cover is that it allows elk to use areas for bedding, foraging, thermal relief, wallowing, and other functions year-round. They further state that hiding cover may contribute to security at any time, but it does not necessarily provide security during the big game hunting season.

Migration Routes: Situations usually linked to topography and vegetation, which provide a completely or partially suitable habitat that animals move through during migrations (Lyon and Christiansen 1992). Here we interpret migration to mean a distinct seasonal movement from winter to summer range or visa versa, and not dispersed or even focused daily movement associated with bedding and feeding areas.

Security: (added as part of Amendment 14) The protection inherent in any situation that allows big game to remain in a defined area despite an increase in stress or disturbance associated with the hunting season or other human activities. Security components may include vegetation, topography, open road density, distance from roads, hunter density, season timing, etc. (also cited in Lyon and Christensen 1992).

Staging Area: No definition. Lyon and Christiansen refer to "Transitional Range" as an area where elk concentrate during spring and/or fall, which are generally adjacent to winter range, and which may provide important security during the fall.

Thermal Cover: Cover used by animals to ameliorate chilling effects of weather; for elk and grizzly bear, a stand of coniferous trees 40 feet tall or taller with an average crown closure of 70% or more. For deer, thermal cover may also include saplings, shrubs, or trees at least 5 ft tall with a 75% crown closure. (In some cases, topography and vegetation less than specified may meet animal's needs for thermal regulation) (Forest Plan, Amendment 14; the first part is also cited as a "structural definition" in Lyon and Christensen 1992).

The Problem Statement

Besides being out of step with the more recent focus on security areas, this Gallatin Forest Plan standard, as written, requires a certain amount of interpretation in order to assess compliance. The most reasonable part of the standard is the required project level "mapping" of the key habitat components.

For example, it is not clear if "maintain 2/3 hiding cover" refers to cover available at the beginning of forest plan implementation (1987) or at the beginning of a project level analysis (existing hiding cover) or some other baseline. Furthermore, there is not a specific spatial area referenced in the standard; we don't know based on the actual wording of the standard if 2/3 has dimensions related to distance from the key component (e.g. 100 feet), specific timber stands adjacent to a feature, based on TSMRS stand delineations; a project area, or a resource-specific analysis area.

In addition, this standard was written at a time when the Forest was implementing mostly regeneration harvests (clear cuts) and doing prescribed burning in grassland/shrubland habitats. Today, the Forest is generally proposing thinning treatments to reduce fuels in the wildland urban interface and conducting prescribed burning treatments in a variety of habitats, including forest vegetation (e.g. to increase aspen).

Discussion:

Basis for Gallatin Standard:

At the time Forest Plans were being prepared, there had been many studies completed looking at big game responses to what had been a fairly aggressive timber harvest era on National Forests in Region 1. The recommendations from those studies were embodied in a publication often referred to in Forest Plans (Coordinating Elk and Timber Management; 1985). On page 9 of that publication, it speaks to "good cover" as being two-thirds of total area; this may be the background for the Gallatin's two-thirds standard. On page 12 of this publication, it suggests that moist summer range sites are heavily used by elk and should be identified and the integrity of these habitat components maintained by "selective withdrawal from treatment, along with protection of peripheral zones to provide continuous cover with the uncut forest". This is likely the basis for the "key components" portion of the Gallatin standard.

The Forest Plan EIS (page IV-40) stated that the effects analysis for the Forest Plan was based on a timber sale program where 90% of the volume would come from even-aged harvest systems. The FEIS acknowledged the reduction in big game cover from even-aged timber harvest. In addition, the FEIS states that "selection harvest (thinning) generally has little effect on the cover requirements for big game" (Forest Plan FEIS, pages 45 and 55).

Based on a review of the Forest Plan EIS, the standard would apply to larger scale timber sales and prescribed burning projects with the overall intent to protect big game habitat components and the integrity of hiding cover over time. However,

because of appeal and litigation considerations, we are in the position to apply this standard to uneven-age harvest projects, even though that was not the intent of the standard based on the Forest Plan EIS.

Vegetation Based Proxies for "Hiding Cover": Literature review

Although the definition of hiding cover as cover capable of concealing 90% of an elk at 200' has been largely accepted as the "objective" of hiding cover, there has been a historical correlation with using vegetation attributes, and specifically the canopy cover stand attribute data kept by the Forest Service (TSMRS) as an acceptable proxy.

In preparation for the development of Forest Plans under NFMA, the Montana Department of Fish, Wildlife and Parks (FWP) put forth a proposal for linking hiding cover and road densities as a way to meet their objectives for the annual number of elk hunter days, the rate of success, and the effort per elk harvested (FWP 1982). They defined hiding cover as PI types (photo-interpretation classes for timber inventory purposes) with 40% canopy coverage or greater. This was based on some modeling done by Lonner and Cada (1982) that used this same proxy, and showed that there was a strong relationship between hiding cover (as estimated by PI types), road densities, and harvest rate the first week of the general hunting season. As hiding cover decreased, a lower road density could offset the expected increase in harvest rate. Thus, this PI proxy seemed satisfactory as a way to explain the functional attributes of hiding cover, and has been used to model hiding cover in project-level analyses on the Gallatin (and other R1) National Forests.

Lyon and Marcum (1986) compared a computer model for estimating hiding cover (HIDE2) with 3 different field methods. There were no significant statistical differences between visual blockage estimates made from the model from samples taken in the field. However, estimates in the field tended to be higher. The assumption in the HIDE2 model is that the area required to hide an elk will average 65 inches in width. The field methods used cover boards or human torsos with much smaller widths (18-24"). They conclude that because of observer bias, the computer generated estimates of hiding cover were more accurate than field observations and that where inventory information was available, the model generated estimates at a lower cost and with greater speed.

Smith and Long (1987) also generated a model to assess hiding cover in lodgepole pine stands and compared that to field estimates using a sighting target 6 feet long and 3 feet high (measured at the 200' distance). They found a well-defined relationship between the amount of an elk hidden and the sum of the dbh of trees in stands where the live crown was above 3 feet (i.e. pole to mature stands), and that the sum of the dbh must be greater than 4979" to provide hiding cover. For stands with live crown below 3' (i.e. sapling stands), they found that the sum of the crown diameters must be at least 630 feet/acre. In both stand types, it took higher densities of trees where stands were irregular (clumpy) to provide hiding cover (as opposed to more uniform spacing). Furthermore, they concluded that young stands of trees with lower crowns provided hiding cover at

lower tree densities than more mature stands, and that thinning young stands would maintain low crowns for an extended period of time.

Canfield et al. (1986) addressed the effect of viewing angle on hiding cover and acknowledged that the quality of hiding cover is affected not only by within stand characteristics, but also the context of the stand relative to topography and other factors.

Christensen et al. (1993) conclude that elk are less selective about the specific vegetative characteristics of coniferous cover and more responsive to size of units, consecutiveness with adjacent units, and the scale of cover on the landscape. They offer that it is important to develop long-term perspectives on cover management that address condition, quantity, location, and configuration.

Current Context:

In an attempt to clarify the hiding cover standard and other standards in the 1987 Gallatin Forest Plan, in 2009, the Gallatin National Forest Proposed a FP Cleanup Amendment. This "clean up" addressed some of the ambiguity of the hiding cover standard. The amendment has not proceeded past scoping due to other priorities.

In 2010, the 4 eastside forests in the Region (Gallatin, Helena, Custer, Lewis and Clark) proposed to assess vegetation and wildlife habitat on a large scale as a precursor to Forest Plan Revision and/or needed immediate amendments. Big game standards are in need of revision on all 4 forests. This effort identified a need to "build" wildlife habitat models for elk, deer, and bighorn sheep, with a goal to be completed (in conjunction with FWP) by the end of 2011.

The Regional Office, in conjunction with other Forest Wildlife Biologists and area biologists from FWP, have initiated dialogue on the need to meet and collaborate on development of meaningful Forest Plan standards that reflect current science and current conditions on the east side of Region 1. Three meetings have taken place thus far in 2010. The goal is to collaboratively develop big game guidelines and standards that provide for the needs of big game and maintain diverse hunter opportunities and to propose Forest Plan amendment(s) sometime in 2011.

Many changes have occurred since the original forest plans were written that can make the application of existing standards difficult, because the standards do not reflect current scientific knowledge or management realities. In addition, many of the so called "standards" were written more like goal statements, lacking detail and clarity. Among many, these include the transition from clearcutting for timber production to fuel reduction (thinning) in urban interface on behalf of the Forest Service, mountain pine beetle mortality in Pinus communities, reintroduction of wolves, travel plan decisions that have resulted in lower motorized road densities, and climate change.

There has not been any recent literature that deals with measurement or modeling of hiding cover. The most recent research from the Pacific Northwest Research Station on elk provides a model of elk habitat use unrelated to hunting season.

Summer elk use in western Oregon and Washington was predicted by distance from an open public road, dietary digestible energy, distance to cover-forage edge, and slope. They do state that in their analysis, elk responded to a cover-forage edge defined by the 40% canopy cover threshold (less than 40% is considered forage) (White 2010).

On September 15, 2010 the 9th circuit court filed its opinion on Hapner vs. Tidwell or the Smith Creek Vegetation Project. The 9th circuit court affirmed the District Court's decision on all counts except "failing to comply with the elk-cover requirement contained in the Gallatin National Forest Plan.", which is a NFMA violation. The project was remanded to the Forest to remedy this error.

In the opinion, the conclusions were as follows:

- The Forest did not measure elk cover according to the definition provided in the Gallatin Plan (i.e. 90% at <=200 feet)
- The Forest Plan requires that 2/3 cover be maintained "over time" and not just at the time of a proposed Forest Service action.
- State management objectives for big game populations cannot replace federal management objectives.

In summary, it is our intent to amend the forest plan to incorporate our collaborative efforts with FWP, and best science relative to big game habitat needs. In the interim, for on-going projects, this white paper provides the needed interpretation of the standard based on the Smith Vegetation Project opinion, and an analysis framework to demonstrate compliance with this Forest Plan Standard

Analysis and Interpretation Guidelines; Standard #5, page II-18, Gallatin National Forest Plan:

1. Conduct an analysis relative to this standard on larger scale vegetation management projects (fuel reduction projects, timber sales, prescribed burning in conifers).

2. Define appropriate analyses area for big game (direct and indirect and cumulative effects). Document the rationale for selection of the analyses areas.

3. Using GIS tools, calculate the baseline level of hiding cover in the analysis area, which is the total of all conifer forest dominance types (which are at least capable of having 40% canopy cover or greater) based on either photo-interpretation (PI strata from TSMRS, NAIP), or R1VMAP. Baseline hiding cover depicts the total "hiding cover potential" in the analysis area, and could include burned or harvested (or thinned) conifer stands, but not conifer stands that are naturally open (for example, Douglas fir on south slopes). With this standard, at least 2/3 of the baseline hiding cover is to be maintained over time.

4. Determine the amount of baseline hiding cover that has been "affected" (stands that are potential hiding cover but which are not currently capable of screening animals due to past harvest activities, prescribed fires, or natural disturbances (FACTS database). This would include hiding cover that has burned or been clearcut harvested or stands with a PI strata with less than 40% canopy cover because of past thinning activities.

5. Determine if affected hiding cover has recovered the capability to hide 90% of an elk at <=200'. Document how you make this determination (e.g. photos, model, field validation, stand exams). Generally, dense sapling sized stands where trees are at least 4.5' in height will meet the Forest Plan definition for hiding cover (Smith and Long, 1987). Stands harvested <=1990 can be considered hiding cover based on FVS runs for height growth on the Gallatin NF, as long as they have at least 40% canopy cover (NAIP imagery can be used for this).

6. The existing hiding cover is the baseline hiding cover (acres) minus the "unrecovered" hiding cover. To comply with the current Forest Plan standard, the hiding cover affected by project treatment units plus the "unrecovered" acres cannot be more than 1/3 of the baseline hiding cover.

7. A more ecologically based approach to the baseline determination would include consideration of unique wildlife habitats, which may currently "hide big game", but which may have a greater wildlife habitat value as something other than hiding cover for big game or which would not be expected to be hiding cover in a natural disturbance regime. Some examples include aspen that has been encroached by conifers or drier conifer forests (Douglas fir or ponderosa pine that have a high frequency fire interval). This analysis could be done concurrently with the above calculation and discussed. In the case of a project with the objective of restoring aspen for example, where 2/3 hiding cover will not be maintained, a site-specific forest plan amendment may be needed.

8. Consult with the FWP area biologist most familiar with the area to understand the importance of the area for "migration", "staging areas", or other unique attributes for big game. The results from this consultation should be documented, added to the map and/or explained in the analysis.

9. Use TSMRS PI "best strata" as a reasonable way to be consistent in the mapping and quantification of some of the "key components" (see Appendix). Some key components (e.g. thermal cover; forested forage) also meet the criteria for hiding cover. Add any known discrete key habitat components (e.g. a wallow) to the key component map. R1VMAP canopy cover data could also be used to approximate either hiding or thermal cover.

10. If there is relatively current stand exam data in the analysis area, the "Smith and Long" hiding cover thresholds can be calculated as a way to help prioritize field validation described below.

11. Validate the tie between our forest plan definition of hiding cover (vegetation capable of hiding 90% of an animal at <=200 feet) and conifer stands with at least 40% canopy cover. Walk through exams or cover board estimates in the field can be used to validate estimates at the project level. When selecting locations to make hiding cover measurements, document the process used and any supporting rationale. An example of how to select sample sites and take measurements is included in Appendix B, as well as analysis of hiding cover field data relative to PI strata from project areas on the Gallatin National Forest where field data has been collected (if PI is not the basis for mapping, then the field validation should tie to the mapping units used to model hiding cover; e.g. R1VMAP).

12. Based on the oral arguments in "Smith Creek", the interpretation of the judges was that the 2/3 hiding cover standard applied to the analysis area. Since "key components" within an analysis area are either already hiding cover (e.g. thermal cover), or they are openings in a matrix of conifer cover (foraging, moist areas), the most important part of complying with the Forest Plan standard is the calculation done as step #6. Hiding cover associated with specific key components will be retained through mitigation measures that buffer these areas either by project unit design, prescriptions, or actual marked buffers during timber sale layout and marking.

13. During NEPA, an implementation mitigation measure can be designed to buffer both mapped key components, as well as point locations such as wallows, when they are encountered during initial field review and/or during layout and marking. The mitigation should specify that at least 2/3 of the existing hiding cover around these sites be retained (untreated). The width of the buffers will be prescribed by the biologist based on an assessment of the site characteristics. It is possible that some "key components" may not occur in a forest context under natural disturbance regimes and would not be "buffered". For example, if moist areas are associated with aspen stands that have, in the absence of disturbance, been encroached by spruce or other forest species, it is more desirable to feature aspen (which are capable of providing hiding cover especially when released and new sprouting occurs) in those settings than to protect coniferous hiding cover.

14. Assess, for cumulative effects analysis, any reasonably foreseeable activities that would reduce hiding cover and make a determination of whether the current project, in conjunction with foreseeable projects, would still maintain 2/3 of the hiding cover (the "over time" part of the standard) in the project analysis area (on NFS lands and other land ownerships).

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Example Analysis

Methods:

For Project Z, a thinning project near the wildland urban interface (WUI), there was no specific herd unit data available from FWP. The 2 timber compartments, approximately 33,000 acres were used for the analysis, based on telemetry data from FWP that indicates that the elk population that intersects the project area uses an area approximated by these compartments.

Key habitat components, as per the Forest Plan, were mapped using the Timber Stand Management Record System (TSMRS), the vegetation layer that best depicts various cover types at the stand level, and from field reconnaissance. A proportional sample of stands or areas mapped as hiding cover was field-validated (Appendix B). In addition, hiding cover was assessed for the representative PI strata in the analysis area, from available stand exam data based on the method in Smith and Long (1987).

Past activities (fire, harvest, natural events) were quantified using the FACTS database and other GIS layers. These "affected areas" were then assessed using a combination of aerial photos, NAIP imagery, field surveys and a forest vegetation simulation model (FVS), to see if they currently provide current elk hiding cover according to the Forest Plan definition. The existing hiding cover was calculated from the baseline hiding cover (all forested areas capable of at least 40% canopy cover) with the "unrecovered" affected areas subtracted.

Results:

According to FWP, the approximately 33,000 acre functions as summer range. There were no specific identified staging areas, or migration routes within the analysis area (map provided).

Table 3 summarizes the results of the GIS analysis and shows the relative impact of the Project Z treatment units on hiding cover. Map X shows the key components within the analysis area.

Table 3-GIS Analysis Results and Impact of Project Z on Hiding Cover

Hiding Cover Analysis	Hiding Cover
Baseline Hiding Cover (conifer stands in the analysis area capable of being hiding cover)	20,919
Baseline hiding cover that has not recovered at the time of project Z	1,000
Existing Hiding Cover	19,919
Acres of hiding cover treated by project	2,256
Unrecovered hiding cover plus treated hiding cover	3,256
Hiding Cover post treatment	17,663
Percentage of functional hiding cover at time Z	84%
Compliance with FP standard to maintain 2/3	YES

Hiding Cover

Project treatment units would partially reduce canopy cover on 2,256 acres within this hiding cover matrix. Along with (baseline hiding cover) stands that have not yet recovered their hiding cover function (1,000 acres), 16% of the baseline hiding cover post-treatment would not be functional. Therefore, 84% or over 2/3 of the baseline hiding cover would be maintained within the analysis area after project implementation.

Provide a conclusion relative to compliance with the Forest Plan Standard and all its pieces (2/3, used Forest Plan definition, over time) and substantiate that the result on the ground provides continued integrity for big game use of the area (may need to consult with FWP).

Thermal Cover

Since the analysis area functions as elk summer range, only summer thermal cover was assessed. Based on a TSMRS query within the analysis area, 26% of the analysis area has conifer cover that functions as summer thermal cover (8,342 acres).

Moist Areas

Moist areas do occur within the analysis area and within proposed treatment units (provide map). They include riparian vegetation associated with perennial streams, as well as areas where high ground-water table is near enough the surface to influence above ground vegetation. This increase in water is sometimes associated with highly productive foraging areas that may be important for big game during the summer months.

Moist areas were mapped first using the Timber Stand Management Record System (TSMRS) for stands identified as tall willow, low willow, forb dominated

seep, wet forb meadow, moist forb meadow, marsh and fen, wet grassland and meadow, moist grassland and meadow, wet forest opening, moist to dry forest opening, stream course, and open water. Additional moist areas were mapped during field review of the project. Two moist areas including one wallow were identified in unit X both associated with a stream management zone (provide map).

There were 1400 acres of moist habitat identified from the TSMRS query within the analysis area. These areas along with the two wet areas identified during project layout in the field (including one which appeared to be in use as a wallow), are protected by project mitigation measures. Based on a field visit, a no-treatment buffer of 50' adjacent to mapped moist sites was determined adequate to protect existing hiding cover. This is included as a project mitigation measure (see Chapter 2, page x).

Foraging Areas

There are areas that provide forage in forested sites and in non-forested sites within the analysis area (map included). Forested foraging areas were modeled by querying TSMRS for all stand polygons classified as conifer forest (saw timber or pole sized timber) with 10-69% canopy cover and seedling/sapling stands that were non-stocked (term used for areas that have been harvested or burned with little to no regeneration). Forested forage was also considered available where the overstory trees were aspen.

Non-forested forage included all stand polygons having <10% forest crown closure that were moist or dry sagebrush, forb dominated seep, moist or wet forb meadow, moist or wet or dry grassland, high elevation rocky grassland, and wet or moist to dry forest openings.

There were a total of 11,578 acres of foraging habitat within the analysis area (4,735 in forested areas and 6,843 in non-forested areas). These areas are protected by project mitigation measures. Based on a field visit, a no-treatment buffer of 100' adjacent to open foraging sites was determined to protect existing hiding cover. This is included as a project mitigation measure (see Chapter 2, page x). Thinning of existing forested foraging areas will enhance their foraging value to big game.

Migration Routes and Staging Areas

Migration routes are distinct areas big game use when traveling from summer to winter range. According to FWP, elk may travel through the area as one of many routes they would use in moving from summer to winter range (personal communication with FWP biologist, Date), but there is not a defined migration route to protect within the analysis area.

A staging area is a place where elk concentrate to rest and feed during or prior to migration. There is no place within the analysis area that functions in this way (personal communication with FWP biologist, Date).

Conclusions:

Based on this analysis and the associated key habitat component mapping, the project complies with the Forest Plan standard to maintain two thirds of the hiding cover associated with key habitat components over time. Because the project involves thinning to reduce fuels (and not even age harvest), there will be cover throughout the analysis area after implementation; therefore, this analysis overestimates actual project impacts. The integrity of big game habitat, including key components, will be maintained post-treatment by maintaining (>67%) hiding cover overall as well as a no-treatment buffer around specific key components.

Appendix A

Example of Queries used from TSMRS to address habitat components (Best stratum picks up a field verified PI if available)

Thermal Cover[4]

1. Winter

   ((Best_stratum = *13)) and ((aspect = S, SE, SW, W)).

2. Summer

   ((Best_stratum = *13,)) and ((aspect = N, NE, E, NW)).

Foraging Habitat

3. Forested[5]

   ((Best_stratum =*NCF, *11, *21, *31, *32, *44, CW, PF, PG, KR, QA)).

4. Non-Forested

   ((Best_stratum = 00012, 00013, 00015, 00021, 00022, 00023, 00024, 00032, 00033, 00034, 00035, 00041, 00042)).

Moist Areas

((Best_stratum =00011, 00014, 00021, 00022, 00023, 00031, 00032, 00033, 00041, 00042, 00054, 00055)). This includes tall willow, low willow, forb dominated seep, wet forb meadow, moist forb meadow, marsh and fen, wet grassland and meadow, moist grassland and meadow, wet forest opening, moist to dry forest opening, stream course[6], and open water. Add to mapping of above, any specific moist sites located through field inventories.

Migration Routes and Staging Areas

Determine in consultation with Montana Fish, Wildlife, and Parks.

Baseline Hiding Cover

TSMRS (Best_stratum = *11, *12, *13, *21, *22, *23, *31, *32 *33)

[4] Stands that are thermal cover (>70% cc) will also be hiding cover;
[5] Best_Stratum *32 forested foraging are also hiding cover.
[6] Not all perennial streams provide forage, thermal or hiding cover such that they are "key" components, and in addition, streams are subject to management buffers under the Stream Management Zone laws and Gallatin Forest Plan Standards.

The stands with a PI stratum of less than 40% canopy cover (*1) must be assessed to see if they should be included in the baseline (e.g. are they capable of providing hiding cover). The process for this includes assessing if these stands are naturally open or they have been harvested or burned and then for areas that have had "treatment", to see if recovery of hiding cover has occurred. This can be done in the field or through the use of NAIP photography and the FACTS activity database.

Best_Stratum Key:

* Refers to all Dominance types (Douglas Fir, Lodgepole, DFLP combo, Subalpine Fir)

First numeral = size class (1=mature; 2=pole; 3=sapling)

Second numeral = canopy cover (1=<40%; 2=40-70%; 3=>70%)

Appendix B

Field Validation of Hiding Cover

Use survey protocols described in the literature (Lyon and Marcum 1986, Smith and Long 1987). These protocols typically involve standardized methods where cover boards or people are viewed from a point on the ground, either in a straight line trajectory or at regular time intervals in a random movement pattern, and estimates of the target's visibility are recorded. These methods are statistically valid and repeatable, but do not account for an animal's ability to purposely select distinct patches of vegetation for cover qualities, nor do they reflect the natural camouflage or other adaptations of native species such as stealth and body positioning. Further, due to the highly variable structure of understory vegetation, ocular estimates of hiding cover can vary tremendously between observers, or by shifting the view perspective by minute amounts.

Select sample points in or adjacent to proposed treatment units in proportion to the strata represented, with emphasis on strata codes that do not meet Smith and Long's (1987) minimum stand density threshold for hiding cover based on stand exams. Generally, the sample will be limited to stands that intersect the project treatment units to have the most accurate information for the areas in which the project would potentially affect. Other strata in the analysis area, particularly sapling stands regenerated following fire or harvest, and low canopy stratum pole or mature stands, can be validated in the field using this same method, to determine if they are "existing hiding cover".

Calculate the total acreage of proposed treatment units within the strata identified as hiding cover (>40% canopy cover). Select survey points at 1 plot per 10 acres for approximately 20% of the total acreage of proposed treatment units for the strata in question. This sampling method was recommended by Bertram and Claar (2008) for snowshoe hare habitat, which, like big game hiding cover, is focused on horizontal vegetative cover.

For example, the preferred Alternative has a total of 2,721 acres of proposed treatment in the strata to be surveyed. Twenty percent of 2,721 equates to 544 acres to be sampled, at 1 plot per 10 acres, for a total of 54 sample points. Sample points are assigned proportionate to strata representation in proposed treatment units. For example, approximately 707 acres of proposed treatment occur in DF12; 707/2721 = 0.26; 0.26 X 54 = 14, so assign 14 sample points in proposed treatment units with a strata code of DF12 . These are randomly selected in GIS and the lat/long location recorded and entered into a GPS.

The field validation requires 2 people to conduct. In the field, the observers navigate to the randomly selected GPS points. At the plot center, an observer records the proportion of the cover board visible as the 'target' moves away from the viewer in the four cardinal directions at distances of up to 200 feet. If 90% or more of the target is concealed at a distance less than 200 feet (using a range

finder or GPS unit) from the observer, the target need not go further and this is noted on the field form.

In addition to this method, another, more biological method can be used. This method uses a life size elk decoy and allows the target to "act like an elk" and intentionally select vegetation that would obscure the visibility of the decoy from the observer. Rather than requiring the target to move in a straight line in the four cardinal directions, the survey plot can be divided into quadrants (NE, NW, SE and SW) in which the target can select for hiding cover at a distance of up to 200 feet from the viewer. Using this method, you can validate whether the strata types modeled as hiding cover, truly represent vegetation capable of concealing 90% a standing adult (elk decoy), at distances less than 200 feet from the observer.

Field data is summarized in a spreadsheet and averaged over the strata. Based on the definition of vegetation "capable" of hiding 90% of an elk at 200', if the cover board was hidden in "any" of the cardinal directions and/or the elk was obscured by vegetation within any of the quadrants, then the sample point representing a particular strata is considered hiding cover as per the Gallatin Forest Plan definition.

For effects analysis, calculations are done using the total acres of the stands, as defined by the TSMRS stand layer. In addition, to be conservative, the calculations subtract the entire acreage within treatment units from the available hiding cover, even though proposed fuel reduction treatment methods (thinning and prescribed burning) typically leave some patches of hiding cover capable of hiding big game.

Appendix C

Analysis of Field Validated Hiding Cover

Four Project Areas on the Gallatin National Forest

Table 4-Analysis of Field Data for Bozeman Municipal Watershed

PI HC Strata	# plots	Avg. Cover Board HC	Avg. Elk Decoy HC	Comments
LP 23	21	93	99	Exceeds definition requirements
LPDF12	5	97	100	Exceeds definition requirements
DF12	14	87	98	Except for 2 plots, cover exceeded 90% in 3 of 4 cardinal directions. In those 2 plots, cover exceeded 90% in 2 cardinal directions and in all cases using the elk decoy; clearly the vegetation is "capable" of hiding 90% of an elk at <200'.
DF13	13	84	99	Except for 3 plots, cover exceeded 90% in 3 of 4 cardinal directions. In those 3 plots, cover exceeded 90% in at least 1 cardinal directions and in all cases using the elk decoy clearly the vegetation is "capable" of hiding 90% of an elk at <200'.
DF23	1	93	100	Exceeds definition requirements

Table 5-Analysis of Field Data for East Boulder Fuels

PI Strata	# plots	Avg. Cover Board HC	Avg. Elk Decoy HC	Comments
LP 13	3	98	99	Exceeds definition requirements
LPDF13	4	94	94	Exceeds definition requirements
DF23	1	86	88	Cover exceeded 90% in 1 cardinal direction and in 3 quadrants using the elk decoy.
DF13	5	95	98	Exceeds definition requirements
SAF13	1	96	99	Exceeds definition requirements

Table 6-Analysis of Field Data for Lonesome Wood Project

PI Strata	# plots	Avg. Cover Board HC	Avg. Elk Decoy HC	Comments
LP12	3	98	100	Exceeds definition requirements
LP 13	1	100	100	Exceeds definition requirements
LPDF12	2	98	100	Exceeds definition requirements
LPDF13	2	100	100	Exceeds definition requirements
LP23	2	83	99	Cover exceeded 90% in 2 cardinal directions and in all 4 quadrants using the elk decoy.
DF12	2	92	100	Exceeds definition requirements
LP32	1	100	100	Exceeds definition requirements
DF13	3	93	100	Exceeds definition requirements
SAF13	2	100	100	Exceeds definition requirements

Table 7-Analysis of Field Data for Smith Creek Project

PI Strata	# plots	Avg. Cover Board HC	Avg. Elk Decoy HC	Comments
LP12	1	100	100	Exceeds definition requirements
LP 13	5	98	100	Exceeds definition requirements
LPDF12	1	100	100	Exceeds definition requirements
LPDF13	2	100	100	Exceeds definition requirements
LPDF 31	1	75	90	Cover exceeded 90% in 3 cardinal directions and in 3 quadrants using the elk decoy.
LPDF32	2	87	95	Only one cardinal direction in one plot did not exceed 90% cover
LP22	3	96	100	Exceeds definition requirements
LP33	2	97	100	Exceeds definition requirements
LP23	3	96	100	Exceeds definition requirements
DF12	4	99	100	Exceeds definition requirements
LP32	4	96	100	Exceeds definition requirements
DF13	1	100	100	Exceeds definition requirements
DF22	1	94	100	Exceeds definition requirements
DF23	2	100	100	Exceeds definition requirements
SAF12	4	92	99	Exceeds definition requirements
SAF23	1	90	100	Exceeds definition requirements
SAF32	1	100	100	Exceeds definition requirements

SAF33	1	100	100	Exceeds definition requirements

Table 8-Analysis of Stand Exam Data Relative to Hiding Cover for 2 Analysis Areas on the Gallatin National Forest

BEST STRATUM	# EXAMS BMW (compartment 508 & 509)	# EXAMS Lonesome Wood (compartment 709 & 710)	% exceeding Smith and Long Threshold BMW	% exceeding Smith and Long Threshold Lonesome Wood
DF11	12	6	17	33
DF12	31	20	19	65
DF13	87	32	44	78
DF23	5	0	20	NA
DF32	0	1	NA	100
LPDF11	0	1	NA	100
LPDF12	9	5	33	100
LPDF13	18	28	44	96
LP11	2	3	100	66
LP12	13	33	54	94
LP13	131	28	79	100
LP23	91	21	40	100
LP22	0	2	NA	100
LP31	0	2	NA	50
LP32	0	3	NA	0
LP33	9	1	67	100
SAF11	4	2	75	0
SAF12	8	5	63	75
SAF13	41	30	85	100
SAF23	8	0	87	NA

*SHADED= TSMRS QUERY FOR GREATER THAN 40% TREE CANOPY COVER

Conclusions:

The field validation studies from 2010 indicate that PI stratum that are classified as >=40% canopy cover, were indeed capable of hiding 90% of an elk at <=200 feet. In most cases, the cover board was hidden at less than 200 feet, and 90% of the elk decoy was hidden at less than 200 feet on at last one quadrant of a plot.

The stand exam (Smith and Long method) calculation of the cumulative dbh for a stand was not consistent with field studies, or between study areas. Their work was done in lodgepole forests only, and the Gallatin NF has a much higher propensity of mixed species and multistoried conditions.

Therefore, the stand exam data may be used to help prioritize, based on PI strata with a low percentage of exams exceeding the Smith and Long threshold, where field sampling occurs, but it appears that field sampling is the better crosswalk between the modeled hiding cover (>=40% canopy cover) and the Forest Plan definition (vegetation capable of hiding 90% at less than 200').

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