Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Northern Region Bitterroot National Forest Publication Number R1-23-06 September 2023

Programmatic Amendment (#40) for Elk Habitat, Old Growth, Snags and Coarse Woody Debris Objectives - Bitterroot Forest Plan

Ravalli County and Missoula County, Montana and Idaho County, Idaho

Final Environmental Assessment

In Cover photos: Clockwise from top left, three elk, snag, downed wood in a harvest unit, and tall ponderosa pine.

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This environmental assessment, appendices, and supporting documents are available on the project website at https://www.fs.usda.gov/project/?project=57302.

ERRATA

As a result of the objection process, this final environmental assessment has been edited for clarification and corrections.

The standard at Chapter II, Section F.2(e)5 in the Bitterroot National Forest Plan was miscited as Section F.1(e)(5).

A portion MA 3b standard regarding acreage for old growth was added to the list of standards to be amended to make it clear that the Forest-wide definition and acreages for old growth also apply to MA 3b.

FW-DC-VEG-02 was edited for clarity.

The second sentence in FW-GDL-VEG-04 was meant as a qualifier for the first sentence regarding snags over 20” dbh. This was edited for clarity. Leaving high numbers of smaller diameter snags would defeat the purpose of most vegetation or fuel treatments.

P. 46. “or new best available science” was changed to “as updated”.

Table 2. Forest-wide and existing table of old growth was updated with Hybrid 2015 data.

Table 3. Green et al. Western Montana Zone Old Growth Groups was added to make it clear the literature is adopted in whole.

Table 4. Desired snags was changed to incorporate the best scientific information available originally intended. The previous snag table was based on inventory in roadless and wilderness areas only and did not reflect management objectives for treated areas.

Table 5. Fire groups and coarse woody debris was simplified.

P. 91. Inconsistency in statements regarding future carbon stocks and sequestration corrected.

Additional literature citations have been added in response to objections.

The glossary term “elk security analysis” was corrected to read “elk security.”

Appendix C was added to provide rationale for changes to snag components.

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1. Purpose and Need

1.1 Introduction

The purpose of this environmental assessment (EA) is to briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. An environmental assessment is meant to be a concise public document (40 CFR 1508.9(a)). It includes a brief discussion of the need for the proposal, alternatives, the environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted.

According to 36 CFR 219.13(b)(3), the appropriate NEPA documentation for an amendment may be an environmental impact statement, an environmental assessment, or a categorical exclusion, depending upon the scope and scale of the amendment and its likely effects. Internal scoping and preliminary analysis did not reveal any components that were likely to create significant environmental effects, regardless of the forest-wide application of the components. This environmental assessment discloses the impacts of amending plan components and definitions for elk habitat, old growth, snags, and coarse woody debris objectives in the Bitterroot National Forest Plan (1987c). This amendment would align elk habitat, old growth, snag, and coarse woody debris objectives on the Bitterroot National Forest with the best available scientific information. This environmental assessment fulfills agency policy and direction to comply with the National Environmental Policy Act by determining whether implementation of the plan amendment may create a significant environmental effect and thereby require the preparation of an environmental impact statement. This EA bears out the perception that an EIS is not required and concludes with a Finding of No Significant Impact at Chapter 5.

This is a programmatic document; decisions on new projects that implement the Forest Plan will have site-specific analyses, public input, and comply with the Forest Plan as amended.

1.2 Changes in the objection document from the draft environmental assessment

This environmental assessment replaces the draft EA and the EA that went out for objection. In the April EA, additional alternatives considered but not analyzed in detail were added in response to comments. Alternative C was added to modify three of the proposed components and modifies the glossary definition for old growth. In Alternative C, component **FW-GDL-VEG-01** was rephrased to remove the word “minimum”; and **FW-GDL-WLF-ELK- 01 and 02** have additional language to address security and habitat concerns raised by the Rocky Mountain Elk Foundation. It adds terms to the glossary that should have been included in the draft EA. Alternative C includes all the other components and glossary items in Alternative B, except as modified in C, and was added in response to comments regarding elk security.

In the EA that went out for objection, in response to concern that timber purchasers would claim snags were operational safety hazards so they could cut them and take them, Component **FW-GDL-VEG-04**: was modified to add a statement that snags felled for operational safety in treatment units shall be left on site. This is already a standard provision in timber sale contracts on the Forest. Component **FW-GDL-VEG-06** was clarified to illustrate the intent to have large Douglas-fir with dwarf mistletoe infection remain standing as snags rather than being felled and/or removed during sanitation treatments. **FW-GDL-VEG-07** erroneously occurred twice in the draft EA, but with different verbiage. Under coarse woody debris, it should have been identified as **FW-GDL-VEG-08**. **FW-GDL-VEG-07** was dropped under snag components as unnecessary or redundant with existing direction. The guideline for coarse woody debris was simplified and the statement that largest diameter coarse woody debris available should be emphasized for retention was added and the numbering remained as FW-GDL-VEG-08 in the version that went out for 30-day comment. The numbering has been corrected for logical sequence in this final EA and Decision Notice.

MTFWP requested we refer to geographic areas in the Bitterroot National Forest as hunting districts (HD) instead of Elk Management Units (EMU). This will align with how they predict the new elk management plan will reference these areas. Guidelines have been retitled from EMU to HDs.

Some literature provided during the 30-day comment period was incorporated into resource sections, as have clarifications attempting to alleviate perceived misinterpretations by the public. The purpose of some components was misrepresented in the draft EA, and this was rectified.

Changes to this final document are listed above in the errata.

1.3 Background

1.3.1 Plan Area

The Bitterroot National Forest consists of approximately 1.6 million acres in Missoula and Ravalli Counties, Montana and Idaho County, Idaho. Approximately half of the Forest lies within the Selway-Bitterroot, Frank Church-River of No Return, and Anaconda Pintler designated wilderness areas. The Bitterroot Mountains are a key feature of the Forest, characterized by heavily glaciated, rugged peaks, with the highest elevation at 10,157 feet. The Bitterroot Valley largely bisects the Forest and contains a mix of small communities, residential developed areas, forested areas, and agricultural lands. The Forest offers an abundance of natural resource opportunities, including year-round recreation, grazing, wildlife, fisheries, timber, and minerals. The Bitterroot National Forest is divided into four districts including Darby, Stevensville, Sula, and West Fork. The Bitterroot National Forest maintains administrative offices in the cities of Hamilton, Darby, Stevensville and at the West Fork Ranger Station near Connor, as well as a work center in Sula, Montana.

Climate: This mountainous region of the Bitterroot National Forest sits at the boundary between warm, wet, maritime airflows from the Pacific Ocean, and cooler, drier airflows from Canada. Changes in climate affecting mountain snowpack will have hydrologic implications. Over the historical period of record (1895–2012), the annual mean monthly minimum temperature increased by about 2.6 °F, while the annual mean monthly maximum temperature increased by about 1.3 °F. By 2100, temperature is projected to increase 6 to 12 °F for the annual mean monthly minimum, and 5 to 11 °F for the annual mean monthly maximum. Mean monthly minimum and maximum temperatures are projected to increase for all seasons. The mean monthly minimum temperature (spring and autumn) and the mean monthly maximum temperature (winter) may rise above freezing. Seasonal precipitation is projected to be slightly higher in winter and spring and slightly lower in summer than during the historical period of record (Halofsky et al. 2018a).

1.3.1.1 Elk Habitat

Four Montana Fish, Wildlife, and Parks (MTFWP) proposed elk hunting districts overlap the forest, including the West Bitterroot (HD240), North Sapphires (HD204/261/262), East Fork Bitterroot (HD270), and West Fork Bitterroot (HD250) (Figure 1). The remainder of the Forest is in Idaho.

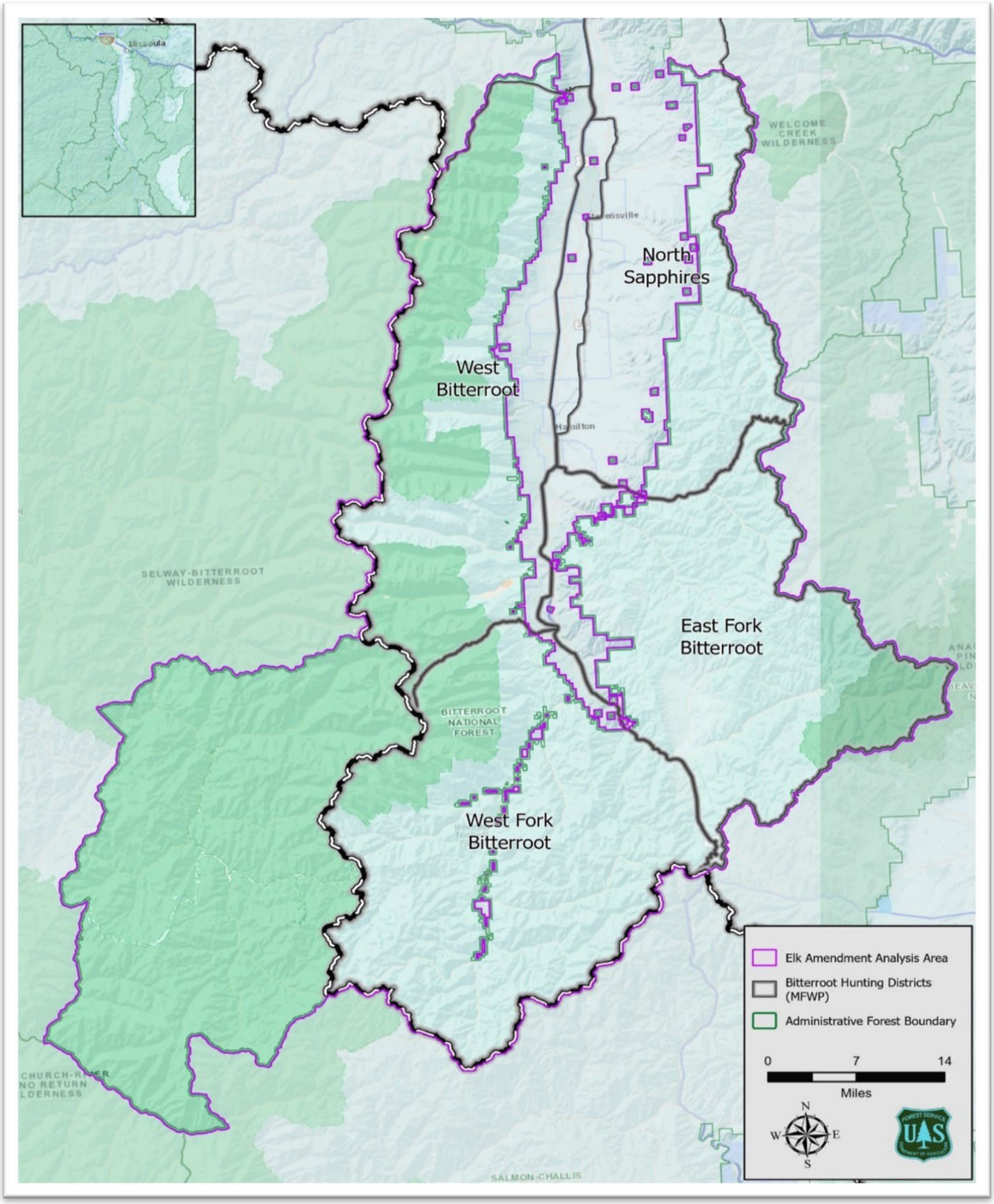

Figure 1. Elk Plan Amendment Area: Montana Fish, Wildlife, and Parks proposed hunting districts, and the Idaho portion of the Bitterroot National Forest.

1.3.1.2 Old Growth

The 1987 Forest Plan (U.S. Department of Agriculture 1987c) includes a forest-wide standard for old growth (USDA, p. II-20) stating: Stand conditions that qualify as old growth will vary by habitat type and landform. Current plan criteria to consider for identifying old growth include:

- large trees, generally 15 per acre greater than 20 inches diameter at breast height (dbh) for species other than lodgepole pine and 6 inches DBH for lodgepole pine; canopy closure at 75 percent of site potential
- stand structure usually uneven-aged or multistoried
- snags, generally 1.5 per acre greater than 6 inches DBH and 0.5 per acre greater than 20 inches
- more than 25 tons of per acre of downed material greater than 6 inches diameter
- heart rot and broken tops in large trees are common; and
- mosses and lichens are present.

This definition (*based on* Franklin et al. (1981)) was the best information the Forest had for describing old growth attributes when the plan was developed in the 1980s (USDA, p. IV-61). However, this definition has several limitations. These criteria were developed for the Douglas-fir forest type in the Cascade Mountains, with its Pacific maritime climate, which is not representative of conditions, or the fire return intervals found on the Bitterroot National Forest. Additionally, it does not address the variability in old growth conditions across various biophysical settings (habitat type groups) or variability of species diameter as it relates to age. Many of the attributes in this definition cannot be accurately measured in the field nor are part of standard data collection protocols so they cannot be assessed at a forest-wide scale to determine if goals and objectives of the plan are being achieved. Current climatic conditions on a drying trend also make Franklin et al. (1981) an inappropriate scenario of conditions in the Bitterroot.

1.3.1.3 Snags

The 1987 Forest Plan includes a forest-wide wildlife standard for snags that states "All snags that do not present an unacceptable safety risk will be retained" (Bitterroot National Forest Plan, 1987, p. II-20). A snag is defined in the Forest Plan as a standing dead tree usually greater than 5 feet in height and 6 inches dbh (diameter at breast height).

The Forest Plan Record of Decision considers and permits salvage of dead or dying trees (U.S. Department of Agriculture 1987b). Fuel treatment is discussed in several areas of the Forest Plan (pp. II-7, II-8, II-28, III-7, III-13, III-20, III-28, III-34, III-38, III-63). The Forest Plan FEIS even specifically discussed the concern of stand-replacing fires following mortality from insect epidemics and due to fire suppression (Volume I, pp. III-33, IV-22). Salvage is also discussed in multiple areas of the Forest Plan and Record of Decision, further supporting that the removal of snags, beyond what is necessary for safety, was programmed (FP pp. II-20, II-20, II-22, III-8, III-14, III-21, III-29, III-35).

1.3.1.4 Coarse Woody Debris

The purpose of the 1987 Forest Plan coarse woody debris requirements is to maintain soil productivity, design fire management programs consistent with other resource goals and to provide for non-game habitat. Current management area direction for coarse woody debris retention does not recognize the differences in the natural variation of coarse woody debris among different forest and habitat types, as supported by the best available scientific information. Additionally, Management Area 2 includes two contradictory standards requiring both 10 to 15 tons per acre and 25 tons per acre of coarse woody debris to be left after harvest activities. Lastly, the tons/acre amounts of coarse woody debris prescribed in the 1987 Forest Plan exceed what current scientific information recommends is needed to maintain soil productivity and manage fuel loadings. Proposed components will also consider the needs of non-game habitat.

1.3.2 Planning Regulations for Plan Amendments

The proposed plan amendment is subject to the land management planning regulations at 36 CFR 219, also known as the 2012 Planning Rule. An amendment to the 2012 Planning Rule published in 2016 clarified application of the rule to plan amendments. In addition, Forest Service Manual 1920 and Forest Service Handbook 1909.12 provide agency-wide directives for land management planning. The proposed plan amendment will be subject to the objection regulations for land management planning at 36 CFR 219, subpart B.

The planning rule requires determination of which specific substantive requirements within 36 CFR 219.8-219.11 are directly related to the plan direction being added, modified, or removed by the amendment (36 CFR 219.13(b)(5)). Direct relation to the plan amendment is based on the purpose for the amendment and the effects, whether beneficial or adverse, of the amendment (36 CFR 219.13(b)(5)(i)). The responsible official has the discretion to determine the timing, scope, and scale of the amendment (36 CFR 219.13(a)) and is not required to apply any substantive requirements that are not directly related to the amendment (36 CFR 219.13(b)(5)). Nearly any substantive requirement may be identified as indirectly related, as that is the nature of ecosystem processes. Below are those which the responsible official has determined to be *directly* related. His determination for the proposed amendment is *not* based on adverse effects (36 CFR 219.13(a)(5)(ii).

The purpose of the proposed amendment is to update current plan direction for elk habitat, old growth, coarse woody debris, and snags based on current scientific information regarding the management of these characteristics of habitat diversity. Based on the purpose and likely effects of the amendment, the directly related requirements include:

- the requirements to maintain or restore the ecological integrity of terrestrial ecosystems taking into account interdependence of terrestrial and aquatic ecosystems in the plan area, ecological conditions in the broader landscape that may influence the sustainability of resources, system drivers (such as natural succession and wildland fire) and the ability of terrestrial ecosystems in the plan area to adapt to change and opportunities for landscape scale restoration at 36 CFR 219.8(a)(1) (i), (ii), (iii),(iv) and (vi).
- the requirement that a plan must include plan components to maintain or restore soils and soil productivity, including guidance to reduce soil erosion and sedimentation at 36 CFR 219.8(a)(2)(ii)
- the requirements to provide for habitat diversity by maintaining or restoring key characteristics associated with terrestrial ecosystem types at 36 CFR 219.9(a)(2)(i).
- the requirement to provide for ecosystem services and multiple uses, including outdoor recreation, range, timber, watershed, wildlife, and fish, within Forest Service authority and the inherent capability of the plan area; that habitat conditions for wildlife, fish, and plants commonly enjoyed and used by the public; for hunting, fishing, trapping, gathering, observing, subsistence or other activities (in collaboration with federally

recognized Tribes and State and local governments, system drivers, such as natural succession, wildland fire, and climate change, at 36 CFR 219.10(a)(1), (5) and (8).

The news release published in the *Ravalli Republic* on December 18, 2019, and the scoping letter mailed to the public, government agencies, and partners in 2019 included notice that 36 CFR 219.10(a)(5) regarding the consideration of habitat conditions for wildlife commonly enjoyed and used by the public was likely to be directly related to the proposed amendment. A legal notice published in the Ravalli Republic on July 13, 2022, and the scoping letter mailed to above listed entities included notice that the applicable requirements at 36 CFR 219.8 and 219.9. 36 CFR 219.10(a) also apply to old growth forest components.

The requirements at 36 CFR 219.9 include maintaining a viable population of each species of conservation concern within the plan area. Because the Bitterroot Forest Plan was developed under a prior planning regulation, the Forest has not identified species of conservation concern. Under the planning rule, if species of conservation concern have not been identified for the plan area and if scoping or National Environmental Policy Act effects analysis for the proposed amendment reveals substantial adverse impacts to a specific species, or if the proposed amendment would substantially lessen protections for a specific species, the responsible official must determine whether such species is a potential species of conservation concern, and if so, apply 36 CFR 219.9(b) with respect to that species as if it were a species of conservation concern (36 CFR 219.13(b)(6)). The effects analysis for the proposed amendment or its alternatives did not reveal substantial adverse impacts or substantially lessen protections for any species, as discussed in Chapters 3 and 5 of this environmental assessment.

The planning rule also requires documentation of how the best available scientific information was used to inform the plan amendment, including a determination of what information was most accurate, reliable, and relevant to the issues being considered (36 CFR 219.3). A description of the best available scientific information used to develop the alternatives for the proposed plan amendment appears in section 3.2 Framing the Analysis. While a large body of scientific research is available for all four resource topic areas, we have narrowed the field to those most relevant, accurate and reliable. Lists of the literature used in the environmental effects analysis appear at the end of this environmental assessment.

1.3.3 New Information and Changed Circumstances

1.3.3.1 Elk Habitat Effectiveness and Thermal Cover

Elk *(Cervus elaphus)* are an iconic species in and around the Bitterroot National Forest, important culturally, economically, and ecologically. The Forest Plan contains several forest-wide management objectives and desired conditions designed to maintain or improve wildlife habitat and to support viable populations of wildlife, including big game species (U.S. Department of Agriculture 1987c). Current forest plan standards specific to big game and elk place constraints on management activities that would help meet these objectives and desired conditions. Several standards focus on travel and vegetation management and are largely based on guidance provided in USDA (1978), Lyons and Beschta (1983), and Lyon et al. (1985). New information and changed circumstances have caused challenges with implementation of some of these standards, particularly those related to elk habitat effectiveness and elk thermal and hiding cover. These standards, based on research conducted in the 1970s and 1980s, have limited the ability of the Forest Service to incorporate newer science into elk habitat management, maintain other important elk habitats on the forest, and manage for consistency with forest plan goals, objectives, and desired conditions for other resources. As a result, the Forest Service has repeatedly amended these standards using project-specific forest plan amendments. These include 12 project-specific amendments related to elk habitat effectiveness and nine related to thermal cover since the Forest Plan was approved in 1987 (Table 1). These project-specific plan amendments have applied scientific information developed since 1987 that has resulted in a more nuanced understanding of elk habitat needs.

Table 1. Project-specific Forest Plan amendments related to management of elk habitat, snags, CWD and old growth.

Year	Amendment number	Project name	Project-specific amendments related to elk habitat management
1990	3	Gird Point Fire Salvage	Allowed a temporary entry into MA 5 to salvage trees killed by the Gird Point Fire.
1997	16	Unknown	Allowed 2 third-order drainages on the Sula Ranger District to be managed at elk habitat effectiveness values less than the 50 percent standard.
2001	22	Burned Area Recovery Project	Refined elk habitat effectiveness and elk thermal cover standards changes to snags and coarse woody debris requirements.
2002	23	Slate/Hughes Watershed Restoration and Travel Management Project	Allowed 5 third-order drainages in the project area to be managed at elk habitat effectiveness values less than the 50 percent standard.
2006	25	Middle East Fork Hazardous Fuel Reduction Project	Allowed reduction of thermal cover in some treatment units, which would continue to have thermal cover values less than 25 percent. Refined snag, coarse woody debris and unsuitable land standards.
2008	27	Trapper Bunkhouse Land Stewardship Project	Allowed 5 third-order drainages in the project area to continue to be managed at elk habitat effectiveness values less than the 50 percent standard. Allowed reduction of thermal cover in some treatment units, which would continue to have thermal cover values less than 25 percent. Refined snag and coarse woody debris standard.
2008	28	Haacke-Claremont Vegetation Management Project	Allowed portions of third-order drainages in the project area to be managed at elk habitat effectiveness values less than the 50 percent standard. Refined the coarse woody material standard.
2010	29	Lower West Fork Project	Allowed 5 third-order drainages in the project area to be managed at elk habitat effectiveness values less than the 50 percent standard. Allowed reduction of thermal cover in some treatment units, which would continue to have thermal cover values less than 25 percent. Refined coarse woody debris standard.
2012	30	Larry-Bass Project	Allowed reduction of thermal cover in the project area, which would continue to have thermal cover values less than 25 percent. Refined coarse woody debris standard.
2013	31	Three Saddle Vegetation Management Project	Allowed 5 third-order drainages in the project area to be managed at elk habitat effectiveness values less than the 50 percent standard. Refined coarse woody debris standard.
2015	32	Darby Lumber Lands Watershed Improvement and Travel Management Project	Allowed 6 third-order drainages in the project area to be managed at elk habitat effectiveness values less than the 50 percent and 60 percent standards.
2015	33	Como Forest Health Project	Allowed reduction of thermal cover in the project area, which would continue to have thermal cover values less than 25 percent. Refined coarse woody debris standard.

Year	Amendment number	Project name	Project-specific amendments related to elk habitat management
2016	34	Bitterroot National Forest Travel Management Planning Project	Allowed third-order drainages to be managed at elk habitat effectiveness values less than the 50 percent and 60 percent standards.
2016	35	Westside Collaborative Vegetation Management Project	Allowed 2 third-order drainages in the project area to be managed at elk habitat effectiveness values less than the 50 percent and 60 percent standards. Refined coarse woody debris standard.
2017	36	Meadow Vapor Project	Allowed 5 third-order drainages in the project area to be managed at elk habitat effectiveness values less than the 50 percent and 60 percent standards. Allowed variance from elk thermal cover standard. Allowed variance from coarse woody debris standard.
2019	37	Darby Lumber Lands Phase II Project	Allowed 3 third-order drainages in the project area to be managed at elk habitat effectiveness values less than the 50 percent and 60 percent standards. Allowed variance from elk thermal and hiding cover standards.
2023	38	Mud Creek	Allowed 14 third-order drainages in the project area to be managed at elk habitat effectiveness values less than the 50 percent and 60 percent standards. Allowed variance from elk thermal and hiding cover standards.
2023	39	Gold Butterfly Project	Allowed 6 third-order drainages in the project area to be managed at elk habitat effectiveness values less than the 50 percent and 60 percent standards. Would allow variance from elk thermal cover standard.
2023	?	Bitterroot Front. No Decision yet.	Would allow 22 of the 65 third order drainages in the analysis area to not meet EHE standards. Would apply Green et al. 2011. Would base desired snag numbers on habitat type groups. Would base coarse woody debris ranges on Fire Group.

Clearly, continuing to include a site-specific amendment for every new project is not a practical approach.

Elk habitat effectiveness

Elk habitat effectiveness (EHE) is a term that originally appeared in literature in the mid to late 1970s by Lyon (1979), Lyon (1983), Lyon et al. (1985), and Lyon and Canfield (1991) among others. In a Partial Glossary of Elk Management Terms Lyon and Christensen (1992), the authors defined habitat effectiveness as related to elk as the percentage of available habitat that is usable by elk outside of the hunting season. The authors postulated that the term habitat effectiveness appeared to have originated in early road density models as a means of expressing habitat loss associated with open forest roads and further suggested that the term had since been "used to express habitat quality, hunting season security, habitat capability, carrying capacity, and several other conditions not justified by the available data." Ranglack et al. (2016) defined habitat effectiveness for elk as a measure of the actual elk use of an area in relation to the expected use of that area if no motorized routes were present. These varying definitions applied across time have complicated how the concept of elk habitat effectiveness is applied, and Ranglack et al. (2022) demonstrated how the management of elk habitat on public lands is currently dominated by road density concerns to the detriment of other, equally important considerations. The existing Forest Plan standard regarding elk habitat effectiveness states:

> *Manage roads through the Travel Plan process to attain or maintain 50 percent or higher elk habitat effectiveness (Lyon 1983) in currently roaded third order drainages. Drainages where more than 25*

percent of roads are in place are considered roaded. Maintain 60 percent or higher elk habitat effectiveness in drainages where less than 25 percent of roads have been built. (U.S. Department of Agriculture 1987c), page II-21).

The standard's definition of "roaded" refers to 25 percent of the potential road system as projected in 1987, which has since become outdated because of subsequent travel management planning efforts (U.S. Department of Agriculture 2016b). An elk habitat effectiveness value of 50 percent equates to open road density of two miles per square mile, and a value of 60 percent equates to one mile of open road per square mile (Lyon 1983). When calculating open road densities for this standard, Forest Service staff have counted roads open at any time during the year.

Lyon (1979) initially suggested that the minimum area of consideration should be 2,000 acres, which Lyon (1983) later refined to areas greater than 3,000 acres. The information presented in Lyon (1983) is the basis for the current Forest Plan standard. However, 310 of 385 third order drainages to which the Forest Plan standard applies are less than 3,000 acres in size. This scale discrepancy has caused the standard to be a flawed application of the elk habitat effectiveness recommendations in Lyon (1983).

In part because of the inappropriate scale at which the Lyon (1983) elk habitat effectiveness recommendations are applied by the Forest Plan standard, drainages on the Forest have been out of compliance with the standard since the completion of the Forest Plan. Three hundred and eleven (311) third order drainages were immediately out of compliance with the Forest Plan in 1987 due to a minimum 3,000-acre size criteria in Lyon (1983); currently, regardless of size, 230 third order drainages do not meet the EHE standards and 155 meet the EHE standards (Figure 2).

There has been additional research related to habitat effectiveness since the completion of the Forest Plan: this has incorporated other factors in addition to road densities to predict habitat effectiveness. Wisdom (1986) evaluated cover and forage, and Hillis et al. (1991) integrated concepts of elk habitat effectiveness into evaluation of elk security, which apply during the hunting seasons. Rowland et al. (2000) used collared elk on the Starkey Experimental Forest to model and evaluate elk distribution related to road density but found that despite the strong relation detected between elk selection and distance from open roads, little or no significant relationship appear to exist between number of elk locations and habitat effectiveness scores based on road densities. Like Robel et al. (1993), Rowland et al. (2000) suggested that inappropriate scale of model variables was likely to have caused the lack of correlation they observed between habitat suitability and densities of elk. Benkobi et al. (2004) refined earlier models of elk habitat effectiveness based on weighting forage and cover ratios. While additional studies have documented avoidance of roads and trails, and more specifically human activity, by elk (Wisdom et al. 2004, Rumble et al. 2005, Naylor et al. 2009, McCorquodale 2013), the majority of this work has not addressed road density from the perspective of habitat effectiveness.

More recently, Proffitt (2012) began to evaluate the effects of hunter access and land ownership with regard to elk distribution, and further research by Proffitt et al. (2016a) linked in nutritional parameters to elk distribution on the landscape. Ranglack et al. (2016) recommended that the earlier elk summer habitat management paradigm based on managing motorized route density to maintain elk habitat effectiveness (U.S. Department of Agriculture and Montana Fish Wildlife and Parks 2013) be expanded to also consider nutritional resources. These recommendations mirror earlier research conducted on captive elk that emphasized the importance of nutritional resources on elk reproductive rates and survival (Cook et al. 2004). Ranglack et al. (2017) and Devoe et al. (2019) further explored the idea behind security areas in relation to female elk resource selection and hunting, and both studies concluded that elk responded more strongly to the nutritional quality of forage than perceived risk. Finally, Ranglack et al. (2022) examined elk summer habitat use by nine herds across southwestern Montana, including two on the Bitterroot

National Forest, and demonstrated that elk summer range use was primarily driven by forage quality and nutrition. The authors showed that the influence of route density on elk varied by forage quality; in areas of high forage quality elk showed little response to route density while in areas of lower quality forage elk responded negatively to route density. The authors also concluded that due to differences in selection patterns of different herds, managers should be cautious about applying research results from elk herds located outside their immediate area.

This research, in conjunction with the confusion about and misapplication of elk habitat effectiveness and the newer concept of elk security because of their explicit differences (i.e., elk habitat effectiveness referring to outside of hunting seasons and elk security applying to within hunting seasons), has created constant confusion around elk habitat objectives in the Bitterroot National Forest Plan.

The elk population in the Bitterroot has increased dramatically since the Forest Plan was written despite non-compliance with the existing elk habitat effectiveness standard in 230 drainages. Other research supports the idea that the effectiveness of elk habitat is intrinsically linked to forage abundance and quality in addition to road density (Crane et al. 2016, Ranglack et al. 2016, Robatcek 2019) and that nutritional condition is tightly linked to elk population viability (Middleton et al. 2013, Lukacs et al. 2018, Rowland et al. 2018, Lehman et al. 2019). The Forest’s environmental analysis protocol now includes elk security analysis (Hillis et al. 1991), which has proven to be a more suitable tool than elk habitat effectiveness analysis for achieving the forest plan objective to maintain elk populations and hunting season opportunities in cooperation with Montana Fish, Wildlife, and Parks.

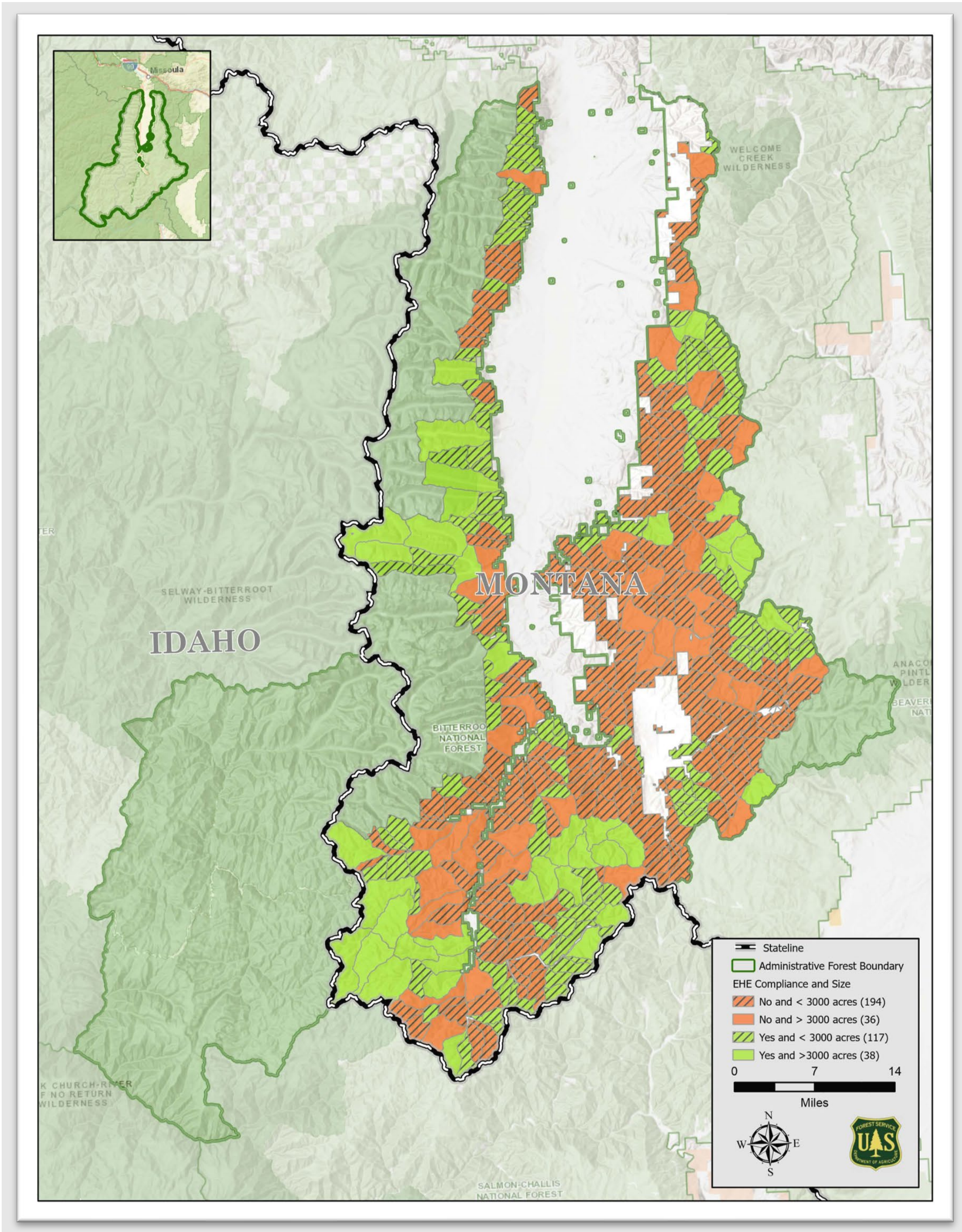

Figure 2. Third order drainages on the Bitterroot National Forest currently in compliance with EHE standards and minimum size criteria.

Thermal cover and hiding cover

In its description of how the Forest Plan addresses management of thermal cover for elk, the Record of Decision states, “Winter range will be managed to provide diversity of forage and hiding cover with at least 25 percent of the area in thermal cover at all times" (U.S. Department of Agriculture 1987bp. 8). The corresponding forest plan standard states, "Big game cover/forage relationships, as described in Guides for Elk Habitat Objectives (U.S. Department of Agriculture 1978), will be a consideration in planning timber management activities" (U.S. Department of Agriculture 1987c, p. II-21). Types of habitat factors recommended to consider in the Guides for Elk Habitat Objectives include hiding cover, thermal cover, forested forage, and open forage (U.S. Department of Agriculture 1978). As a general practice, the Forest Service no longer uses procedures outlined in Guides for Elk Habitat Objectives. While this is due to several factors, one significant issue is that in practice both thermal cover and hiding cover are difficult to accurately assess. The Forest Plan defines thermal cover based on crown closure, whereas research since 1987 has shown that canopy cover, which, though nearly analogous, is more accurately and consistently measured than crown closure (Jennings et al. 1999, Paletto and Tosi 2009, Mirik and Ansley 2012, Hulet et al. 2013, Richardson and Moskal 2014). The Forest Service has not discretely assessed hiding cover in project-level analyses on the Bitterroot National Forest because of a lack of an accurate assessment technique; instead, analyses have used thermal cover metrics as a proxy for hiding cover.

In addition, literature has become available since the completion of the Bitterroot Forest Plan that provides more nuanced information about the roles of different types of elk habitat on landscape. In particular, Cook et al. (1998) indicated that thermal cover is not a required ecological condition for elk. In a review of elk research across the western U.S., Anderson et al. (2005) found that while elk did use higher cover environments, they preferred areas of low forest cover, and the authors associated this behavior with forage availability. Regarding hiding cover, blocks of forested cover were not a strong predictor of elk distribution in a study in Montana (Proffitt et al. 2012). USDA and Montana Fish, Wildlife and Parks (2013) concluded that a specific quantifiable hiding cover recommendation was not supported by the scientific literature. Factors such as forage abundance, distribution, availability, and quality; distance from open roads during hunting seasons; and hunting pressure have been found to affect elk use patterns and distribution across the landscape (Proffitt et al. 2012, Proffitt et al. 2016a, Ranglack et al. 2017).

1.3.3.2 Old Growth

Since the plan was approved, the Northern Region developed ecological descriptions for old growth forests by specific forest type and biophysical settings in the Northern Rocky Mountains as described in Green et al. errata corrected (2011). Green et al. includes quantitative and qualitative criteria that are measured in the field by the National Forest Inventory Assessment (FIA) data collection program and site-specific stand exams and walk-through exams.

Project-specific Forest Plan amendments related to the old growth definition have been applied to the Mud Creek and Gold Butterfly projects in 2023. A site-specific amendment is proposed for the Bitterroot Front project, which will not be necessary if this programmatic amendment is ratified first.

Unlike the criteria in the Forest Plan, Green et al. (2011) provides measurable criteria for designating old growth based on forest types and habitat type groups in Montana and Idaho:

- Criteria for live trees: a minimum number of live trees per acre meeting age and diameter at breast height (dbh) thresholds, and a minimum stand density measured as basal area (square feet per acre of live trees greater than or equal to 5 inches dbh)
- associated characteristics such as pieces per acre of down woody material that is at least 9 inches in diameter on the large end, number of canopy layers, presence of trees with broken/missing tops, trees with decay, and number of snags greater than 9 inches diameter at breast height.

Litigation on the Gold Butterfly Project has led the Forest to propose this amendment to the Forest Plan to make Green et al. (rev. 2011) the appropriate and applicable definition of old growth based on habitat types and local site potential. Project-by-project site specific amendments are impractical when Green et al. (2011) is the definition used by the remainder of the Region.

Executive Order 14072 directed the Agency to inventory old growth and mature forests on National Forest System lands. This amendment will allow for consistent and reliable project-level identification and a statistically valid Forest-wide inventory of old growth acres by applying Green et al. (2011) which aligns the Forest Plan definition with the national inventory effort published on April 20, 2023. An accurate inventory is the first step in promoting the continued health and resilience of old forest stands; retaining and enhancing carbon storage; conserving biodiversity; mitigating the risk of wildfires; enhancing climate resilience, enabling subsistence and cultural uses; providing outdoor recreational opportunities; and promoting sustainable local economic development.

1.3.3.3 Snags

The amendment will resolve the discrepancy apparent in the Forest Plan regarding snag management. Snag retention in treated stands will be based on findings from Harris (1999), Bollenbacher et al. (2009), Bush and Reyes (2023), and numerous scientific papers by Evelyn Bull and others.

1.3.3.4 Coarse Woody Debris

Since the Forest Plan was developed, scientific information became available regarding the amount of coarse woody debris present in different habitat type groups (Fischer and Bradley 1987, Graham et al. 1994, Brown and Smith 2000, Brown et al. 2003). This information provides more refined measures to guide project implementation to contribute to achieving Forest Plan goals and objectives. The components for coarse woody debris will integrate managing the risk of wildfire, the habitat requirements of species requiring high densities of logs, soil function, and the ecological processes resulting from fire (Bull et al. 1997, Bull 2002).

1.4 Purpose and Need Statement

1.4.1 Need to Change

Plan amendments may be broad or narrow, depending on the need for change, and are used to help Forests adapt to new information or changing conditions. The responsible official has the discretion to determine whether and how to amend the plan and to determine the scope and scale of any amendment. Total plan revision has not yet begun for the Bitterroot National Forest, and it can be a years-long process; in the meantime, we can resolve certain long-standing problematic language regarding elk habitat standards, snags and coarse woody debris and improve our inventory of old growth forest stands by amending the current Bitterroot Forest Plan using the best available scientific information.

Direction for the management of elk habitat, old growth, coarse woody debris, and snags in the Bitterroot Forest Plan is based on older science and relies on research that is no longer the best available scientific information. The purpose of the proposed plan amendment is to provide programmatic management guidance that is feasible, reasonable, and based on recent relevant scientific information regarding multiple aspects of natural resource management.

1.4.1.1 Elk Habitat Effectiveness & Thermal Cover

There is a need to adjust the current Forest Plan standards regarding elk habitat management in order to better align plan guidance with the goals of managing with the current best available science, providing optimal habitat on both summer and winter ranges, and maintaining current level of big game hunting opportunities on public land. Furthermore, there is a need to integrate the management of elk habitat with other forest resources.

Since the completion of the 1987 Forest Plan, there has been a wealth of research on elk ecology and habitat selection, including recent research conducted in western Montana and on the Bitterroot National Forest. This research has demonstrated the necessity of balancing the management of habitat security with forage quality and has shown how this balance can influence both elk population dynamics as well as their use of public lands.

The proposed amendment will expand the management options available for the recruitment of high-quality elk foraging habitat while providing security during critical periods. It will continue to limit the construction of new roads in order to protect existing habitat security, and it will promote retention of elk herds on public land.

1.4.1.2 Old Growth

There is a need to modify the forest-wide standard and glossary definitions in the 1987 Forest Plan to those described in Old-Growth Forest Types of the Northern Region by Green et al. (2011) to provide consistent, measurable criteria for monitoring old growth at the project scale and when evaluating whether project activities are maintaining and promoting old growth characteristics associated with the varying forest types and habitat type groups (biophysical settings) across the Bitterroot National Forest. The amendment would align the Bitterroot Plan with the definition used in Region One and what is being used for the national inventory effort (FIA or Forest Inventory Assessment).

Modification of standards in Management Areas 1, 2, 3a, and 3c is also needed to delineate old growth by stand as identified in Forest Service Handbook 2409.17. Old growth would be delineated at the stand level based on forest composition and structure as defined by Green et al. (2011) during project area planning. Stands smaller than 40 acres, if meeting criteria, would be maintained or promoted as old growth during project implementation. Five acres is considered the minimum size practical for stand delineation and even stands of this size are valuable as a key characteristic of ecosystem diversity. Due to the dynamic nature of stand progression, stands are best identified at the project-specific scale. Thus, a forest-wide static map of old growth will not be provided. Old growth is not a static state; natural disturbances such as windstorms, wildfire, insects and diseases can move a stand from one successional stage to another (Oliver and Larson 1996).

This amendment will allow for consistent and reliable project-level identification and a statistically valid Forest-wide inventory of old growth acres by applying Green et al. (2011) as the standard and the definition of old growth in the glossary of the Forest Plan. Replacing the standard that states "Old-growth stands may be logged and regenerated when other stands have achieved old-growth status" (U.S. Department of Agriculture 1987c, p. II-20) with a guideline that conserves old growth but allows for management actions to increase resilience, particularly when stands are heavily impacted by insects and/or disease, will provide flexibility until national policy is developed. E.O. 14072 (Biden 2022) implores the agency to conserve mature and old growth forests on Federal lands while deploying climate-smart forestry practices to improve the resilience of these lands. In this vein, the numerical percentages of old growth for third-order drainages would be removed and replaced with the Forest-wide desired condition to increase the amount of old growth forest on the Bitterroot National Forest, and not retain a target of a low percentage.

1.4.1.3 Snags

There is a need to amend this forest-wide plan wildlife standard for snags (U.S. Department of Agriculture 1987c, p. II-20) to resolve the contradictory standard that all snags that do not create a safety risk will be retained, while at the same time other plan direction allows for salvage and sanitation harvest and firewood gathering. The proposed change would provide sufficient snag habitat for wildlife while also allowing for the removal of excess snags where necessary to address fuel loading or to meet restoration objectives through sanitation treatments, salvage, and reforestation (Harris 1999, Spiering and Knight 2005). With the recent listing of whitebark pine as a threatened species, a standard is proposed to prevent the felling of whitebark pine by firewood cutters.

1.4.1.4 Coarse Woody Debris

There is a need to amend coarse woody debris plan standards in Management Areas 1, 2, 3a, 3b, and 3c (USDA 1987a, pp. III-6, III-12, III-13, III-19, III-28, III-33) to resolve the contradictory direction within the existing standards and ensure the amount of coarse woody debris to be left on the ground aligns with the current scientific information regarding soil health and fuel loading (Graham et al. 1994, 2003).

1.5 Public Involvement and Tribal Consultation

1.5.1 Elk Habitat

On December 18, 2019, the Bitterroot National Forest published a scoping letter soliciting comments on the need to conduct a programmatic amendment for elk habitat direction in the Forest Plan. The Forest distributed the scoping letter to landowners, partner agencies, tribes, non-governmental organizations, and individuals who had previously requested notification about the types of activities included in the proposed plan amendment. The Forest issued a press release which appeared in the *Ravalli Republic* to notify the public of the scoping period. The scoping letter and supporting documents were available on the Bitterroot National Forest website. The Forest received 29 unique scoping comment letters. Additional review, comments and recommendations were solicited and received from the Montana Department of

Fish, Wildlife and Parks, as well as the Rocky Mountain Elk Foundation during the 30-day comment period on the draft EA. Comments and responses are summarized in Appendix A.

1.5.2 Old Growth, Snags, and Coarse Woody Debris

On July 13, 2022, the Bitterroot National Forest published a scoping letter soliciting comments on the need to conduct a programmatic amendment for old growth definition, coarse woody debris standards and snag management direction in the Forest Plan. The Forest distributed the scoping letter to landowners, partner agencies, tribes, non-governmental organizations, and individuals who had previously requested notification about the types of activities included in the proposed plan amendment. A legal notice was posted in the *Ravalli Republic* and the Forest issued a press release to notify the public of the scoping period. The scoping letter and supporting documents were available on the Bitterroot National Forest website. The Forest received 16 unique scoping comment letters.

The project wildlife biologist, Forest Silviculturist, Forest Supervisor and Stevensville District Ranger also met with representatives of the Ravalli County Collaborative to discuss the project and answer questions. Scoping comments identified concerns related to the project, which the interdisciplinary team used to develop the issue statements. Scoping comments also contributed to the consideration of alternatives. The Bitterroot National Forest has a Memorandum of Understanding with the Confederated Salish and Kootenai Tribes regarding management projects on the forest.

Letters were sent to the Confederated Salish Kootenai Tribe and the Nez Perce Tribe seeking their input and collaboration. We received no response or indication of interest from the tribes.

The draft environmental assessment was out for a 30-day comment period beginning February 2, 2023. Thirty-six letters were received. Comment topics and responses are summarized in Appendix A.

An objection period for the draft Decision Notice was held in accordance with 36 CFR 219.56. Five objections were received, and changes were made to the EA and Decision Notice in response. See errata at the beginning of this document and the Decision Notice.

1.6 Issues

Issues highlight effects or unintended consequences that may occur from the proposed action and alternatives, giving opportunities during the analysis to reduce adverse effects and compare trade-offs. The following issue statements were derived from review of public comments received during scoping, internal review, and preparation of this environmental assessment. *These bulleted statements do not represent conclusions*, but rather reflect concerns that need to be addressed or analyzed, or misconceptions to be addressed.

Elk habitat and population

Changes in levels of vegetation management and fire occurrence may substantially change the availability or quality of elk habitat.

Changes in levels of road density and motorized recreation may or may not substantially affect the availability or quality of elk habitat.

Land use on lands adjacent to the forest could affect elk habitat on the forest.

Removal of current elk habitat protections could flatten or decrease elk population trends.

Elk are a generalist species, and conservation of elk populations may not require species-specific plan content.

Concerns regarding the effects of changes in vegetation management and road density on elk and elk population trends are addressed in the effects analysis in Chapter 3. Elk are designated a Management Indicator Species on the Bitterroot National Forest, and therefore species-specific plan content is appropriate.

Roads

> Changes to the road system could impact access to forest resources.
>
> Current levels of enforcement of road use restrictions may not effectively provide elk security.

The amendment proposes no changes to the road system or access to forest resources. It limits future permanent open roads in some geographic areas but does not change current access. Enforcement of existing road use restrictions is outside the scope of the proposal.

At-risk species and other animal species

> Changes to forest plan content regarding elk habitat management could affect the availability or quality of habitat for species that rely on similar ecological conditions to elk.
>
> Changes to the old growth definition could affect habitat for animals that depend on old growth.

Elk are addressed as a management indicator species; therefore, the effects analysis includes an assessment of how the components might influence the species that rely on similar ecological conditions as elk. Changing the old growth definition makes it more likely that a stand will be identified as old growth during site-specific project area planning and then managed as such, more likely retaining that habitat. Section 3.3 of this EA addresses the potential effects of the proposed action on a wide variety of sensitive species.

Water resources and aquatic ecosystems

> Changes to the road system could affect hydrologic processes and aquatic ecosystems such as sediment yield, water quality, water quantity, and fisheries.

The amended plan component changes do not result in changes to the road system, and therefore will not result in effects to hydrologic processes or aquatic ecosystems. Future management actions that propose changes to the road system will be evaluated in site-specific analyses at that time.

Noxious and invasive weeds

> Changes to Forest Plan content regarding elk habitat management could cause increased spread of invasive plants, which may decrease elk forage availability.

The proposed amendments do not authorize any ground disturbing action, and therefore will not result in the introduction or spread of invasive plants. The potential for future management actions to promote the spread of invasive plants will be evaluated in site-specific analyses at that time.

Hunting

> Changes in levels of vegetation management, fire occurrence, or road density may affect opportunities for elk hunting because of elk movement to or from National Forest System lands.

Other than removing the standard that old growth stands may be regenerated when mature forests reach the old growth successional stage, the components do not propose changes in levels of vegetation management. Fire occurrence is not influenced by the amendment. Road density may be influenced at the project level, and effects to hunting will be assessed if so. The amendment does not propose motor vehicle use designation changes but would limit future construction of permanent open roads in certain geographic areas.

Socioeconomic concerns

> Changes in elk population size could impact local income and jobs associated with elk hunting and viewing.
>
> Displacement of elk from National Forest System lands could impact agricultural operations on private lands, increase motor vehicle collisions with elk on highways, increase large predator presence on private lands, and increase opportunity for conflict between private landowners and hunters.

Effects to elk population and potential displacement are addressed in Chapter 3. The components are not expected to reduce elk populations. The objective of the elk habitat components is to encourage elk to stay on National Forest System lands.

Climate change

> Climate change could cause extreme conditions that increase elk thermal cover requirements.
>
> The Forest Service must quantify greenhouse gas emissions.

Elk habitat in the face of climate change is part of the existing condition and included in the effects analysis. Implementation of all alternatives would contribute to similar levels of GHG emissions from activities such as equipment, vehicles, wood product productions, and other business operations used to implement a land management plan. Because emissions from these other connected actions are similar, a detailed quantitative analysis was not conducted. A quantitative analysis of carbon and sequestration is provided in Chapter 3 as a metric to evaluate the contributions to global climate change. Projects initiated after January 9, 2023 must quantify greenhouse gas emissions.

Laws, regulations, and policies

> Changes to forest plan content regarding elk habitat management could conflict with requirements of the Endangered Species Act as they relate to grizzly bear recovery.
>
> Needed plan changes regarding elk habitat management could be met through plan revision rather than plan amendment.
>
> The amendment should be analyzed with an environmental impact statement.

A detailed analysis of potential impacts of changes to elk habitat management on grizzly bear is included in the associated Biological Assessment (PR-WILD-002), and a summary of these effects is included in Chapter 3, Section 3.3. In the subsequent Biological Opinion, the USFWS determined that the implementation of the amended Forest Plan is "not likely to jeopardize the continued existence of the grizzly bear" and “will not negatively impact the recovery of grizzly bears” (PR-WILD-003). The BO goes on to state that “Forest Plan direction will result in conditions that support grizzly bear use of the Forest for dispersal or exploratory movements, and potentially some home range establishment at some point in the future."

While plan revision could also remedy elk habitat management issues, this amendment can do so in a timelier manner. The amendment is a collection of relatively minor changes to standards and guidelines, and they do not alter the multiple-use goals and objectives of the land and resource management plan.

Agencies may prepare an environmental assessment on an action at any time in order to assist agency planning and decision-making (40 CFR 1501.3(b)). This environmental assessment was conducted in order to lead to a determination of whether an environmental impact statement is necessary. See Finding of No Significant Impact (Chapter 5) (40 CFR 219.13(5)(ii)(B). Scale alone is not relevant, the likely effects were considered, and no significant environmental effects were found to occur from this amendment.

Old Growth

> Changing the minimum number of trees per acre could become a target number of large old trees per acre.
>
> Monitoring of old growth should be a part of this amendment.
>
> All old trees should be retained.

Changing the minimum trees per acre and the age of large trees, dbh related to trees per acre and basal as the minimum criteria (along with other associated characteristics) required for a stand to be identified as old growth allows the identification of more stands as old growth during project planning than under the existing definition. Trees per acre is not a target. There is no plan to reduce all old growth stands to a minimum number of trees. Alternative C was created to respond to this concern.

Inventories of old growth are taken forest-wide using Forest Inventory Assessment plots on a recurring, statistically valid basis. This allows for trend monitoring over time. Monitoring of old growth occurs when areas are analyzed for vegetation treatment. Stands will either be set aside from management in that project or treated to maintain or improve stand resiliency, depending on the purpose and need of the project. A monitoring plan is not required for plan amendments (36 CFR 219.12(c).

A single old tree does not constitute old growth. Retaining every old tree is simply not practical. Individual old trees may have stem decay and pose a risk to recreation sites and forest users, or may constitute roadside hazard trees, requiring their felling and possible removal. These would be assessed on a case-by-case basis, just as they always have. Large old trees that do not pose a hazard are more than likely to be favored for retention in silvicultural prescriptions. All fuel reduction and vegetation management projects funded through the Infrastructure Investment and Jobs Act and/or through the Inflation Reduction Act will maximize the retention of large trees, as appropriate for the forest type, to the extent that the trees promote fire resilient stands as stated in EO 14072.

Snags

> Changing the snag standard could lead to salvage logging at the expense of wildlife.

The snag standard is expected to have no influence on the likelihood of salvage logging. Salvage logging is allowed under the existing plan, and changing the standard only rectifies an inconsistency. Amendment components consider the structure and function of snags and their value to wildlife, future coarse woody debris, and old growth.

Coarse Woody Debris

> The amendment could reduce coarse woody debris to minimum amounts in all treated stands and in old growth.

A range of amounts of coarse woody debris in treated stands allows for adequate structure, function and process of soils and non-game habitat without imposing an impractical precision requirement on contractors. There is no incentive for a minimum amount to be left, especially when the contractor must sometimes revisit a treated unit to remove excess woody debris. Even so, the bottom of the range still allows for soil function and provides habitat for mammals, birds, amphibians, fungi, and insects.

1.7 Decision Framework

The purpose of this document is to disclose the effects and consequences of the no action and proposed action alternatives. The responsible official has used this environmental assessment, its associated planning record, and public feedback to determine whether a significant effect on the quality of the human environment is likely to occur (FSH 1909.15, Chapter 40, Section 43.1). The responsible official has determined that the selected alternative would not have a significant effect on the quality of the human environment, and therefore an environmental impact statement will not be prepared. The responsible official has issued a finding of no significant impact with this EA and will decide whether to approve the project. More specifically, the responsible official will decide:

- Whether to implement a plan amendment to change elk habitat management as described in the proposed action;
- Whether to implement a plan amendment to change how old growth stands are defined and determined based on biophysical setting as described in the proposed action;
- Whether to implement a plan amendment to remove the standard allowing for regeneration of old growth stands when other stands reach the old growth stage;
- Whether to implement a plan amendment to change the amounts of coarse woody debris determined to be appropriate based on habitat type as described in the proposed action;
- Whether to implement a plan amendment that removes the prohibition against removing any snags that do not pose a safety hazard;
- Whether to adopt amended forest plan components consistent with the proposed action; and
- Whether to take no action.

Criteria for the decision will include addressing the purpose and need for the amendment, addressing the issues, and consistency with relevant legal mandates.

1.8 Project Record

This environmental assessment hereby incorporates by reference all appendices and the project record, which provide detailed analysis and background information related to the proposed plan amendment. Incorporation by reference implements the Council on Environmental Quality regulation to reduce paperwork related to the National Environmental Policy Act (40 CFR 1500.4). The project record is available for review at the Bitterroot National Forest Supervisor's Office, 1801 N 1st St, Hamilton, Montana 59840. Pertinent resource reports are posted on the project website Forest Service (usda.gov).

2. Alternatives

2.1 Introduction

This chapter provides a detailed description of the alternatives proposed for this plan amendment, including the no action, the proposed action Alternative B, a modified proposed action Alternative C, and alternatives considered but not carried forward.

2.2 No Action- Alternative A

Under the no action alternative, current direction for elk habitat objectives, old growth, snags, and coarse woody debris in the 1987 Forest Plan would remain in place. No changes would be made to plan components. Use of project-specific plan amendments to apply current best practices and the best available scientific information to elk habitat management and old growth identification would likely continue, adding complexity and process to many projects. Conflicting language regarding snags and coarse woody debris management would remain. The existing snag standard infers that firewood gathering should not be allowed, which is unacceptable to many residents of the Bitterroot Valley who depend on firewood gathered from the National Forest System lands to heat their homes. Section 1.2.3. New Information and Changed Circumstances describes the existing plan components related to the purpose and need for the proposed programmatic plan amendment and how Forest Service staff currently interpret and implement those plan components.

2.3 Proposed Action – Alternative B

The Bitterroot National Forest proposes to amend elk habitat management direction, direction on old growth identification and regeneration harvest, and the standards for snags and coarse woody debris in the Bitterroot Forest Plan based on the changed understanding of the large body of science underpinning guidance on those various resources. The proposed action involves addition, modification, and removal of plan components with the purpose of providing a greater degree of management flexibility by managing for a mosaic of vegetation arrangement and successional stages to move toward Forest Plan desired conditions. The proposed action is designed to produce management outcomes based on the best available scientific information about elk habitat needs (in coordination with Montana Fish, Wildlife, and Parks), old growth, snags and coarse woody debris and achieve the goals and objectives of the 1987 Forest Plan. Identifying characteristics of old growth would be based on the biophysical setting appropriate to conditions on the Bitterroot National Forest, with Green et al. (2011) (1992 errata 2011) being the best available scientific information in identifying old growth forest. "Old-Growth Forest Types of the Northern Region" was commissioned specifically to study and identify old growth stand characteristics based on habitat types on the national forests of the Northern Region. Amending the component regarding snags will remove conflicting language in the Forest Plan; and amending the component for coarse woody debris will remove conflicting language as well as prescribe amounts of coarse woody debris better suited to biophysical settings and fuel reduction based on relevant scientific research and literature.

2.3.1 Geographic Areas

Plan direction should vary across the Bitterroot National Forest due to differences in elk populations, migration routes, habitat types, geography, climate, and recreation and hunting pressure and access. As a result, some of the proposed plan components provide geographically delimited direction. The proposed action will use the current Montana Fish, Wildlife, and Parks hunting district (HD) boundaries as geographic areas to address specific habitat needs in each of the four wholly or partially encompassed HDs on the Bitterroot National Forest (Figure 1). The HDs include the West Bitterroot (WB), West Fork

Bitterroot (WFB), North Sapphires (NS) and East Fork Bitterroot (EFB) districts. The Idaho geographic area contains the Idaho portion of the Bitterroot National Forest, which is located within the Selway-Bitterroot and Frank Church-River of No Return wilderness areas.

Geographic areas apply only to the elk components. Old growth direction would be applied forest-wide, as would components for coarse woody debris and snags.

2.3.2 Description of the Proposed Action

2.3.2.1 Elk Habitat

The proposed action would remove three forest-wide standards and eight management area standards related to elk habitat effectiveness and thermal cover. The proposed action would also modify one management area standard related to elk thermal and forage cover relationships. These standards are largely based on Lyon (1983) and Bitterroot Guides for Elk Habitat Objectives (U.S. Department of Agriculture 1978).

New plan components in the proposed action were developed using an interagency collaborative process to ensure incorporation of best available scientific information about elk habitat management. Through conversations and meetings among staff from the Bitterroot National Forest, the Idaho Department of Fish and Game, and the Montana Fish, Wildlife, and Parks, the proposed action applies the agencies' combined expertise to replace management direction for elk habitat effectiveness and thermal cover with new plan components based on current scientific understanding of the ecological conditions required for the persistence of elk on the forest. A description of the scientific information used to develop the proposed new plan components appears in sections 1.3.3 New Information and 3.2, Framing the Analysis.

In addition to directly addressing outdated management direction related to elk habitat effectiveness and thermal cover, as explained in more detail in the two subsequent sections, the proposed action includes guidelines and desired conditions designed to address all facets of elk and general big game habitat management, including forage, connectivity, winter range, and calving habitats, and goals to enhance collaborative processes related to elk management. In particular, the proposed plan components address recreational opportunities (for example, see plan components number FW-DC-WLF-ELK- -01, FW-GOAL-WLF-ELK-01, FW-GOAL-WLF-ELK-03, and GA-GDL-EFB-WLF-ELK-01, below), education (FW-GOAL-WLF-ELK-04), and cross-jurisdictional coordination (FW-GOAL-WLF-ELK-02, FW-GDL-WLF-ELK-05), which can help facilitate continuity of management outcomes across the landscape. The proposed action also aims to minimize conflicts between elk and private landowners adjacent to National Forest System lands by managing for a landscape that incentivizes elk to use the forest throughout the year (FW-DC-WLF-ELK-02, FW-GDL-WLF-ELK-02, GA-GDL-NS-WLF-ELK-02).

Any existing forest plan components not proposed for removal or modification would remain in place, and project-level management would continue to adhere to those plan components. Existing plan direction for elk habitat management not proposed for removal or modification includes a forest-wide goal to provide habitat to support viable populations of native wildlife (U.S. Department of Agriculture 1987c) (Chapter II, section B.7) and forest-wide objectives to provide optimal habitat on elk winter range, maintain habitat to support viable populations of wildlife species, and cooperate with state wildlife management agencies to maintain big game hunting opportunities (Chapter II, section C.1(d)). Forest-wide standards regarding use of recommendations in Lyon et al. (1985) for timber management and transportation planning, and the priority of wildlife use over livestock use on elk winter range would remain in place (FP, Chapter II, section F.1(e)). The proposed action would also retain several management area goals for elk winter range, cover, forage, and security and a few existing management area standards related to livestock grazing and elk forage, among others.

2.3.2.2 Elk habitat effectiveness

The proposed action would remove standard (e)(14) in section F.1 of Chapter II of the Forest Plan, which requires maintenance of 50 percent and 60 percent elk habitat effectiveness in third-order drainages, depending on road existence in relation to the Forest's original travel plan. The proposed action would also remove associated elk habitat effectiveness and road closure standards for management areas 1, 2, 3a, 3b, 3c, 8a, and 8b and standard (e)(15) in section F.1 of Chapter II.

In place of elk habitat effectiveness standards, proposed new plan direction restricts opening of roads, trails, or areas for motor vehicle use based on elk population size and elk use of National Forest System lands in the Bitterroot National Forest (FW-GDL-WLF-ELK-01). Other proposed forest-wide guidelines direct travel management projects and activities associated with vegetation management projects to minimize disturbance to elk on winter range during the winter and in calving areas during the reproductive season and to avoid impeding migration corridors (FW-GDL-WLF-ELK-02, FW-GDL-WLF-ELK-03). Additional proposed guidelines in the North Sapphire and East Fork Bitterroot hunting districts restrict new permanent road construction to administrative use only (GA-GDL-NS-WLF-ELK-01, GA-GDL-EFB-WLF-ELK-01), and a proposed guideline in the East Fork Bitterroot unit stipulates no net increase in motorized route density at the project scale (GA-GDL-EFB-WLF-ELK-02). This suite of proposed plan components is intended to provide a flexible, holistic approach to the relationship between travel management and the ecological conditions required for elk.

2.3.2.3 Thermal cover and hiding cover

The proposed action would remove standard (e)(12) in section F.1 of Chapter II of the Forest Plan, which requires that forest staff consider relationships between cover and forage habitats for big game as described in Guides for Elk Habitat Objectives (USDA Forest Service 1978) when planning timber management activities. Guides for Elk Habitat Objectives recommends consideration of thermal cover, hiding cover, and forest and open foraging areas. The proposed action would also modify the associated standard (e)(1) regarding timber management in management area 2, to remove the requirement that timber harvest rotations are greater than culmination of mean annual increment to provide for 20 to 30 percent of the rotation length in thermal cover and 55 to 65 percent of the rotation length in forested or open forage, while the remainder of the rotation is in hiding cover. In addition, if the proposed action is adopted, the decision for this plan amendment would supersede that section of the 1987 Record of Decision for the Forest Plan, which clarified direction by stating that at least 25 percent of winter range should always act as thermal cover, and that winter range should provide a diversity of forage and hiding cover (U.S. Department of Agriculture 1987b).

The proposed new plan components reflect current best available scientific information by emphasizing management for elk forage in vegetation management projects. A proposed forest-wide guideline states that vegetation management should increase elk forage in winter and spring foraging areas (FW-GDL-WLF-ELK-02). A proposed guideline for the North Sapphires Hunting District is very similar to the proposed forest-wide guideline, but applies to all vegetation management activities, rather than solely to those occurring in winter and spring foraging areas (GA-GDL-NS-WLF-ELK-02). Three more proposed guidelines for geographic areas state that wildfire management in the Selway-Bitterroot wilderness area should aim to increase elk forage where feasible (GA-GDL-WFB-WLF-ELK-02, GA-GDL-WB-WLF-ELK-01, GA-GDL-IDAHO-WLF-ELK-14). In addition, a proposed guideline for the West Fork Elk Management Unit states that vegetation management should reduce conifer encroachment to increase elk forage on open slopes (GA-GDL-WF-WLF-ELK-02), and a proposed guideline for the Idaho area states that projects should include components to treat invasive and noxious plant species to increase elk forage (GA-GDL-IDAHO-WLF-ELK-01).

2.3.2.4 Old Growth

The proposed desired condition is to increase the amount of old growth forest on the landscape. The proposed action would remove two forest-wide standards and four management area standards related to old growth forest. It removes the standard that allows for regeneration harvest in old growth when other stands progress into the old growth successional stage; the replacement standard would only allow regeneration harvest in rare cases, such as severe insect or disease problems or blowdown events. It removes the management area standards for MA 1, 2, 3a and 3c that state old growth stands should be 40 acres or larger. The amendment would allow stands as small as five acres to be identified and inventoried as old growth, recognizing that even small patches of old forest have ecological benefit. Five acres is the smallest practical size for management and forest inventory. Smaller patches of old growth will be managed as inclusions of larger stands and conserved as appropriate for wildlife, silviculture, and other resource needs at the project level.

The proposed amendment would remove the numerical percentages of old growth to be maintained in MA 1, 2, 3a and 3c, because the desired condition is to increase the amount of old growth forest on the landscape, regardless of the existing percentages. The proposed amendment will remove the description of stand conditions that qualify as old growth at forest-wide standard (e)(2) in section F.1. of Chapter II of the Bitterroot Forest Plan. Old growth stands would be identified using characteristics described in Green et al. (2011), based on biophysical setting on the landscape. Moisture, elevation, aspect, forest type and age of the trees influence what constitutes old forest characteristics. It would also change the definition of old growth in the glossary to reflect Green et al. (2011), as well as update the definition of a “stand” to comport with the Forest Service Handbook.

Regarding the historical range of variability of old growth on the Bitterroot National Forest, Lieberg 1899 (Losensky 2002) reported that with settlement in the Bitterroot Valley and the building of the Northern Pacific Railroad, “that below Grantsdale fully 90 percent of the accessible merchantable timber had been cut” as of 1899. This was before the Bitterroot Forest Reserve was designated. Losensky (1993) attempted to determine, by climatic section, the percentage of stands that could have qualified as old growth in the 1930s. He points out that factors such as tree size, tree number, and other stand attributes could not be evaluated, and therefore percentages represent all potential acres, and the actual area could have significantly less. The applicable climatic section in his research is presented as Bitterroot-Blackfoot. For all cover types, he estimates an average of 22 percent of the stands were old growth in 1930, with ponderosa pine up to 56 percent due to frequent under burning. That is a single snapshot in time in a post-glacial disturbance regime of 10,000 years. Regardless of the historical range of variability, the desired condition is to move forward in a manner that increases old growth across the forest.

Because old growth stands provide valuable ecological and social functions, the Bitterroot National Forest developed plan components for the amendment that are designed to increase the quantity of old growth in the future, increase the resistance and resilience of the old growth to disturbances and stressors, and to increase the size of the old growth patches that exist in the future. This also aligns with Executive Order 14072 to conserve old-growth and mature forest on Federal lands while supporting and advancing climate-smart forestry and sustainable forest products.

2.3.2.5 Snags

The desired condition is to have adequate snags numbers in various size classes and species across the landscape. The proposed action would remove the forest-wide standard (e)(3) in section F.1 of Chapter II of the Forest Plan that states "All snags that do not present an unacceptable safety risk will be retained" (USDA Forest Service 1987, p. II-20). Snag retention in treated stands will be based on findings from Harris (1999), Bollenbacher et al. (2009), Bush and Reyes (2023), and numerous scientific papers by Evelyn Bull and others. Stands targeted for treatment should retain a suitable number of snags in a variety of size classes, depending on habitat type group. This will resolve the discrepancy in the existing plan that allows for salvage while also stating that snags shall be retained if they do not present an unacceptable safety risk.

2.3.2.6 Coarse Woody Debris

The proposed action would remove five management area standards related to the amounts of coarse woody debris needed to protect water and soil conditions as well as regenerating seedlings in Management Areas 1, 2, 3a, 3b, and 3c (USDA Chapter 3). They would be replaced with appropriate amounts suitable to the biophysical setting according to the best available scientific information in Graham et al. (1999) and Brown et al. (2003), allowing the Forest to manage for fuel reduction while providing small mammal habitat and soil function.

2.3.3 Plan Components

The proposed action would remove certain desired conditions, standards and guidelines from the existing plan and add components to meet the purpose and need. New or modified plan direction must follow the applicable format for plan components set out at 36 CFR 219.7(e) except where an amendment modifies solely the area to which existing direction applies (36 CFR 219.13(b)(4)). Plan components, as defined at 36 CFR 219.7(e), include desired conditions, objectives, standards, guidelines, and goals. Desired conditions and objectives provide specific direction for management while standards and guidelines provide constraints for project planning and design. Goals are broad statements of intent. The following terms and definitions apply to modified and new plan components in the proposed action:

- **Desired Condition** – A description of specific social, economic, and/or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land and resources should be directed. Desired conditions must be described in terms that are specific enough to allow progress toward their achievement to be determined, but do not include completion dates.
- **Objective** – A concise, measurable, and time-specific statement of a desired rate of progress toward a desired condition or conditions. Objectives should be based on reasonably foreseeable budgets.
- **Standard** – A mandatory constraint on project and activity decision-making, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.
- **Guideline** – A constraint on project and activity decision-making that allows for departure from its terms, so long as the purpose of the guideline is met. Guidelines are established to help achieve or maintain a desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.
- **Goal** – A broad statement of intent, other than desired conditions, usually related to process or interaction with the public. Goals are expressed in broad, general terms, but do not include completion dates.

Proposed additions, modifications, and removals of plan components are included below. The proposed action additionally includes glossary definitions to clarify how the Forest Service intends to implement the proposed plan amendment.

New plan components are numbered for reference. Unchanged and unmodified plan components would retain their numbers as listed in the Forest Plan. New plan components have been numbered using a combination of codes in the following format: XX-XX -WLF-ELK-XX. The initial code indicates the area to which the component applies, including FW for forest-wide and GA for geographic area. Each geographic area additionally includes the codes WB for the West Bitterroot Hunting District, EFB for the East Fork Bitterroot Hunting District, NS for the North Sapphires Hunting District, WFB for the West Fork Bitterroot Hunting District, and IDAHO for the Idaho portion of the Forest. The second code indicates the type of plan component, including DC for desired conditions, OBJ for objectives, STD for standards, GDL for guidelines, and GOAL for goals The third code indicates the broad resource area to which the component applies; for each new plan component under this amendment, the resource area code is WLF for wildlife. The fourth code “ELK” indicates that the component was introduced as part of the plan amendment for elk habitat objectives. The final code indicates the plan component’s number.

2.3.3.1 Elk Habitat Effectiveness and Thermal Cover

Current 1987 Plan Components

The current components to be **modified or removed** from the Bitterroot Forest Plan read:

Forest-wide Desired Condition at the End of the Fifth Decade

Cover on winter range will have been maintained at the desirable level of 40 percent of the winter range area. (Chapter II, Section E.2(c))

Forest-wide *Standards*

Big-game cover/forage relationships, as described in Guides for Elk Habitat Objectives (USDA, 1978), will be a consideration in planning timber management activities. (Chapter II, Section F.1(e)(12))

Manage roads through the Travel Plan process to attain or maintain 50 percent or higher elk habitat effectiveness (Lyon 1983) in currently roaded third order drainages. Drainages where more than 25 percent of roads are in place are considered roaded. Maintain 60 percent or higher elk habitat effectiveness in drainages where less than 25 percent of the roads have been built. (Chapter II, Section F.1(e)(14))

If, for three years running, the bull elk harvest during the first week of the hunting season exceeds 40 percent of the total bull harvest, additional fall road closures will be considered. (Chapter II, Section F.1(e)(15))

Management Area Standards

Management Area 1

Maintain elk habitat effectiveness through road closures as specified in the Forest-wide standards in Chapter II (Lyon 1983). (Chapter III, Section B.3(c)(4))

Management Area 2

Maintain elk habitat effectiveness through road closures as specified in the Forest-wide standards in Chapter II (Lyon 1983). (Chapter III, Section C.3(c)(4))

Guides for Elk Habitat Objectives (USDA Forest Service 1978) will be followed in prescribing any timber harvest in this management area. The following timber management standards are desirable on winter range:

a. Even-aged management.

b. Precommercial and commercial thinning.

c. Establish or maintain a mixture of ponderosa pine and Douglas-fir.

d. Rotations will be greater than culmination of mean annual increment to provide for 20 to 30 percent of the rotation length in thermal cover and 55 to 65 percent of the rotation length in forested or open forage. The rest of the rotation will be in hiding cover.

e. Timber harvest on land unsuitable for timber production is appropriate for meeting cover/forage objectives if other resource objectives including soil and water can be met. (Chapter III, Section C.3(e)(1))

Management Area 3a

Maintain elk habitat effectiveness through road closures as specified in the Forest-wide standards in Chapter II (Lyon, 1983). (Chapter III, Section D.3(c)(4))

Close the road through Signal Creek to motorized vehicles during hunting season. (Chapter III, Section D.3(c)(5))

Management Area 3b

Maintain the elk habitat effectiveness standards of the surrounding management areas through road closures as specified in the Forest-wide standards in Chapter II (Lyon, 1983). (Chapter III, Section E.3(c)(11))

Management Area 3c

Maintain elk habitat effectiveness through road closures as specified in the Forest-wide standards in Chapter II (Lyon, 1983). (Chapter III, Section F.3(c)(4))

Management Area 8a

Maintain elk habitat effectiveness through road closures as specified in the Forest-wide standards in Chapter II (Lyon, 1983). (Chapter III, Section L.3(c)(2))

Management Area 8b

Maintain elk habitat effectiveness (Lyon, 1983) in conjunction with the contiguous winter range management area as specified in Forest-wide standards Chapter II and Management Area 2. Chapter III, Section M.3(c)(1)

Glossary

ELK HABITAT EFFECTIVENESS - An index of the capability of an area to provide security for elk. It is based on hiding and thermal cover present and roads open to public motorized use.

Modified Amendment Components for Elk

The modified components that would be **added to and amend** the Bitterroot National Forest Plan would read:

Forest-wide Desired Condition

FW-DC-WLF-ELK-01: The Forest supports a diversity of elk habitats that provide for ecological conditions that supplement diverse recreational opportunities including wildlife enjoyment, viewing, and hunting.

Forest-wide *Guidelines*

FW-GDL-WLF-ELK- 01: Travel management decisions should be designed to maintain elk residency on National Forest System lands during the archery and rifle big game hunting seasons by maintaining contiguous blocks of habitat in locations elk traditionally use at times when they are vulnerable to disturbance from hunting or other recreation that may cause displacement from public lands. No additional roads, trails, or areas should be designated for motor vehicle use if hunting district-specific elk trend data (5- or 10-year) suggests the population is below State objectives and declining or if elk use of National Forest System lands in the plan area has declined independent of population size.

FW-GDL-WLF-ELK-02: Vegetation management project activities on known elk winter and spring foraging areas should contain vegetation management treatments to increase elk forage to help alleviate elk conflicts with adjacent landowners.

FW-GDL-WLF-ELK-03: Vegetation management project activities and travel management decisions should be located and scheduled to minimize disturbance of elk on known winter range during the winter and in known calving areas during the reproductive season to avoid stressing elk when energy demands are high. Exceptions may occur when needed for protection of other resources as mandated by law, regulation, or policy. In such cases, concentrating management actions in time or space could be a method to minimize disturbance and reduce impacts to elk.

FW-GDL-WLF-ELK-04: To help maintain or restore habitat connectivity, vegetation management project activities and travel management decisions should not create movement barriers to elk in known migration corridors, except where necessary to provide for human health and safety.

FW-GDL-WLF-ELK -05: To maintain connectivity with adjacent lands, vegetation management project activities should be compatible with habitat management goals on adjoining State or Federal lands (for example, project planning should not be detrimental to elk winter range next to State Wildlife Management Areas where winter range management is the goal).

Geographic Area Guideline HD240 West Bitterroot

GA-GDL-WB-WLF-ELK-01: Wildfires in the Selway-Bitterroot Wilderness should be managed employing minimal impact suppression tactics where feasible to enhance high alpine elk forage.

Geographic Area Guideline North Sapphires (multiple HDs)

GA-GDL-NS-WLF-ELK-01: All new permanent road construction should be for administrative use only to minimize pressure on elk.

GA-GDL-NS-WLF-ELK-02: Vegetation management project activities should contain vegetation management treatments to increase elk forage quantity and nutritional quality on National Forest System lands to help reduce elk conflicts with adjacent landowners.

Geographic Area Guideline HD270 East Fork Bitterroot

GA-GDL-EFB-WLF-ELK-01: All new permanent road construction should be for administrative use only to minimize additional pressure on elk that may contribute to movement to adjacent private lands during the archery or rifle hunting seasons. Exceptions may be made in the case of existing roads needing relocation.

GA-GDL-EFB-WLF-ELK-02: To help maintain or restore habitat connectivity for elk, there should be no net increase in permanent motorized route density at the project scale.

Geographic Area Guideline HD250 West Fork Bitterroot

GA-GDL-WFB-WLF-ELK-01: Vegetation management project activities should contain vegetation management treatments to reduce conifer encroachment on open grassland slopes where applicable to increase spring elk forage.

GA-GDL-WFB-WLF-ELK-02: Wildfires in the Selway-Bitterroot Wilderness meeting management direction and suppression strategies required for health and human safety should employ minimal suppression where feasible to enhance high alpine elk forage.

Geographic Area Guideline Idaho Management Unit

GA-GDL-IDAHO-WLF-ELK-01: To increase elk forage, treat to reduce invasive plant or noxious weed occurrence where applicable in conjunction with other management activities.

GA-GDL-IDAHO-WLF-ELK-02: Wildfires in the Selway-Bitterroot Wilderness meeting management direction and suppression strategies required for health and human safety should employ minimal suppression where feasible to enhance high alpine elk forage.

Forest-wide *Goals*

FW-GOAL-WLF-ELK-01: Forest Service and Montana Fish, Wildlife, and Parks biologists cooperate to identify potential needs for and means to achieve desired distribution, viewing, and hunting opportunities of elk.

FW-GOAL-WLF-ELK-02: Through cooperation with willing landowners and other entities, opportunities are identified to conserve or manage non-Federal lands within or adjacent to the national forest boundary to benefit elk.

FW-GOAL-WLF-ELK-03: The Forest Service engages in cooperation and collaboration with other partners in the development of management strategies to maintain suitable habitat conditions and big game populations in numbers and distribution that allow for sustainable, high-quality viewing and hunting experiences on National Forest System lands.

FW-GOAL-WLF-ELK-04: Educational information is available that provides public awareness of the high value of wildlife resources such as biodiversity, habitat connectivity, recreation opportunities, cultural or spiritual connections, safety issues, and co-existence.

FW-GOAL-WLF-ELK-05: Elk remain on National Forest System lands throughout the archery and rifle hunting seasons at levels that support State recommendations regarding big game distribution, population size, and harvest.

FW-GOAL-WLF-ELK-06: Elk forage, connectivity, winter range, and calving habitat conditions alleviate adjacent landowner conflicts and support State elk management objectives.

Glossary

ELK SECURITY - Adequate forage and hiding cover where disturbance to elk on winter range during the winter and in calving areas during the reproductive season is minimized and impeding migration corridors is avoided.

2.3.3.2 Old Growth

Current 1987 Plan Components

The current components to be **modified or removed** from the Bitterroot Forest Plan read:

Forest-wide Desired Condition at the End of the Fifth Decade

On suitable timberland. about 81,600 acres will be seedlings and saplings, 55,900 acres poletimber, 113,100 acres immature and mature sawtimber, and 105,300 acres old growth. (Chapter 2, Section E.2.(e))

Forest-wide Management Standards

Stand conditions that qualify as old growth will vary by habitat type and landform. Current plan criteria to consider for identifying old growth include:

- large trees, generally 15 per acre greater than 20 inches diameter at breast height (dbh) for species other than lodgepole pine and 6 inches DBH for lodgepole pine; canopy closure at 75 percent of site potential;
- stand structure usually uneven-aged or multistoried;
- snags, generally 1.5 per acre greater than 6 inches DBH and 0.5 per acre greater than 20 inches;
- more than 25 tons per acre of downed material greater than 6 inches diameter;
- heart rot and broken tops in large trees are common; and
- mosses and lichens are present. (Chapter II, Section F.1(e)(2))

Old-growth stands may be logged and regenerated when other stands have achieved old-growth status. (Chapter II, Section F.2(e)(5))

Management Area *Standards*

Management Area 1

Old growth stands should be 40 acres and larger, distributed over the management area. About 3 percent of Management Area 1 suitable timberland, in each third order drainage will be maintained in old growth. Provide 40-acre stands of old growth by coordinating management activities in this area with activities m adjacent management areas and with intermingled riparian and unsuitable management areas (USDA, 1979). (Chapter III, Section B.3(c)(2) Suitable for timber management).

Management Area 2

Old growth stands should be 40 acres and larger, distributed over the management area. About 8 percent of the Management Area 2 suitable timberland, in each third order drainage will be maintained in old growth. Provide 40-acre stands of old growth by coordinating management activities in this area with activities in adjacent management areas and intermingled riparian and unsuitable areas (USDA, 1979). (Chapter III, Section C.3(c)(2). Big-game winter range suitable for timber production).

Management Area 3a

Old growth units should be 40 acres and larger, distributed over the management area. About 8 percent of the Management Area 3a suitable timberland in each third order drainage will be maintained in old growth. Provide 40-acre stands of old growth by coordinating management activities in this area with activities in adjacent management areas especially Management Area 3b, riparian areas (USDA, 1979). (Chapter III, Section D.3(c)(2). Visually sensitive foreground and middleground East; suitable for timber production).

Management Area 3b

Riparian old growth should be coordinated with adjacent management area old growth to provide for adequate distribution and 40 acre or larger units.

Management Area 3c

Old growth stands should be 40 acres and larger, distributed over the management area. Over 8 percent of non-riparian suitable timberland in each separate piece of Management Area **3c** will be maintained in old growth. Over 25 percent of riparian area suitable for timber production in each separate piece of Management Area 3c will be maintained in old growth. Riparian and non-riparian old growth will be coordinated to assure that old growth stands are at least 40 acres. (USDA, 1979). (Chapter III, Section F.3(c)(5). Visually sensitive foreground and middleground West; suitable for timber production).

Glossary

OLD GROWTH-A forest stand with 15 trees per acre greater than 20 inches dbh (6 inches in lodgepole pine) and canopy closure that is 75 percent of site potential. The stand is uneven-age or multistoried. There should be 1.5 snags per acre greater than 6 inches dbh; 0.5 snags per acre greater than 20 inches dbh; and 25 tons per acre of down material greater than 6 inches diameter. Heart rot and broken tops are common, and mosses and lichens are present.

STAND- A community of trees or other vegetative growth occupying a specific area and sufficiently uniform in composition (species), age, spatial arrangement, and conditions as to be distinguishable from the other growth on adjoining lands, so forming a silvicultural or management entity.

Modified Amendment Components regarding Old Growth

The modified components that would be **added to and amend** the Bitterroot National Forest Plan would read:

Forest-wide Desired Condition

FWD-DC-VEG-01: The amount of old growth increases relative to existing condition. The location and condition of old growth is dynamic over time. Old growth stands are influenced by succession, natural disturbance regimes, and climate. Landscape level resiliency is provided by promoting a mosaic of younger forests to replace old growth when it is killed by stand-replacing events. The desired condition of old growth is described in Table 2.

Table 2. Forest-wide existing and desired conditions of old growth

Region 1 Habitat Type Groups[1]	Existing Condition (90 percent confidence interval)[2]	Desired condition
Forest-wide	9.90 percent (8%-12%)	Old growth is distributed widely across the forest, and levels vary depending on available compositions and structures, disturbance levels, and management objectives. The amount of old growth is generally similar to or greater than that of the existing condition, however the amount of old growth may be subject to the likelihood of increased extent and/or severity of natural disturbances such as insects, disease and wildfire. Old growth distribution that complements habitat connectivity is desired. Old growth is resilient to impacts that might result in the loss of old growth characteristics, such as insect infestations, wildfire, and drought. Old growth contains components that contribute to high quality habitat, including large or very large live trees with rot or broken tops, snags, downed woody material, and a diversity of tree size classes and canopy layers. A variety of old growth types are present.
Cold	11 percent (6%-18%)	Old growth in this potential vegetation type generally consists of whitebark pine, Engelmann spruce, and subalpine fir, with stand-level resiliency and open structures desired in whitebark pine types versus spruce/fir types which may be denser and more layered.
Cool Moist Cool Wet Cool Moderately Dry	13 percent (9%-19%)	Old growth in these potential vegetation types may be subject to wider pulses of availability, due to the preponderance of lodgepole pine and high severity low frequency disturbance regimes. Old growth includes spruce and Douglas-fir dominated stands, often with dense canopy layers, as well as even-aged lodgepole pine.
Moderately Warm Dry Moderately Warm - Moderately Dry Moderately Warm Moist -	8 percent (5%-1%)	Old growth is dominated by ponderosa pine and Douglas-fir, often in large patches with an uneven-aged and irregular tree distribution. Stands are resilient to low severity disturbance. Other species such as juniper and aspen are valuable habitat components.
Warm Dry -	2 percent (0%-6%)	Old growth is dominated by pure stands of large, fire-resistant ponderosa pine, in various patch sizes with an uneven-aged and irregular tree distribution. Stands are resilient to low severity disturbance.

1. Old growth forests are defined specifically as forests that meet the minimum criteria established for the Northern Region of the Forest Service (see glossary)

2. Existing condition shown is the mean percent of old growth (see glossary) with the 90 percent confidence interval shown in parenthesis. Source is Northern Region Summary Database, Forest Inventory and Analysis data, Hybrid 2015.

Forest-wide *Guidelines*

FW-GDL-VEG-01: To promote the retention of old growth (see glossary) and contribute to biodiversity, vegetation management activities in old growth should retain all minimum old growth characteristics as defined in Green et al. (2011) (Table 3) and as updated over time.

Vegetation management activities in old growth stands should only occur for one or both of the following purposes:

- Maintain or restore old growth habitat characteristics and ecosystem processes.
- Increase resistance and resilience to disturbances or stressors that may have negative impacts on old growth characteristics or abundance (such as drought, wildfire, and bark beetles).

Exceptions to this guideline may be allowed where needed to mitigate hazards to: (1) public safety in campgrounds, other designated recreation sites, administrative sites, and permitted special use areas; or (2) infrastructure that is essential to community welfare (e.g., utilities and communications or wildland urban interface).

FW-GDL-VEG-02: To maintain habitat connectivity and minimize disturbance of old-growth associated wildlife, road construction (permanent or temporary) or other developments should be avoided in old growth (see glossary) unless access is needed to implement vegetation management activities and purposes as outlined in FW-GDL-VEG-01 and there are no feasible alternative road locations. When identifying if proposed treatment areas include old growth, use a reasonable and accurate approach based on data collection or validation. Consider delineating old growth stands based on the FSH 2409.17, or other current direction.

As stated in the existing Forest Plan, Forest-wide management direction applies to MA 3b (U.S. Department of Agriculture 1987c)(p. III-22).

Table 3. Western Montana Zone (Flathead, Lolo, Bitterroot and Kootenai National Forests) old growth forest characteristics (based on Green et al., 2011, Feb. 2005 errata edit)

Old-growth forest type[a]	Habitat type group[b]	Minimum criterion: age of large trees (above minimum dbh)	Minimum criterion: number of trees per acre by dbh[j]	Minimum criterion: basal area (sqft/acre)	dbh variation[d]	Percent dead/ broken top[c]	Probability of downed woody[d]	Percent decay[c]	Number canopy layers[e]	Snags ≥ 9 inches d.b.h.[c]	Number of samples[f]	Broad Potential vegetation types[g]
1–PP, DF, L, GF, LP	A, B	170	8 ≥ 21”	60	M	12 3-23	L-M	5 0-11	SINGLE	6 0-22	4,847	WD
2–DF, L, PP, SAF, GF	C	170	8 ≥ 21”	80	H	11 0-21	M	5 2-12	SINGLE/ MULTIPLE	7 2-37	2,505	WD
3–LP	C, D, E, F, G, H	140	10 ≥ 13”	60/70/80[h]	L	11 5-2	H	6 2-15	SINGLE	19 0-92	2,648	WD, WM, CM
4–SAF, DF, GF, C, L, PP, WP, WH	D, E, F	180	10 ≥ 21”	80	H	9 0-19	H	9 1-31	SINGLE/ MULTIPLE	15 2-43	13,867	WM, CM
5–SAF, DF, GF, L, PP, WP, WB	G, H	180	10 ≥ 17”	70/80[i]	M	9 1-18	H	6 0-12	MULTIPLE	12 3-36	4,053	WD, CM
6-–SAF, WB, DF, L	I	180	10 ≥ 13”	60	M	11 2-31	M	10 2-17	MULTIPLE	25 5-38	255	CO
7–LP	I	140	30 ≥ 9”	70	L	8 3-14	H	5 0-11	SINGLE	17 9-22	95	CO
8–SAF, WB/AL	J	180	20 ≥ 13”	80	M	12 10-14	M	5 0-8	SINGLE/ MULTIPLE	37 33-40	14	CO

a. Forest cover type species codes: PP=ponderosa pine; DF=Douglas-fir; L=western larch; GF=grand fir; LP=lodgepole pine; SAF=Engelmann spruce/subalpine fir; C=western redcedar; WP=western white pine; WH=western hemlock; WB=whitebark pine; AL=alpine larch

b. Habitat types that occur within these groups are found in Green et al. (2011).

c. These values are not minimum criteria. They are the range of means for trees ≥9” dbh across plots within forests, forest types, or habitat type groups.

d. These are not minimum criteria. They are low, moderate, and high probabilities of abundant large downed woody material or variation in diameters based on stand condition expected to occur most frequently.

e. This is not a minimum criterion. The number of canopy layers can vary within an old-growth forest type based on age, relative abundance of different species, and successional stage.

f. Plot data from the Northern Region stand exam inventory.

g. Bitterroot National Forest-specific column added to Green's table to show which potential vegetation types in the forest plan apply to the old-growth forest type. WD = warm-dry; WM = warm-moist; CM = cool-moist; CO = cold

h. In old-growth forest type 3, for basal area, 60 square feet/acre applies to habitat type group E for LP; 70 square feet/acre applies to habitat type group C for LP and habitat type group H for ES, AF, and WBP; 80 square feet/acre applies to all other habitat type and cover type combinations.

i. In old-growth forest type 5, for basal area, 70 square feet/acre applies to habitat type group H for SAF; 80 square feet/acre applies to all other habitat type and cover type combinations

j. To use these criteria, Basal Area and DBH must be met. For example, 8 Trees greater than or equal to 21" dbh needs to meet Basal Area requirement as well. To meet 60 BA at 21" dbh, 25 TPA are needed. 8 TPA would be met if trees were 37" dbh or greater.

Glossary

OLD GROWTH -Old Forest with qualitative and quantitative characteristics varying by habitat type, as defined for Western Montana in Green et al. 1992 errata 2011 and as updated over time.

STAND- A community of naturally or artificially established trees of any age sufficiently uniform in composition, constitution, age, site productivity, spatial arrangement, or condition to be distinguishable from adjacent communities thereby forming a silvicultural or management entity. FSH 2409.17 SILVICULTURAL PRACTICES HANDBOOK. Five acres is the smallest practical area to manage as a stand.

2.3.3.3 Snags

Current 1987 Plan Components

The current component to be **modified or removed** from the Bitterroot Forest Plan reads:

Forest-wide Management Standards

All snags that do not present an unacceptable safety risk will be retained. (Chapter II, Section F.1(e)(3))

Modified Amendment Components regarding Snags

The components that would be **modified or added to amend** the Bitterroot National Forest Plan would read:

Forest-wide Desired Condition

FW-DC-VEG-02: Forest conditions support natural quantities and distributions of snags. Snags are unevenly distributed and dynamic over time, with a range of decay classes represented. The highest densities of snags occur in burned areas and in areas infested by insects; the lowest densities occur along roads, in areas where the concern for human safety is elevated, areas where there is concern for fire hazard (such as the wildland-urban interface) and in stands where active management is occurring. Individual stands may have no snags, or many, depending upon site-specific conditions. Table 4 displays the mean number of snags per acre by diameter threshold by snag analysis group found in areas of the Forest that have not had pro-active vegetation management.

Table 4. *Forest wide existing condition and desired minimum snags across the Forest

Snag Analysis Group[1]	Medium (>10"dbh[4])		Large (>15"dbh[4])		Very large(>20"dbh[4])	
	Existing Condition[2]	Desired minimum[3]	Existing Condition[2]	Desired minimum[3]	Existing Condition[2]	Desired minimum[3]
Lodgepole Pine	24.7 (16-33)	11	3.4 (1-5)	2	1.1 (0.3-2)	2
Warm/Dry	16.1 (11-20)	4	7.4 (4-10)	4	3.6 (2-5)	2
Warm/Moist	19.7 (4-39)	4	12.4(2-24)	3	6.8(0-13)	3
Cold, Cool/Moist	26.1 (21-31)	14	7.3 (5-9)	5	1.8 (0.9-2)	1

[1] Snag analysis groups are from Bollenbacher (2009). See appendix C
[2] Existing condition is the mean snags per acre, with the 90% confidence intervals shown in parenthesis. Source is R1 Summary Database, FIA data, Hybrid 2015. (Bush and Reyes 2023).
[3] Desired is derived from Bollenbacher (2009), supplemental data Harris (1999) represented by the mean number of snags found in the wilderness and roadless areas on the Bitterroot NF, Bull et al. 1997, and Brown et al. 2003.
[4] Diameter at breast height (4.5' above the ground). The classes are not mutually exclusive; e.g. the numbers for the 10"+medium class include the large/very large classes and the 15"+ large class includes the very large class.

Forest-wide *Guidelines*

FW-GDL-VEG-03: To maintain snags (standing dead trees) over the long term for wildlife habitat and ecosystem processes, vegetation management projects should retain, on average, at least:

- Across the Warm Dry snag analysis group, retain an average of at least 4-6 snags per acre greater than 15" dbh

- Across the Warm Moist snag analysis group, retain an average of at least 4-6 snags per acre greater than 15” dbh
- Across the remaining snag analysis groups, retain an average of at least 8-10 largest available snags per acre

The largest snags available should always be prioritized for retention. Guideline applies as an average of treatment units across a project area and allows for variation in snag retention among treatment units with the intent of preserving the most desirable snags. Snags need not necessarily be present on every acre or in every treatment unit; they may be clumped as appropriate for the site, species, and existing snag distribution. If fewer than the minimum desired snags are present, live trees should be retained for future recruitment to meet the minimum desired snags within treatment units with a preference for the largest and most decadent trees available. Large, live replacement trees may also count toward compliance with FW-GDL-VEG-05. Trees with evidence of rot or wildlife use are preferred. Live replacement trees do not need to be retained where retention is not possible due to operational limitations associated with harvest or burning implementation. Snags should be retained greater than 150 feet away from roads in areas open for firewood collection. Exceptions to the snag retention guideline may be allowed in areas where the minimum number of snags or live replacement trees are not present prior to management activities or where needed to manage infrastructure.

FW-GDL-VEG-04: Vegetation management activities should retain snags greater than 20 inches DBH and at least the minimum number of snags and live trees (for future snags) that are displayed above in FW-GDL-VEG-03. Where snag numbers for trees greater than 20 inches DBH do not exist to meet the recommended ranges, the difference would be made up with live replacement trees for future recruitment. Exceptions occur for issues such as human safety and instances where the minimum numbers are not present prior to the management activities. Snags felled for operational safety in harvest units shall be left on site.

FW-GDL-VEG-05: Where vegetation management activities occur and snags (or live trees for future snags) are retained, the following direction should be followed:

- Group snags where possible, such that in some areas the density of snags >20” dbh may reach 5-10 snags/ac
- Retain snags far enough away from roads or other areas open to public access to reduce the potential for removal (generally more than 150 feet)
- Emphasize retention of the largest snags and live trees as well as those species that tend to be the most persistent, such as ponderosa pine, western larch, and Douglas-fir
- Favor snags or live trees with existing cavities or evidence of use by woodpeckers or other wildlife.

FW-GDL-VEG-06: Where fuel models allow, girdle large trees with dwarf mistletoe to maintain large snag structure, rather than felling them during sanitation treatments.

Forest-wide Management *Standards*

FW-STD-VEG-01: Whitebark pine shall not be authorized for firewood collection.

2.3.3.4 Coarse Woody Debris

Current 1987 Plan Components

The current components to be **modified or removed** from the Bitterroot Forest Plan read:

Management Area *Standards*

Management Areas 1, 2, 3a, 3c

- On dry and harsh sites, at least 10 to 15 tons per acre of residual debris is needed (Harvey, et al 1981a &1981b; Harvey, 1982) (Chapter III, Section B.3(f)(4); Section C.3(f)(3); Section D.3(f)(4); Section F.3(f)(4)).

Management Area 2

- About 25 tons/acre of down trees larger than 6-inch diameter will be left for nongame habitat if available (Chapter III, Section C.3(j)(2)).

Management Area 3b

- About 25 tons/acre of dead and down trees greater than 6 inches in diameter should be left, where available, to provide habitat for nongame and small game wildlife (Chapter III, Section E.3(j)(4)).

Amendment Components regarding Coarse Woody Debris

The components that would be **added to amend** the Bitterroot National Forest Plan would read:

Forest-wide Desired Conditions

FW-DC-VEG-03: Downed wood occurs throughout the forest in various amounts, sizes, species, and stages of decay. The larger down wood (i.e., coarse woody debris) provides habitat for wildlife species and other organisms, as well as serving important functions for soil productivity.

FW-DC-SOIL-01: Soil organic matter, physical conditions, and down woody debris maintain soil productivity and hydrologic function. Physical, biological, and chemical properties of soil are within the recommended levels by soil type as described in the Bitterroot National Forest soil inventory. These soil properties enhance nutrient cycling; maintain the role of carbon storage, and support soil microbial and biochemical processes.

FW-DC-SOIL-02: Soil organic matter and downed woody debris support healthy mycorrhizal populations, protect soil from erosion due to surface runoff, and retain soil moisture.

Table 5. Recommended ranges of tons/acre of Coarse Woody Debris to Retain after Vegetation Management Activities for each Fire Group.*

Fire Groups	Recommended Coarse Woody Debris Ranges (tons/acre)
Scree, Rock, Meadows, Grasslands	0-5
1, 2, 4 =Warm, Dry Ponderosa Pine; Warm Dry Douglas-fir	5-10
5, 6 = Cool, Dry Douglas-fir; Moist Douglas-fir	10-20
7, 8, 9, 10 =Cool lodgepole; Dry Lower Subalpine Fir; Moist Lower Subalpine Fir; Cold, Moist Upper Subalpine and Timberline	8-24
11=Warm Moist Grand Fir, Western Redcedar, and Western Hemlock	20-30

*Based on Brown and Smith 2000, Graham et al. 1994, and Fischer and Bradley 1987

Forest-wide *Guideline*

FW-GDL-VEG-07: To support ecosystem function and habitat, vegetation management activities should retain the amounts of coarse woody debris (including logs) that are displayed in Table 5. A variety of species, sizes, and decay stages should be retained, with emphasis on largest diameter coarse woody debris available. Exceptions may be allowed where there is elevated concern for fire risk or minimum quantities are not available.

2.4 Modified Proposed Action - Alternative C

In response to public comments, this alternative includes the components as described in the Proposed Action with modifications to two of the proposed forest-wide guidelines for elk, one forest-wide guideline for vegetation, a clarification for the glossary term for old growth, and four important terms for the glossary. After the objection process, it has been further refined. See Appendix C for a summary of comments and responses.

Forest-wide *Guideline*

FW-GDL-WLF-ELK- 01: Motor vehicle use designations should be designed to maintain elk residency on National Forest System lands during the archery and rifle big game hunting seasons by maintaining contiguous blocks of secure habitat in locations elk traditionally use at times when they are vulnerable to disturbance from hunting or other recreation that may cause displacement from public lands. No additional roads, trails, or areas should be designated for motor vehicle use if project-level analysis indicates a likelihood of disturbance significantly affecting elk behavior or distribution, if elk use of National Forest System lands in the plan area has declined independent of population size, or in areas of low-quality forage.

FW-GDL-WLF-ELK-02: Vegetation management project activities on known elk winter, spring and summer foraging areas should contain vegetation treatments to increase elk forage quality to help alleviate elk conflicts with adjacent landowners and maintain elk residency on National Forest System lands.

FW-GDL-VEG-01: To promote the retention of old growth (see glossary) and contribute to biodiversity, vegetation management activities in old growth should retain all old growth characteristics to ensure structure, function and process, as defined in Green et al. (2011) and as updated.

Vegetation management activities in old growth stands should only occur for one or both of the following purposes:

- Maintain or restore old growth habitat characteristics and ecosystem processes.
- Increase resistance and resilience to disturbances or stressors that may have negative impacts on old growth characteristics or abundance (such as drought, wildfire, and bark beetles).

Exceptions to this guideline may be allowed where needed to mitigate hazards to: (1) public safety in campgrounds, other designated recreation sites, administrative sites, and permitted special use areas; or (2) infrastructure that is essential to community welfare (e.g., utilities and communications or wildland urban interface). Regeneration harvest may occur in rare instances of severe insect and disease situations or blowdown events, where the stand is no longer functioning as old growth (Oliver and Larson 1996), as determined by a certified Silviculturist.

Management Area 3b – Riparian Areas *Standard*

MA3b-STD-VEG-01: Snags that do not present an unacceptable safety risk will be retained. Snags may be managed for the benefit of riparian ecosystem process including fish, wildlife, and botany purposes.

Glossary

COARSE WOODY DEBRIS - Wood material comprised of the downed tree trunks and large branches that are greater than 3 inches diameter on the small end for at least six feet in length. Also referred to as 1000-hour fuels.

DUFF- A highly decomposed transitional soil layer formed in forested soils between partially decomposed forest liter at the surface and underlying mineral soil.

ECTOMYCORRHIZAE- A specific type of fungi that form symbiotic relationships with many tree and shrub species by enveloping the surface of roots in a mantle which increases the ability of the host plant to obtain water and nutrients from the soil. Ectomycorrhizae are especially critical to the sustainability of conifer forests during drought conditions and on infertile soils.

RESILIENCE -The capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment. In the context of ecosystems, the Forest Service defines resilience as the ability of an ecosystem and its component parts to absorb or recover from the effects of disturbances through preservation, restoration, or improvement of its essential structures and functions and redundancy of ecological patterns across the landscape (U.S. Global Change Research Program 2022).

OLD GROWTH -Old Forest with qualitative and quantitative characteristics varying by habitat type, as defined for Western Montana in Green et al. 1992 errata 2011. A stand is no longer old growth if mortality from disturbance reaches a level where structure, function and process now define the stand initiation phase (Oliver and Larson 1996).

The elk components were modified in collaboration with the Rocky Mountain Elk Foundation to consider the role that habitat security plays in elk habitat selection. The vegetation guideline was modified to clarify that minimum characteristics of the old growth definition is not a desired condition for all old growth stands. The old growth glossary revised definition recognizes forest succession. Additional glossary items were added to update the plan with soil science findings.

2.5 Alternatives Considered but Not Analyzed in Detail

2.5.1 Apply elk habitat effectiveness standards to fourth order drainages

The interdisciplinary team considered an alternative that would apply elk habitat effectiveness standards to fourth order drainages or other scales larger than third order drainages to provide consistency with the management recommendations in Lyon (1983). This alternative did not warrant detailed analysis because of the current research regarding elk habitat security, the importance of forage availability and nutrition, and the failure of management-based habitat effectiveness to account for the full suite of resources needed by elk. As described in Ranglack et al. (2022) , elk habitat effectiveness standards are based entirely on road density; a roadless area is considered 100 percent effective regardless of the habitat or forage condition. Similarly, an area with a road density of 1 km/1.61 km² is considered 75 percent effective, etc. While elk have been shown to be sensitive to road density and disturbance, this sensitivity varies according to forage quality (Ranglack et al. 2022) and the nutritional content of forage has repeatedly been shown to have a greater influence on elk habitat selection (Proffitt et al. 2016b). Therefore, a more holistic approach to elk habitat management is necessary (DeVoe et al. 2018, Rowland et al. 2018), and simply increasing the scale at which elk habitat effectiveness standards are applied will not resolve this issue.

2.5.2 The old growth scoping alternative

The components scoped in July 2022 did not include the removal of the forest-wide standard at Section F.1(e)(5)) stating that “old-growth stands may be logged and regenerated when other stands have achieved old-growth status.” This was an oversight in the scoping document; therefore, the amendment as scoped without this standard removed will not be carried forward. Retaining that standard is not aligned with the intent of E.O. 14072 to develop a policy to maintain and promote old growth forests.

2.5.3 Include carbon in old growth definition

Members of the public suggested that carbon sequestration should be included in the definition of old growth. Using Green et al. 2011 allows for the identification of old growth based on FIA plot data and stand examination data collected by personnel in the field. Carbon is present in every living thing. Carbon sequestration is inherent in the structure and composition of a stand. It does not need to be part of a field survey designed to identify old growth. Carbon is addressed at length in this EA.

2.5.4 Expand the scope of the amendment to include defining mature forest

Members of the public suggested that to comply with Executive Order 14072, the Forest must define mature forest as well as old growth, and provide corresponding plan components to retain and recruit both classes, including specific objectives necessary to ensure the agency maintains viable populations of management indicator species. The Forest Plan has a definition for mature timber. See Glossary at p.VI-20 (U.S. Department of Agriculture 1987c).

A definition for mature forest is provided in the Old Growth and Mature Inventory Report just released in compliance with EO 14072 concurrent with the advanced notice of proposed rulemaking. It would be premature for the Bitterroot to finalize a definition or management direction via amendment prior to forthcoming national direction. If necessary to comply with new regulations developed from rulemaking, the plan's mature definition will be modified through an administrative change as described at 36 CFR 219.13(c) and the plan will be modified through amendment or during revision.

2.5.5 Address habitat connectivity for grizzly bears

Members of the public asked for an alternative that would restore grizzly bear habitat to improve connectivity. The 2012 Planning Rule requires that forests "maintain or restore structure, function, composition, and connectivity" as part of the forest plan revision process (36 CFR 219.8(c)(1)). The Planning Rule goes on to define connectivity as "Ecological conditions that exist at several spatial and temporal scales that provide landscape linkages that permit the exchange of flow, sediments, and nutrients; the daily and seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long-distance range shifts of species, such as in response to climate change" (36 CFR 219.19). This is well beyond the scope of a focused amendment to define old growth, elk habitat, and clarify direction for snags and coarse woody debris. Grizzly bear habitat connectivity is currently being addressed by the Interagency Grizzly Bear Bitterroot Ecosystem subcommittee, as well as the larger Interagency Grizzly Bear Committee. Recommendations from these organizations will inform a need for change to the Bitterroot Forest Plan either via a future amendment or plan revision.

2.5.6 Address weed spread

A member of the public asked for an alternative that includes preventative measures for weed spread. The Bitterroot National Forest has a forest-wide Record of Decision for weed suppression along roads, trails and at trailheads. Individual site-specific project analyses address areas that would need to be considered if vulnerable to weed spread. Standard contract provisions also address prevention and mitigation of weed spread. This suggested alternative is beyond the scope of this focused amendment.

3. Affected Environment and Environmental Consequences

3.1 Introduction

A description of the best available scientific information used to develop the alternatives for the proposed plan amendment.

3.2 Framing the Analysis

3.2.1 Elk Habitat

Pages 16 through 19 in Chapter 1 describe the multitude of scientific references used to create the components for elk. In particular, several recent research papers regarding elk habitat (Proffitt et al. 2016b, Ranglack et al. 2016, Lukacs et al. 2018, Devoe et al. 2019, Robatcek 2019, Ranglack et al. 2022) have found nutritional resources were the most important factors associated with elk summer resource selection. Ranglack's (2022) research was focused on findings from western Montana, where the Bitterroot National Forest is located. Proffitt's (2016a) research was conducted on the Bitterroot National Forest. Taken as a whole, they are the best available scientific information. Elk habitat requirements are inherent in the components and address the interdependence of terrestrial ecosystems in the plan area. They inherently provide for the continued opportunity for humans to view and hunt elk in the Bitterroot.

3.2.2 Old Growth

Ecological integrity is at the heart of the components for old growth, while addressing natural succession. We were provided an abundance of literature from the public regarding the value of old growth as habitat and as carbon storage. These concepts are understood. The key best available scientific information pertinent to the amendment regarding defining old growth on the Bitterroot National Forest is "Old-Growth Forest Types of the Northern Region" by Green, Joy, Sirucek, Hann, Zack and Naumann (Green et al. 2011) because it is based on growing conditions found on the Bitterroot National Forest, stratified by habitat types (Pfister et al. 1977, Cooper et al. 1991). This definition allows for the designation of old growth stands at the project level that would not have been designated as such with the original forest plan definition. It will allow an interpretation of Forest Inventory and Analysis (FIA) plot data to give a more accurate estimation of the inventory of old growth acres across the Forest.

Climate and carbon scientific studies (Stephenson et al. 2014, Mildrexler et al. 2020, Law et al. 2021) provide the basis for removing the standard allowing the regeneration harvest of old growth stands when other stands reach that successional stage. Conservation of old growth and large trees is recognized as important for carbon storage and the myriad of other ecosystems services they provide, as described in E.O 14072. The numerical percentages by third order drainage would be replaced by the desired condition to increase the amount of old growth forest on the landscape, regardless of existing percentages, or in what management area.

Forest Inventory Assessment (FIA) is the nation's "census" of its public and private forestlands and consistent forest plots have been monitored since 1930 (Czaplewski 2004). The data are statistically sound and gathered impartially by the Research and Development Deputy Area, administratively independent from the National Forest System. These data are the best available scientific information for a forest-wide inventory of old growth. These are the data used to determine the inventory of acres of old growth across the Forest, as well as the nation. Plot data do not equate to old growth stand designation. The designation of a stand as having reached the old growth successional stage is done at the project level by Silviculturists and Foresters, with field verification and applying the stratified definitions of Green et al. by forest type and habitat type grouping.

Therefore, an old-growth stand map will not be a product of this amendment. While stand examination data does exist for several areas on the Forest, it does not provide a consistent, unbiased set of data across the entire Forest as the FIA data does. For example, FIA includes plots in designated wilderness areas where stand examinations have not occurred. Stand examination data is useful at the project level and allows for site-specific identification and mapping of old growth stands during project planning. Old growth is a successional stage and does not necessarily continue into perpetuity, even without fire as a disturbance. Natural processes will eventually lead to its decay and dissolution as old trees become snags and fall to the ground over time. A stand map is merely a snapshot in time and the map can become quickly inaccurate following disturbance processes.

The components for old growth do not propose any ground-disturbing treatments. Harvest in old growth is not a new concept; the existing Forest Plan allows it. Therefore, an assessment of the direct effects of vegetation treatments is not necessary. Any future projects that propose management actions in old growth stands will assess effects through the normal planning processes.

3.2.3 Snags

The value of snags for structure, function, and process of ecosystems and their contribution to habitat diversity is recognized by the agency (Bull et al. 1980, Cunningham et al. 1980, Bunnell et al. 2002, Lorenz et al. 2015). Snag data is collected as part of Forest Inventory Assessment (FIA) monitoring (Czaplewski 2004). This allows an estimate for the number of snags that exist across the Bitterroot National Forest (Harris 1999, Bollenbacher et al. 2009, Bush and Reyes 2023). Concentrations of snag areas are also apparent on the east and west-facing slopes of the Bitterroot Front and Sapphire Range from wildfires in recent decades. The snag component of the amendment applies to the desired number of snags across the landscape and minimum number of snags to be left as residuals after vegetative treatment to provide for structural diversity, wildlife habitat, and future coarse woody debris. Snags may be clustered or scattered across the landscape, as long as the number of snags retained on average meet habitat needs (Bull et al. 1997).

3.2.4 Coarse Woody Debris

The components for coarse woody debris were created to maintain soil productivity, assist in soil carbon storage, and provide structure for small mammals.

Forest Inventory and Analysis (FIA) data collection includes coarse woody debris (Woodall and Williams 2007). This information provides an estimate of the amount of coarse woody debris that exists across the Bitterroot National Forest. Direction for coarse woody debris applies to areas undergoing vegetative treatment; it is not a target amount for coarse woody debris across the Forest. It is based on the amount of woody material that allows for soil function and process, successful regeneration, as well as small mammal habitat, while not creating a fuel loading hazard (Graham et al. 1994, Bull 2002, Brown et al. 2003, Atchley et al. 2021). Forest Inventory and Analysis (FIA) data collection includes coarse woody debris (Woodall and Williams 2007). This information provides an estimate of the amount of coarse woody debris that exists across the Bitterroot National Forest. Direction for coarse woody debris applies to areas undergoing vegetative treatment; it is not a target amount for coarse woody debris across the Forest. It is based on the amount of woody material that allows for soil function and process, successful regeneration, as well as mammal habitat, birds, insects, microbes, etc. while not creating a fuel loading hazard (Harvey et al. 1988, Graham et al. 1994, Bull 2002, Atchley et al. 2021).

3.3 Regulatory Framework

3.3.1 National Forest Management Act

Planning regulations from the 2012 Planning Rule and how they are applied to this project are described in Chapter 1 at pages 11-12. The following describes how the components align with the related substantive requirements at 36 CFR 219.

The purpose of the proposed amendment is to update current plan direction for elk habitat, old growth, coarse woody debris, and snags based on current scientific information regarding the management of these characteristics of habitat diversity. Based on the purpose and likely effects of the amendment, the likely directly related requirements include:

the requirements to maintain or restore the ecological integrity of terrestrial ecosystems taking into account interdependence of terrestrial and aquatic ecosystems in the plan area, ecological conditions in the broader landscape that may influence the sustainability of resources, system drivers (such as natural succession and wildland fire) and the ability of terrestrial ecosystems in the plan area to adapt to change and opportunities for landscape scale restoration at 36 CFR 219.8(a)(1) (i), (ii), (iii),(iv) and (vi).

the requirement that a plan must include plan components to maintain or restore soils and soil productivity, including guidance to reduce soil erosion and sedimentation at 36 CFR 219.8(a)(2)(ii)

the requirements to provide for habitat diversity by maintaining or restoring key characteristics associated with terrestrial ecosystem types at 36 CFR 219.9(a)(2)(i).

the requirement to provide for ecosystem services and multiple uses, including outdoor recreation, range, timber, watershed, wildlife, and fish, within Forest Service authority and the inherent capability of the plan area; that habitat conditions for wildlife, fish, and plants commonly enjoyed and used by the public; for hunting, fishing, trapping, gathering, observing, subsistence or other activities (in collaboration with federally recognized Tribes and State and local governments, system drivers, such as natural succession, wildland fire, and climate change, at 36 CFR 219.10(a)(1), (5) and (8).

The effects analysis for vegetation finds that identifying and managing old growth to maintain and restore the ecological integrity of terrestrial ecosystems meets the first requirement, as do the components for snags and woody debris. The soils analysis, carbon analysis, and fire and fuels analysis all show there are no negative effects that prevent the plan from meeting 36 CFR 219.8(a)(1) (i), (ii), (iii), (iv) and (vi). The elk components promote ecological conditions to sustain elk as a resource.

Coarse woody debris and snag components were designed to meet requirements for soil productivity, and this is evident in the effects analysis for soils.

Identifying and managing old growth, maintaining coarse woody debris and snags to provide structure function and process for soil and wildlife, and promoting habitat conditions that provide forage and security for elk all maintain key characteristics associated with terrestrial ecosystems.

The elk habitat components and the identification and management of additional acres of old growth provide for ecosystem services and multiple uses as described at 36 CFR 219.10(a)(1), (5) and (8). Snags and downed woody debris components provide for ecosystem services for soil function and wildlife habitat, while considering wildfire as a system driver.

3.3.2 Multiple Use Sustained Yield Act of 1960

(b) "Sustained yield of the several products and services" means the achievement and maintenance in perpetuity of a high- level annual or regular periodic output of the various renewable resources of the national forests without impairment of the productivity of the land.

Congress expects a certain amount of volume of wood products annually from national forests. Components in this Amendment allow for management without impairment of productivity.

3.3.3 Executive Order 14072

Executive Order 14072 recognizes the threats to old growth and mature forests from climate impacts, wildfire, insect infestation and disease; it directs us to act to conserve, restore, reforest, and manage our forests. It promotes science-based, sustainable forest and land management. We are to conserve America's mature and old growth forest on Federal lands while at the same time investing in forest health and restoration. The E.O. is not a directive for "hands off" management. The plan components for old growth proposed in this amendment guide management to retain existing old growth on the forest and increase old growth forests over time. In many stands, fuel reduction may be necessary to provide resiliency to those stands when wildfire arrives. In other stands, insects, diseases, and parasitic plants (dwarf mistletoe) may signify the need for management. The plan components allow for management, as well as the identification of additional stands of old growth based on the Green et al. definition, and for the identification and management of smaller forest patches of old growth than in the original Forest Plan. The E.O. directed that an inventory of old growth and mature forests on Federal lands was to be completed by 4/27/2023. The national inventory of mature and old growth forests was published on 4/20/2023. The initial inventory is a snapshot in time and forests are constantly changing. Results of this initial inventory will form the foundation for future monitoring and be used as the foundation to assess threats and develop a risk assessment to inform appropriate forest management activities moving forward. It is expected that a continual adaptive management process integrating new science, local conversations, and social processes will refine old-growth and mature forest working definitions over time.

Applying Green et al criteria would result in more old growth on the landscape, more old growth on the landscape would result in a greater abundance of carbon sequestration – responsive to EO 14072 direction for conserving OG to retain and enhance carbon storage resulting in climate-smart forest stewardship. This plan amendment is responsive to EO14072, Section 2 (c)(iii) develop policies, with robust opportunity for public comment, to institutionalize climate-smart management and conservation strategies that address threats to mature and old-growth forests on Federal lands; and Sec 4 through the capture and storage of carbon dioxide.

In addition, to inform this amendment effort, we completed a unit-specific inventory of old growth, and the acreages are disclosed in this document. The analysis in this EA moves toward meeting much of Section 2. (b) at this local level. An advanced notice of proposed rulemaking was published in the Federal Register on 4/20/23. The current Forest Plan has a definition for mature timber, which may be modified in the future if needed to comply with completed rulemaking.

The data for the acreage of old growth is plot-based in a statistically sound design across the forest, making a forest-wide stand map identifying all old growth and mature forest impossible currently. The E.O. calls for an inventory, *not* a stand list or a stand map, and that direction is met with this Amendment and analysis. Old growth is mapped at the stand level during site-specific project planning and analysis.

E.O. 14072 must be considered in balance with the Multiple Use Sustained Yield Act of 1960, the National Forest Management Act, as well as Healthy Forest Restoration Act, the Inflation Reduction Law, the Bipartisan Infrastructure Law, and the Wildfire Crisis Strategy, all of which support forest management and/or the reduction of hazardous fuels. Section 40803 (c)(11)(A)(i) of the Infrastructure

Investment and Jobs Act (Public Law 117-58) provides funding to the USDA Forest Service for — (i) conducting mechanical thinning and timber harvesting in an ecologically appropriate manner that maximizes the retention of large trees, as appropriate for the forest type, to the extent that the trees promote fire-resilient stands; or (ii) precommercial thinning in young growth stands for wildlife habitat benefits to provide subsistence resources.

3.3.4 Endangered Species Act

The Endangered Species Act of 1973 requires all Federal agencies to review any project authorized, funded, or carried out to determine that the action is not likely to jeopardize the continued existence of any proposed, threatened, or endangered species. This is accomplished via preparation of a biological assessment for those listed or proposed species present in the project area. This was done and consultation with the US Fish and Wildlife Service is complete.

3.3.5 Migratory Bird Treaty Act of 1918

The Migratory Bird Treaty Act prohibits unauthorized take of migratory birds, as defined through subsequent regulations. Executive Order 13186 (66 FR 3853) and memoranda of understanding (USDAUSFWS, 2008, 2016, 2023) outline the responsibilities of Federal agencies to protect migratory birds in furtherance of the purposes of the Migratory Bird Treaty Act.

As of 2021, the USFWS identified 24 Birds of Conservation Concern in the Northern Rockies (U.S. Department of the Interior 2021b). Of these, nine species are associated with water and unlikely to be impacted by the proposed amendment. Another three are associated with prairie habitats and one with alpine habitat, again unlikely to be impacted by the proposed amendment. Of the remaining 11, seven (Calliope hummingbird, Rufous hummingbird, Broad-tailed hummingbird, Long-eared owl, Lewis's woodpecker, Williamson's sapsucker and Cassin's finch) are considered to be globally stable and are ranked by the International Union for Conservation of Nature (IUCN) Conservation as a species of "least concern" or unlikely to become endangered or extinct in the near future. Flammulated owls are also ranked by the IUCN as a species of "least concern", however the species is designated as a Regional Forester Sensitive Species in Region 1, therefore effects of the amendment to this species are described in Section 3.4.4. Two of the remaining species, Pinon jay and Evening grosbeak, are considered vulnerable by the IUCN but are unlikely to be negatively affected by the proposed amendment due to their habitat (Pinon jay) or widespread distribution (Evening grosbeak). Only the Olive-sided flycatcher, considered 'near threatened' by the IUCN, may be affected by the proposed amendment. This species is typically associated with forest edges and often nests in tall conifer trees, which suggests it may benefit from the proposed forest plan standards that increase habitat heterogeneity and old growth forest retention. While Olive-sided flycatchers are often associated with mixed-severity fire (Smucker et al. 2005), they are likely to benefit from a reduction in large-scale high severity wildfire due to the associated habitat loss and post-fire homogeneity (Meehan and George 2003, Norris et al. 2021).

3.4 Wildlife

3.4.1 Introduction

This section provides information concerning the existing wildlife resources on the Bitterroot Forest Plan Programmatic Amendment for Elk Habitat, Old Growth, Snags and Coarse Woody Debris Objectives (Amendment) and the potential consequences of the proposed alternatives. It discloses the direct, indirect, and cumulative impacts on Threatened and Endangered Species (TES), Regional Forester Sensitive wildlife Species (RFSS), as well as Management Indicator Species (MIS) identified on the Bitterroot National Forest (Forest) and presents a summary of the scientific and analytical basis for the comparison of alternatives presented in Chapter 2 of the Environmental Assessment (EA). Each wildlife species potentially affected by the Amendment is analyzed by its current condition along with rationale for the spatial and temporal boundaries of cumulative effects analyses.

The Forest provides habitat for many different species of wildlife, and the presence or absence of these species depends on the amount, distribution, and quality of each species' preferred habitat. Some of these species are affected by hunting or trapping, which is regulated by Montana Fish, Wildlife and Parks (MTFWP). This analysis focuses on issues addressed through public scoping; species listed as Threatened and Endangered Species (TES) on the Forest (U.S. Department of the Interior 2020); the Regional Forester Sensitive Species (RFSS) present on the Forest (U.S. Department of Agriculture 2011); and the two Management Indicator Species (MIS), marten and pileated woodpecker; in addition to elk, which are addressed to determine Amendment compliance with Bitterroot Forest Plan (Forest Plan, U.S. Department of Agriculture 1987c) standards and management direction.

Some of the species were not analyzed in further detail because (1) either the species or their preferred habitat does not occur in the analysis area; (2) the Amendment language from the action alternative would have no effect on a species or suitable habitat; and/or (3) the nature of the Amendment would either eliminate or minimize impacts to such a degree they are undetectable or unmeasurable. Rationale for elimination from detailed analysis for Canada lynx, yellow-billed cuckoo, American peregrine falcon, bald eagle, black-backed woodpecker, northern bog lemming, Townsend's big-eared bat, Coeur d'Alene salamander, northern leopard frog, and western toad is listed in the Biological Evaluation (BE) section and no further discussion is provided or warranted.

Included in this EA is summary information from the Biological Assessments (BA) of the threatened grizzly bear and proposed wolverine as required by the Endangered Species Act (ESA, 1973), the Biological Evaluation (BE) of RFSS, and the evaluation of MIS on the Bitterroot National Forest. This report and analysis are used to determine the potential effects of the alternatives (Chapter 2 of the EA) to the wildlife resource and their habitats that may be present in the analysis area. Additional information can be found in the wildlife specialist report (PF-WILD-001).

The Amendment is programmatic in nature and serves to replace current language in the Forest Plan. No specific management actions will occur as a direct result of this amendment; rather, language will guide Forest management actions for future site-specific actions. Analysis within this report is based on how the proposed language changes may indirectly or cumulatively affect Forest species. Future management projects will still need to analyze project-specific effects at a site-specific level.

3.4.2 Scope of Analysis and Analysis Methods

3.4.2.1 Issues Addressed

Issue 1: How would the Amendment affect Threatened and Endangered Species?

Issue 2: How would the Amendment affect Regional Forester Sensitive Species (RFSS) and Management Indicator Species (MIS, i.e., wildlife species associated with or dependent on old growth)?

Issue 3: How would the Amendment affect elk, elk habitat, and elk populations including: changes in vegetation management and fire, road and road density impacts, noxious and invasive weed management, hunting, and socio-economic concerns?

3.4.2.2 Methodology

Analysis methodology differs for each species depending on type and amount of data available including recent and past literature on life history, habitat needs, movement and dispersal, home range analyses; professional expertise and knowledge; and other pertinent information. Limitations in the applied methodology are noted for each species analyzed. Modeled data comes from a variety of sources. Most sensitive species predicted habitat suitability models come from the Montana Natural Heritage Program (MNHP, Montana Natural Heritage Program and Montana Fish Wildlife and Parks 2019); other models such as wolverine dispersal habitat come from specific, peer-reviewed research (Inman et al. 2013). Elk distribution data, collected in 2014, comes from the Montana Fish Wildlife and Parks website. Modeled data is evaluated and assimilated along with peer-reviewed research for each analyzed species in addition to any local surveys collected by Forest personnel or other agencies. Known habitat requirements are evaluated with existing condition data to inform species potential current or future use based on the suitability of the habitat. Effects to species are analyzed with the understanding that:

- Any modeled data used is imprecise;
- Amendment language specifies guidelines, but no two treatments are the same;
- An activity may affect a species in one way at one place in one time but may have different effects in another place at another time.

For these reasons, analyzing species and potential effects uses several assumptions and limitations. General assumptions and limitations include:

- spatial data used is relevant, but accuracy of these data fluctuate because databases are compiled by specialists through various means of field visits, surveys, inventories, and photo interpretation. Data collection and compilation may affect accuracy and errors can occur;
- relevant cited scientific research is applied appropriately to the species analyzed where possible, lack of appropriate research may be impetus for further field investigation;
- the Amendment results in the same general outcomes;
- effects from the Amendment are relatively uniform across the landscape from one location to the next.
- the Forest Service analyzes the effects of the Amendment to TES, Regional Forest Sensitive and Management Indicator wildlife species and their habitats at the analysis area level, and then puts those effects into a Forest or Regional context to analyze potential effects to species viability. In this instance, the Amendment analysis area is the entire Forest, and thus the analyses of the Amendment effects are contextualized at the Regional level where appropriate data exists. This approach is consistent with recommendations in Ruggiero et al. (1994) and Marcot and Murphy (1992) that large analysis areas are appropriate for assessing population viability for highly mobile or wide-ranging species.
- not all terrestrial wildlife species contained within the project area are analyzed in this report. The wildlife biologist analyzes all species as mandated by law, regulation, or policy which serves as a proxy to assess the effects of management activities on wildlife populations and the populations of other species with similar habitat needs which they may represent.

Specific assumptions and limitations based on the analysis methodology used are discussed in each species' section. All analyses use the best available scientific data to inform decisions based on species' needs and predicted effects. All literature and references are cited where appropriate; however, some references not specifically cited includes all literature in the Bitterroot National Forest Wildlife Reference Database which have been reviewed over time and are incorporated into the report.

3.4.2.3 Information Sources

Information sources for analysis differ depend on the species and available data. Some Regional Forester Sensitive Species and Management Indicator Species analyses use the MNHP (2019) species occurrence maps and data points, structured survey results, and inductive models constructed using Maximum Entropy software (Phillips et al. 2006) in conjunction with a variety of statewide biotic and abiotic layers standardized to 90 x 90-meter raster pixels and presence only data for individual species contributed to Montana Natural Heritage Program databases and filtered to ensure spatial and temporal accuracy and reduce spatial autocorrelation. The goal of inductive model outputs is to predict the distribution and relative suitability of habitat during the primary season of interest (usually breeding habitat, but overwintering habitat for winter migrants) at large spatial scales (Montana Natural Heritage Program and Montana Fish Wildlife and Parks 2019).

Some Regional Forester Sensitive Species, Management Indicator Species, and Threatened and Endangered Species analyses uses Forest-specific modeling based on current research and known life history needs. Spatial data includes Region 1 Existing Vegetation Database (VMAP, Ahl and Brown 2017) which provides a database of existing vegetation and associated map products that are constructed with an analytical methodology based on the Existing Vegetation Classification and Mapping Technical Guide (Brohman and Bryant 2005) to support the Region 1 Multi-level Classification, Mapping, Inventory, and Analysis System, R1-CMIA (Berglund et al. 2009). Other spatial data used may include Field Sampled Vegetation (FSVeg) data collected by Forest Service personnel using Common Stand Examination protocols, Natural Resource Information System (U.S. Department of Agriculture 2007) databases and computer applications, and modeling products created and peer-reviewed by researchers and appropriately cited.

3.4.2.4 Incomplete and Unavailable Information

Data gaps and assumptions made to address data gaps influence effects conclusions. Without specific research or spatial data on every species (e.g., home ranges, disturbance response, micro-habitat needs, foraging behavior), literature, professional judgment, and experience provide the basis and rationale for conclusions. Data gaps do not rise to the level of creating uncertainty in conclusions.

3.4.2.5 Spatial and Temporal Context for Effects Analysis

Spatial context (analysis area) where effects (indirect and cumulative) may be caused by the Amendment varies for each species. Forest plan guidance does not create direct impacts because the plan does not compel management. Unless otherwise noted, the indirect effects to species are analyzed on National Forest System lands in the analysis area. Exceptions to this due to species or habitat distribution, home range size, linkages between suitable habitats, modeling methodologies or other considerations, will be explained in the appropriate species' analysis sections. The cumulative effects analysis area is defined for each species with appropriate rationale and includes all land ownerships.

Some elements of wildlife habitat require a detailed analysis and discussion to determine potential effects on particular species. Other elements may not be impacted or are impacted at a level which does not influence the species or their occurrence. In these cases, a detailed analysis is not necessary and was not conducted. A species was selected for detailed analysis if the species was present within the affected area or when known habitats for that species had a likelihood of being affected by the Amendment. The level of analysis depends on the existing habitat conditions, the intensity of the action, the magnitude of the action, existing literature, and the risk to the resources.

Temporal bounds where effects (direct/indirect, and cumulative) may be caused by the Amendment may also vary. In general, short-term temporal bounds of ten years during the remaining life of Forest Plan implementation capture the effects analysis, but discussion regarding longer-term effects speak to the resulting vegetational succession, not potential disturbance.

3.4.3 Issue 1: Environmental Consequence of the Proposed Action on Federally Threatened, Endangered, or Proposed Species

3.4.3.1 Canada Lynx and Canada Lynx Critical Habitat

Canada lynx were excluded from detailed analysis for the following reasons:

- No species occurrence.
- Previous consultations for effects exist.
- Northern Rockies Lynx Management Direction will be considered on all future projects potentially impacting Canada lynx habitat, serving as suitable design features.

3.4.3.2 Yellow-billed Cuckoo

Yellow-billed cuckoo were excluded from detailed analysis for the following reasons:

- No species occurrence.
- No suitable habitat.
- Not known to occur on the Bitterroot National Forest.
- Insufficient habitat in project area to support a breeding pair.

3.4.3.3 Monarch Butterfly (Candidate species)

Monarch butterfly were excluded from detailed analysis for the following reasons:

- No species occurrence.
- No suitable habitat.
- Not known to occur on the Bitterroot National Forest.

3.4.3.4 Grizzly Bear

Detailed analysis of the grizzly bear analysis area, environmental baseline, existing condition, and direct, indirect, and cumulative effects to grizzly bear with regards to the ESA are documented in the Biological Assessment (U.S. Department of Agriculture 2020). The Biological Assessment considered the ongoing implementation of the Forest Plan and the Bitterroot Travel plan for its effects determination. As stated in the associated Biological Opinion (U.S. Department of the Interior 2021a), the proposed amendments are not likely to jeopardize the continued existence of the grizzly bear, and that any negative effects associated with the implementation of the amended Forest Plan will not negatively impact the survival or recovery of grizzly bears.

Indirect Effects

The US Fish and Wildlife Service (U.S. Department of the Interior 2020) considers that grizzly bear "may be present" on some portions of the Forest. The Amendment will replace currently existing language; however, no Forest management actions will directly occur regarding the Amendment, thus there would be no direct effects to grizzly bear or grizzly bear suitable habitat.

All the guidelines in the Amendment (both Forest wide and Geographic Area specific) may have indirect effects on grizzly bears and suitable habitat. Forest-wide guidelines in relation to maintaining contiguous blocks of habitat and conducting project activities to enhance elk forage, minimizing disturbance to elk, maintaining connectivity, vegetation management related to adjacent lands, reducing noxious weeds, and certain management actions related to wildfire suppression would all have general benefits to grizzly bear. Maintaining contiguous blocks of habitat would serve to preserve existing grizzly bear secure habitat across the Forest. Minimal suppression of wildfires in wilderness areas and project activities that enhance elk forage, reduce noxious weeds, and minimize disturbance would serve to increase both the nutritional forage available to elk, as well as increase the reproductive potential of cow elk. In the Yellowstone Ecosystem, research found that from March through May, ungulates, mostly elk and bison, comprise a substantial portion of a grizzly bear's diet. Grizzly bears feed on ungulates primarily as winter-killed and wolf-killed carrion but also through predation on elk calves (Mattson et al. 1996, Schwartz et al. 2013). Grizzly bear have also been known to feed on adult bull elk during the fall elk rut (Mattson et al. 1991). The intent of the Amendment guidelines is to increase elk forage productivity and security on the Forest, thus potentially increasing the resources available to elk populations. This would potentially translate into a greater food resource for grizzly bears that may inhabit the Forest. In the North Sapphires and East Fork Bitterroot Geographic Areas, the intent of certain guidelines is to reduce new road construction open to public travel in order minimize additional pressure on elk that may contribute to elk movements off National Forest System lands. Disallowing public travel on newly constructed roads benefits grizzly bears by minimizing impacts to grizzly bear secure habitat. For more information on these indirect effects, see the Biological Assessment (U.S. Department of Agriculture 2020).

Grizzly bears are typically unaffected by vegetation management activities outside the physical disturbance resulting from human activity and roads (Wielgus and Vernier 2003). Changes in the definitions used to identify old growth forest patches is therefore unlikely to affect bears. However grizzly bears are opportunistic omnivores and do acquire resources and shelter in old growth forest. They often spend time in older forest stands during the day, possibly due to cooler microclimates (Roever et al. 2010). The increase in acreage designated as old growth forest expected under the proposed amendment, and in particular the identification and retention of smaller patches of old growth forest, should benefit grizzly bears by helping to promote a more heterogenous landscape. In particular the components of the Green et al. 2011 definition that emphasize the structural diversity of old growth forest will help ensure that retained old growth orest can provide the resting and denning structures bears require.

Bears are omnivores, and insects also make up an important part of their diet (Mace and Jonkel 1986). Often they acquire these food items, such as ants or beetles by tearing apart snags or coarse woody debris (Servheen 1983). By clarifying the current snag and coarse woody debris retention guidance, and aligning it with the levels found historically on the Bitterroot National Forest, the proposed amendment help will maintain a source of insects for bears, such as carpenter ants, beetles, grubs and fungi (Mattson et al. 2002, Gunther et al. 2014, Saab et al. 2014).

Cumulative Effects

The cumulative effects area for grizzly bear is all lands within the administrative boundary of the Forest (1.6 million acres), as well as all other ownership acres, totaling slightly over two million acres. Past, present, and reasonably foreseeable actions were evaluated for cumulative effects to grizzly bear. The single greatest limiting factor for grizzly bear in the analysis area is immigration of enough bears to sustain a breeding population, although other factors include appropriate human food storage, and potential human-bear conflicts. The greatest limiting factor for grizzly bear suitable habitat is the distribution and scale of secure habitat for bear existence.

While a number of known ongoing and future activities may affect grizzly bear or their habitat in the analysis area, past effects are limited to one cause. Human-caused effects from excessive bear mortality is responsible for extirpation of bears from the Forest and surrounding lands. Grizzly bears were actively killed for their fur, for sport, and to eliminate possible threats to humans and livestock. The last known bear was killed in the area in 1932, and until recently, the last verified observation was in the 1940s (U.S. Department of the Interior 1993). Sporadic observations of verified tracks and grizzly bears have once again been documented over the past two decades. Cumulative effects from the Amendment and related actions on both Federal and other landownerships will likely affect grizzly bear re-population of the Forest. Currently listed as threatened under the ESA, grizzly bears are generally afforded protection from hunting mortality. Grizzly bear suitable habitat is largely restricted to National Forest System lands due to the large blocks of unroaded areas that provide security habitat and the necessary components for denning. Grazing management and recreational use of forested lands have the potential to effect grizzly bears from human-grizzly bear interactions. Grazing is limited on the Forest, but recreational use is wide-ranging. While the Forest can implement actions related to grizzly bear protections such as effective grazing management strategies and food storage strategies, these actions are outside the scope of this Amendment. The greatest beneficial cumulative effects to grizzly bears from the Amendment are directly related to the indirect effects discussed above.

As shown above in Table 1, sixteen site-specific plan amendments have been implemented since 1990 that addressed local application of the elk habitat effectiveness, thermal and hiding cover standards. The effects of these amendments are incorporated into the existing condition for the forest. The Mud Creek and Gold Butterfly projects, signed in 2023, are expected to be implemented and are therefore subject to cumulative effects analysis. However, because these two project amendments modified forest plan direction for elk habitat effectiveness, old growth forest definitions, and snag & coarse woody debris in the same manner as the proposed programmatic amendment, the effects of the two amendments are identical. The Bitterroot Front project is currently considering similar site-specific amendments; however, these will not be necessary if the programmatic amendment is ratified first.

In the relevant October 6, 2020 Biological Assessment, the Forest Service determined that the continued implementation of the Forest Plan and the Bitterroot Travel Plan, with the proposed Amendment regarding elk management standards, may affect and is likely to adversely affect grizzly bears (U.S. Department of Agriculture 2020). In the associated Biological Opinion, the USFWS concluded that continued implementation of the Forest Plan with the proposed Amendment is not likely to jeopardize the continued existence of grizzly bear (U.S. Department of the Interior 2021a). The subsequent expansion of the proposed Amendment to include updating the old growth forest definition, aligning coarse woody debris retention guidelines with biophysical conditions, and resolving the discrepancy in the snag retention guideline is not expected to alter the conclusions of the 2020 Biological Opinion or threaten the expansion of grizzly bears onto the Bitterroot National Forest. The USFWS concurred with this finding.

3.4.3.5 Wolverine

Detailed analysis of the wolverine analysis area, environmental baseline, existing condition, and indirect and cumulative effects to wolverine with regards to the ESA are documented in the Biological Assessment (BA, PF-WILD-002). Following this analysis, the determination is that the proposed project is not likely to jeopardize the continued existence of the North American wolverine.

Direct Effects

Because the proposed amendment does not propose or authorize any ground-disturbing activities, or any activities that might disrupt wolverine behavior, there are no direct effects to the species. Indirect effects, through the future authorization of projects following the modified Forest Plan management direction, may occur.

Indirect Effects

The best scientific and commercial information available indicates that only the projected decrease and fragmentation of wolverine habitat or range due to future climate change is a threat to the continued existence of the species. Current information does not indicate that potential stressors such as land management activities, recreation, infrastructure development, and transportation corridors pose a threat to the species (U.S. Department of the Interior 2013a;2018).

Habitat

Changes in forest guidance regarding the definition of old growth forest or the retention of snags and coarse woody debris are unlikely to affect wolverine habitat quality. Changes in forest guidance regarding the management of elk habitat may result in changes to the structure of vegetation, however these are also unlikely to affect wolverine habitat quality. Wolverines are not known to be dependent on any type of vegetation or forest structural stage, the wolverine is a generalist species that appears to be little affected by changes to the vegetative characteristics of its habitat (U.S. Department of the Interior 2013b). Mechanical treatment activities (and associated vehicle traffic), use of the existing road system, construction and use of temporary project routes, decommissioning of temporary project routes, fuels treatment and burning, and other human activity in excess of background levels (e.g., hand pre-commercial thinning and other activities including whitebark pine daylighting) were determined to not be a threat to the species (U.S. Department of the Interior 2013a;2018).

Because wolverine dispersal habitat is widespread on the Bitterroot National Forest, there is extensive overlap with areas used by elk. Therefore, it is likely that activities authorized under this amendment will alter the vegetation structure of dispersal habitat. However, because wolverines are less sensitive to habitat quality when outside primary habitat (Carroll et al. 2020), this is unlikely to negatively affect the species.

Disturbance

Changes in forest guidance regarding the definition of old growth forest or the retention of snags and coarse woody debris are unlikely to result in disturbance to wolverines. Changes to forest guidance regarding the management of elk habitat may result in the approval of vegetation management projects with the potential to disturb wolverines. This could include mechanical treatment activities (and associated vehicle traffic), use of the existing road system, construction and use of temporary project routes, and other human activity above background levels. However, these activities were determined to not be a threat to the species (U.S. Department of the Interior 2013a;2018). There is the potential that approved activities could result in increased use of forest roads, which could increase the potential for vehicle-related mortality. This type of mortality would remain highly unlikely on forest roads where vehicle speeds are slow due topography and road conditions, and road use is limited to haul routes and temporary road construction. These activities were determined to not be a threat to the species (U.S. Department of the Interior 2013a;2018). Furthermore, in the North Sapphires and East Fork Bitterroot Geographic Areas, the intent of guidelines GA-GDL-NS-WLF-ELK-01 and GA-GDL-EFB-WLF-ELK-01 is to reduce new road construction open to public travel.

Given the widespread availability of wolverine dispersal habitat, both male and female, on the Bitterroot National Forest, there is significant overlap between dispersal habitat and elk distribution on the forest While wolverine dispersal could be affected to some degree, dispersal habitats are not suitable for the establishment of home ranges and reproduction and are generally not for used for foraging (U.S. Department of the Interior 2013a;2018). Wolverines have also been found to be only moderately sensitive to habitat quality when outside areas suitable for home ranges (Carroll et al. 2020). Any disruption of dispersal or other exploratory movements due to project activities approved as a result of this amendment would be temporary and would occur at a small scale when compared to the landscape scale of dispersal habitat and large home range size of wolverines.

Winter recreational motorized and non-motorized activities currently occur, and would continue to occur, in the project area. Wolverine have been documented to persist and reproduce in areas with high levels of human use and disturbance including developed alpine ski areas and areas with motorized use of snowmobiles (Heinemeyer 2012, U.S. Department of the Interior 2013a, Heinemeyer et al. 2019). This suggests that wolverines are able to adjust their use within their home ranges to avoid disturbance (Heinemeyer 2012). The proposed amendment does not include any changes to over-the-snow motorized activity or access.

Prey and Prey Distribution

Changes in forest guidance regarding the definition of old growth forest or the retention of snags and coarse woody debris are unlikely to result in changes to wolverine prey availability. Changes to forest guidance regarding the management of elk habitat may result in the approval of vegetation management projects with the potential to temporarily disturb prey species. However, the amendment is expected to benefit elk through the enhancement of forage availability and nutritional quality, which could result in greater availability of carrion, a significant source of food for wolverine (U.S. Department of the Interior 2018). Other wolverine prey species include small mammals like snowshoe hare, ground squirrels and marmots (Lofroth et al. 2007). Snowshoe hare habitat would remain well distributed but may be impacted by implementation of project activities but not outside the project area in the male dispersal habitat. Availability of these species as prey are unlikely to be impacted by the proposed amendment. Disturbance to prey resources is not considered a potential threat to the wolverine in either the 2013 or 2018 proposed listing rules (U.S. Department of the Interior 2013b;2018).

Cumulative Effects

The Endangered Species Act (ESA) defines cumulative effects as future state, tribal, local, or private activities that are reasonably certain to occur in the action area considered in this biological assessment. The Bitterroot National Forest regularly sees activities such as timber harvest and other vegetation management; residential development; road and trail construction, maintenance, and use; maintenance and use of utilities; and recreational activities such as hunting, hiking, mountain biking, camping, snowmobiling, cross-country skiing, snowshoeing, horseback riding, driving, motorcycle and ATV riding; and firewood and other miscellaneous forest product gathering. These activities are expected to continue.

Trapping for wolverine is currently not permitted; however, trapping for other furbearers does occur. In winter, plowed roads and snowmobile access provide access for trappers and possibly competitors. Based on recent history, the activities listed above are expected to continue to occur at increasing levels due to more recreational pressures and private land development. The Forest Service does not know of any activities that are reasonably certain to occur on non-federal lands that will affect dispersal habitat. Ongoing activities on private lands in the action area that may continue include residential development and occupancy, firewood gathering, recreational activities, and commercial activities. As these activities are occurring and are expected to continue in the future, it is unlikely that wolverine would avoid these areas to a greater degree than what may be currently occurring. There is no evidence that human development, infrastructure development, and associated activities are preventing wolverine movements between suitable habitat patches (U.S. Department of the Interior 2018).

Cumulative effects associated with projects authorized under this amendment will be analyzed and disclosed in association with project-specific effects analyses.

3.4.4 Issue 2: Biological Evaluation addressing the affected environment of Regional Forester Sensitive Species and the Management Indicator Species (MIS) as related to old growth habitat on the Bitterroot National Forest

The Amendment fulfills the project's stated purpose and need to base elk management on the most recent science that is measurable and applicable to the geography, landscape, and biology of the Bitterroot National Forest to remedy some of the antiquated science from the 1987 Forest Plan. The Amendment will provide a greater degree of management flexibility by managing for a mosaic of vegetation arrangement and successional stages to support elk and evaluating and integrating new science regarding elk disturbance in coordination with MT Fish, Wildlife and Parks. Additionally, the Amendment adopts improved definitions for old growth forests to facilitate compliance with Executive Order 14072 and refines the guidance on coarse woody debris retention in alignment with recent science. Finally, the Amendment reconciles existing conflict within the current Forest Plan regarding the retention and/or harvest of snags. The old growth components would significantly increase the amount of forest identified as old growth on the Bitterroot National Forest (PF-VEG-016). The elimination of standard F.2(e)(5) will result in the retention of more old growth.

Thorough evaluation of the species' analysis areas, environmental baselines, existing conditions, and indirect and cumulative effects can be found in the wildlife specialist report (PF-WILD-001). A summary of analyses, including rationale for species eliminated from detailed analysis, is included in Table 6.

Table 6. Summary of conclusions regarding impacts to Region 1 Regional Forester Sensitive Species and Bitterroot National Forest Management Indicator Species, and associated rationale

SPECIES	Preferred Habitat	Species Present?	Determination[1,2]	Conclusion and Associated Rationale
Regional Forester Sensitive Species present on Bitterroot National Forest				
Birds				
American peregrine falcon *Falco peregrinus anatum*	Cliff nesting (ledges); aerial foraging over open areas for small to medium-sized bird species prey.	Yes	NI	Eliminated from detailed analysis • Nesting habitat is limited to rocky cliff areas. • Amendment would not affect management of suitable habitat and would not affect nesting habitat. • No indirect or cumulative effects anticipated.
Bald Eagle *Haliaeetus leucocephalus*	Nesting trees/platforms near large rivers or lakes; available fish and water bird species prey.	Yes	NI	Eliminated from detailed analysis • Nesting areas are limited to large riparian areas on major rivers. • Amendment would not affect management of suitable or nesting because of the retention of large trees and snags. • No indirect or cumulative effects anticipated.
Black-backed woodpecker *Picoides arcticus*	Burned or insect-killed snag concentrations, limited to 5 or 6 years following mortality. Individuals may occur in green forests with concentrations of insect-killed snags.	Yes	No Action - NI Action Alt – MIIH	• Amendment would influence the management of snags and old growth forest, which could impact habitat • Snag retention guidelines would result in the removal of some snags, though emphasis is on retaining the highest concentrations of snags in burned habitat as well as any snags that show evidence of wildlife use. • Existing plan direction regarding salvage logging remains unchanged. • Habitat is not a limiting factor for black-backed woodpeckers at the regional or forest scale

SPECIES	Preferred Habitat	Species Present?	Determination[1,2]	Conclusion and Associated Rationale
Flammulated owl *Otus flammeolus*	Mature and old growth ponderosa pine with snags and open understory, with abundant moth species prey. Secure nesting habitat (< 35 percent canopy cover)	Yes	No Action - NI Action Alt – MIIH/BI	• Amendment will result in identification of additional acreage (5-40 ac patches) of suitable old growth habitat and limit regeneration harvest in old growth stands. •Future Projects under Bipartisan Infrastructure Law and Inflation Reduction Act call for the retention of large diameter trees and snags where appropriate. • Potential future treatments in stands identified as old growth ponderosa pine in flammulated owl habitat would retain the forested nature of treated stands and promote open understory conditions. • Flammulated owl habitat is abundant and widely distributed in the analysis area, Forest, and Region, such that population viability is not a concern.
Mammals				
Bighorn sheep *Ovis canadensis*	Grasslands or open forest with steep, rocky escape cover. Semi-open to open vegetation types preferred.	Yes	No Action - NI Action Alt – MIIH/BI	• Amendment will likely have little to no effect management of bighorn sheep habitat. • Bighorn sheep suitable habitat and recent population data suggest that habitat is abundant and widely distributed in the analysis area, Forest, and Region, such that population viability is not a concern.
Fisher *Martes pennanti*	Moist coniferous forested types (including mature and old growth spruce/fir), riparian/forest ecotones. Suitable habitat predominantly along larger tributary streams in Bitterroot Mountains.	Yes	No Action - NI Action Alt – MIIH/BI	• Habitat is abundant enough to support a viable population of fisher at the Regional Scale (U.S. Department of the Interior 2017d); the proposed action would not guide management in a manner that would substantially decrease fisher habitat. • The Bitterroot Forest is likely dispersal/marginally suitably habitat for fishers and detections are minimal. • The Bitterroot Forest contains only small amounts of high probability habitat in fragmented pieces, likely not enough to support a persistent fisher population. • The amendment will increase the amount of forest identified as old growth habitat, and limit regeneration harvest in those areas.

SPECIES	Preferred Habitat	Species Present?	Determination[1,2]	Conclusion and Associated Rationale
Gray wolf *Canis lupus*	Habitat generalist.	Yes	No Action - NI Action Alt – MIIH/BI	• Amendment would enhance elk habitat quality, thereby increasing prey availability for wolves. • Wolves are highly adaptable and use a variety of habitat, therefore and vegetation management projects approved as a result of this Amendment are unlikely to alter habitat quality. ‘ • Increases in elk hunting opportunities could result in increased wolf mortality, however any such changes would be monitored and adjusted for by MTFWP through quotas and other management actions.
Northern bog lemming *Synaptomys borealis*	Wet riparian sedge meadows, bogs, fens	Yes	NI	Eliminated from detailed analysis • Amendment would not affect management of suitable habitat • No indirect or cumulative effects anticipated.
Townsend's big-eared bat *Corynorhinus townsendii*	Roosts in caves, mines, rock crevices, and buildings. Forages over tree canopy, over riparian areas or water. Hibernates in caves or mines. Temporarily roosts in large snags.	Yes	NI	Eliminated from detailed analysis • Amendment would not affect management of suitable habitat • No indirect, or cumulative effects anticipated.
Amphibians				
Coeur d'Alene Salamander *Plethodon idahoensis*	Spray zones near waterfalls or seeps in fractured bedrock.	Yes	NI	Eliminated from detailed analysis • Amendment would not affect management of suitable habitat • No indirect or cumulative effects anticipated.
Northern Leopard frog *Rana pipiens*	Non-forested ponds. Possibly extirpated from Bitterroot drainage.	Possible	NI	Eliminated from detailed analysis • Amendment would not affect management of suitable habitat • No indirect or cumulative effects anticipated.

SPECIES	Preferred Habitat	Species Present?	Determination[1,2]	Conclusion and Associated Rationale
Western toad (Boreal toad) *Bufo boreas*	Mostly associated with wetlands and wet areas during the day, may range wider to drier sites during nighttime. Somewhat of a terrestrial habitat generalist, but largely associated with wetlands; breeds in ponds, slow streams.	Yes	NI	Eliminated from detailed analysis • Amendment would not affect management of suitable habitat • No indirect or cumulative effects anticipated.
Management Indicator Species and other important species on Bitterroot National Forest (U.S. Department of Agriculture 1987c)				
Elk *Cervus canadensis*	Habitat generalist. Winter range in lower elevation conifer/shrub/grasslands.	Yes	No Action - ME Action Alt – GB	See ISSUE 3 Section
Marten *Martes americana*	Mature and older lodgepole, subalpine fir and spruce forests with abundant down logs.	Yes	(No Action) - ME (Action Alt) – ME/GB	• Habitat is abundant enough to support a viable population at both the Forest and Regional scale and the Amendment would not guide management in a manner that substantially decreases marten habitat. • The Bitterroot Forest has likely served as suitable habitat for marten and will continue to provide marten with the necessary habitat components for the foreseeable future. • Amendment will increase the amount of forest identified as old growth habitat, and limit regeneration harvest in those areas. • Amendment provides for snag and coarse woody debris structure used by marten. • Amendment would not guide management in a manner that would substantially affect trapping pressure or other causes of mortality.
Pileated woodpecker *Dryocopus pileatus*	Mature and older lower to mid-elevation conifer forests or cottonwood gallery forests with large snags and down logs.	Yes	No Action - ME Action Alt – ME	• At Forest and Regional scale, ample pileated woodpecker habitat exists. The requirement to retain 40 snags per 10 acres in treated stands would guide management in a manner that maintains habitat.

Update to Forest Service Northern Region Sensitive Species List 2011. Options in determination of effects: (1) NI - No impact; (2) MIIH - May impact individuals but is not likely to cause a trend to Federal listing or loss of viability; (3) LAA - Likely to result in a trend to Federal listing or loss of viability; and (4) BI - Beneficial impact. There would be "no impact" to sensitive species determined to be absent from the project area and not included in this table. The determination is based on the presence of suitable habitat.

2 There is no specific determination for Forest Management indicator species related to ESA or NEPA. Determination of effects are categorized as: (1) GB - General Benefit; (2) ME - Minimal Effect; or (3) N - Negative Effect.

3.4.5 Issue 3: Environmental Consequence of the Proposed Action on Elk

As a game species, elk are of great importance to the public. Elk populations in Montana are managed by the Montana Department of Fish, Wildlife, and Parks (MTFWP). The 2004 Elk Management Plan (Montana Fish Wildlife and Parks 2004) discusses four Elk Management Units (EMUs) that are contained partially or in whole within the analysis area: Rock Creek, Sapphire, Bitterroot, and West Fork. The four EMUs that intersect the Bitterroot National Forest are made up of seven Hunt Districts (HDs): 204, 240, 250, 260, 261, 262, and 270. The 2004 Elk Management Plan identified goals for the elk populations in the different EMUs with the primary focus on maintaining elk populations in a healthy condition and cooperating in the management of elk habitat to provide a diversity of hunting experiences (Montana Fish Wildlife and Parks 2004), and habitat objectives focus on maintaining elk security and maintaining and enhancing the current amount of winter range.

MTFWP is currently revising the 2004 Elk Management Plan and expects to remove the EMUs as a planning tool, instead relying on the hunting district (HD) boundaries (R. Mowry, MTFPW, personal communication 2023). For this reason, the geographic areas dictating application of the elk habitat management components for the amendment are defined by hunting district instead of EMU.

While MTFWP manages the elk populations, the Forest plays a large role in managing habitat for elk. The Forest Plan includes multiple Management Areas (MA) that focus on habitat for elk and other big game, particularly MAs 1, 2, 3a, 5, and 8a (Table 7). All of these MAs and their standards and goals pertaining to elk are discussed in the Forest Plan (U.S. Department of Agriculture 1987c).

These Forest Plan Management Areas contain the regulatory framework for elk that apply to the Amendment.

Table 7. Management Areas with respect to elk and big game on Bitterroot National Forest

Management Area	Management Goals	Acres in Analysis Area	Percent of Bitterroot National Forest Lands
1	Emphasize timber management, livestock and big game forage production, and access for roaded dispersed recreation activities and mineral exploration. Assure minimum levels for visual quality, old growth, and habitat for other wildlife species.	208,429	13 percent
2	Optimize elk winter ranger habitat using timber management practices. Emphasize access for mineral exploration and roaded dispersed recreation activities. Provide moderate levels of visual quality, old growth, habitat for other wildlife species and livestock forage.	143,067	9 percent
3a	Maintain the partial retention visual quality objective and manage timber. Emphasize roaded dispersed recreation activities, old growth, and big game cover. Provide moderate levels of timber, livestock forage, big game forage and access for mineral exploration.	123,489	7 percent
5	Emphasize motorized and non-motorized semi-primitive recreation activities and elk security. Manage big game winter range to maintain and enhance big game habitat. Manage existing road corridors to provide recreation access.	228,296	14 percent
8a	Manage at the minimum level, but protect timber, soil, water, recreation, range and wildlife resources on adjacent management areas. Maintain existing uses and facilities.	25,725	2 percent
8b	Optimize big-game forage production utilizing habitat improvement practices. Manage to ensure adequate forage for wintering big game.	7,339	<1 percent

3.4.5.1 Indicators and Measures Used for Analysis

The Forest Plan Record of Decision (U.S. Department of Agriculture 1987b) identified two factors under Forest control: winter habitat and security. Research has identified three key components to habitat management for elk density: winter range, elk habitat effectiveness, and vulnerability/security (Christensen et al. 1993, Ranglack et al. 2016, Ranglack et al. 2017). Analysis of the proposed Amendment's effects to elk considered the following factors: (1) potential effects to elk populations; (2) potential effects to elk winter range habitat and thermal cover; and (3) potential effects to elk vulnerability and security. Additional information used to evaluate potential effects, the analysis area, and existing conditions, are included in project file PF-WILD-001.

3.4.5.2 Environmental Consequences of the No Action Alternative on elk

Because this alternative would not change Forest Plan components, elk habitat would adhere to current standards involving vegetation management activities, and specific Management Area (MA) standards and guidelines. No actions would be authorized without project-specific analysis and the existing condition would continue to change throughout time as individual projects are implemented; thus, there would be no direct effects to elk.

This alternative would not directly alter vegetation and would not change roads or access in the analysis area. There would be no immediate direct or indirect effects to winter range, habitat effectiveness, or vulnerability/security. However, over time the vegetation would continue to become denser throughout the analysis area, which would continue to decrease forage quality, but may increase hiding cover. The risk of high severity wildfire in the lower elevations (i.e., winter range) in the absence of fuel treatments would likely continue to increase due the effects of tree mortality from decadence, disease, and potential climate change factors. A large-scale high-severity fire in winter range could greatly reduce cover, which may negatively affect winter range quality, although re-growth of grasses and shrubs after a fire would substantially increase the forage values.

In high elevations, where fuels continue to build up, chances of high severity wildfire would also likely increase. A high-severity fire in upper elevations could benefit elk summer range forage. Without such disturbance, forage quality and quantity will continue to decrease over time. A large-scale high-severity wildfire could have short-term negative effects until enough vegetation begins to re-grow. The potential effects of climate change on elk in Region 1 are discussed in (McKelvey and Buotte 2018), including the effects of changes in disturbance regime and subsequent changes in forage and thermal cover availability. The authors conclude that there are unlikely to be strong negative consequences for elk, given their generalist behavior and flexibility in habitat use, and other authors have suggested that changing temperature and precipitation patterns may strongly benefit elk populations (Wang et al. 2002).

Road access, with the abundance of open roads in the certain portions of the analysis area, has affected security for elk, and those conditions would continue to remain. Thermal cover and habitat effectiveness in certain areas would likely continue to fall short of Forest Plan standards.

3.4.5.3 Environmental Consequences of Proposed Action on Elk

The Amendment would change some language that would alter management strategies on a site-specific basis in the future; however, other current Forest Plan forest-wide standards would remain intact across the suite of resources, in addition to specific Management Area (MA) standards and guidelines that direct management in elk habitat. No actions would be authorized without future site-specific project analysis and the existing condition would continue to change throughout time as individual projects are implemented; thus, there would be no direct effects to elk at the Amendment level. Any direct effects to elk would be analyzed during future site-specific project planning and implementation; therefore, the following discussion related to indirect and cumulative effects only.

Desired conditions are descriptions of specific social, economic, and/or ecological characteristics of the plan area toward which management of the land and resource should be directed. FW-WLF-ELK-DC-01 describes the over-arching desire of the Forest with respect to elk to support a diversity of elk habitats that provide for ecological conditions that supplement diverse recreational opportunities including wildlife enjoyment, viewing, and hunting with the intention of maintaining elk on National Forest System lands throughout the archery and rifle hunting seasons at levels that support State recommendations regarding big game distribution, population size, and harvest. FW-WLF-ELK-DC-02 describes the Forest’s desire to alleviate adjacent landowner conflicts and support State elk management objectives through appropriate elk forage, connectivity, winter range, and calving habitat. As desired conditions, these statements do not have any direct or indirect effects on elk or elk habitat; however, other plan components discussed below may have indirect effects to elk.

The Amendment language includes four goals that are broad statements of intent, usually related to process or interaction with the public. These goals provide a framework for the guidelines discussed below and are intended to support the process by which the Forest progresses towards desired conditions. FW-WLF-ELK-GOAL-01 states the intention of the Forest to cooperate with Montana Fish, Wildlife and Parks biologists to identify potential needs for and means to achieve desired distribution, viewing, and hunting opportunities for elk. FW-WLF-ELK-GOAL-02 states the intention of the Forest to cooperate with willing landowners and other entities to identify opportunities to conserve or manage non-Federal lands within or adjacent to the national forest boundary to benefit elk. FW-WLF-ELK-GOAL-03 states the intention of the Forest to engage in cooperation and collaboration with other partners in the development of management strategies to maintain suitable habitat conditions and big game populations in numbers and distribution that allow for sustainable, high-quality viewing and hunting experiences on National Forest System lands. FW-WLF-ELK-GOAL-04 states the intention of the Forest to make educational information available that provides public awareness of the high value of wildlife resources such as biodiversity, habitat connectivity, recreation opportunities, cultural or spiritual connections, safety issues, and co-existence.

Five Forest-wide guidelines and nine Geographic Area (GA)-specific guidelines are included in the proposed Amendment language. Guidelines are a constraint on project and activity decision-making that allows for departure from its terms, so long as the purpose of the guideline is met. Guidelines are established to help achieve or maintain a desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements. Geographic Areas are now based on hunting districts instead of MTFWP Elk Management Units (EMUs), where they overlap with Bitterroot National Forest lands. The GA-specific guidelines recognize that different areas of the Forest have different elk habitat management challenges. These are discussed in the appropriate sections below.

Proposed changes to Forest Plan language regarding old growth forest, snag retention, and coarse woody debris are not expected to impact elk or elk habitat.

Elk Population Status

Montana Fish, Wildlife, and Parks (MTFWP) is responsible for elk population management. Currently a mix of elk population management practices exist across the analysis area including limited entry draw licenses, over-counter general elk licenses, and other specialized management actions for additional harvest opportunities. Total elk harvest numbers have slightly decreased over time (Figure 3) in Hunt Districts (HDs) that are contained by or have portions within the administrative boundary of the Bitterroot National Forest, which is likely a result of multiple factors including but not limited to: elk population distribution, license allocation, increases in human population, distribution of hunters afield, and habitat changes through time. The proposed Amendment language is not expected to alter elk population management or potential recreational opportunities for elk, with respect to MTFWP management goals. While MTFWP may change season dates, numbers of licenses available, or other season structures, the proposed action will not directly affect these management decisions. Indirect effects from the proposed Amendment language may result in changes to elk populations or distribution over time as future site-specific projects are implemented. Amendment desired conditions, guidelines, and goals are intended to assist MTFWP with achieving State management objectives.

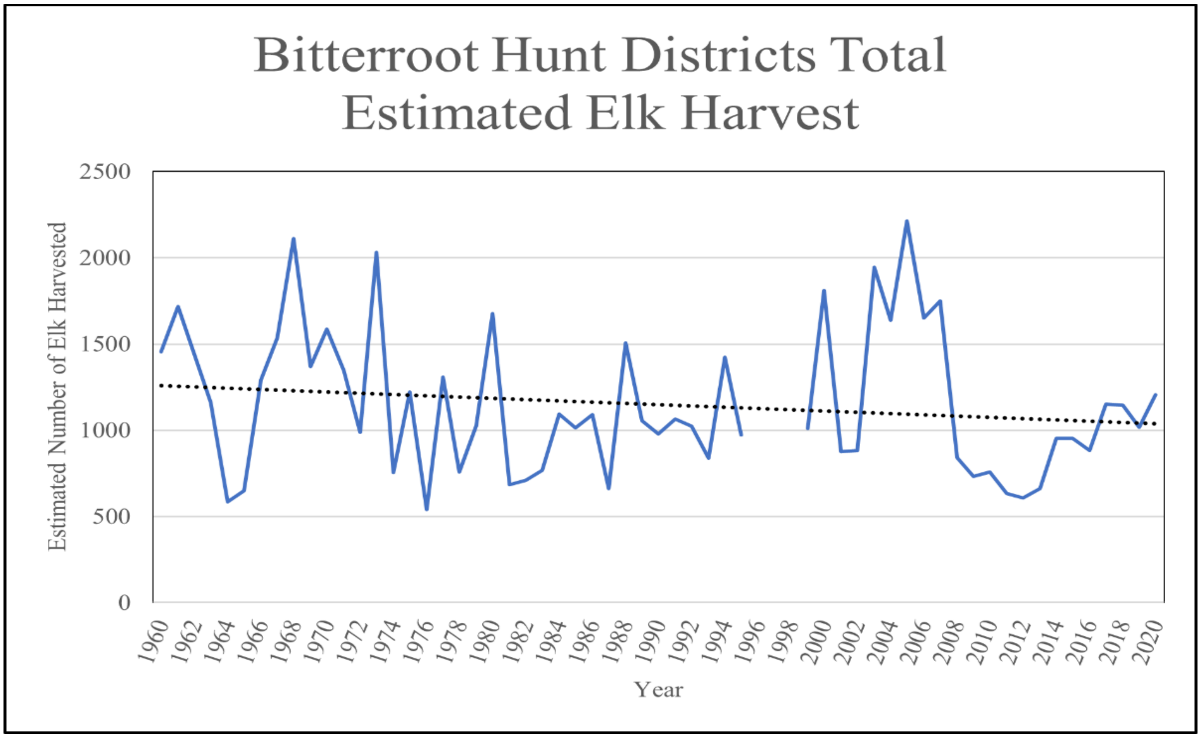

Figure 3. Total Estimated Elk Harvest for Hunt Districts intersecting Bitterroot National Forest (adapted from MTFWP data 2020, available at https://myfwp.mt.gov/fwpPub/harvestReports)

Winter Range

The proposed Amendment language would guide the Forest in future management activities that occur on known elk winter range. The desired conditions and goals noted above would direct Forest cooperation with State and other willing landowners and other entities in determining winter range habitat to maximize effectiveness. Forest-wide guideline FW-WLF-ELK-GDL-02 directs the Forest to include vegetation management project activities on known elk winter and spring foraging areas to increase elk forage to help alleviate elk conflicts with adjacent landowners. The indirect effects to elk will include guiding future management activities towards increasing elk forage. These activities, depending on the location, varying silvicultural prescription, and coordination with MTFWP biologists and other entities may include prescribed burning, commercial or non-commercial operations to promote forage enhancement, noxious weed treatment, planting, or other methods applicable to the area. This guideline is intended to guide management in a manner that will benefit winter range and/or calving habitat, so indirect effects are anticipated to be largely beneficial.

FW-WLF-ELK-GDL-03 directs the Forest to locate and schedule vegetation management activities and travel management motor vehicle use decisions appropriately to minimize disturbance of elk on known winter range during the winter and in known calving areas during the reproductive season to avoid stressing elk when energy demands are high, with exceptions mandated by law, regulation, or policy. The indirect effects to elk would be beneficial, as it guides future management activities towards reducing elk disturbance. The intent of this guideline is to minimize elk disturbance at sensitive times during the year to minimize impacts to reduced elk forage availability, reproduction, and survival. This guideline is intended to guide management in a manner that will benefit winter range and/or calving habitat, so indirect effects are anticipated to be mostly beneficial.

Thermal Cover

Regarding the elimination of thermal cover standards, recent research on winter range and thermal cover by Cook et al. (1998) concluded that:

- thermal cover does not appreciably enhance the energetic status and productive performance of elk in climatological settings similar to those of our study;
- providing thermal cover is not a suitable solution for inadequate forage conditions; and
- habitat management based on the perceived value of thermal cover should be re-evaluated as elk biologists refocus their attention to the influences of forest management on:
  - forage sources and related production potential of forest successional stages; and
  - vulnerability of ungulates to harvest harassment.

Christensen et al. (1993) noted that detailed analyses of hiding and thermal habitat components are not considered as essential except in habitats with high natural levels of openings or where conifer cover is at a premium. However, Christensen also noted that management of winter range to improve thermal cover may be as important as management to change forage quality or quantity and recommended that where behavior patterns have been recorded, elk select resting and feeding sites based on control of energy transfer rather than forage availability, and thus retention of larger trees where possible is beneficial. The analysis of both thermal cover from Thomas et al. (1979) and forested winter stands show these areas widely distributed throughout the analysis area and modeled winter range.

In a review of thermal cover research on ungulates, Cook et al. (2005) reviewed four distinct studies that aimed to clarify the connections between thermal cover, elk habitat selection, animal energetics, and other factors. The authors realized that results of experimental studies cannot be used to categorically reject all potential benefits of forest cover to elk, and attention to cover management may be warranted in many circumstances where security is low or where snow accumulations limit animal performance. However, in summary, Cook suggested that there was little justification in these ecological settings [explicitly noting dry ecosystems of the central Rocky Mountains] for retaining thermal cover as a primary component of habitat evaluation models for elk, while also noting that it may be time to shift our attention toward relationships between herd productivity and nutrition-based attributes of habitat.

Future site-specific project activities including logging, thinning, and prescribed burning will alter the arrangement of stands on the landscape, and this could impact elk energy expenditure during winter. However, based on the growing body of research and conclusions regarding nutritional quality and forage availability at different times of the year, this proposed Amendment language change regarding eliminating thermal cover standards is not expected to have measurable effects to elk.

The potential effects to management of winter range may likely lead to beneficial changes in winter distribution, potentially maintaining elk on Bitterroot National Forest lands for longer durations in the winter.

Habitat Effectiveness and Quality

The proposed Amendment would eliminate elk habitat effectiveness from the standards and guidelines in the current Forest Plan and add guidelines to guide management of elk aligned with current scientific information. The concept of habitat effectiveness is heavily referenced in the literature (Lyon 1983, Lyon et al. 1985, Christensen et al. 1993), but until recently has been mostly measured in terms of the amount of motorized routes present, where non-motorized areas were assumed to be more effective than roaded areas. Recent research shows the nutritional resources available to elk on summer range are of particular importance because females must meet the nutritional demands of lactation, while also accruing fat for the winter (Cook et al. 2013). In a recent study of habitat selection by nine different elk herds in Montana, Ranglack et al. (2017) found that nutritional resources are the primary factor affecting elk distribution, more so than motorized route densities. Ranglack et al. (2016) noted that: "In addition to the strong effect of nutritional resources on elk summer resource selection, motorized routes also affected elk summer resource selection, although the magnitude of the access effect was small relative to nutrition." In later research, Ranglack et al. (2017) provided management recommendations regarding elk security habitat including expanded distances from roads as compared to Hillis et al. (1991), and for management activities to consider areas with high nutritional resources during the archery season. An important note is that the term "elk habitat effectiveness" has generally been misused in reference to elk habitat needs. Elk habitat effectiveness was defined by Lyon and Christensen (1992) as the percentage of available habitat that is usable by elk outside the hunting season, whereas Hillis et al. (1991) defined elk security around large blocks of contiguous habitat for elk to use during hunting season.

Under the proposed Amendment language, FW-WLF-ELK-GDL-01 would direct the Forest to design travel management motor vehicle use decisions to help maintain elk residency on National Forest System lands during the archery and rifle big game hunting seasons by maintaining contiguous blocks of habitat in locations elk traditionally use at times when they are vulnerable to disturbance from hunting or other recreation that may cause displacement from public lands. No additional roads, trails, or areas should be designated for motor vehicle use if project-level analysis indicates a likelihood of disturbance significantly affecting elk behavior or distribution, if elk use of National Forest System lands in the associated Hunt District has declined independent of population size, or in areas of low-quality forage, as described in Alternative C. FW-WLF-ELK-GDL-04 would direct the Forest to help maintain or restore habitat connectivity by ensuring that future site-specific project vegetation management activities and travel management motor vehicle use decisions should not create movement barriers to elk in known migration corridors, except where necessary to provide for human health and safety. Furthermore, FW-WLF-ELK-GDL-05 directs the Forest to maintain connectivity with adjacent lands by ensuring that future site-specific project vegetation management activities should be compatible with habitat management goals on adjoining State or Federal lands (for example, project planning should not be detrimental to elk winter range next to State Wildlife Management Areas where winter range management is the goal).

Certain proposed Geographic Area guidelines are intended to address effects to elk from travel management motor vehicle use decisions. GA-GDL-NS-WLF-ELK-01 would direct the Forest to designate all new permanent road construction as administrative use only in the North Sapphires GA. GA-GDL-EFB-WLF-ELK-02 would constrain the Forest to no net increase in permanent motorized route density at the future site-specific project scale, thus maintaining or decreasing the current amount of road density in the East Fork Bitterroot GA. The intent of these guidelines is to maintain or restore contiguous blocks of elk habitat that provide security, and connectivity both between Federal and non-Federal surrounding lands, in addition to preserving or reducing current road densities in certain areas. Effects to elk would likely be beneficial, as these guidelines were developed with collaborative partners to ensure that the Forest minimized to the extent possible the additional stressors to elk and subsequent movement between National Forest System lands and adjacent landowners.

Certain Geographic Area (GA) guidelines are intended to address summer elk forage quality and availability on summer range. GA-GDL-WB-WLF-ELK-01, GA-GDL-WFB-WLF-ELK-02 and GA-GDL-IDAHO-WLF-ELK-02 would direct the Forest to employ a minimum suppression strategy for wildfires that meet management direction and suppression strategies required for health and human safety where feasible in the Selway-Bitterroot Wilderness Area to enhance high alpine elk forage. Summer range quality would likely only be affected in these areas if larger fires were minimally suppressed, primarily in the higher elevation areas as the Forest is prohibited from most vegetation and fuels management actions in wilderness. Wildfires would likely have positive benefits to summer range, as it would clear out some of the dead downed and standing trees, release nutrients back into the soil, and promote the regeneration of grasses, shrubs, and small trees. Sachro et al. (2005) found that prescribed burning of coniferous subalpine forests substantially increased forage availability, and resulted in the greater abundance of herbaceous plant species that are more preferable to elk, with the effect of the treatment lasting at least a decade, but only showed short-term increases in mixed deciduous shrub habitat. Long et al. (2009) suggested that in areas with seasonal climatic patterns and vegetation associations similar to those at Starkey Experimental Forest in Eastern Oregon, maintaining a mixture of burned and unburned (e.g., late successional) forest habitat might provide the best long-term foraging opportunities for large herbivores as a result of rapidly declining forage abundance in burned stands between spring and summer. Finally, Palidwor (1990) showed that elk exhibited an increase in usage of prescribed burn areas, as the prescribed burn plots supported significantly greater amounts of desirable forage than control plots. Depending on location, size, and severity of any future wildfires, it is likely these areas would provide similar benefits to elk.

Certain geographic area-specific guidelines were included based on conversations with Montana and Idaho State wildlife biologists regarding some of the major management issues for specific areas. GA-NS-WLF-ELK-GDL-02 would direct the Forest to include vegetation management activities in future site-specific project planning to increase elk forage quantity and nutritional quality on National Forest System (NFS) lands to help reduce elk conflicts with adjacent landowners in the North Sapphires GA. One of the management challenges in the North Sapphires GA revolves around elk use of other non-Federal lands adjacent to NFS lands with limited harvest opportunities. While the Forest has minimal ability to contain elk on NFS lands, increasing forage and nutritional quality may maintain elk on Forest lands longer into hunting seasons, thus providing greater opportunity for harvest. GA-WFB-WLF-ELK-GDL-01 would direct the Forest to include vegetation management activities in future site-specific project planning to reduce conifer encroachment on open grassland slopes where applicable to increase spring elk forage in the West Fork Bitterroot GA. Along with Forest-wide guidelines FW-WLF-ELK-GDL-02 and FW-WLF-ELK-GDL-03, and GA-WFB-WLF-ELK-GDL-02, this guideline was included based partly on research by Proffitt et al. (2016b) that found their results supported previously documented relationships between body fat and pregnancy rate (Cook et al. 2013) and provided estimates linking measurements of summer range nutritional resources to observed levels of body fat and pregnancy rate for free-ranging elk. Proffitt et al. (2016b) suggested that the reduced probability of pregnancy may represent a reproductive pause in response to chronically inadequate nutrition resources (Cameron 1994, Stewart et al. 2005, Cook et al. 2013). Such reproductive pauses in response to nutritional stress may enhance long-term reproductive performance in ungulates (Testa 2004). While the Forest has limited management tools to directly influence elk population factors, the indirect effects of these guidelines will likely benefit elk by increasing forage availability and nutritional quality.

GA-IDAHO-WLF-ELK-GDL-01 would direct the Forest to include vegetation management activities in future site-specific project planning to reduce invasive plant or noxious weed occurrence where applicable in conjunction with other management activities. This guideline was included recognizing the limited management actions available to the Forest in the Idaho portion of the Forest, given that the entirety of the area is in the Selway-Bitterroot and Frank Church-River of No Return Wilderness areas, except for the road that divides the two areas. Current NEPA decisions allow targeted noxious weed treatments in these areas, which likely enhances palatable forage for elk. Future site-specific noxious weed treatments will likely benefit elk in this area to a limited degree.

The intent of these guidelines is to provide enhanced forage availability, quality, and nutrition in a variety of habitats to benefit elk. Effects to elk from these guidelines would be beneficial and support Desired Condition FW-WLF-ELK-DC-01.

Vulnerability/Security

Certain guidelines included in the proposed Amendment language are included to enhance or maintain elk secure habitat and minimize vulnerability. FW-WLF-ELK-GDL-01 would direct the Forest to employ travel management decisions during future site-specific project planning to maintain elk residency on National Forest System lands during the archery and rifle big game hunting seasons by maintaining contiguous blocks of habitat in locations elk traditionally use at times when they are vulnerable to disturbance from hunting or other recreation that may cause displacement from public lands. In addition, this guideline directs the Forest to refrain from designating future roads, trails, or areas for motorized travel based on declining elk population trends or declining use of NFS lands by elk.

GA-EFB-WLF-ELK-GDL-02 would direct the Forest to designate all new permanent road construction as administrative use only to minimize additional pressure on elk that may contribute to movement to adjacent private lands during the archery or rifle hunting seasons in the East Fork Bitterroot GA. Exceptions may be made in the case of existing roads needing relocation. One of the management challenges in the East Fork Bitterroot GA revolves around elk movement off Forest lands onto other non-Federal lands adjacent thus limiting harvest opportunities and increasing elk-landowner conflicts. While the Forest has minimal ability to contain elk on NFS lands, following FW-WLF-ELK-GDL-02 to increase elk forage, and limiting further disturbance to elk from additional roads will likely benefit elk to some degree in the future.

The proposed Amendment language may reduce hiding cover in future site-specific project treatment areas. These effects would be most pronounced in commercial thinning units, especially in larger openings. Increased sight distances and reductions in cover may lead to more vulnerability for elk, as hunters would have more opportunity to spot animals from a distance, and would be most pronounced along open, motorized routes, particularly where the topography is flat or slopes downhill from the road.

Based on the discussion above in respect to the existing condition of hiding cover and security, the proposed Amendment language would likely have positive benefits to elk vulnerability and security. Future site-specific projects will likely alter the arrangement of secure habitat across the landscape, but these alterations are not likely to negatively affect elk.

3.4.5.4 Cumulative Effects

Past, present, and reasonably foreseeable actions were evaluated for cumulative effects to elk. Many past, present, and reasonably foreseeable future activities have or will affect winter range, vulnerability/security, and elk habitat quality. Past harvest provided regeneration units that brought about new open areas for forage. As those areas grew back in young shrubs, grasses, and saplings, the forage quality and quantity in low-to mid-elevations of the analysis area were high. As these areas have matured, the forage values have decreased. Large wildfires over the past three decades provided for varying stages of new regeneration in the analysis area. Fire suppression has decreased the potential amount of new forage areas that may have been created without fire suppression. The proposed changes in management direction will increase the pace at which elk forage habitat will be created.

Reductions in cover may occur under the proposed Amendment language and cover may decrease across the analysis area in certain places. However, an adequate heterogeneity of cover types would be retained throughout the analysis area, and reduction in stand-replacement fire risk will likely improve the chances of a mix of cover types existing for many decades into the future. The tendency for heterogenous landscapes to retain their diversity following disturbances, as opposed to the large-scale homogenization that occurs following large, stand-replacing fires, has been well documented (Kelly et al. 2017, Jones and Tingley 2022).

The legacy of road management in the analysis area has shown a slow decrease in open roads over the past several decades, as continued road decommissioning occurs after the Travel Management Plan (U.S. Department of Agriculture 2016b), and old logging roads have grown in with vegetation. This has led to a slight decrease in road densities in portions of the analysis area, although open road densities remain high for most of the year in other portions. Open roads will continue to influence elk in terms of disturbance and vulnerability. They are also important, to some extent, for allowing public access into areas for hunting and controlling game populations. Any new roads as a result of future site-specific planning along with thinning treatments on open roads would increase sight distances and reduce hiding cover, increasing negative effects to elk vulnerability. This could be advantageous to hunters in the short-term, until elk shift their use areas in response.

As stated above, over the past 25 years the Bitterroot National Forest has repeatedly relied on project-specific amendments to integrate elk habitat management with other forest management objectives and to better apply emerging scientific information (Table 1). In each of these cases, including the upcoming Gold Butterfly Record of Decision, signed before Amendment 40, project-specific analyses indicated that a deviation from existing plan direction was necessary to better manage elk habitat and to integrate elk habitat management with other forest resources. The proposed Forest Plan Amendment recognizes the fact that the need to modify Forest Plan language regarding elk habitat effectiveness and thermal cover has repeatedly arisen and is therefore better addressed at the Forest scale.

The proposed changes in management direction will also help address the emerging issue of elk movement off public lands and onto surrounding private lands. It is reasonable to expect that private landowners adjacent to the Bitterroot National Forest will continue to manage their lands in a manner that is attractive to elk. Retaining elk on public lands will therefore require improving the quality of habitat, particularly forage, on National Forest System lands. Research has shown that improvement in forage quality can be achieved through judicious vegetation management. Cumulatively, the effect of the proposed Amendment and the prior site-specific elk habitat amendments will therefore be greater retention of elk on public lands and reduced movement to surrounding private lands.

Overall, any indirect effects of the proposed Amendment language on elk would be additive to the past, ongoing, and present activities that affect how and where individual elk use the landscape. Because of the recent history of project-specific amendments such as Gold Butterfly and the proposed Bitterroot Front project, the proposed Forest Plan amendment does not represent a significant shift in management direction. Herd dynamics would continue to shift in response to changing conditions, but no major elk population increases, or declines would be anticipated that are attributable to the proposed Amendment language. Hunting, wildlife viewing, and availability of the species as prey would continue. MTFWP will continue to monitor population sizes and use areas and shift their management strategies accordingly. None of the proposed or foreseeable future activities in the area are expected to precipitate major changes in herd management.

3.4.5.5 Determination and Summary of Results

Implementation of the proposed Amendment language will generally benefit elk. This determination is based on the following rationale:

The elk population in the analysis area has increased over the past half century despite past and current land management practices;

The proposed Amendment language contains guidelines that will enhance elk forage availability and nutritional quality in future site-specific project through vegetation management, prescribed fire, or potential wildfire;

The proposed Amendment language will guide management in a manner that will allow alteration of cover types in future site-specific projects, effects to elk are not likely to be adverse; and

Road densities, while high in certain places within the analysis area, likely do not significantly decrease elk vulnerability/security due to the availability of large secure habitat blocks across the analysis area. The proposed Amendment language included guidelines to minimize these effects in future site-specific project planning.

3.4.6 Conclusion

This wildlife effects analysis provides information concerning the existing management of wildlife resources in the analysis area and the potential consequences of the proposed Amendment. The Amendment has been evaluated within the CEQ framework (40 CFR § 1508.1(g)) throughout this report and have been determined not to have significant effects from the environmental consequences, thus meeting the requirements of a Finding of No Significant Impact. See Section 5.

The components for elk habitat, old growth identification and management, snags, and coarse woody debris apply the substantive requirements to maintain or restore the ecological integrity of terrestrial ecosystems taking into account interdependence of terrestrial and aquatic ecosystems in the plan area, ecological conditions in the broader landscape that may influence the sustainability of resources, system drivers (such as natural succession and wildland fire) and the ability of terrestrial ecosystems in the plan area to adapt to change and opportunities for landscape scale restoration at 36 CFR 219.8(a)(1) (i), (ii), (iii),(iv) and (vi).

All components apply the requirements to provide for habitat diversity by maintaining or restoring key characteristics associated with terrestrial ecosystem types at 36 CFR 219.9(a)(2)(i).

The effects analysis reveals the proposed plan components apply the requirement to consider ecosystem services and multiple uses, including outdoor recreation, range, timber, watershed, wildlife, and fish, within Forest Service authority and the inherent capability of the plan area; that habitat conditions for wildlife, fish, and plants commonly enjoyed and used by the public; for hunting, fishing, trapping, gathering, observing, subsistence or other activities (in collaboration with federally recognized Tribes and State and local governments, system drivers, such as natural succession, wildland fire, and climate change, at 36 CFR 219.10(a)(1), (5) and (8).

3.5 Old Growth-Vegetation & Wildlife

3.5.1 Introduction

In 1989, the Chief of the Forest Service established a National Old Growth Task Force and directed each Region to develop local definitions based on a national generic definition of old growth. In Region 1 for each of three geographic zones, committees were formed including members of National Forest Systems, Forest Service research, universities, and the public. The resulting work, *"Old-Growth Forest Types of the Northern Region,"* authored by P. Green, J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Nauman and commonly referred to as *Green et al. 2011*, is widely acknowledged as the best available scientific information regarding old growth within the Northern Region.

During the Bitterroot Forest Plan Five-Year Review (U.S. Department of Agriculture 1994a, PF-VEG-017) it was determined that updating plan direction to incorporate information presented in *Green et al.* was needed. The review acknowledged that "Analyzing old growth on a landscape level and specific to various ecosystems may be more appropriate than the current Forest Plan Standard (old growth percentage required within a Management Area and third order drainage)" (*ibid*. p. 22).

Old growth is defined in Green et al. 2011 based on capabilities of different habitat types which are more comprehensive than the definition written into the Bitterroot Forest Plan in 1987. Originally issued in 1992, Green et al. has been updated four times, with a date of December 2011 being the most recent issuance.

This science has already been adopted by other National Forests in the Northern Region, including those who have revised or are currently revising their forest plans using the 2012 Planning Rule (U.S. Department of Agriculture 2012).

The 1987 Forest-wide standard definition of old growth characteristics cannot be easily measured (*e.g., canopy closure*) and does not accurately identify the amount and type of old growth found in habitat types across the Forest. The Forest Plan does not incorporate what the Northern Region uses as the best available scientific information to define old growth for local ecological conditions. Using the Forest Plan criteria as currently written does not allow for accurate inventory or monitoring of old growth on the Forest. The mature and old growth report published by the Washington Office on 4/20/2023 makes it clear that no one definition represents the full diversity of old growth ecosystems and that definitions are specific to the vegetation type. That is what Green et al. 2011 provides for vegetation types on the Bitterroot National Forest.

Management Area direction related to old growth would also be modified per Green et al. (2011). Management Areas 1, 2, 3a, 3b and 3c, each have a standard related to old growth stand size and percentage. The requirement to only designate stands sized 40-acres and larger when maintaining old growth in a third order drainage would also be modified in this EA. Stand size is not identified in Green et al. as a driving factor in whether a stand should be classified as old growth because even small patch sizes provide important ecological values and increase ecosystem diversity. The percentage of old growth by third order drainage by Management Area would also be removed as old growth would be managed on the landscape rather than a narrowly defined area with little ecological significance (PF-VEG-016).

The Amendment is programmatic in nature and serves to replace current language in the Forest Plan. No specific management actions will occur as a direct result of this amendment, rather, language will guide Forest management actions for future site-specific actions. Analysis within this report is based on how the proposed language changes may indirectly or cumulatively affect old growth. Future management projects will still need to analyze project-specific effects at a site-specific level. Minimum characteristics described in Green et al. are not prescriptive. Stand prescriptions are written by a Certified Silviculturist based on site-specific conditions and objectives.

3.5.2 Scope of Analysis and Analysis Methods

3.5.2.1 Issues Addressed

Issue 1: How would the Amendment affect the amount of old growth measured, managed and monitored for vegetation and wildlife?

3.5.2.2 Methodology

To assess old growth on the Bitterroot National Forest using the Forest Plan definition and compare with Green et al. (2011), queries were created then applied to Forest Inventory Analysis (FIA) data sets and stand exam stand data. There were limitations in both data sets due to sampling designs in FIA and stand exam data (Morgan and Reyes 2022); however, this resulted in more liberal estimates of old growth than what would have been produced if the Forest Plan criteria could have been applied precisely.

3.5.3 Issue 1: Environmental Consequences on Old Growth

3.5.3.1 Environmental Consequences of the No Action Alternative on Old Growth

Under the no action alternative, current management plans would continue to guide management of the Bitterroot National Forest. Not amending the Forest Plan criteria for old growth would prevent the Forest from being able to accurately quantify the amount of existing old growth at various scales to determine whether project activities are contributing to achievement of Forest Plan goals and objectives for old growth habitat and supporting viability of wildlife species associated with components common in old growth habitat. Additionally, the Forest Plan does not incorporate what the Northern Region uses as the best available scientific information to determine old growth. The existing plan definition was derived from research literature based on conditions in the Cascade Mountains of Oregon and Washington, in a Pacific maritime climate. Old growth characteristics there are not directly transferable to growing conditions in the Bitterroot National Forest in southwest Montana.

The current glossary and Forest-wide standard definition of old growth for identifying old growth cannot be easily measured and does not accurately identify the amount and type of old growth specific to habitat types within the project area. By not amending the Forest Plan we are unable to evaluate whether project activities are contributing to the achievement of Forest Plan goals and objectives for old growth habitat. The Forest Inventory and Analysis (FIA) program, which gives the Forest a periodic, statistically valid estimate of old growth at several broad scales across the Forest uses the Green et al. criteria. This is the basis of the inventory provided to the Biden Administration to meet EO 14072. Green et al. (2011) definitions also form the basis for the regional algorithm that identifies old growth based on common stand exam data.

Figure 4. Old Growth stand at Lick Creek

3.5.4 Environmental Consequences of the Proposed Action on Old Growth

In October 1989, Forest Service Chief Robertson directed regional foresters to develop definitions for old growth forests specific to each Forest Service region to increase consistency in the management of old growth forests. This task was completed for the Northern Region of the Forest Service, with definitions of old growth forest documented in a publication by Green et al. (1992, errata 2011) entitled Old-Growth Forest Types of the Northern Region.

The Bitterroot National Forest has been using Green et al. since 1992 to analyze environmental effects when the Forest adopted definitions of old growth developed by the Regional Old Growth Task Force and documented by Green and others as the best available scientific information. This work contains measurable criteria to consistently define old growth based on a national definition that old growth forests are distinguished by old trees and related structural attributes (*ibid*).

The 1987 Forest Plan defined standards and guides for measuring old growth which are not statistically quantifiable or measurable nor can we find literature supporting these guides. Green et al. uses measurable and statistically quantifiable key characteristics that define old growth forest (basal area, trees per acre, diameter at breast height, and age) to provide the means to monitor existing amounts and trends of old growth forest over time at the broad scale and to know the reliability of the estimates.

The 1987 Forest Plan does not define old growth forest as a community of forest vegetation that is distinguished by sufficient numbers of large, old trees and by stand densities and related structural attributes occurring at levels that meet the definitions established for the Northern Region of the Forest Service in Green et al. (2011). As defined by Green et al. old growth forest definitions vary by habitat type grouping. Green et al. defines the primary statistically measurable criteria that define old growth forest in the Northern Region as basal area and trees per acre above a certain size (diameter at breast height) and age as well as describes associated structural attributes including amounts of dead, broken-top, or decayed trees, amount and size of downed wood, and number of canopy layers appropriate by habitat type. Old growth forest provides habitat for old growth associated species, including invertebrates, mammals, and bird species.

There is no distinction in the Forest Plan old growth criteria related to different habitat type groups. The best available scientific information makes it clear that the structure and composition of old growth can be very different from one habitat type group to another, yet the Plan old growth criteria lump them all together. The Plan does acknowledge that “Stand conditions that qualify as old growth will vary by habitat type and landform,” but does not provide any difference in the criteria used to determine old growth in those various habitat types and landforms. Habitat types are based on the biological capability of the land to produce a given type of plant community at the endpoint of succession.

The existing plan criteria do not specify any minimum age for the large trees used to determine whether a stand qualifies as old growth. Large trees used to determine the presence of old growth are defined only by size as quantified by diameter at breast height (dbh). This is problematic because several common local tree species (e.g., ponderosa pine, Douglas-fir, Engelmann spruce) growing on productive sites can exceed the Forest Plan criteria of 20” dbh size minimum when they are younger than ages typically associated with old growth. The Forest Service position on old growth recognizes late stages of stand development and are distinguished by old trees and related structural attributes and specific attributes that vary by forest type.

The 6” dbh minimum size criteria for lodgepole pine is not based on the best available scientific information and would likely greatly over-estimate the amount of old growth on the forest. Many mature lodgepole pine stands contain well over 20 trees per acre that exceed 6” dbh, yet these stands are often relatively young and vigorous and do not provide old growth components for wildlife species associated with mature and over-mature forests (PF VEG-009). Specifically, these smaller diameter lodgepole pine stands typically provide few if any snags larger than the 12” dbh needed for most woodpecker species to excavate nesting cavities, and thus also provide little opportunity for secondary cavity users. They usually contain few trees or snags affected by heart decay and are typically single-storied and even-aged stands. They may contain a considerable amount of residual coarse woody debris from the previous stand, but are often almost devoid of coarse woody debris, depending on the fire history of the stand.

We are unsure what the scientific basis is for the 1987 Forest Plan to incorporate the criteria of 75 percent of site potential for canopy closure, and therefore cannot determine whether potential old growth stands meet this criterion. The techniques to estimate canopy closure vary in the amount of hemisphere measured and are influenced by the angle of view measured, the height of the measurement, and heights to base of live crowns and ground slope. Hood (2021) describes the difficulties in determining and using canopy closure. The Forest Plan does not prescribe a method to measure canopy closure. Without knowing the viewing angle and sampling height that should be used to estimate closure, it makes it very difficult to relate any new measurements of canopy closure to the Plan’s guidance.

There is no distinction in the 1987 Forest Plan old growth criteria related to different habitat type groups in terms of the amount of down material greater than 6 inches diameter. The Plan criteria suggest 25 tons per acre across the planning area. This amount may be appropriate for cool, moist habitat type groups, but likely exceeds the historical range and site potential of warm, dry habitat type groups.

Old-growth forest, like all forest conditions, is dynamic, with stands moving into and out of old growth forest conditions and the proportion and distribution of old growth forest across the landscape changing naturally over time. Although all old growth forest is late-successional forest, not all late-successional forest qualifies as old growth forest. As described in the introduction to this section, old growth forest is specifically defined for the Northern Region. Green et al. 1992, errata 2011 contains the complete documentation and details related to old growth forest definitions, the analysis process used to develop the old growth forest classifications for the Northern Region, and how the definitions should be applied.

Old growth forest is one component of the shifting mosaic of stand conditions across the Bitterroot National Forest's ecosystem. The time it takes for a forest stand to develop into old growth forest conditions depends on many local variables, such as forest composition, density, habitat type, and climate. Natural chance events involving forces of nature such as weather, insects, disease, fire, and the actions of humans, such as harvest, also affect the rate of development of old growth forest conditions. Under the natural disturbance regimes of the Bitterroot, old growth forest can develop through multiple different successional pathways, usually with fire and other disturbances along the way. Low to mixed severity fire regimes are the most common on the Bitterroot, with historical fire frequencies from seven to 100 years most prevalent.

Although there are pockets and areas that may not have fire events for many centuries, the likelihood of any particular forest stand to experience, within 100 to 150 years, a moderate- to high-severity wildfire where most or all existing trees are killed is relatively high. However, even within the boundaries of large stand-replacing fires, there are often small pockets or islands of forest that burn less severely, through chance or because of site specific conditions such as pockets of lower tree densities, less downed woody fuels, more sheltered or moist site conditions, and/or sudden meteorological changes. Lower-severity fires may kill fire-sensitive species, particularly subalpine fir, Engelmann spruce, and grand fir, but not the fire-resistant species. Thus, because of the frequency of fire in this ecosystem, a common successional pathway for old growth forest development involves the survival of a sufficient number of trees after a fire and the regeneration of a new forest under the canopy of the surviving trees. The overstory trees continue to grow and develop into the very large, old trees that are key components of old growth forests. The mid- and understory trees, along with the snags and downed wood from the fire, contribute structural diversity and the residual live trees may themselves grow and develop into old, overstory tree layers. If they, too, are fire-resistant species, then there is the potential that some of them will survive the inevitable next fire event. The acres of wildfire far exceed the number of acres harvested on the Bitterroot National Forest by almost 90 percent. The number of acres burned from wildfire starting in 2000 through 2022 was approximately 378,831 acres compared to 37,783 acres that was harvested during the same period.

This successional pathway is why fire-resistant tree species play a particularly important role— especially those that have achieved larger diameters—in the development of old growth forests on the Bitterroot. Species such as western larch, ponderosa pine, and, to a lesser degree, Douglas-fir have the potential to survive low- to moderate-severity fire, sometimes even when they are smaller diameter (i.e., 10 to 15 inches diameter at breast height). Although it may not occur for several centuries in some spots, forests across the Bitterroot will at some point experience a high severity fire that kills even the fire-resistant, largest trees. Old growth forest then reverts to an early-successional stage and the successional process begins anew (Oliver and Larson 1996).

Old growth forest character can vary depending on site capabilities (e.g., potential vegetation type) and on other factors unique to the site, such as disturbance history. Descriptions of typical old growth forest conditions are found in the regional old growth forest publication (Green et al. 1992 errata 2011). Brief descriptions of a typical species composition and forest structure in existing old growth forest and habitat on the Forest follow below. The long-lived, early successional, fire-tolerant tree species play a particularly critical role in the successional process and development of old growth forests on the Bitterroot National Forest. These are the trees that have a chance of surviving moderate- and even high-severity fires and that also have adaptations that enable them to regenerate and grow rapidly in burned forest conditions. These species include western larch, ponderosa pine, as well as Douglas-fir and whitebark pine on some sites.

Individual trees of these species can persist on some sites well into the late-successional stages. They become the large-diameter old trees that are key features of the old growth forest and habitat condition.

Old growth forest conditions on the warm-dry potential vegetation type contain large-diameter, old, overstory Douglas-fir and ponderosa pine, with minor amounts of western larch on some sites. Typically, there are at least eight trees per acre greater than 21 inches diameter at breast height averaging 60ft^2 or greater of basal area per acre, and greater than 170 years old. A relatively open overstory canopy exists, but Douglas-fir can often be dense in the mid and understory canopy layers—a condition resulting from lack of disturbance, which thins out the smaller-diameter Douglas-fir. When this denser condition occurs, the large, older Douglas-fir and ponderosa pine become more susceptible to mortality caused either by the Douglas-fir beetle or the western pine beetle, respectively, thereby possibly changing old growth forest characteristics.

Old growth forests on the cool-moist types have the widest range of species that may comprise the overstory tree layer, including western larch, Douglas-fir, ponderosa pine, Engelmann spruce, subalpine fir and lodgepole pine. Western larch, Douglas-fir, and Engelmann spruce are the dominant large-diameter old trees within old-growth forests on the cool-moist type. Typically, at least 10 trees per acre of old trees (minimum age 180 years) occur, with the minimum size of the old trees ranging from 17 inches diameter at breast height (dbh) on the drier sites to 20 inches dbh on the moist sites averaging 80 ft^2 or more of basal area per acre. These forests are typically dense and have multiple canopy layers, with subalpine fir and Engelmann spruce the most common mid- and understory tree species.

Engelmann spruce and subalpine fir are the most common large old overstory tree in old growth forests on the cold potential vegetation type, although in a few rare situations there may still be a few scattered, large old whitebark pine present (that have not yet been killed by blister rust or bark beetles). Because of the cold, harsh growing conditions, tree growth is slower and old trees are smaller than in old growth forests at lower elevations. Old growth forests in these cold types typically have a minimum of 10 trees per acre greater than 13 inches dbh averaging 60 ft^2 per acre of basal area and greater than 180 years old. They are usually multi canopy layers, although overall tree density may be low. Subalpine fir and spruce dominate in the mid- and lower canopy layers.

Eliminating the standard that states old growth may be logged and regenerated simply because more has been found will obviously result in the retention of more old growth stands. This is in line with the desired future condition to increase the amount of old growth across the forest.

Pileated woodpeckers, an old growth management indicator species, live primarily in warm and very dry and warm and dry habitat type groups. These are habitats that characteristically had low severity, high frequency or mixed severity fire (Bull and Jackson 1995). The old growth stand structure produced by frequent low severity fires was a relatively open forest stand with large live trees, scattered large snags (used for nesting, roosting, and feeding) and large down logs (used for foraging, primarily on carpenter ants).

Marten (*Martes americana*), an old growth management indicator species, occupy primarily the warm and moist, cool and wet, cool and dry to moist, cool and moist to wet and warm to cool and dry habitat types. Their typical habitat is high density mature or old stands with a relatively closed canopy and abundant down woody material that provides cover for small mammals and access to subnivean (under snow) habitat (Strickland and Douglas 1987).

3.5.5 Indirect Effects-Vegetation & Wildlife

The proposed amendment improves the method for measuring and monitoring the amount of old growth across the Bitterroot National Forest by modifying the criteria used to identify old growth based on better scientific information than was used in 1987 when the Bitterroot Plan was developed. Components for snags and coarse woody debris maintain important structure, function, and process for both future vegetation and wildlife while balancing the need to manage fuels. The components for elk habitat may influence vegetation management planning; however, this would be done in an integrated manner with other forest resource concerns.

The amendment is programmatic and proposes modifications of the Forest-wide standard for old growth and Forest Plan glossary definition to update its identification criteria for old growth using the quantitative and qualitative factors of Green et al. (1992, errata 2011). Green et al. represents the Forest Service's best available scientific information to define old growth. This work contains measurable criteria to consistently define old growth based on a national definition that old growth forests are distinguished by old trees and related structural attributes (*ibid*). The old growth definitions are specific to forest type and habitat type group. Key attributes include age, numbers and diameter of the old tree component within the stand and stand density. Minimum thresholds have been established for these attributes. Associated characteristics are also defined such as probabilities of coarse woody debris, number of canopy layers, and number of snags over 9 inches diameter at breast height.

Green et al. (2011) is a better measure to evaluate whether a project maintains and promotes old growth compared to the 1987 criteria in the Forest Plan. As an example, using Forest Plan standards, stands with at least 15 trees per acre over 20" in diameter qualify as old growth. These trees could easily be produced in wetter moister sites and be less than 90 years old. In these cases, the 1987 criteria would incorrectly estimate that there is more old growth than exists because these trees are large but not necessarily old and lack the associated characteristics. If the 1987 Forest Plan criteria for old growth were applied, there would be less old growth identified in high cold elevation areas based on the diameter and tree per acre requirements, because high elevation sites may never be able to grow a 20" diameter tree.

During project area old growth assessments in 2016 and 2017, stands sampled in high elevations using Green et al. (2011) were verified as old growth stands. If we had applied 1987 Forest Plan criteria, these stands would not be identified as old growth. Using the 1987 criteria in the Forest Plan would in some cases underrepresent and in other cases, over represent the amount of old growth within the project area. Therefore, the goals and objectives of the plan are not met when applying the Forest Plan definition.

Green et al. recognizes three broad old growth stand structures, late seral, single story; late seral multi-story; and near climax. The three stages are generalities which are useful for explaining why an individual old growth stand may be expected to have, or not have, various structural characteristics sometimes identified with old growth in forest ecology literature. Based on analysis by Green et al. individual old growth stands may combine various elements of the three stages or unique characteristics due to stand history. The 1987 Forest Plan standard states that structure is uneven-aged or multistory. Many warm potential vegetation types (ponderosa pine and Douglas-fir) are characteristic of the late seral, single-story stage and may not be multistoried.

Using FIA datasets and available stand exam data, we conducted a comparison of the 1987 Forest Plan definition for old growth with the criteria for Green et al. Although we do not have data to determine "canopy closure at 75 percent of site potential" (Hood et al. 2020), we applied the other Forest Plan criteria to consider for identifying old growth for the project. Using the FIA Hybrid 15 analysis dataset, two queries were developed stratifying FIA data by the dominance mid-40 vegetation type. One query was applied to all dominance mid-40 vegetation types except for lodgepole pine and then another query was applied to all data with a lodgepole pine dominance mid-40 vegetation type. For all dominance mid-40 types except for lodgepole pine the FIA data was queried for 24 trees per acre (TPA) or more of trees greater than or equal to 20 inches dbh, greater than or equal to 25 tons/acre of downed woody debris (greater than or equal to 3 inches diameter), and greater than or equal to 24 TPA of dead trees greater than or equal to 5 inches dbh. For the lodgepole pine dominance mid-40 vegetation types, the only change to the query was for the live trees per acre criteria which changed to 24 TPA or more of trees greater than or equal to 5 inches dbh stand exam data was queried for 15 trees per acre (TPA) greater than 20 inches dbh; stands with 15 or more lodgepole pine TPA that are 6" or greater dbh; downed woody debris over 25 tons/acre; 1.5 snags per acre greater than 6", and 0.5 snag per acre greater than 20 inches dbh and a stand size of 40 acres or larger as the Forest Plan requires. Queries were also run without this minimum size requirement.

Using FIA datasets, the number of acres analyzed across the Forest is 1,594,579 acres with a total of 255 subplots sampled. Applying Forest Plan criteria to the dataset a total of 22 subplots equating to 33,825 acres meet plan criteria. When applying Green et al. (2011) criteria to the FIA dataset, the number of subplots meeting old growth criteria is approximately 100 subplots which equates to 153,748 acres of old growth (Morgan and Reyes 2022). This estimate is approximately four times greater than the amount of old growth estimated when applying the Forest Plan criteria.

Another analysis using verified stand exam data compared Forest Plan definition for old growth with the criteria for Green et al. A total of 164,447 acres of verified stand exams were used and 24,905 acres met the Green et al. definition for old growth and associated characteristics. When the requirement of 15 trees per acre with dbh greater than 20 inches is used as in the Forest Plan, then only 6,171 acres would be considered old growth. If using the other required Forest Plan criteria, such as snags, coarse woody debris, and 40-acre minimum stand size, even fewer acres would be considered old growth. There are 389 third order drainages across the Forest and 232 of those drainages meet Forest Plan minimums for percentages of old growth by management area using Green et al. criteria. If using the Forest Plan criteria only 74 drainages meet the requirements for old growth. The management of old growth by third order drainage by management area is not appropriate even using Green et al. Analyzing old growth based on percentages in a relatively small defined area has little ecological significance in a broader landscape context (PF-VEG-001, p. 18). The percentages identified are not necessarily scientifically sound or meaningful and we are uncertain how those percentages were identified. They are not based on any current or historical data for any vegetation type. Based on the comparison analysis of using stand exam data, the application of the Green et al. criteria for identifying old growth across the Forest results in more old growth acres identified than would the application of the Forest Plan definition (PF-VEG-005).

A final comparison analysis was conducted using verified stand exam data in a monitoring area. The application of the Green et al. criteria for identifying old growth in the monitoring area results in substantially more old growth acres designated than would applying the Forest Plan definition. Of the 11,966 acres inventoried, 2,830 acres meet Green et al. criteria for old growth based on requirements for each old growth type. The acres for each stand vary from four to 200+ acres in size. Also, from these exams there are 263 acres that are recruitment old growth that will be managed as old growth stands. Recruitment old growth meets all the criteria of an old growth group except age. These stands support the continued trajectory of acquiring future old growth and activities in any of these stands will maintain old growth characteristics.

As for the "canopy closure at 75 percent of site potential" in the Forest Plan criteria, this is challenging to measure at a forest wide and project area scale because techniques to estimate canopy closure vary in the amount of hemisphere measured and are influenced by the angle of view measured, the height of the measurement, and heights to base of live crowns and ground slope. Neither the Forest Plan nor the 1987 Plan EIS describe the methodology to measure canopy closure. Without knowing the viewing angle and sampling height that was intended to be used to estimate closure, it cannot be measured with any degree of accuracy in terms of providing a broadscale comparison. Thus, the canopy closure criterion was not used for this comparison. Given the substantial difference in how many acres were identified as old growth using Green et al. versus the 1987 plan direction described in the previous paragraphs, it is unlikely the inclusion of canopy closure measure would provide additional meaningful information.

Existing Forest Plan direction for Management Areas 1, 2, 3a, 3b and 3c includes a requirement for old growth stands to be 40 acres or larger. The modified component is intended to delineate old growth within the Management Areas by stands as identified in Forest Service Handbook 2409.17 (U.S. Department of Agriculture 1994b), where five acres is the smallest practical stand size. Old growth will be delineated at the stand level based on vegetation composition and structure as defined by Green et al. during project specific stand examinations. Stands less than 40 acres, if meeting old growth criteria, will be included as they are valuable as a key characteristic of ecosystem diversity. While larger stands of old growth may be more valuable for many reasons, there is no downside to identifying and maintaining stands of old growth in all size categories. The landscape should be managed for a full range of natural variation and variation in the size of old growth stands is one piece of the mosaic. Overall, more acres would be managed for old growth characteristics across the Forest by removing the 40-acre minimum stand size standard and by applying the Green et al. definition.

The proposed Forest Plan component and removal of the requirement that old growth stands meet a minimum of 40 acres is beneficial to wildlife species associated with mature or over-mature forests or old forest components because patches of old growth less than 40 acres would now be identified and managed to maintain and promote those old growth characteristics. Many wildlife species such as pileated woodpeckers and marten are associated with some components of older forests such as large snags or large logs. Retaining these smaller patches of old growth would maintain the number and distribution of these components, which contributes to connectivity and amount of suitable habitat available for these species (Perhans et al. 2009). The allowance for a stand of old growth to be identified at a smaller size does not infer that five acres is a target stand size and that larger stands will be reduced to five acres.

The purpose of old growth management in the Forest Plan (1987) is stated in the Forest-wide resource standard on page II-19 of the plan:

> *"The amount and distribution of old growth will be used to ensure sufficient habitat for the maintenance of viable populations of existing native and desirable nonnative vertebrate species, including two indicator species, the pine marten and pileated woodpecker*."

The amendment to support using the old growth definitions in Green et al. for the Forest rather than the existing Plan old growth criteria would not result in negative indirect effects to old growth or to wildlife species associated with mature or over-mature forest structure. The Forest has been applying the old growth definitions in Green et al. to identify old growth since Green et al. was published because those definitions are the best available scientific information. Because old growth stands have been identified on the Forest using the definitions in Green et al. for a substantial amount of time, an amendment to support using the Green et al. definitions would not result in changes to the amount or distribution of old growth previously identified. Not applying Green et al. 2011 results in substantially fewer stands identified as old growth, as described above.

Pileated woodpeckers and marten are not old growth dependent species. They are associated with mature and over-mature forests that contain habitat components such as large trees, large snags and down woody material that are often found in old growth forests, but also make use of younger forests that contain some of those habitat components and forage in a variety of forest types (Mellen et al. 1992). Therefore, forests that do not meet the old growth definitions can and do provide habitat that contributes to the viability of these species at several scales.

Suitable habitat for pileated woodpeckers typically includes dry to moderately moist forests in older seral stages, and usually contains old growth, mature, saw timber, or multi storied structural components. While pileated woodpeckers are often associated with mature forests (Conner 1979, Shackelford and Conner 1997) the presence of large trees or snags for nesting is reported to be more important than forest age (Kirk and Naylor 1996, Giese and Cuthbert 2003). Pileated woodpeckers may be able to do well in younger and more fragmented forests that retain abundant remnant (older) structure (Kirk and Naylor 1996). A precise number of snags on every treated acre is not necessary, as long as snags are distributed across the landscape (Bull et al. 1997). Regional habitat models using FIA data estimate that the Bitterroot National Forest contains sufficient suitable nesting habitat to support about 91 pairs of pileated woodpeckers, and enough winter foraging habitat to sustain almost 800 pairs of this species (Samson 2005). Samson calculated a critical habitat estimate of 90,441 acres for a viable pileated woodpecker population in the Northern Region (Samson 2006). Samson estimated that the Bitterroot Forest has 78,085 acres of pileated woodpecker habitat (Samson 2005). This habitat is well distributed across the Bitterroot at lower to mid elevations.

Likewise, the amendment would not affect the amount of habitat that is available for species such as pileated woodpeckers or marten that are associated with habitat components that are most common in mature or over-mature forests, but not exclusively with stands that meet old growth definitions. Adequate snag and downed wood will be left in future vegetation treatment units to provide for cavity nesting and subnivean activity of small mammals (Bull et al. 1980, Bull et al. 1997, Bull 2002). Large Douglas-fir trees with dwarf mistletoe infection that would previously have been removed during treatment would now remain as snag habitat if girdled as an alternative treatment. Therefore, the old growth, snag and coarse woody debris components in the proposed amendment would not have any indirect effects to pileated woodpeckers or marten and will continue to provide habitat.

Comparative analysis shows that the application of the Green et al. (2011) old growth definitions results in more identified old growth acres and stands in the larger size classes that are more widely distributed across the project area than are identified using the 1987 Forest Plan old growth definitions (PF VEG-

005). Therefore, the Green et al. old growth definitions result in more acres of old growth in the larger size classes managed as old growth habitat than would the Forest Plan definitions. This would benefit wildlife species associated with mature and over-mature forests because the acres identified as old growth using Green et al. that are not identified as old growth using the 1987 Forest Plan definitions would lack direction requiring it be managed as current or future old growth and would thus not retain adequate amounts of old growth components to provide suitable habitat for those species. Lodgepole pine stands >6” dbh that are identified as old growth using the 1987 Forest Plan criteria normally do not provide the larger habitat components required by wildlife species associated with mature and overmature forests. Additionally, by using the Forest Plan requirement for lodgepole pine, we are overestimating the amount of lodgepole pine old growth.

Using the 1987 Forest Plan criteria of 6” dbh in lodgepole as a qualifying requirement for old growth, few if any of those acres qualify as old growth using Green et al. definitions. Most lodgepole pine stands greater than 6” dbh do not provide the larger habitat components required by wildlife species associated with mature and overmature forests, and thus provide little suitable habitat for those species. Therefore, using the Forest Plan definitions for old growth in lodgepole pine likely greatly overestimates the amount of old growth habitat that is available to wildlife species associated with habitat components in the larger size classes (PF VEG-009).

Additionally, by adopting Green et al. we are better able to monitor old growth because of FIA data and monitoring protocols developed by the Northern Region. The Bitterroot National Forest uses the monitoring protocols for investigating the effects of treatments, both mechanical and prescribed fire, intended to increase resilience in old growth and mature stands in the project area using Green et al. (U.S. Department of Agriculture 2019). The minimum characteristics applied in identifying a stand as old growth are not prescriptive for treating old growth stands for resilience. The components do not suggest all old growth stands should be managed for a minimum level of old growth characteristics. Each stand prescription is specific to project objectives and resource considerations.

Previously monitored stands of old growth that had undergone fuel reduction/restoration treatments on the neighboring Lolo National Forest provided evidence of reduced probability of uncharacteristically severe wildfire behavior and effects, even under severe fire weather, and improved general health of old trees by reducing competition for soil moisture and nutrients, allowing for greater resistance to insects and disease (Harrington *in* (Ruggiero 2007)). When monitoring stands that have been treated, it is important to also monitor control areas that have similar characteristics so that an evaluation can be made regarding how stands change over time, with and without management activities. This will allow the Forest to assess how management activities or lack of, affect old growth characteristics and desired conditions over time. Data collection follows Northern Region protocols for old growth which are repeatable and consistent.

The proposed components for snags will have no negative effects on vegetation and succession. The proposed coarse woody debris components as they relate to soil nutrients and ectomycorrhizae are considered in the soils section of this EA.

3.5.6 Cumulative Effects

The habitat-type specific definitions of old growth, as well as the removal of the 40-acre Forest Plan standard minimum size limitation, is more inclusive, resulting in an improved method for identifying old growth in all forest types and various stand sizes. Using Green et al. 2011 criteria for identifying old growth will include more stands that are more widely distributed and provides a greater variety of stands that would not have been identified using the current Forest Plan standards. The amendment provides a better foundation to meet the Forest Plan goals and standards as well as meet the EO requirements for informing land management based on the best available scientific information while managing for old growth across the Bitterroot National Forest.

Using the current Forest Plan standards for old growth we are unable to evaluate whether project activities are contributing to the achievement of Forest Plan goals and objectives for old growth habitat criteria. The current Forest Plan definition is not consistent with the national and regional definitions that old growth forests are distinguished by old trees and related structural attributes. We are unable to meet monitoring requirements as well.

The Mud Creek and Gold Butterfly projects recently incorporated a project site-specific amendment for the Green et al. (2011) definition. The Bitterroot Front project will be incorporating a project site-specific amendment to the Forest Plan for old growth if this forest-wide amendment is not ratified first. These site-specific amendments improve the method for measuring the amount of old growth in project areas and evaluating project effects. Modifying the current criteria used to identify old growth is based on better scientific information than was used in 1987 when the Bitterroot Plan was developed. Therefore, there would be no adverse effects expected to old growth when considering those project-specific amendments in concert with the programmatic Forest Plan amendment. By having a programmatic Forest Plan amendment for old growth, old growth stands across the Forest would be identified using the definitions in Green et al. The potential amendment would not result in changes to the amount of old growth identified in the project areas. In fact, Green et al. 2011 definitions identify more acres and stands as old growth in the larger size classes, and those stands are more widely distributed because they occur in more third order drainages across the Forest (PF VEG-003, 004, 005). Therefore, more acres would be managed as old growth in the larger size classes in more places using the Green et al. definitions, which would result in retaining more old growth habitat than would be the case applying the 1987 Forest Plan old growth criteria.

The amendment to support using the old growth definitions in Green et al. for the Forest rather than the existing Plan old growth criteria would not result in negative indirect effects to old growth or to wildlife species associated with mature or over-mature forest structure. The Forest has been applying the old growth definitions in Green et al. to identify old growth since Green et al. was published because those definitions are the best available scientific information and are based on local habitat types and growing conditions. As old growth stands have been identified on the Forest using the definitions in Green et al. for decades, an amendment to support using the Green et al. definitions would not result in changes to the amount or distribution of old growth previously identified during project planning but would avoid the additional planning processes necessary for a site-specific amendment on future projects.

3.5.7 Conclusion

A programmatic Forest Plan Amendment to support using the old growth definitions in Green et al. for the Forest rather than the old growth criteria in the Plan would better achieve the Forest Plan purpose for old growth management because it would provide a consistent, non-subjective method of determining whether stands currently qualify or are close to qualifying as old growth, and as noted in the vegetation effects would result in identification and retention of more acres of old growth. Additionally, the Forest and the public could be more confident that stands identified as old growth provide the range of stand characteristics associated with old growth in their respective habitat type groups.

Green et al. is accurate, reliable, and relevant to issues being considered because it contains measurable criteria to consistently define old growth based on a national definition that old growth forests are distinguished by old trees and related structural attributes. The old growth definitions are specific to forest type and habitat group which focuses on both climax and late seral subclimax communities composed of stands with mixes of structural attributes enabling management across a landscape for biological diversity.

Key attributes include age, numbers, and diameter of the old tree component within the stand and stand density. Minimum thresholds have been established for these attributes. Associated characteristics are also defined such as coarse woody debris, number of canopy layers, snags over 9 inches DBH, as well as broken and dead top trees. Green et al. provides a regionally consistent approach to measure the characteristics that we are striving to maintain and improve for a full range of diversity. Through comparative analysis, Green et al. provided up to four times as much old growth than the Forest Plan definition (PF VEG-016).

Most Forests in the Northern Region have revised their land management plans to include Green et al., which provides consistency in old growth definition and management across a larger geographic area. While all old growth forest is late-successional forest, not all late-successional forest qualifies as old growth forest. Old growth forest is specifically defined for the Northern Region by Green et al. Green et al. 1992, errata 2011 contains the complete documentation and details related to old growth forest definitions, the analysis process used to develop the old growth forest classifications for the Northern Region, and how the definitions should be applied.

The Green et al. definition identifies old growth that provides more wildlife habitat components than does the Forest Plan definition because it is based on habitat types that wildlife on the Forest evolved with, rather than the Forest Plan definition which was based on a general technical report of a study of Douglas-fir old growth forests in the Pacific Northwest (Franklin et al. 1981).

Comparative analyses show that the application of the Green et al. old growth definitions results in more identified old growth acres and stands in the larger size classes that are more widely distributed across the project area than are identified using the Forest Plan old growth definitions (PF VEG-005, 018). Therefore, the Green et al. old growth definitions result in identification of more acres of old growth in the larger size classes that will be managed as old growth habitat than would the Forest Plan definitions. Lodgepole pine stands >6" dbh that are identified as old growth using Forest Plan criteria normally do not provide the larger habitat components required by wildlife species associated with mature and overmature forests.

Results from the comparison analysis using FIA datasets and common stand exam data indicate, many fewer acres and stands in the larger size classes would be managed to retain and/or improve old growth characteristics using the 1987 Forest Plan old growth definitions than would be managed as old growth using the old growth definitions in Green et al. Therefore, using the existing Forest Plan old growth definitions to define and quantify old growth across the Forest is much less beneficial to wildlife species associated with mature and over-mature forest components that are most common in old growth stands in the larger size classes.

The components for old growth, snags and coarse woody debris meet the requirements to maintain or restore the ecological integrity of terrestrial ecosystems taking into account interdependence of terrestrial and aquatic ecosystems in the plan area, ecological conditions in the broader landscape that may influence the sustainability of resources, system drivers (such as natural succession and wildland fire) and the ability of terrestrial ecosystems in the plan area to adapt to change and opportunities for landscape scale restoration at 36 CFR 219.8(a)(1) (i), (ii), (iii),(iv) and (vi).

The effects analysis shows the components for old growth, snags and coarse woody debris meet the requirements to provide for habitat diversity by maintaining or restoring key characteristics associated with terrestrial ecosystem types at 36 CFR 219.9(a)(2)(i).

The components for old growth, snags and coarse woody debris meet the requirement to provide for ecosystem services and multiple uses, including outdoor recreation, range, timber, watershed, wildlife, and fish, within Forest Service authority and the inherent capability of the plan area; that habitat conditions for wildlife, fish, and plants commonly enjoyed and used by the public; for hunting, fishing, trapping, gathering, observing, subsistence or other activities (in collaboration with federally recognized Tribes and State and local governments, system drivers, such as natural succession, wildland fire, and climate change, at 36 CFR 219.10(a)(1), (5) and (8). There are no negative effects that keep these requirements from being met.

Alternative C – the modified proposed action, creates no material change in the effects analysis for vegetation as analyzed for Alternative B. The modification in FW-GDL-VEG-01 represents an acknowledgement that if insect and disease has removed the characteristics of old growth as defined by Green (e.g., widespread tree mortality), the full array of vegetation management prescriptions can be used to manage for plan objectives. It also removes the word minimum that led some persons to believe minimum characteristics of old growth was a management target.

3.6 Whitebark Pine

The US Fish and Wildlife Service listed whitebark pine (*Pinus albicaulis*) as a "threatened" species effective January 17, 2023. A biological assessment for the tree has been conducted and the determination is that the amendment will have "no effect" on whitebark pine individuals or populations or suitable habitat, and therefore no consultation is expected. There is no physical disturbance from this amendment, only changing definitions, desired conditions, guidelines, and standards.

The change in old growth definition to Green et al. 2011 may allow for the identification of additional stands of whitebark pine. Whitebark pine (WBP) is not a commercial species on the Bitterroot National Forest; therefore, no change in management from the new components are expected. The listing by the USFWS will have the greatest influence on future management decisions. All future project proposals will need to meet consultation obligations if they will affect WBP or suitable WBP habitat.

3.7 Carbon Storage & Sequestration

3.7.1 Introduction

The Forest Service recognizes the vital role that our nation's forests and grasslands play in carbon sequestration. Accordingly, carbon storage and associated climate regulation is a key ecosystem service provided by the Bitterroot National Forest. This uptake and storage of carbon from the atmosphere helps modulate greenhouse gas (GHG) concentrations in the atmosphere. Estimates of net annual storage of carbon indicate that forests in the United States (U.S.) constitute an important carbon sink, removing more carbon from the atmosphere than they are emitting (Pan et al. 2011b). This section of the EA addresses and compares the existing conditions and expected trends of carbon pools on the Bitterroot, specifically the aboveground carbon pool. The potential effects of alternatives are analyzed relative to carbon storage (sequestration) potential. This analysis incorporates by reference data and analysis from (36 C.F.R. §220.7[b][3(v)]) the Forest Carbon Assessment for the Bitterroot National Forest that evaluates carbon stocks and flux as well as factors influencing forest carbon possible future carbon conditions relevant to the Bitterroot's ecosystems (Dugan et al. 2021).

The current levels of carbon dioxide in the atmosphere far exceed the concentrations found over the past 650,000 years (Ryan et al. 2010) . As a result, global surface temperatures have increased since the late 1800s, with the rate of warming increasing substantially. This warming will have an impact on the earth's climate, climate variability, and ecosystems (Intergovernmental Panel on Climate Change 2007). The effects of climate change observed to-date and projected to occur in the future include changes in temperature, precipitation, and disturbance patterns that drive and stress ecosystems and the benefits they provide, including degraded air quality, water resources, wildlife, carbon storage, and the quality of recreational experiences. Globally, climate change is expected to have positive impacts to forest carbon sequestration through accelerated growth because of CO2 fertilization and increased nitrogen deposition (Hudiburg et al. 2013).

Carbon sequestration is one way to mitigate greenhouse gas emissions by offsetting losses through capture and storage of carbon. The relationship between climate change and other resources is addressed throughout this analysis. The amendment's contribution to global atmospheric carbon dioxide (CO2) is assessed in context of the fluctuations of carbon at the scale of the Bitterroot National Forest. This analysis considers the potential effects of future management actions on climate change as indicated by consideration of changes in carbon sequestration and storage arising from natural and management driven processes. For further information on appropriateness of scale, see Appendix B (Carbon Analysis Scale).

3.7.1.1 Regulatory Framework

There are no applicable legal or regulatory requirements or established thresholds concerning management of forest carbon or greenhouse gas emissions. The 2012 Planning Rule and regulations require an assessment of baseline carbon stocks and a consideration of this information in management of the national forests (FSH 1909.12.4). Carbon is considered as one of many ecosystem services managed on the Bitterroot National Forest. It is not the intent of this project or the Bitterroot National Forest to maximize or optimize carbon at the scale of the project, forest, or agency; but rather to steward and ensure national forest system lands are maintained to continue to provide carbon as an ecosystem service.

On January 9, 2023, the Council on Environmental Quality (CEQ) published interim "National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change" in the Federal Register (Council on Environmental Quality 2023). CEQ grants agencies the discretion to decide whether to apply the guidance to NEPA analyses that were in progress when the guidance was issued. The interim CEQ guidance was published late in the development process for this amendment, and therefore this analysis will primarily rely on earlier CEQ guidance on considering climate change in NEPA (Council on Environmental Quality 2016). For example, this analysis does not include all new recommendations such as applying social cost of GHG estimates to the incremental metric tons of each individual type of GHG emissions expected from the proposed action and its alternatives. However, this project does analyze the two fundamental considerations required by current and former iterations of CEQ climate change guidance: (1) the potential effects of a proposed action on climate change, including both GHG emissions and reductions from the proposed action (carbon/sequestration analysis), and (2) the effects of climate change on the proposed action and its environmental impacts where relevant (see other resource analysis).

3.7.1.2 Key indicators:

Carbon pools (carbon stocks), carbon uptake, CO_2 emissions

Natural and human-caused influences on carbon stocks, uptake, and emissions

3.7.1.3 Methodology, Analysis Process, and Information Sources

The affected environment section incorporates by reference and summarizes the Forest Carbon Assessment for the Bitterroot National Forest. The carbon assessment draws largely from two recent U.S. Forest Service reports: the Baseline Report(U.S. Department of Agriculture 2015) and the Disturbance Report (Birdsey et al. 2019). These reports provide assessments of forest ecosystem and harvested wood product (HWP) carbon stocks and flux, and the factors that have influenced carbon dynamics. The Resource Planning Act (RPA) assessment (U.S. Department of Agriculture 2016a) and a regional vulnerability assessment (Halofsky et al. 2018a;b) also provide information on potential future carbon conditions. These reports incorporate advances in data and analytical methods and collectively represent the best and most relevant scientific information available for the Bitterroot National Forest.

Potential carbon effects are discussed qualitatively, with supporting estimates where possible. This is accomplished by drawing on the quantitative analysis of the impacts of past management activities on forest carbon stocks and fluxes, as well as through future-looking analysis where available (see Carbon Assessment ((Dugan et al. 2021) in project record for additional detail).

3.7.1.4 Analysis area

The spatial scale of this analysis includes the forested lands of the Bitterroot National Forest. Based on FIA data, the Forest consists of approximately 1.5 million acres of forest land. The effects analysis for GHG emissions is the global atmosphere given the mix of atmospheric gases can have no bounds. The temporal scale for analyzing carbon stocks and emissions focuses on the expected lifespan of the plan amendment. This report includes analysis and discussion beyond this expected lifespan to provide context for potential forest carbon dynamics and factors influencing these dynamics in the future. However, estimates of future carbon stocks and their trajectory over time remain unclear because of uncertainty from the multiple interacting factors that influence carbon dynamics. For further information on appropriateness of scale, see Appendix B (Carbon Analysis Scale).

3.7.2 Affected Environment (Existing Condition)

Forests are dynamic systems that naturally undergo ebbs and flows in carbon storage and emissions as trees establish and grow, die with age or disturbances, and re-establish and regrow. Through photosynthesis, growing plants remove CO2 from the atmosphere and store it in forest biomass, such as in plant stems, branches, foliage, and roots. Some of this organic material is eventually stored in forest soils through biotic and abiotic processes (Ryan et al. 2010). Carbon can also be transferred and stored outside of the forest ecosystem in the form of wood products, further influencing the amount of carbon entering the atmosphere (Gustavsson et al. 2006, Skog et al. 2014). Many management activities initially remove carbon from the forest ecosystem, but they can also result in long-term maintenance or increases in forest carbon uptake and storage by improving forest health and resilience to various types of stressors (McKinley et al. 2011).

According to results of the Baseline Report (U.S. Department of Agriculture 2015), Annual carbon stock changes in the Bitterroot National Forest were -0.9 ± 0.8 Tg C per year (gain) in 1990 and 0.1 ± 1.1 Tg C per year in 2012 (loss) (Figure 5). For context, the total 105.1 Tg C is equivalent to emissions from approximately 84 million passenger vehicles in a year. The uncertainty between annual estimates can make it difficult to determine whether the forest is a sink or a source in a specific year (i.e., uncertainty bounds overlap zero) (Figure 5). However, the trend of relatively steady carbon stocks from 1990 to 2013 over the 23-year period suggests that the Bitterroot National Forest are neither a carbon source nor a carbon sink. Carbon stocks have been relatively stable over that period.

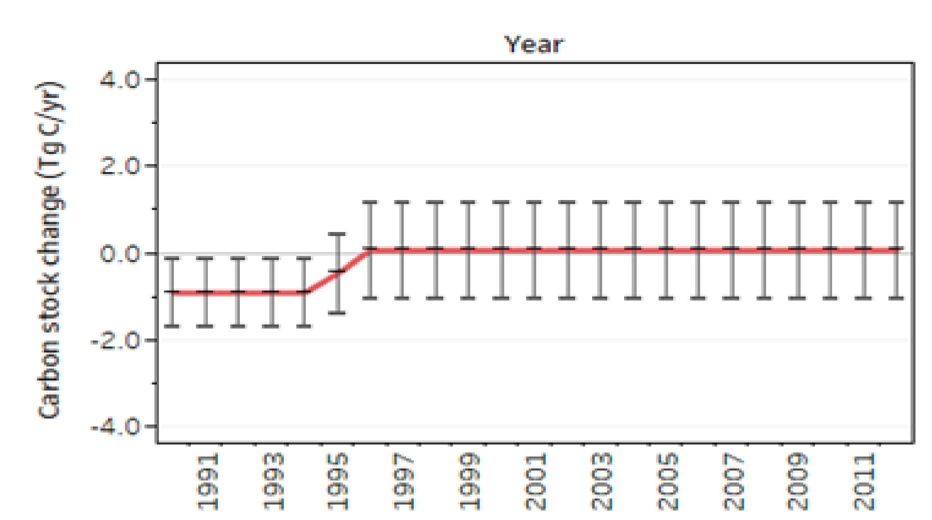

Figure 5. Carbon stock changes on the Bitterroot National Forest from 1990-2022

The forests of the Bitterroot National Forest are mostly middle-aged and older. As of 2011, 64.1 percent of the Forest was greater than 80 years old; 35.9 percent of the forest was less than 80 years old (Figure 6). If the Forest continues on this aging trajectory, more stands will reach a slower growth stage in coming decades (Figure 7), potentially causing the rate carbon accumulation to decline and the Forest may eventually transition to a steady state in the future. It is also important to note that once biomass carbon stocks approach maximum levels, ecosystem carbon stocks can continue to increase for many decades as dead organic matter and soil carbon stocks continue to accumulate (Luyssaert et al. 2008). Furthermore, while past and present aging trends can inform future conditions, the applicability may be limited, because potential changes in management activities and particularly disturbances could affect future stand age and forest growth rates (Davis et al. 2009, Keyser and Zarnoch 2012).

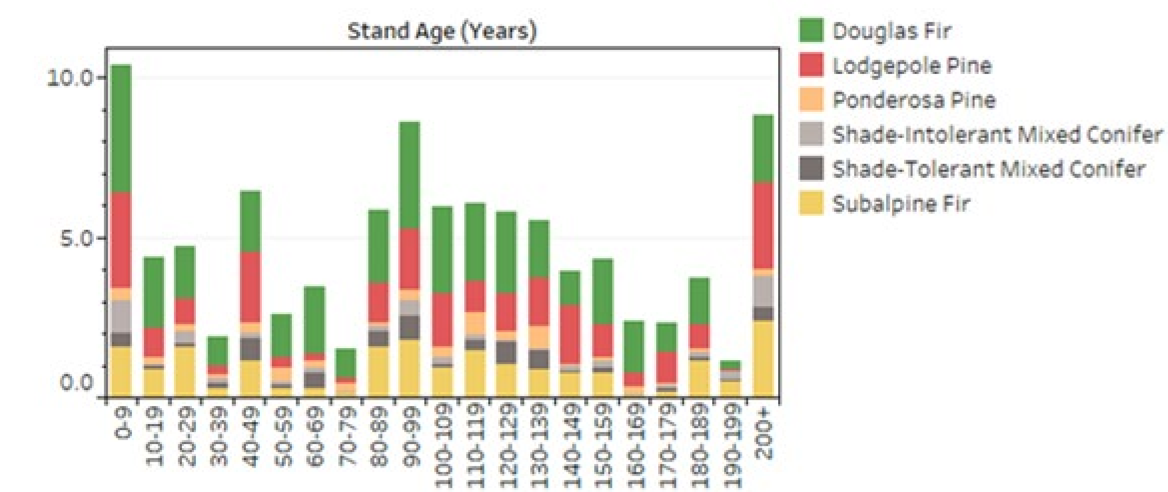

Figure 6. Stand age distribution in 2011

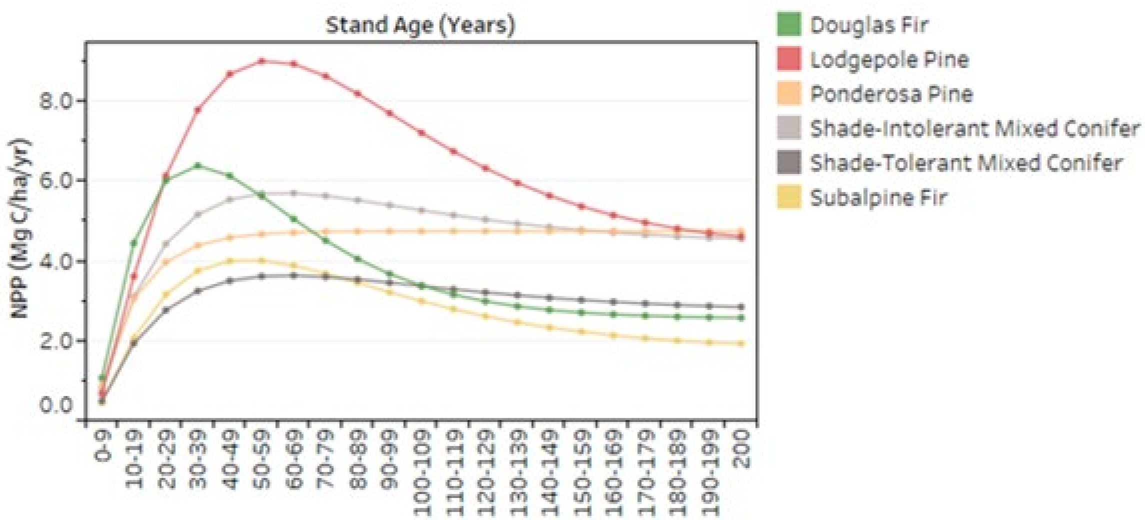

Figure 7. Net primary productivity-stand age curves by forest type group in the Bitterroot National Forest. Derived from forest inventory data

Fire has been the dominant disturbance type detected on the Bitterroot National Forest from 1990 to 2011, in terms of the total percentage of forested area disturbed over the period (Figure 8). However, according to the satellite imagery, fires affected a relatively small area of the forest during this time. With the exception of 2000, fire affected less than three percent of the total forested area of the Bitterroot National Forest in any single year from 1990 to 2011, and in total about 14 percent (approximately 82,686 ha) of the average forested area during this period (590,804 ha). Lesser disturbance was due to insect activity and in total about 1.3 percent (approximately 7,934 ha) of the average forested area from 1990 to 2011 (82,686 ha) was impacted by insect activity. The total amount of disturbed forest from all factors during this period was 15.7 percent, a total of 93,683 ha disturbed. Although the disturbances varied in intensity, they generally removed less than 75 percent of canopy cover (magnitude) (Figure 9). In total, only 2.8 percent of the forest had a disturbance that resulted in a canopy loss of greater than 75 percent from 1990 to 2012.

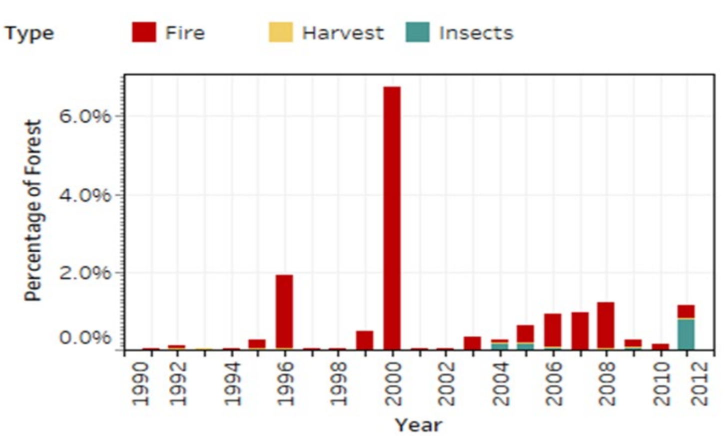

Figure 8. Percentage of forest disturbed from 1990 to 2011 in Bitterroot National Forest by (a) disturbance type including fire, harvests, insects, and abiotic (wind)

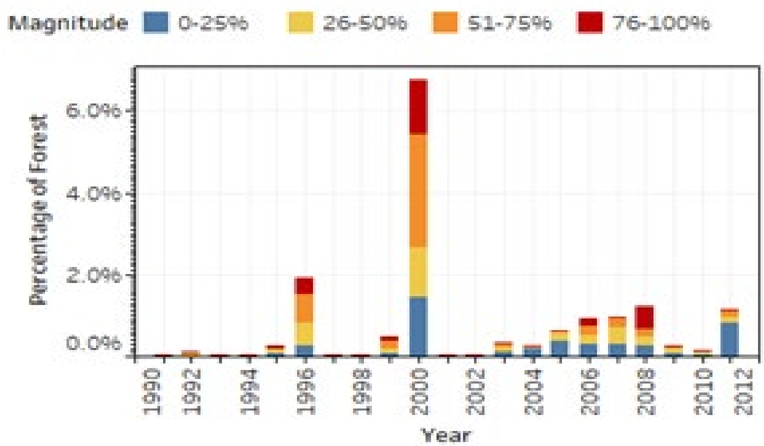

Figure 9. Percentage of forest disturbed from 1990 to 2011 in Bitterroot National Forest by (b) magnitude of disturbance (change in canopy cover). Estimated using annual disturbance maps derived from Landsat satellite imagery

Climate change introduces additional uncertainty about how forests—and forest carbon sequestration and storage—may change in the future. Climate change causes many direct alterations of the local environment, such as changes in temperature and precipitation, and it has indirect effects on a wide range of ecosystem processes (Vose et al. 2012). Further, disturbance rates are projected to increase with climate change (Vose et al. 2018), making it challenging to use past trends to project the effects of disturbance and aging on forest carbon dynamics.

3.7.3 Environmental Consequences

The best strategy to optimize continue carbon benefits from many old-growth forest stands in the near term is to maintain them, that is keeping them as forested lands in continuous cycle of growth and decay. By broadening the definition of what constitutes an old growth forest, it is expected that the action alternative would results in greater protection and maintenance for these carbon stocks (see vegetation specialist report). Nevertheless, the potential for drought stress and forest disturbances such as wildfires and insect outbreaks are growing (Vose et al. 2018), so climate-informed management is important for sustaining old-growth forests and the ecosystem services they provide. These interventions may involve removing some carbon, such as through hazardous fuels reduction, to help forest stands be more resilient to increasing disturbances.

It is difficult to quantify potential carbon consequences of management alternatives in the future due to potential variability in future conditions and the stochastic nature of disturbances. The result of such uncertainty is often a very low signal-to-noise ratio: small differences in carbon impacts among management alternatives, coupled with high uncertainty in carbon stock estimates, make the detection of statistically meaningful differences among alternatives highly unlikely.

Forests managed for timber production are considered sustainable if the harvests are planned to not remove more wood than is grown (i.e., the forest inventory is not declining over time). Forests managed for sustainable multiple ecosystem values would attempt to include a sustainable balance between timber outputs, ecosystem values and economic or social values; acknowledging that not all forests can produce all values. Unmanaged forests may result in regeneration after natural disturbances but are subject to mortality risks that complicate restoration. Unmanaged forests do not support sustainable timber production; however, they may contribute critical ecosystem values not found in timber producing forests (Lippke et al. 2011).

3.7.4 Management Direction under the Current Plan

The existing forest plans contain no plan components or direct acknowledgment related to carbon sequestration. The existing plan direction contains direction aimed at promoting the sustainability of vegetation.

The current plan contains a standard stating that "Old-growth stands may be logged and regenerated when other stands have achieved old-growth status" (USDA Forest Service 1987a, p. II-20). Given old-growth forests have high carbon stocks that can take centuries to recover, carbon benefits from harvesting old-growth stands will likely take longer to develop with greater uncertainty about achieving desired outcomes in the long-term.

Under the current plan, management would likely continue similarly as in the recent past, resulting in a similar pattern of carbon storage and flux as discussed in the affected environment section (given similar magnitude of disturbance, Figure 8). Direction in the current plans aimed at promoting the sustainability of vegetation would continue to promote the Bitterroot National Forest towards resiliency from disturbance, and thus enable the National Forest to provide carbon sequestration over both the short and long term.

3.7.5 Management Direction under the Amended Plan

Under the action alternatives, FW-GDL-VEG-01 would adopt descriptions for old growth forests by specific forest type and biophysical settings (Green et al. 2011). This would result in the identification of additional old growth relative to the current plan's definition of old growth. Moreover, in contrast to the current plan, under the amended plan, treatment in old growth forest would be limited to actions that would maintain or increase resilience (USDA Forest Service. 2022 July) of old growth (FW-GDL-VEG-01). The addition of FW-DC-VEG-01 would guide management to increase the amount of old growth across the forest. Together, these plan components would result in an increase in old growth as well as greater protections for old growth forest and the carbon stocks they represent.

3.7.6 Indirect, Direct, and Cumulative Effects Common to all Alternatives

In general, management activities (such as vegetation management, harvest, thinning, prescribed burning) implementing forest-wide vegetation desired conditions of the Bitterroot Land Management Plan as they are now and as proposed amended would initially directly reduce carbon stocks and sequestration on the forest and would negatively contribute to global climate change trends. For the action alternative impacts are slightly less when compared to the no action alternative, as the proposed changes to the plan components would result in identification of four times more current old growth acres and therefore regeneration harvest would be less likely in these newly identified old growth areas. For all alternatives, however, it is anticipated that carbon stock would stabilize, as suggested by the carbon and disturbance trends from the last 23 years (Figure 5 and Figure 7); with the acknowledgement that uncertainty exist with predicted risk from climate change increasing the magnitude of disturbance to national forest systems lands on the Bitterroot National Forest. Despite the challenges of using past trends to project the effects of disturbance and aging on forest carbon dynamics (because of the unpredictability of local climate change effects), the carbon stock data remains the best information and analysis tool available to evaluate carbon stocks.

The Bitterroot National Forest will continue to be managed to maintain forests as forests and the many ecosystem services and co-benefits the forests provide, including carbon uptake and storage. The following management strategies are available under both alternatives and also influence carbon uptake and storage potential:

- Preserve, enhance or accelerate the development of large trees stands and structures and maintain or increase old-growth conditions to support higher carbon stocks in mature forests compared with younger stands (Harmon et al. 1990, Birdsey et al. 2023).
- Manage the forest to provide a mosaic of forest structure and composition that is consistent with the natural range of variability to support ecological integrity, resilient ecosystems and provide wildlife habitat. Managing for younger stands where appropriate may cause a decline in carbon stocks in the short term, but compared with older stands, doing so promotes relatively high rates of carbon uptake over time as forests regrow (Pregitzer and Euskirchen 2004).
- Decrease forest densities and fuel conditions to reduce the risk of large, stand-replacing disturbance from insect, disease, and fire. Although this strategy initially reduces carbon stocks, it can lower risk for greater carbon stock losses and emissions in the future (Wiedinmyer and Hurteau 2010).
- Ensure successful reforestation after harvest or mortality-inducing disturbances to ensure continued carbon uptake and storage (Intergovernmental Panel on Climate Change 2014).
- Promote desired composition, structure, function, and pattern (ecological integrity) which will support long-term carbon uptake and storage in the face of changing environmental conditions (Millar et al. 2007).
- Use harvested wood for valuable and renewable products to store carbon over the long-term and substitute for energy-intensive materials or fuels, reducing the net carbon emissions into the atmosphere (Gustavsson et al. 2006, Lippke et al. 2011).

Climate change is a global phenomenon, because major greenhouse gases mix well throughout the planet's lower atmosphere. Estimated emissions of GHGs in 2010 were 13,336 ± 1,227 teragrams carbon globally (Intergovernmental Panel on Climate Change 2014) and 1,881 teragrams carbon nationally (U.S. Environmental Protection Agency 2015). All of the alternatives are projected to contribute to overall GHG emissions, by initially reducing carbon storage and sequestration when vegetation treatments are implemented in accordance the LMP vegetation desired conditions. The largest source of GHG emissions in the forestry sector globally is deforestation (e.g., conversion of forest land to agricultural or developed landscapes) (Intergovernmental Panel on Climate Change 2000, Pan et al. 2011a, Houghton et al. 2012). However, forest land in the United States has had a net increase since the year 2000, and this trend is expected to continue for at least another decade (Wear et al. 2013, U.S. Department of Agriculture 2016a). No alternatives will result in the loss of forest land on the BNF; rather, forest stands and old growth would be managed to retain the system's ability to store and uptake carbon.

Implementation of LMP vegetation desired conditions for both alternatives would manage to reduce the risk of loss of forest stands (potentially resulting in decreased ecosystem services of decreased carbon storage and sequestration) from large and higher-severity wildfires (Agee 2005, Stephens et al. 2013). Working Group III to the Fourth Assessment Report of the IPCC in regard to the impact of forests stated: "In the long term, a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fiber, or energy from the forest, will generate the largest sustained mitigation benefit" (Lippke et al. 2011).

Implementation of both alternatives would also contribute to similar levels of GHG emissions from activities such as equipment, vehicles, wood product productions, and other business operations used to implement a land management plan. Because emissions form these other connected actions are similar, a detailed quantitative analysis was not conducted. Rather a quantitative analysis of carbon and sequestration is provided above as a metric to evaluate the contributions to global climate change.

3.7.7 Conclusion

A large body of science agrees that future climate conditions will include increasing average annual temperatures over the coming decades, which will have impacts to natural resources.

Plan components in the action alternative are designed to provide for ecological integrity and resiliency to disturbances. Carbon stocks and sequestration will generally remain stable with implementation of all alternatives; particularly because plan components are designed to assist ecosystems in recovering from disturbance threats with minimum damage to social well-being, the economy, and the environment. This will help retain the ability of NFS lands to continue to store and sequester carbon. Over the longer term, applying Green et al. criteria would result in more old growth on the landscape, and more old growth on the landscape would result in a greater ability to sequester carbon. This is responsive to EO 14072 direction for conserving old growth to retain and enhance carbon storage resulting in climate-smart forest stewardship. The management mechanisms applied in both plan alternatives are consistent with internationally recognized climate change adaptation and mitigation practices identified by the IPCC (Intergovernment Panel on Climate Change (IPCC) 2007).

Carbon stocks on the Bitterroot National Forest would likely continue to increase or remain stable under both alternatives in the foreseeable future. Natural ecosystem processes, including forest growth (succession) and small-scale disturbances (e.g., fire, insects, harvests) would continue to influence carbon stocks and emissions, and though carbon trends may continue in similar trends in the last two decades (Figure 5 and Figure 7), uncertainty exist, due to increases in projected disturbance rates due to climate change (Vose et al. 2018). Both plan alternatives would preserve existing forest lands and forests by improving forest conditions and retaining forest characteristics by maintaining current land use. Given the likely changes in land use in coming decades on adjacent land ownerships, this is a critical goal. This plan amendment is responsive to EO14072, Section 2 (c)(iii) develop policies, with robust opportunity for public comment, to institutionalize climate-smart management and conservation strategies that address threats to mature and old-growth forests on Federal lands; and Sec 4 through the capture and storage of carbon dioxide.

In relation to carbon storage and sequestration, the components for old growth, snags and coarse woody debris meet the requirements to maintain or restore the ecological integrity of terrestrial ecosystems taking into account interdependence of terrestrial and aquatic ecosystems in the plan area, ecological conditions in the broader landscape that may influence the sustainability of resources, system drivers (such as natural succession and wildland fire) and the ability of terrestrial ecosystems in the plan area to adapt to change and opportunities for landscape scale restoration at 36 CFR 219.8(a)(1) (i), (ii), (iii),(iv) and (vi).

The components for snags and coarse woody debris meet the requirement that a plan must include plan components to maintain or restore soils and soil productivity, including guidance to reduce soil erosion and sedimentation at 36 CFR 219.8(a)(2)(ii). Soil carbon is maintained, and coarse woody debris will reduce soil erosion and aid in carbon sequestration.

The requirement to provide for habitat diversity by maintaining or restoring key characteristics associated with terrestrial ecosystem types at 36 CFR 219.9(a)(2)(i) is met by maintaining and increasing the amount of old growth across the forest.

The components align with the requirement to provide for ecosystem services and multiple uses, including outdoor recreation, range, timber, watershed, wildlife, and fish, within Forest Service authority and the inherent capability of the plan area; that habitat conditions for wildlife, fish, and plants commonly enjoyed and used by the public; for hunting, fishing, trapping, gathering, observing, subsistence or other activities (in collaboration with federally recognized Tribes and State and local governments, system drivers, such as natural succession, wildland fire, and climate change, at 36 CFR 219.10(a)(1), (5) and (8).

3.8 Fire and Fuels

3.8.1 Introduction

This forest plan amendment would align elk habitat, old growth, snag, and coarse woody debris objectives on the Bitterroot National Forest with the best available scientific information. In doing so, amending plan components and definitions for elk habitat, old growth, snags, and coarse woody debris objectives will have effects on the fire and fuel resource. This proposed forest plan amendment is intended to maintain or restore the ecological integrity of terrestrial ecosystems while considering the interdependence of terrestrial and aquatic ecosystems in the plan area. Maintaining fire behavior and fire severity within historical ranges is the best path toward maintaining or restoring the ecological integrity of the terrestrial and aquatic ecosystems in the plan area.

The modified plan direction will allow proposed project activities to occur that will maintain or restore ecological integrity by moving stand conditions towards their historical composition and function. There will be an increased opportunity to return fire to the landscape and move the project area towards having historical fire return intervals. These historical ranges are generally described in the context of a “fire regime” within which the natural role of fire can be described and communicated (Brown and Smith 2000). This analysis will lean heavily on the characteristics, extent, and juxtaposition of the various fire regimes known to exist in the plan area to evaluate the relative positive or negative effects the proposed action will have on the fire and fuel resource. Alternative C creates no material change to the effects analysis.

3.8.2 Indicators

INDICATOR #1: How would the Amendment affect potential fire behavior within the plan area?

INDICATOR #2: How would the Amendment affect potential fire severity within the plan area?

3.8.3 Methodology

The analysis centers on two indicators to examine environmental effects from the project alternatives: (1) potential fire behavior and (2) potential fire severity.

3.8.3.1 Potential fire behavior

Potential fire behavior is commonly characterized such as rate-of-spread, intensity, torching, crowning, spotting, and fire persistence, and by resistance-to-control. **Potential Fire intensity**, largely a measure of upward heat transfer, is heavily influenced by small woody fuels (3 inches and less in diameter) along with associated torching and crowning of crown fuels. Fire severity refers to the effects of fire on the ecosystem and depends on fuel consumption and heat flux into all living components (Brown et al. 2003).

Fuels are made up of the various components of vegetation, live and dead, occurring on a site. These components include litter and duff layers, the dead-downed woody material, grasses and forbs, shrubs, regeneration, and timber. Various combinations of these components define the major fuels groups of grass, shrub, timber, and slash. Fire behavior fuel models (Anderson 1982, Scott and Burgan 2005) assimilate fuel characteristics into a classification system that allows for estimation of fire behavior. The fuel load of each fuel model is described by the size class, the ratio of surface area to volume for each size class, and the depth of the fuel bed involved in the fire front. Crown fuels are also important for determining crown fire characteristics, such as whether a fire can transition from the ground to the tree crowns. A crown fire burns in the elevated canopy fuels. Canopy fuels normally consumed in crown fires consist of the live and dead foliage, lichen, and very fine live and dead branch wood found in the forest canopy. Crown fires generally result in high levels of mortality to the trees (Stephens et al. 2018).

The differences in fire behavior among these groups are fundamentally related to the fuel load and the associated crown fuel. Fuel load and depth are critical fuel properties for predicting whether a fire will ignite, its rate of spread, flame length and its intensity. The relative effect of the proposed plan amendments on the potential arrangement of the various fuels present in the plan area will determine the positive and/or negative effects on fire intensity.

3.8.3.2 Potential fire severity

Potential fire severity is generally dependent on large woody fuels, or coarse woody debris (coarse woody debris). These types of fuels have little influence on spread rate and intensity of the initiating surface fire in current fire behavior models; however, they can contribute to development of large fires and high fire severity. High fuel accumulations greatly increase the potential for catastrophic stand and soil destructive wildfire (Harvey et al. 1994). Coarse woody debris increases fire persistence, resistance-to-control, and burnout time which all contribute to downward heat transfer, directly affecting **potential soil heating**. Coarse woody debris is characterized by loading, size, and decay state of large woody fuel. Where burning logs smolder directly on soil, soil organic matter may be combusted or destructively altered, nutrients volatilized, water-absorbing capacity decreased, and living plant parts and microorganisms killed. These effects are most profound in the top two inches of soil. The downward severe heating is tied to longer duration burning of heavy fuels. A red and orange colorization after a stump or log has burned to extinction are telltale signs that severe soil heating has oxidized the soil matrix (Smith et al. 2017). The severe burn can skew the recovery of early successional organisms and extend recovery with less nutrients available for recolonization (Reazin et al. 2016, Smith et al. 2017).

Estimates of soil heating can be obtained using First Order Fire Effects Model or FOFEM (Reinhardt et al. 1977). The model predicts a time-temperature profile at specified depths; depths at which critical temperatures occur can also be predicted. The relative effect of the proposed plan amendments on the potential arrangement and amount of coarse woody debris in the plan area will determine the positive and/or negative effects on soil heating.

This proposed forest plan amendment is intended to modify coarse woody debris requirements to support achieving goals and objectives in Forest Plan for soil productivity while achieving the project purpose and need to improve landscape resilience to disturbances (such as insects, diseases, and fire). This amendment would help ensure the amount of coarse woody debris to be left on the ground aligns with the historical ranges identified for the Fire Groups present within the project area.

Modifying plan direction will allow for better fuels management as the amount of coarse woody debris to be left on-site wood will better align with the levels that would have been present historically. Maintaining coarse woody debris within historical ranges will reduce fire severity and impacts to soils from long-duration burning of large wood. Cumulatively, by implementing this standard for coarse woody debris, the plan area is expected to have appropriate levels of coarse woody debris by fire group, over time, fully supporting the Forest goals and objectives.

Potential fire behavior and fire severity are analyzed with the understanding that:

Any modeled data used is imprecise;

Amendment language specifies guidelines, but no two treatments are the same;

an activity may affect potential fire behavior and fire severity in one way at one place in one time but may have different effects in another place at another time.

For these reasons, analyzing potential fire behavior and fire severity uses several assumptions and limitations. General assumptions and limitations include:

relevant cited scientific research is applied appropriately to the species analyzed where possible, lack of appropriate research may be impetus for further field investigation;

the Amendment results in the same general outcomes;

effects from the Amendment are relatively uniform across the landscape from one location to the next.

Finally, fuels data used in this analysis are assumed to represent current on-the-ground conditions. During plan implementation, efforts will be made to ensure that this assumption is true, including field verification, and photo series interpretation, and incorporation of remote sensing technology.

3.8.4 Environmental Consequences

3.8.4.1 Indicator 1: How would the amendment affect Fire Behavior?

The proposed programmatic forest plan amendment does not authorize any ground-disturbing or vegetation management activities, therefore, there will be no direct effects of this action. Indirect effects, through the subsequent authorization of project-level activities, may occur.

Environmental Consequences of the No Action Alternative on Fire Behavior

Under the no-action alternative, standards for snags and coarse woody debris would remain the same as they are in the current forest plan. Standards, Desired Conditions, and the definition for old growth would remain the same. Natural processes would continue, and accumulation of forest debris would increase natural fuel loadings.

Environmental Consequences of the Amendment on Fire Behavior

Elk Components

Proposed plan amendment components for elk focus on vegetation management project activities on known elk winter and spring foraging areas that will seek to increase elk forage which in turn will change fuel conditions to more herbaceous or grass dominated models with less potential fire intensity. Plan amendment components for elk will also allow for wildfires in the Selway-Bitterroot Wilderness to be managed with minimal impact suppression tactics where feasible to enhance high alpine elk forage. This will provide more opportunities for wildfire to reduce fuel in the wilderness landscape and create more herbaceous or grass dominated models with lower fire intensity. Plan amendment components for elk will also allow for vegetation management treatments to reduce conifer encroachment on open grassland slopes where applicable to increase spring elk forage. This will also change fuel conditions to more herbaceous or grass-dominated models with less fire intensity.

Old growth Components

Plan amendment components for old growth seek to promote the retention of old growth by identifying and managing four times the amount of old growth acres than the existing plan does. Vegetation management activities, if proposed for resilience, and/or fuel reduction, would retain old growth characteristics. These vegetation management activities would be determined on project-level basis and would only occur to maintain or restore old growth habitat characteristics and ecosystem processes, such as fire, and increase resistance and resilience to disturbances or stressors such as wildfire, which would by default reduce amounts of available fuel and reduce potential fire intensity (Stephens et al. 2018). In certain situations, hazards could be mitigated in campgrounds, other designated recreation sites, administrative sites, permitted special use areas, and around infrastructure that is essential to community welfare such as utilities, communications, or the wildland urban interface. This would reduce available fuel and thus reduce potential fire intensity. Regeneration harvest of old growth would be removed as a standard, and only allowed in cases of severe insect and disease or blowdown events. These cases would also result in the reduction of fuels.

Snag Components

Proposed components state that vegetation management activities should retain the largest snags available based on habitat type groups. Where snag numbers do not exist to meet the recommended ranges, the difference would be made up with live replacement trees or accounted for in adjacent stands. Exceptions occur for issues such as human safety and instances where the minimum numbers are not present prior to the management activities. Human safety includes areas where fuel levels are a concern on treatment units adjacent to private property. The levels of coarse woody debris on the ground will increase over time as snags fall which may slightly increase potential fire intensity.

Coarse Woody Debris Components

Proposed guidelines for the amounts of coarse woody debris (including logs) that should be retained during vegetation management activities are displayed in Table 5 in Chapter 2. A variety of species, sizes, and decay stages should be retained. Exceptions may occur in areas where a site-specific analysis indicates that leaving the quantities listed in the table would create an unacceptable fire hazard to private property, people, or sensitive natural or historical resources, as determined by a fuel specialist. These levels are stratified by site productivity and natural fire regime and will keep potential fire intensity within historical ranges where forest treatments have been conducted.

Cumulative effects associated with projects authorized under this amendment will be analyzed and disclosed in association with project-specific effects analyses.

3.8.4.2 Indicator 2: How would the amendment affect Fire Severity?

The proposed programmatic forest plan amendment does not authorize any ground disturbing or vegetation management activities, therefore there will be no direct effects of this action. Indirect effects, through the subsequent authorization of project-level activities, may occur. The amended components would allow for the reduction in levels of residual coarse woody debris, thus reducing ground fuels and potentially reducing fire severity.

Environmental Consequences of the No Action Alternative on Fire Severity

Under the no-action alternative, there would be no new proposed treatments within the project area. Natural processes would continue, and accumulation of forest debris would increase natural fuel loadings. Many of the forested stands across the Forest would remain overstocked and ladder fuels would continue to fill-in and crowd the understory. This understory would serve as ladder fuels that would permit a surface fire to expand into the canopy of overstory trees. This could result in the mortality of many of the existing overstory trees that would have otherwise survived a surface fire of lower intensity. Additional mortality from insects and disease in the project area would lead to higher fuel loading over time.

Environmental Consequences of the Proposed Amendment on Fire Severity

Elk Components

Plan amendment components for elk focus on guidelines for vegetation management project activities on known elk winter and spring foraging areas that would seek to increase elk forage which in turn could change fuel conditions to more herbaceous or grass-dominated models with less potential soil heating. Plan amendment components for elk would also allow for wildfires in the Selway-Bitterroot Wilderness to be managed with minimal impact suppression tactics where feasible to enhance high alpine elk forage. This would provide more opportunities for wildfire to reduce fuel in the wilderness landscape and create more herbaceous or grass-dominated models with lower potential soil heating. Proposed plan amendment components for elk would also allow for vegetation management treatments to reduce conifer encroachment on open grassland slopes where applicable to increase spring elk forage. This would also change fuel conditions to more herbaceous or grass-dominated models with less potential soil heating.

Old growth Components

Plan amendment components for old growth seek to promote the retention of old growth when vegetation management activities are prescribed that would retain old growth characteristics. These vegetation management activities would only occur to maintain or restore old growth habitat characteristics and ecosystem processes, such as fire, and increase resistance and resilience to disturbances or stressors such as wildfire, which will by default reduce amounts of available fuel and reduce intensity. In certain situations, hazards will be mitigated in campgrounds, other designated recreation sites, administrative sites, permitted special use areas, and around infrastructure that is essential to community welfare such as utilities, communications, or the wildland urban interface. This would reduce available fuel and thus reduce potential soil heating. Thinning stands to a lower density of trees per acre can increase wind penetration and influence rate of spread of a fire; however, rate of spread of a surface fire has little influence on severity or ability for firefighters to engage the fire (Graham et al. 1999). Reducing ladder fuels and thus reducing the likelihood of a crown fire is an important benefit to old growth stands (Harrington 2007). According to Michell et al. (2009), balancing a demand for maximal landscape C storage with the demand for reduced wildfire severity will require treatments to be applied strategically throughout the landscape rather than indiscriminately treating all stands. Thoughtful and strategic placement and prescriptions will be considered in any proposed projects with an objective of fuel reduction.

Snag Components

Proposed plan components provide guidelines for the retention of snags during vegetation management activities. The snag guidelines include leaving the largest snags available. Where snag numbers do not exist to meet the recommended ranges, the difference would be made up with live replacement trees or accounted for in adjacent stands. Exceptions occur for issues such as human safety and instances where the minimum numbers are not present prior to the management activities. The levels of coarse woody debris on the ground will increase over time as snags fall, providing generally light levels of fuel for future wildfires. This is less than the existing Forest Plan that may leave more snags in a vegetation treatment unit, and therefore result in potentially less severe fire effects.

Coarse Woody Debris Components

Proposed plan components provide guidelines for the amounts of coarse woody debris (including logs) to be retained during vegetation management activities. These guidelines are displayed in Chapter 2. The guidelines for CWD are all well below 40 tons per acre, above which severe soil heating could occur if a wildfire burned the logs to extinction (Brown et al. 2003). Severe soil heating does not render soils sterile, but can lengthen the time for recovery, as observed where piles of logging slash have burned. A variety of wood species, sizes, and decay stages should be retained. Large wood in advanced decay has high value since brown cubicle rot can retain moisture into the dry season that may decrease fire severity. Exceptions to the proposed guidelines may occur in areas where a site-specific analysis indicates that leaving the quantities listed in the table would create an unacceptable fire hazard to private property, people, or sensitive natural or historical resources which would reduce potential soil heating. These levels are stratified by site productivity and natural fire regime and will maintain potential soil heating within historical ranges.

Cumulative effects associated with projects authorized under this amendment will be analyzed and disclosed in association with project-specific effects analyses.

3.8.4.3 Determination and Summary of Results

Implementation of the proposed Amendment language will generally reduce potential fire behavior and fire severity. This determination is based on the following rationale:

The elk components proposed in this plan amendment will generally reduce potential fire intensity and potential soil heating.

The old growth components proposed in this plan amendment allow for treatments that would generally reduce potential fire intensity and potential soil heating.

The snag components proposed in this plan amendment may slightly decrease potential fire intensity and potential soil heating.

The coarse woody debris components proposed in the plan amendment for future vegetation treatment areas will maintain potential fire intensity and potential soil heating within historical ranges.

3.8.5 Conclusion

This fire and fuel effects analysis provides information concerning the existing fire and fuel resource in the analysis area and the potential consequences of the proposed Amendment. The Amendment has been evaluated within the definition for effects at 40 CFR 1508.1 throughout this report and have been determined not to have significant effects from the environmental consequences, thus meeting the requirements of a Finding of No Significant Impact.

The effects analysis for fire and fuels displays that the requirements to maintain or restore the ecological integrity of terrestrial ecosystems taking into account interdependence of terrestrial and aquatic ecosystems in the plan area, ecological conditions in the broader landscape that may influence the sustainability of resources, system drivers (such as natural succession and wildland fire) and the ability of terrestrial ecosystems in the plan area to adapt to change and opportunities for landscape scale restoration at 36 CFR 219.8(a)(1) (i), (ii), (iii),(iv) and (vi) is met. No negative effects from the proposed amendment will interfere with the ability of the plan to meet this requirement.

Components for the retention of coarse woody debris meet the requirement that a plan must include plan components to maintain or restore soils and soil productivity, including guidance to reduce soil erosion and sedimentation at 36 CFR 219.8(a)(2)(ii).

The effects analysis addresses wildland fire as a system driver. The components align with the requirement to provide for ecosystem services and multiple uses, including outdoor recreation, range, timber, watershed, wildlife, and fish, within Forest Service authority and the inherent capability of the plan area; that habitat conditions for wildlife, fish, and plants commonly enjoyed and used by the public; for hunting, fishing, trapping, gathering, observing, subsistence or other activities (in collaboration with federally recognized Tribes and State and local governments, system drivers, such as natural succession, wildland fire, and climate change, at 36 CFR 219.10(a)(1), (5) and (8).

3.9 Soils

3.9.1 Introduction

This section informs on the potential environmental consequences to the soil resource from the proposed alternatives. There is concern that the amendment could reduce coarse woody debris to minimum amounts in all treated stands and in old growth. The analysis discloses where the proposed changes would affect coarse wood and how this may influence soil productivity. Alternative C creates no material change in the effects analysis.

3.9.2 Scope of Analysis and Analysis Methods

This analysis discusses indirect effects primarily since no action on the ground proposed. The analysis focused on the proposed changes on coarse woody debris management when the Bitterroot National Forest treats forests in the future. Since this proposal would result in programmatic changes to the management plan, the analysis uses the Bitterroot National Forest administrative boundary. The discussion will cover snags as coarse woody debris recruitment although mostly center on coarse woody debris target levels since this organic faction contributes to soil productivity. The wildlife section discusses coarse woody debris in detail as part of habitat structure along with snags, old growth, and elk habitat. The following analysis indicators were generated based on public feedback and professional judgment:

Consistency

Ecological integrity

Best available science

Soil productivity

Fuels

3.9.3 Environmental Consequences (Indirect Effects)

The Bitterroot National Forest Plan has a goal for maintaining soil productivity and an objective to design management treatments to maintain soil productivity. The additional design criteria in the amendment would bolster the direction to meet this goal and objective, having a positive effect for soils. The design criteria emphasize the need to maintain soil properties, including soil organic matter, physical condition and down woody debris for productive soils and hydrologic function. Another component emphasizes the need for soil organic matter (SOM) to sustain mycorrhizae, a key decomposer in soils, in addition to SOM to serve as mulch to resist erosion from wind and water and retain soil moisture. Collectively these components underscore the soil capacity to provide nutrients, and store and provide water.

The proposed action would apply forest plan direction for managing coarse woody debris (CWD across the Bitterroot National Forest outside of designated Wilderness (1,664,512 – 743,000 Wilderness acres = 921,512 acres) whereas the current direction is isolated to management areas that account for 484,201 acres. The proposed action would also expand the scope of the coarse woody debris management direction for the range of habitat types that occur on the Bitterroot National Forest. The current plan only applies to the moderate and high elevations in the upper east and West Fork Bitterroot River drainages (Management Area 1), the drier forest habitat types along the lower elevation habitat band that rings the Bitterroot National Forest valley below 6,200 feet elevation (Management Area 2), the riparian areas (Management Area 3b), and the viewsheds along major corridors (Management Areas 3a and 3c). The proposed guidance would only apply to treated areas, particularly ground-based harvest, as these actions would most affect coarse woody debris levels. Overall, the proposed action would have a positive effect for soils by resolving conflicts in forest plan direction and better align management of coarse woody debris for ecological integrity, while optimizing rates to balance soil productivity and fuels management depending on the specific goals of forest projects.

The proposed action would resolve conflicting specifications and provide consistency. The new desired conditions would define coarse woody debris as greater than 3-inch wood material following conventional terms used in fuels management and soil productivity literature (Graham et al. 1994, Brown et al. 2003, Lutes and Keane 2006). For management areas 1, 2, 3a-3c, the current plan recognizes the importance of maintaining organic matter and identified that site preparation methods retain residual debris under 8-inch diameter to provide nutrient and ectomycorrhizal levels for maintaining growth rates (III-9). The plan prescribes 10-15 tons per acre specific to dry sites based on Harvey et al. (1982) research at that time. However, the plan also had a protection clause of 25 tons per acre of downed wood greater than 6 inches diameter, where available, to provide habitat for nongame and small game wildlife in this management area. The two prescribed levels conflict directly: greater than 25 tons per acre versus 10–15 tons per acre. The two standards also conflict in size of material emphasized. The protection standard only applies to the lower elevation forests that Management Area 2 defines along with the riparian areas of Management Area 3b, which results in plan inconsistency on 179,216 acres.

The proposed action would address the range of coarse woody debris associated with the various habitat types that occur on the Bitterroot National Forest instead of emphasizing a general 10-15 tons per acre for dry and harsh sites. The proposal would also strengthen meeting this intent by providing a guideline FW-GDL-VEG-08. This change shifts the management of coarse woody debris to a broader intent for sustaining ecological integrity rather than a sideboard for a specific high-risk scenario, e.g., site preparation on dry harsh sites. Ecological integrity is a key requirement in the 2012 Planning Rule (36 CFR §219.9(a)). This alignment with habitat type would reflect what was established as desired conditions for coarse woody debris based on soil productivity and wildlife habitat from decades of inventory and research. The shift accounts for expected types but also the range of values somewhat address the spikes that may occur depending on time since disturbance. The direction also clarifies to specify the largest diameter logs be retained. From a soil perspective, the large diameter and rotten logs hold water effectively and provide a larger benefit as microsite that heightens soil biological activity than smaller, solid downed wood (Harvey et al. 1987). Large logs decompose to rich brown cubicle rot deposits as soil wood.

The ranges of coarse woody debris in the proposed plan component for the habitats would account for differences in soil type and soil condition. For example, managers may choose to leave upper range amounts of coarse woody debris for either dry ponderosa pine or dry Douglas-fir habitat types if needed to reclaim soils with legacy effects from past timber harvest. The droughty granitic soils the Bitterroot National Forest Plan FEIS (1987) discussed as sensitive to site preparation would be specific soil types in these habitat types to consider where higher amounts of coarse woody debris could increase water holding capacity.

3.9.4 Why coarse woody debris need varies by habitat type

These proposed target rates for coarse woody debris according to habitat type match the general pattern of recruitment and decay of coarse woody debris. Figure 9 below shows the sinusoidal pattern of coarse wood that occurs with different degrees of fire severity (Agee 2002). Severity in this case is used in terms of mortality to stands. The diagram is modeled after Oregon western hemlock, but the pattern is also instructive for the Bitterroot National Forest cover types. High severity fires typically result in large-scale forest mortality that leaves large sections of burnt trees. These tree boles, described as snags, persist, and then fall and accumulate as coarse woody debris. The length of time snags remain standing depends on the species types and strength of the remnant tree bole – usually big old larch boles last longer than smaller lodgepole pine boles. For high severity fire patches, there is an initial pulse as snags fall and then decay on the ground slowly over time. As a stand matures into old growth, the accumulated litter and coarse woody debris moves into advanced decay such as brown cubicle rot and incorporates into soil wood. Moderate severity fire patches have smaller aggregations of dead trees that follow the same trajectory but at smaller areal scale. Low severity fires that burn through the understory usually leave very few snags and thus only minimal coarse woody debris accumulates. The latter type fires are the classic dry forest, frequent re-occurring fires associated with ponderosa pine. Fire is an important as a recycling process in biological decomposition for nutrient turnover (Harvey et al. 1994).

Forest cover types, categorized as Fire Groups, correspond to these fire severity patterns and thus the amounts coarse woody debris generally increase from dry types to wet and cool cover types (see Fire and Fuels section). For example, the warm, dry ponderosa pine that is Fire Group 1 has a recommended coarse woody debris range of 5-10 tons per acre. In contrast, the moister and cooler lodgepole pine Fire Group 7 has recommended ranges of 8-24 tons per acre (Table 4). That higher rate of coarse woody debris reflects the fire regime where fires occur less frequently, but with higher severity.

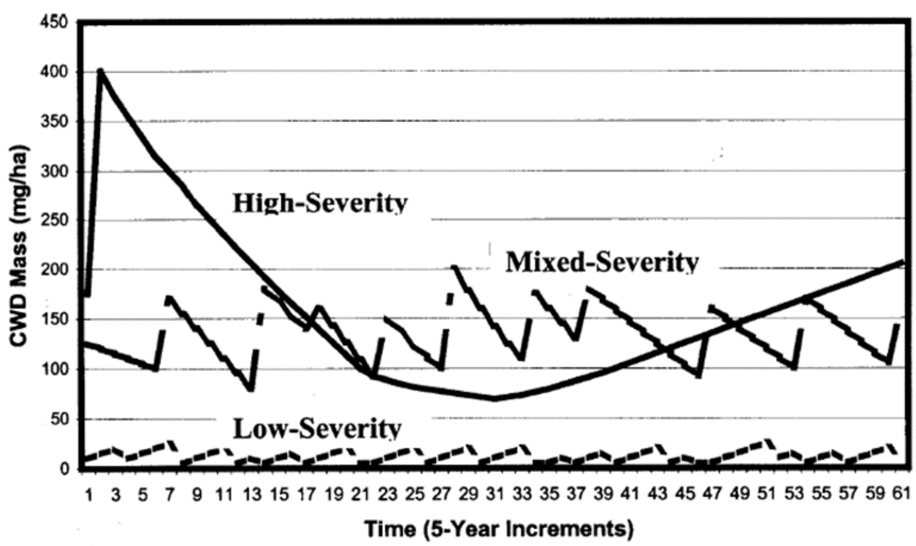

Figure 10. Coarse woody debris accumulation over time by fire severity

The proposed action would focus on future treated areas since timber harvest efficiency can lead to a dearth of coarse woody debris. Recent monitoring from the Kootenai and Idaho Panhandle National Forest Biennial Evaluation and Monitoring Reports have shown that with modern whole tree yarding techniques and machine piling of fuels that coarse wood debris can be scarce after timber harvest (U.S. Department of Agriculture 2021;2022). The proposed plan components set forth desired conditions that encompass all cover types and management areas that would give consistent guidance.

Currently, past harvest regeneration areas have the lowest level of coarse woody debris where stands were cleared and the slash treated and prepared for reforestation with a combination of dozer piling and slash broadcast burning occurred. Roughly four percent of the Bitterroot National Forest has been cut with these slash disposal methods based on forest records. The dominant period when these cutting and slash control methods were used was from the mid-1950s to 1990. These areas amount to 66,325 acres (four percent of the Bitterroot National Forest area) in the mid to lower elevations; roughly half of this cutting was regeneration harvest. Coarse wood is aggregating, albeit slowly in these stands as they mature, where insect and disease and wildfire cause mortality. Snags in these forests decay and eventually fall and become downed wood. The plan components would have a positive effect when treatments occur in these stands that set up a trajectory for meeting desired coarse woody debris levels for the future (Franklin et al. 2002).

Outside treated areas, the Bitterroot National Forest stands are following expected patterns for coarse woody debris loadings mostly following fire disturbance. In the past 40 years, almost half the Bitterroot National Forest has experienced wildfire. Of this, roughly 10 percent had high severity fire that killed forest stands. In the year 2000, wildfires burned just under 400,000 acres, with large swaths burning through lodgepole pine stands. Thus, just based on recent fire history, a large pulse of coarse woody debris is beginning to accumulate where fire burned the most severely in contemporary history. Given the predominance of fire in mid to upper elevations that naturally led to high coarse woody debris loadings, it's likely the tonnage will be on the high end of the ranges. In lodgepole pine stands, wood can accumulate to levels above 50 tons per acre. It is likely that from 10 to 25 percent of the Bitterroot National Forest has very high aggregations of coarse woody debris from recent wildfire.

For more perspective, information provided in the Carbon Storage and Sequestration section, shows the Bitterroot National Forest stands mostly in the middle-aged size class (80-140 years), with roughly 17 percent in old growth status (greater than 200 years). These areas would be in mid pulse of aggregating coarse woody debris where decomposition begins to lower the fraction on the surface depending on the scale of disturbance the stands developing.

Taken altogether, future forest treatments outside of past harvest areas would likely have a greater chance of meeting desired conditions set forth in the proposed action given the higher level of existing coarse woody debris. The monitoring has shown greater success for meeting coarse woody debris objectives where already high loadings occur, since timber management slash disposal concentrates on activity fuels, not existing fuel amounts.

3.9.4.1 Historical context for creating coarse woody debris rates

For context, at the time the plan was written, Brown and See (1981) reported a 6-year inventory of downed wood rates across the Northern Region. Seventeen sites were monitored across the Bitterroot National Forest and Lolo NF. The reported loadings were grouped by habitat types that represented the varying forests across moisture and temperature gradients. The term "loadings" borrows from fuel assessment semantics where greater than 3-inch diameter coarse woody debris equates to 1,000-hour fuels. At this time, west of the continental divide, forests averaged from 10 to 20 tons per acre depending on habitat type. The cool and moist groups, lodgepole pine and subalpine fir-dominated, had the highest loadings. A driver of the inventory was to establish baseline natural rates of coarse woody debris to recommend for nutrient cycling and wildlife habitat and determine an optimum where not detrimentally contributing to fire hazard, or animal and human movement (Brown and See 1981). Even at this time, the rotten dead and downed was seen as the most desirable for this balance.

Another driving concern in the 1980s was the burning of all the forest floor organic material, including coarse woody debris, from preparing the logged areas for reforestation that bared soils for planting and removed activity slash to reduce fire hazard. The Bitterroot National Forest FEIS discussed the issue of slash windrows' potential adverse effects on soil processes with the combination of organic matter loss and intense heating (U.S. Department of Agriculture 1987a). For soils, the plan components were prescriptive to these site preparation practices and focused on the harsh and dry sites where productivity is poorest.

At the same time in the 1980s, the research expanded on the importance of mycorrhizae for forest processes (Harvey et al. 1987). Big plant versus small plant studies showed the greater success of inoculated seedling with ectomycorrhizae, a type of mycorrhizae on which conifers depend for access to water and nutrients. Using ectomycorrhizae as a bio indicator, Graham et al. (1994) measured levels of coarse woody debris where ectomycorrhizae propagules were highest for each of the primary habitats in the Northern Rockies. In a meeting in 2019 for soil scientists and silviculturists before his death in 2020, Russell Graham assured these guidelines were, and should continue as, the working standard for managing coarse woody debris in these habitat types. The proposed amended coarse woody debris plan component follows this guidance.

3.9.4.2 Soil productivity

The proposed action would better align management direction to maintain soil productivity, resulting in a net positive effect. The components retain snags that would then fall down and become wood. The old growth components promote the retention of legacy trees in future proposals. These legacy trees that tend to be larger, with more heartwood, fall down and contribute to soil wood. The direction accounts for the various levels of coarse woody debris depending on warm conditions where frequent fire and cooler conditions that have slower decay rates and less frequent disturbance. The new coarse woody debris guidance would thus better match with the natural soil conditions instead of a "one size fits all" approach for sustaining soil processes.

Coarse wood debris is recognized as vital for soil productivity processes by moderating temperature and moisture, provides a focus for heightened soil biotic activity and serving as mulch that retains water, particularly when decayed wood incorporates into topsoil horizons and layers the surface soil (Harvey et al. 1987). The desired ranges in the proposed action provide tonnage, but larger material has great value since these logs will decay into soil as soil wood.

From a nutrient perspective, coarse wood has little value, but the thermal and moisture properties create soil conditions in which mycorrhizae and soil bacteria thrive (Laiho and Prescott 2004). The brown cubicle rot that becomes soil wood has particularly high value given its sorption of water. Coarse wood that forms microsites on the forest floor mediates droughty conditions. Mycorrhizae particularly concentrate near and around decaying wood, essentially extend the rooting systems of trees. Conifers are obligate hosts where these trees rely on ectomycorrhiza as conduit for nutrients and water. This conduit which travels through decayed soil wood and forest floor mulch also may transfer nutrients and carbon between mature trees and seedlings as well as across tree species (Simard et al. 2012). Since forest soils on the Bitterroot National Forest typically have very mineral soil organic matter, much of the nutrient base resides in the forest leaf and duff as well as the surfaced organic materials such as coarse woody debris (Jurgensen et al. 1997, Fisher and Binkley 2000, DeLuca et al. 2019). Page-Dumroese and Jurgensen (2006) surveyed this suite of organic materials to publish rates for typical habitat types in the Northern Region. From a biomass standpoint, coarse woody debris generally makes up less than 20 percent of surficial organic materials in drier habitats and 60 percent in cool and wet habitats (Laiho and Prescott 1999, Page-Dumroese et al. 2006). Carbon follows similarly with coarse woody debris comprising an average 20 percent of the soil total and 10 percent of the site total. Soils generally have about half the total site carbon in our Northern Rocky Mountain Forests (Heath et al. 2011, Simard et al. 2021).

Balancing Fire Hazard and Soil Productivity

The proposed action would also address risk for fire hazard since the desired rates represent an optimum where a range is given to balance soil productivity versus fire hazard, rather than a minimum amount. The activity that decreases coarse woody debris the most is timber management through fuel abatement. Wildfire may burn severely, but quick moving fires lack the duration that consumes most of the heavy fuels which includes coarse woody debris (Hartford and Frandsen 1992). As an upper bounds, Reinhardt et al. (1991) initially established 40 tons per acre coarse woody debris for managing stands for multiple benefits. In later work, an optimum range was set to 10-30 tons per acre to balance soil productivity concerns with fire behavior, resistance to control and soil heating (Brown et al. 2003). The desired ranges in the proposed coarse woody debris guidance largely fall into this generalized optimum except for the drier areas which naturally have less material from frequent fire.

Though coarse woody debris constitutes heavy fuels that may smolder long and not contribute greatly to fire spread, managers may require aiming for lower levels of coarse woody debris where resistance to control within fuel breaks and near values at risk may be a strategic concern. Fuels may generally be classified in terms of tons for modeling purposes. Coarse wood is a component of the woody residue, soil wood, and forest floor that contribute to fire behavior. As discussed above, coarse wood is typically less than 20 percent of surficial organic materials for the drier stands most typically targeted for treatment.

Thus, the listing of a range of desired levels by habitat gives flexibility when tailoring management prescriptions to fire hazard risks such as egress, ingress, the wildland urban interface, and proximity to values at risk.

3.9.5 Cumulative Effects

Past actions and foreseeable future actions primarily affect soils at the site location. Since this proposal does not propose any direct activities on the ground, no cumulative effect would result. Influence from adjacent management on private, state, or federally managed areas would have undetectable effects on coarse wood levels on the Bitterroot National Forest. Legacy disturbance from past, present, and future management actions could affect the soil condition where future management activities are planned. Past forest regeneration cuts that could have included intensive broadcast burns were most likely prior to the year 2000. Timber records indicate this practice was completed on 79,623 acres, most concentrated during the 1960s and 1970s. For the future, the projected annual total timber harvest that includes intermediate and regeneration types of harvest would average 950 acres per year, based on data from the last six years. Roughly a third of this is regeneration. The guidelines would have a net positive effect to ensure coarse woody debris levels are maintained to match the habitat where these future actions are planned.

3.9.6 Conclusion

The components for elk habitat will have no discernible effect on soils. The components for coarse woody debris, snags and old growth are beneficial for soil processes and function, but do not significantly affect the human environment. The components for coarse woody debris and snags meet the substantive requirement that a plan must include plan components to maintain or restore soils and soil productivity, including guidance to reduce soil erosion and sedimentation at 36 CFR 219.8(a)(2)(ii), and the requirement to provide for habitat diversity by maintaining or restoring key characteristics associated with terrestrial ecosystem types at 36 CFR 219.9(a)(2)(i).

3.10 Water and Fish

There would not be measurable effects from the proposed components on water quality or quantity since there are no direct actions associated with this amendment. All existing water quality plan components would be retained. Resource specific issues, associated indicators, relevant methodologies, and requisite analysis are identified at the project scale. Depending on future proposed actions, water quantity is one of multiple potential issues that may be analyzed in the effort to determine Clean Water Act compliance along with compliance with other laws, regulations, and policies. If water quantity is deemed a relevant issue and indicator for a given future project activity, Equivalent Clearcut Area modeling may comprise a facet of the water quantity analysis conducted at the project scale. Please refer to the soils analysis that details the effects on productivity, including the potential for storing water.

Similarly, the components would not have any measurable effect to fish. The current Bitterroot National Forest Plan objective would remain whereby maintaining riparian habitat and its potential to replace woody debris. Management Area 3b encapsulates 50,431 acres of riparian habitat which includes riparian areas for fish and non-fish bearing streams. The riparian areas have stricter protections since the Bitterroot National Forest Plan was amended in 1995 for the Inland Native Fish Strategy (INFISH) that designated Riparian Habitat Conservation Areas (RHCAs) around all the streams on the forest. These RHCAs include all the MA 3b area.

The proposed plan components would retain the current snag direction for management area 3b since riparian areas are very important as recruitment for stream wood (Young et al. 2006, Everest and Reeves 2007). The coarse woody debris guidelines would change to allow for the ranges associated with habitat type. Cool and moist sites would have upper targets of coarse woody debris of 20 to 30 tons per acre, which is in line with the previous 3b standard upper threshold of 25 tons per acre. The dry sites would have upper loadings of 10 tons per acre, which is less than the current standard. However, management of the riparian areas would be for fish and wildlife benefit and not timber management. The INFISH standards prohibit timber harvest and fuelwood cutting in RHCAs with exceptions for catastrophic events degrading riparian conditions or silvicultural practices needed to promote riparian management for fish benefit. Thus, vegetation management activities that would affect coarse woody debris in these areas is unlikely.

3.11 Recreation

Shifts in elk usage area are not expected to change significantly, therefore hunting and wildlife viewing opportunities would not be expected to change significantly. None of the proposed or foreseeable future activities in the area are expected to create major changes to hunting or wildlife viewing opportunities. Montana Fish Wildlife and Parks will continue to monitor population sizes and use areas and shift their management strategies accordingly which may or may not have impacts on hunting and wildlife viewing opportunities. The desired condition to provide habitat conditions which will encourage elk to remain on NFS lands aligns with EO 13443, Facilitation of Hunting Heritage and Wildlife Conservation – expand and enhance hunting opportunities.

The amendment would not affect old growth stands that already exist on the Forest and would not create more opportunity for people to experience old growth trees. The amendment will lead to the identification of an increased number of stands that will be managed as old growth stands, which could indirectly increase the opportunity for people to experience an old growth stand going forward since they would be less likely to be chosen as a regeneration harvest area. Old growth stands will continue to provide for ecosystem services.

Depending on their location, snags may be considered a hazard tree by the USDA's; "A Guide to Identifying, Assessing, and Managing Hazard Trees in Developed Recreational Sites of the Northern Rocky Mountains and the Intermountain West"(2017). Direction on hazard tree management for USDA Forest Service developed recreation sites is found in Forest Service Manual section FSM 2332.13 where it states: "Consistent with preserving the recreation resource, remove trees or tree limbs identified as hazardous at developed recreation sites." The proposed amendment would not have an effect on existing guidance for removal of snags in developed recreation areas. People will continue to have the opportunity to cut snags for firewood, but the conflicting language in the plan that they must pose a hazard would be removed.

Other than the opportunity to view wildlife that may make use of large, downed wood, coarse woody debris components for stands treated in future projects are irrelevant to recreation. The components align with the substantive requirement to provide for ecosystem services and multiple uses, including outdoor recreation, range, timber, watershed, wildlife, and fish, within Forest Service authority and the inherent capability of the plan area; that habitat conditions for wildlife, fish, and plants commonly enjoyed and used by the public; for hunting, fishing, trapping, gathering, observing, subsistence or other activities (in collaboration with federally recognized Tribes and State and local governments, system drivers, such as natural succession, wildland fire, and climate change, at 36 CFR 219.10(a)(1), (5) and (8).

4. Consultation and Coordination

4.1 Consultation

A letter inviting the Tribal Councils to consult on this Forest Plan amendment was sent on December 22, 2022 to the Confederated Salish and Kootenai Tribes (CSKT) and the Nez Perce Tribe. In addition to letters on this issue, through an existing Memoranda of Understanding (MOU) between the CSKT and the Bitterroot National Forest, Tribal staff were invited to participate in the project development and kept informed of the process through routine phone calls, meetings, and emails. These staff-to-staff level calls serve to ensure issues of concern are dealt with early in the planning process. Through staff level consultation with the Tribal forestry department and the cultural preservation department, to date, no concerns have been received by the forest. The EA and draft Decision Notice were transmitted to tribal chairpersons in June 2023.

Consultation was conducted with the United States Fish and Wildlife Service and a Biological Opinion was received for the elk habitat components in this amendment (PF-WILD-003). Informal consultation is ongoing for grizzly bear and lynx for the remaining components. Consultation regarding the newly listed whitebark pine tree is not necessary because of the determination that the amendment will have no effect on whitebark pine. No decision will be made until concurrence is received from the USFWS.

4.2 Collaborators

Staff from the Montana Fish, Wildlife, and Parks and Rocky Mountain Elk Foundation contributed considerable time and expertise in developing recommendations to Forest Service resource specialists for this plan amendment. A panel of local and regional experts assembled to discuss elk population goals, limiting factors, and habitat needs in each of the Montana Fish, Wildlife, and Parks elk management units/hunting districts and to identify the greatest needs for elk management in each of these areas. The Ravalli County Collaborative also provided input in the development of the proposed action. The Montana Department of Natural Resources supports the amendment.

5. Finding of No Significant Impact

The amendment is not expected to create a significant environmental effect, and therefore does not require preparation of an environmental impact statement (36 CFR 219.13 and 40 CFR 1501.6). The amendment does not significantly alter the multiple use goals and objectives for long-term land and resource management. The amendment includes relatively minor changes to standards and guidelines (FSM 1926.51). The amendment will not substantially alter the management of land and resources (FSM 1926.52). The amendment does not have substantial adverse effects on any substantive requirement at 36 CFR 219.8 through 219.11, nor does it substantially lessen the protections for a specific resource or use. See effects analysis in the EA.

The Finding of No Significant Impact documents the reasons why an action, not otherwise categorically excluded, will not have a significant effect on the human environment and for which an environmental impact statement therefore will not be prepared (40 CFR 1501.6). The Finding of No Significant Impact discussion considers all information included in the environmental assessment, including the Potentially Affected Environment, as well as documentation in the project record. Pertinent specialists have reviewed the proposal and based on their input, the responsible official made the following determinations with regards to the potentially affected environment and degree of effects considered for a Finding of No Significant Impact.

The following effects (or impacts) discussions focus on changes to the human environment from the proposed action (or alternatives) that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives, including those effects that occur at the same time and place as the proposed action (or alternatives) and may include effects that are later in time or farther removed in distance from the proposed action or alternatives.

- Both short- and long-term effects.

The effects to all resources are minor. There will be no significant effect to wildlife from any of the components in this amendment (see p. 63). The identification of an increased number of old growth acres/stands is expected in both the short- and long-term, but this will not have a significant effect on the human environment (pp. 73-74, 81) nor any significant environmental effect. The components for snags and coarse woody debris balance the need for fuel reduction, soil nutrients and small mammal habitat, but are not significant. (pp. 68, 86, 91-92). The elk components and old growth components codify the management approaches that have been applied for decades through site-specific amendments.

- Both beneficial and adverse effects.

Effects have been found to be generally beneficial, but do not rise to the level of significance. Proposed amendment language contains guidelines that will enhance elk forage availability and nutritional quality in future site-specific projects through vegetation management, prescribed fire, or potential wildfire. While the proposed amendment language may lead to a decrease in certain cover types in future site-specific projects, research suggests that thermal cover may not influence elk to the extent originally thought when the Forest Plan was implemented.

The change in the definition of old growth to Green et al. (1991, errata 2011) will allow for the identification of more acres of old growth than the original plan definition. This is beneficial for the retention of old growth characteristics and carbon sequestration, as well as an increase in the amount of habitat managed for the benefit of old growth habitat-dependent species. The definition is not a prescription to treat all old growth stands to minimum characteristics.

Snag components simply correct a long-standing error in the existing plan that states all snags will be retained unless they pose a hazard. The components for snags allow for common sense management, the retention of adequate snags for wildlife habitat and future coarse woody debris, and the ability to remove snags that are hazardous to human health and safety.

Likewise, the components for coarse woody debris remove conflicting direction for certain management areas, while allowing for adequate disposal of activity fuels and the retention of suitable amounts of downed wood for the structure, function and process needed for soils, insects, fungi, amphibians, and mammals.

- Effects on public health and safety.

The components for elk have no effect on public health and safety. The component and definition for old growth has little to no effect on public health and safety, beyond the potential for the retention of more large trees storing carbon, a beneficial effect. The component for snags continues to allow for felling of hazard trees posing a threat to public health and safety. The amount of downed woody debris prescribed to be left in treatment units does not pose a fuel hazard.

- Effects that would violate Federal, State, or local law protecting the environment.

The amendment will not violate any Federal, State, or local law protecting the environment. Consultation for effects to the grizzly bear has been conducted under the Endangered Species Act, and a Biological Opinion has been received. The determination of "may affect, likely to adversely affect" in the Biological Assessment was based on the combined effects of the ongoing implementation of the Bitterroot Forest Plan, the Bitterroot Travel Plan, and the elk habitat components of this amendment. The amendment itself does not create such effects. The amended Forest Plan will not negatively impact the survival or recovery of grizzly bears (p. 59). The proposed project is not likely to jeopardize the continued existence of the North American wolverine (p. 60). The amendment will have no effect to the recently listed whitebark pine.

This finding of no significant impact creates the rebuttable presumption that the proposed amendment will not have substantial adverse effects (36 CFR 219. 13) and therefore, an environmental impact statement is not necessary or required. The proposed action is or closely similar to one that normally requires the preparation of an environmental impact statement under the procedures adopted by the agency pursuant to 40 CFR 1507.3; therefore, in accordance with 40 CFR 1501.6, this FoNSI is available for public review for 30 days before the agency makes its final determination, as part of the 45-day objection period.

6. Appendix A

Comments and Response Summary

Comments and responses are summarized by theme.

Environmental Impact Statement and Significance of the Plan Amendment

Several parties insisted an Environmental Impact Statement was the only appropriate instrument to document effects of the proposed amendment because most of the components would apply forest wide and would have a significant impact. This concern often accompanied a presumption that old growth stands would be targeted for thinning down to "minimum characteristics".

Response: See finding of no significant impact. The Forest Service has considered the degree of effects of the components in the amendment. The amendment does not include any ground-disturbing activities, nor does it direct any to be done in the future.

A plan amendment is only considered a significant change in the forest plan if it "may create a significant environmental effect and thus requires preparation of an environmental impact statement ..." 36 C.F.R. 219.13(b)(3). Effects of the proposed action are disclosed in Chapter 3 of the environmental assessment, and the responsible official was able to reach a finding of no significant impact based on this analysis. As a result, the proposed amendment is not considered a significant change to the forest plan.

The 2012 Planning Rule 2016 amendment Final Rule Federal Register (81 FR 90723, December 15, 2016) provides background information on the 2016 amendments which specifically adopted direction for how to amend plans developed under the 1982 Planning Rule. Since NFMA provides that ''plans can be amended in any manner whatsoever'' (16 U.S.C. 1604(f)(4); 81 FR 90723, 90724 Dec 15, 2016;), the Department explained in the preamble to the 2012 rule, ''[p]lan amendments incrementally change the plan as need arises.'' (77 FR 21162, 21237, April 9, 2012) (emphasis added) (81 FR 90723, 90724 Dec 15, 2016). Department explained its intent that with the 2012 rule, ''plans will be kept more current, effective and relevant by the use of more frequent and efficient amendments, and administrative changes over the life of the plan, also reducing the amount of work needed for a full revision'' (Id.) 81 FR 90723, 90724-90725 Dec 15, 2016). Under the 2012 rule, ''[p]lan amendments may be broad or narrow, depending on the need for change'' (36 CFR 219.13(a)); and amendments ''could range from project specific amendments or amendments of one plan component, to the amendment of multiple plan components.'' (81 FR 90723, 90725 Dec 15, 2016; 77 FR 21162, 21237, April 9, 2012). The 2012 rule provides that ''[t]he appropriate NEPA documentation for an amendment may be an environmental impact statement, an environmental assessment, or a categorical exclusion, depending upon the scope and scale of the amendment and its likely effects.'' (36 CFR 219.13(b)(3)). The 2012 rule gives responsible officials the discretion, within the framework of the 2012 rule's requirements, to tailor the scope and scale of an amendment to reflect the need to change the plan (81 FR 90723, 90725 Dec 15, 2016). No individual amendment is required to do the work of a revision (81 FR 90723, 90725 Dec 15, 2016). The responsible official's ability to target the scope and scale of an amendment is important for adaptive management and will be especially critical for responsible officials amending 1982 plans (81 FR 90723, 90725 Dec 15, 2016). The distinction made in this provision between consistency within an amended plan with direction developed and approved pursuant to the 2012 rule and direction developed or revised under a prior rule reflects that portions of a 1982 rule plan may be changed by an amendment and other portions may remain unchanged until revision (81 FR 90723, 90725 Dec 15, 2016). This final rule ensures that the Forest Service can use the 2012 rule to amend 1982 rule plans without any individual amendment bearing the burden of bringing the underlying plan into compliance with all of the 2012 rule's substantive requirements, even if unchanged direction in the 1982 rule plan fails to address, meet or is contrary to 2012 rule requirements (81 FR 90723, 90726 Dec 15, 2016)."

Forest Plan Guidelines

Some commentors expressed concern that standards would be replaced by guidelines, and the guidelines are merely loopholes for the Forest to do whatever they want.

Response: Guidelines, as defined under the 2012 Planning Rule, are more restrictive than they were in the 1982 Rule.

Guidelines included in the proposed action are being created under the 2012 Planning Rule and will be subject to the rule's requirements. Although guidelines were considered more discretionary under earlier rules, the 2012 Planning Rule re-defined guidelines in a way that is more constraining. The Decision for the 2012 Planning Rule (77 FR 21162, 21172 April 9, 2012) clarified that compliance with both standards and guidelines is mandatory (77 FR 21162, 21172 April 9, 2012). Specifically:

> *A guideline is a constraint on project and activity decision making that allows for departure from its terms, so long as the purpose of the guideline is met. 36 C.F.R. 219.7(e)(1)(iv)*

They are similar to standards in the level of resource protection afforded and only allow deviation if their purpose can be met in another equally effective way. As a result, guidelines proposed in the amendment are ***not*** discretionary and cannot be easily deviated from.

Old Growth

Several parties assumed the Green et al. 2011 definition would be adopted to justify reducing old growth stands to minimum number of trees per acre and suggested the Forest Service is "perverting" the research to be able to cut more trees.

Response: Green et al. (1992, rev. 2011) would be adopted and applied in its entirety; therefore, it can't be a perversion. Green et al. has been applied in stand mapping and project planning for two decades. The lawsuit brought against the Gold Butterfly project by Friends of the Bitterroot in 2020 has triggered the need to formally amend the plan to keep using this best available science. The definition of old growth goes well beyond a simple number of trees per acre of a given diameter. The definition allows the identification of many more stands that would be classified as "mature" under the existing forest plan and changes them to a category with much stricter sideboards and considerations if, and when, they may be proposed for vegetation management. The minimum characteristics described in Green et al. are not prescriptive for future vegetation treatment proposals. A functioning old growth stand must remain a functioning old growth stand. The prescription for any stand is based on stand condition, location, and project and resource objectives.

If the goal was to cut more trees, we would not seek to adopt Green et al. (2011). Stands identified as "mature", and not "old growth" under the existing plan, would be subject to fewer restrictions for management. If the goal was to cut more trees, we would not have dropped a recognizable old growth stand size down to five acres and instead let them remain as inclusions within the surrounding mature stand, with no particular restrictions on vegetation management. These smaller stands would now be managed for the habitat and refugia they provide, even in small patches. If the goal was to cut more trees, we would not have proposed removing the standard that allowed for regeneration harvest when mature stands had reached the old growth successional stage.

In addition, based on the comments received, we realized the following guideline was worded in a way that could result in misinterpretation.

> FW-GDL-VEG-01: To promote the retention of old growth (see glossary) and contribute to biodiversity, vegetation management activities in old growth should retain all **minimum** old growth characteristics as defined in Green et al. (2011) or new best available science (emphasis added).

The word "minimum" may have caused some commenters to incorrectly assume our intent is to actively manage old growth areas down to the minimum old growth characteristics. This misinterpretation may have caused some of the concern about changing to Green et al.'s definition of old growth.

As explained above, that is not our intent. To address that concern, and clarify our intent, we have reworded the guideline in Alternative C to the following:

> FW-GDL-VEG-01: To promote the retention of old growth (see glossary) and contribute to biodiversity, vegetation management activities in old growth should retain old growth characteristics to ensure structure, function and process, as defined in Green et al. (2011) and as updated.

This change is intended to emphasize that we do not intend to manage old growth areas just to meet the minimum characteristics. Instead, it is our intent to retain the characteristics present.

The proposed amendment, moreover, creates new restrictions on timber harvesting that will reduce the potential for commercial logging in old growth stands. The 1987 Forest Plan stated that "[o]ld-growth stands may be logged and regenerated when other stands have achieved old-growth status." (Chapter II, Section F.1(e)(5)). This standard is replaced by a guideline that prohibits vegetation management in old growth stands unless it is conducted to:

- maintain or restore old growth habitat characteristics and ecosystem processes;
- increase resistance and resilience to disturbances or stressors that may have negative impacts on old growth characteristics or abundance (such as drought, wildfire, and bark beetles);
- mitigate hazards to public safety in campgrounds, other designated recreation sites, administrative sites, and permitted special use areas; or
- mitigate hazards to infrastructure that is essential to community welfare (e.g., utilities and communications or wildland urban interface).

As a result, the proposed amendment will not result in more commercial logging. Instead, it will increase the number of areas identified as old growth and reduce the potential for commercial logging by limiting vegetation management treatments in old growth areas to harvests for other resource objectives or to mitigate hazards to public safety or essential infrastructure. See p. 86 in this EA.

Many commenters were concerned that the components for old growth would violate Executive Order 14072.

Response: Executive Order 14072 states that Federal lands will be managed:

> to promote their continued health and resilience; retain and enhance carbon storage; conserve biodiversity; mitigate the risk of wildfires; enhance climate resilience; enable subsistence and cultural uses; provide outdoor recreational opportunities; and promote sustainable local economic development.

The Forest Service just finished working to define and inventory mature and old growth forests and has proposed rulemaking regarding mature and old-growth forests on National Forest System land. Additional information regarding this effort is available online at https://www.fs.usda.gov/managing-land/old-growth-forests.

As discussed in the environmental assessment, the proposed amendment would considerably expand the number of acres identified as old growth and create new management restrictions to ensure old growth characteristics are retained. These efforts are consistent with the executive order and represent an important step forward for managing old growth on the Bitterroot National Forest.

- Applying the Green et al. definition will result in a substantial increase in the amount of National Forest System land identified as old growth. Although we are unable to provide an exact number, a sampling exercise conducted using FIA data indicates that it could be as large as a four-fold increase immediately with potential to increase over time.
- The proposed amendment, moreover, creates new restrictions on timber harvesting that will promote the continued health and resilience of old growth areas.

Some commentors insisted that a map of old growth must be included with this amendment and to comply with EO 14072.

Response: It is important to remember that old growth is dynamic in nature and any maps produced would only be a static snapshot in time of a successional stage of forest stands. Therefore, it is imperative to verify old growth status on a project-by-project basis with field verification. The EO asks for an inventory and does not indicate a map must be produced. This inventory was completed and submitted to the White House.

Some commenters expressed concern over allowing regeneration harvest in old growth stands with severe insect and disease disturbances.

Response: The current plan contains this standard: “Old-growth stands may be logged and regenerated when other stands have achieved old-growth status.” (Chapter II, Section F.1(e)(5)). This standard would be removed in the proposed amendment, and in its place are guidelines that would give certified silviculturists the flexibility to prescribe climate-smart forestry practices in old growth stands, which in some cases may involve treating stands severely affected by insect and disease, or that have been blown down in a wind event. Insects and diseases can cause so much mortality in a stand that it no longer functions as old growth and becomes a carbon source rather than a carbon sink. This would not be a common occurrence, and any proposal to treat an old growth stand will be subject to public comment and environmental analysis.

Carbon and Greenhouse Gas

Many commenters felt the agency fails to recognize the importance of old growth stands in sequestering carbon, and some thought carbon should be added to the definition of old growth.

Response: The environmental analysis for the proposed amendment considers the value of mature and old growth forests to store carbon. Carbon sequestration is inherent in the structure and composition of a stand. See EA at Section 2.5.3. Additional scientific references regarding carbon and sequestration were added to the analysis, and no less than 19 research articles were included that recognize the role of trees and old growth in sequestering carbon. Some of these articles were written and published by the agency, making it clear the agency fully recognizes the importance of old growth stands.

Elk Habitat

Several commenters expressed concern regarding the integrated resource management requirements as they pertain to elk habitat conditions under 36 C.F.R. 219.10(a)(5).

Response: As discussed in section 2.3.2, the amendment removes certain standards for elk habitat effectiveness, thermal cover, and forage cover. The proposed replacement direction, based on the best available science and interagency collaboration, includes desired conditions, goals, and guidelines for forage, connectivity, winter range, and calving habitats, and collaboration. The effects of these changes are discussed in section 3.4.5, which concludes that:

> Implementation of the proposed Amendment language will generally benefit elk. This determination is based on the following rationale:
>
> 1. The elk population across the Forest has increased over the past half century despite past and current land management practices;
>
> The proposed Amendment language contains guidelines that will enhance elk forage availability and nutritional quality in future site-specific project through vegetation management, prescribed fire, or potential wildfire;
>
> The proposed Amendment language may decrease certain cover types in future site-specific projects, which could be detrimental to elk, although research suggests that thermal cover may not influence elk to the extent originally thought when the Forest Plan was implemented; and
>
> Road densities, while high in certain places within the analysis area, likely do not significantly decrease elk vulnerability/security due to the availability of large secure habitat blocks across the analysis area. The proposed Amendment language included guidelines to minimize these effects in future site-specific project planning.

Since the Forest Plan was revised under the 1982 planning rule, “2012 rule requirements only [apply] to those changes to the plan made by the amendment.” 81 Fed. Reg. 90723 at 90725. As noted above, effects of the proposed amendment on elk habitat conditions were identified and related portions of the 2012 Planning Rule were considered and applied.

Species of Conservation Concern

Several commenters expressed concerns regarding effects to individual species, and either stated or implied that certain species should be identified as species of conservation concern.

Response: As explained in section 1.3.2 of the environmental assessment, species of conservation concern requirements only apply if the proposed amendment would result in substantially adverse impacts or substantially lessen protections for a specific species.

Each species identified by commenters is discussed in the environmental assessment. See section 3.4.3.5 for wolverine and table 4 for fisher, flammulated owl, and black-backed woodpecker. Since the proposed amendment would neither result in substantial adverse impacts, nor lessen protections, the 2012 Planning Rule does not require the responsible official to evaluate them as potential species of conservation concern or develop species-specific plan components under 36 C.F.R. 219.9(b).

Grizzly Bear

Several commenters expressed concern that replacing management direction for elk habitat could adversely affect the recovery of grizzly bears. If so, they implied that there may be a need for additional species-specific plan components under 36 C.F.R. 219.9(b)(1).

Response: The 2012 Planning Rule requires plan components to maintain or restore ecosystem integrity. 36 C.F.R. 219.9(a). If these components are not sufficient to contribute to the recovery of federally listed threatened and endangered species, then additional species-specific plan components must be created if doing so is within agency authority and the inherently capability of the plan area. Since the forest plan was revised under the 1982 Planning Rule, these 2012 Planning Rule requirements only apply to those changes to the plan made by the amendment. 81 Fed. Reg. 90723 at 90725. As a result, new species-specific plan components would only be needed if the proposed elk habitat changes adversely affect the recovery of grizzly bear.

Effects to grizzly bear are discussed in section 3.4.3.4 of the environmental assessment. In addition, we consulted with the U.S. Fish and Wildlife Service regarding the proposed amendment to elk habitat and its effect on grizzly bear. The Service issued a biological opinion, which concluded that:

> Forest Plan direction may occasionally result in adverse effects to individual grizzly bears over the life of the plan, particularly as a result of access management direction and inadequate food and attractant storage. Based on the best available scientific information reviewed in this consultation, adverse effects on grizzly bears as a result of the Forest Plan will not negatively impact the recovery of grizzly bears. Further, we expect the Forest Plan direction will result in conditions that support grizzly bear use of the Forest for dispersal or exploratory movements, and potentially some home range establishment at some point in the future, albeit at densities lower than those in the recovery zones. Such use of the Forest by grizzly bears may, over time, benefit grizzly bears. It is our opinion that the proposed action would not appreciably reduce the likelihood of both the survival and recovery of the grizzly bears as a species.

Since the proposed amendment will not adversely affect the recovery of grizzly bear, and may support grizzly bear use of the forest, additional species-specific plan components are not required under 36 C.F.R. 219.9(b)(1).

Some commenters stated that the proposed amendment violates the 2012 Planning Rule because it does not include additional monitoring provisions to track grizzly bear habitat reductions or removals.

Response: Section 36 CFR 219.12(c) discusses the timing and process for developing the plan monitoring program, stating that:

> The responsible official shall develop the plan monitoring program as part of the planning process for a new plan development or plan revision. Where a plan's monitoring program has been developed under the provisions of a prior planning regulation and the unit has not initiated plan revision under this part, the responsible official shall modify the plan monitoring program within 4 years of the effective date of this part, or as soon as practicable, to meet the requirements of this section.

The monitoring program was updated in August 2016 to ensure consistency with the 2012 Planning Rule. Since the monitoring program is consistent, the responsible official has discretion over its remaining scope and scale and is not required to update the program as part of each amendment.

Changes to the forest plan monitoring program are outside the scope of the proposed amendment. If needed, the responsible official could consider using the administrative change process described at 219.13(c) to update the monitoring program in the future.

Biodiversity

Several commenters expressed concern that the current elk habitat effectiveness thresholds provided protection for numerous native species, and that removing those protections could result in habitat loss or degradation. They suggested that this would result in a substantive change for the protections of many species and therefore require additional, species-specific plan components under 36.C.F.R. 219.13(b)(5).

Response: A review of the relevant land management planning regulations is included in Section 1.3.2 of the EA.

The current Forest Plan standard requires that roads be managed to “attain or maintain 50 percent or higher elk habitat effectiveness (Lyon 1983) in currently roaded third order drainages” (U.S. Department of Agriculture 1987c), page II-21). This equates to an open road density of less than 2km/1.61km². The standard continues to say, “Maintain 60 percent or higher elk habitat effectiveness in drainages where less than 25 percent of roads have been built”. However, since the inception of the current Forest Plan, the majority of third-order drainages on the forest have been out of compliance with this standard. Eighty-one percent of the third-order drainages are smaller than the 3,000-acre limit recommended by Lyon (1983). Currently, 60 percent of the third-order drainages fail to meet the road density threshold regardless of size.

This amendment will therefore not result in substantial losses in or degradation of habitat because:

1) The majority of drainages on the Forest have been out of compliance with this standard since the adoption of the Forest Plan; removing the standard will not make a substantial change in on-the-ground conditions.
2) The revised plan components in the proposed action include guidelines that will limit the construction of new, permanent roads.
3) No actual road construction or changes in road density are authorized by this amendment. Any such proposed actions will be subject to project-level effects analysis.

Snags and coarse woody debris

Some commentors felt the agency had not considered important aspects of snags and coarse woody debris such as how they contribute to soil function and the existence of mycorrhizae and carbon in the soil.

> **Response**: Soil productivity is addressed at 3.9.4.2 in this EA. Snags and legacy trees eventually fall and add to soil wood (3.9.4). Soil carbon is addressed at 3.2.4 and 3.7.7. It is well established and understood that coarse woody debris contributes to soil organic matter, which sustains mycorrhizae. Additional discussion and literature citations regarding mycorrhizae were added to the soil analysis. A definition for ectomycorrhizae was added to the Forest Plan glossary.

7. Appendix B

Carbon Analysis Scale

The impact of management practices on forest carbon cycling is highly site-and practice specific and can occur over long timelines, which makes any associated analysis of the carbon flux a challenge. Nevertheless, evaluating the current and future trends of forest carbon is vital to understanding the role of forests in the global GHG balance especially in the context of global change including climate change, insects, disease, and development (land use-change). This project's contribution to global atmospheric carbon dioxide (CO_2) is assessed in context of the fluctuations of carbon at the scale of the Bitterroot National Forest. This analysis considers the potential effects of management actions on climate change as indicated by consideration of changes in carbon sequestration and storage arising from natural and management driven processes.

This scale is appropriate for several reasons:

1) ***Baseline carbon stocks**: The most accurate approach to execute project-scale accounting requires establishing a stand inventory, but this likely poses an unreasonable burden. Alternatively, Forest Inventory and Analysis Program data could provide baseline carbon stock assessments, but these are currently generally only available at a spatial resolution that permits accurate estimation of ecosystem carbon stocks at the scale of the National Forest. Estimation at finer spatial scales, such as at the project scale, cannot be made without a high degree of uncertainty, because of either a limited number of plots or a lack of plots where data have been collected, as well as the variation in forest stand conditions at the project scale that impact carbon stocks.* Although technical capabilities will likely improve over time (e.g., advancements in Small Area Estimation), a logical scale to evaluate project impacts remains the entire unit.
2) ***Project Boundaries:*** Project boundaries can be somewhat flexible or altered to include or exclude non-impacted areas. Unit-scale analyses reflect a consistent reference for project goals as the unit-scale is used for land management planning. This also provides an unbiased comparison that provides necessary context for estimated carbon gains or losses from proposed activities and past disturbances.
3) ***Projection of carbon flux resulting from management/intervention**: Given the variability of site conditions, management practices, and future scenarios, quantitative analyses or estimations of specific project activities effects on carbon stocks is a complex science, and the focus of considerable ongoing research. Computer simulation models exist such as the Forest Vegetation Simulator (FVS), that can project future carbon stocks and allow for a contrast between proposed project actions, alternative actions, or a no-action alternative. However, these models require training and expertise to apply, are only designed to be applied at the forest stand scale and requires further investments to accurately carbon capture flows across all relevant carbon pools in a consistent manner.* Furthermore, Forest Service policies (and CEQ recommendations) require the use of Best Available Scientific

Information (BASI) in NEPA analyses. There is strong scientific agreement that future carbon sequestration, storage and stability on both forested and non-forested lands will be affected by changing climate conditions and their impacts to forest health, disturbance frequency and severity, and tree growth, mortality, regeneration. The current generation of tools used for quantifying projected carbon stocks is not able to adequately incorporate these known impacts to ecosystem carbon dynamics over time across all regions, and especially at fine spatial resolutions. *NEPA analyses require incorporation of BASI on carbon dynamics over time, and therefore the qualitative analyses performed at larger scales which are informed by rigorous, objective methods at much larger scales (e.g., US UNFCCC reports) remain the best way to integrate these known factors into carbon analyses.*

8. Appendix C

Summary of and rationale for changes made to snag density retention components.

In the Draft EA, snag density desired conditions were erroneously based on FIA data representing current conditions (Bush and Reyes 2023) in wilderness and roadless areas, which provides only a snapshot in time in areas generally undisturbed by vegetation management but including recent fire disturbance and/or beetle-caused mortality. While these data accurately represent the existing number of snags on the landscape, they also demonstrate how the number of snags on the landscape has been increasing due to increasing rates of bark beetle epidemics and wildfire (Bollenbacher et al. 2009). A more appropriate basis for snag density desired conditions is a combination of historical conditions, landscape averages, inventory and monitoring data, and wildlife needs, as disclosed at sections 1.3.3.3, 1.4.1.3, 2.3.2.5, and 3.2.3. While dead trees, particularly larger diameter ones, play a crucial ecological role, they also have the capacity to significantly increase wildfire risk when present and concentrated at densities above historical averages.

Data from Harris (1999) is a more accurate representation of historical snag densities across western Montana (Table 8) and provides a direct comparison to the current conditions described by Bush and Reyes (2023). Harris (1999) provides snag density across a variety of forest types on the Bitterroot, Kootenai, Flathead and Lolo National Forests as well as in both harvested and unharvested stands. It is important to note that the densities reported by Harris (1999) are averages calculated across FIA plots and do not reflect the clustering of snags that is both historically typical and ecologically important (Bull et al. 1997, Chambers and Mast 2005, Barry et al. 2017).

Table 8. Average snag density, by forest type and size, on unharvested FIA plots across four national forests in western Montana. Data taken from Harris (1999)

Forest type	Small snags/ac (9-14.9” dbh)	Medium snags/ac (15-20.9” dbh)	Large snags/ac (21-26.9” dbh)	Very large snags/ac (>27” dbh)
Ponderosa Pine	1.51	0.61	0.24	0.15
Douglas-fir	6.78	1.62	0.46	0.10
Western larch	15.23	2.45	0.81	0.30
Engelmann spruce	17.13	3.18	0.72	0.29
Spruce/fir	16.06	3.79	0.92	0.32
Lodgepole pine	11.13	0.85	0.17	0.03
Mesic conifer	12.57	7.20	1.38	0.53
Dry subalpine	27.62	2.78	0.96	0.06
Hardwood	5.33	0.00	0.00	0.05

Bollenbacher et al. 2009 also analyzed habitat groups (warm, cool, and cold) that have similar disturbance regimes within the groups and some general insight to how snags are produced. Characteristic disturbances contribute to snag abundance, during various stages of succession, in different ways and produce different numbers of snags. Frequent, low- to mid-severity fire in the warm habitat group tend to produce a relatively constant level of snags at low numbers. The cool group, with a characteristic fire regime that tended to have less frequent, but with more severe fires, produced pulses of snags, and generally a greater quantity of snags, especially early in the forest succession cycle. Then as stands aged, the density of snags increased, until another high- severity stand replacing fire occurs. The cold types tend to produce high snag densities as characteristic disturbance regimes produced persistent snags over a long period due to colder climates, where decomposition rates are slower, and the time between stand replacing events were likely the longest.

Also, within the Bollenbacher analysis, large snags are rare in all types but tend to occur in cool habitat type groups and are likely to be Douglas-fir or Engelmann spruce. Snags in lodgepole pine types are mostly distributed in the smaller size class. In cool habitat types and lodgepole pine, early seral stands have the most snags due to stand-replacing fires. Warm types have a more even distribution of snags into later seral stages because of a more frequent, less severe fire regime. All groups show fewer mid-seral stage snags as snags transition to downed wood. Snags are generally distributed in clumps across the landscape. This, in part, is because many snags are the result of periodic, broad-level disturbances, fire and insects, which create large areas which have more snags than outside of those disturbed areas (Bollenbacher at al. 2009, Harris 1999).

The pileated woodpecker and American marten are designated as Management Indicator Species (MIS) on the Bitterroot National Forest to represent the condition of mature forest habitat, including the presence of sufficient numbers of snags and downed logs. Additional information on the effects of the proposed action on these species can be found in Chapter 3 of the EA; however, additional information on their use of snags is presented here.

Pileated woodpeckers use large snags, typically > 21” dbh, for nesting and roosting (McClelland and McClelland 1999). Several studies have estimated the number of large snags per acre necessary to support viable pileated populations, ranging from 0.13 to 0.8 (Thomas 1979, Schroeder 1982, Bull 1987, Bull and Holthausen 1993). Because Pileated woodpecker home ranges are typically 6-8 ac in western Montana (Aney 1984), snags should be clustered such that there is at least one site within that area with 3-7 large snags/ac (Bull 1987, Bull and Holthausen 1993).

American marten rely on large snags for dens and rest sites (Ruggiero et al. 1998), often using cavities excavated by pileated woodpeckers. They also prey on small mammals found in association with snags and downed wood, particularly in winter when logs create high quality subnivean foraging areas (Buskirk et al. 1989). Based on research in Oregon and Washington, Raphael and Jones (1998) recommended retaining 1.2 moderately decayed large snags or logs per ac to provide adequate marten resting and denning habitat. Similar to Pileated woodpeckers, clustering these snags in groups of 2-5 large snags/acre will help provide adequate marten resting and denning sites at the landscape scale (Delheimer et al. 2023).

Snags in any given area may experience a disturbance event, such as a windstorm, resulting in standing wood becoming downed wood. Brown and See (1981) are clear that quantities of downed wood greater than 20 tons per acre diminish fire protection efficiency. The original numbers in Table 3 would have resulted in heavy fuel loadings. Studies suggest that the range of when most trees fall is usually between 3 and 15 years after death (Lyon 1977, Mitchell and Preisler 1998, DeNitto et al. 2000) and the original numbers in Table 3 would exacerbate desired coarse woody debris guidelines as well.

Table 3 has been updated to include additional information sources as originally intended and indicated in all versions of this EA. FW-GDL-VEG-03 has been modified to reflect these numbers as well as to provide for the diversity of snags required by wildlife at the landscape scale. FW-GDL-VEG-05 has also been modified in order to highlight the need to cluster large snags in such a way to provide adequate resting, denning and nesting habitat for multiple species.

The new numbers in Table 3 and the modified guidelines do not lead to any substantially different effects conclusions.

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