Biological Assessment for Whitebark Pine

2020 Forest Plan for the Helena-Lewis and Clark National Forest

Prepared by

Justina Dumont	March 13, 2020
Justina Dumont, Botanist	Date

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List of Terms and Abbreviations

Terms used in this document

Term	Full name/additional information
the Forest	Helena-Lewis and Clark National Forest
the Service	U.S. Fish and Wildlife Service
grizzly bear amendment(s)	Forest Plan Amendments to incorporate relevant direction from the Northern Continental Divide Ecosystem Draft Grizzly Bear Conservation Strategy
the assessment	Assessment of the Helena-Lewis and Clark National Forest
Forest Plan	Helena-Lewis and Clark National Forest Revised Land Management Plan
Helena Forest Plan	Helena National Forest Land and Resource Management Plan (1986)
Lewis and Clark Forest Plan	Lewis and Clark National Forest Land and Resource Management Plan (1986)
the Rule	the 2012 Planning Rule as described in 36 CFR Part 219, Subpart A

Abbreviations used in this document

Abbreviation	Full term/description
BA	Biological Assessment
BO	Biological Opinion
CFR	Code of Federal Regulations
dbh	diameter at breast height
DC	desired condition (reference to Forest Plan component)
EIS	environmental impact statement (DEIS = draft EIS; FEIS = final EIS)
ESA	Endangered Species Act
FIA	Forest Inventory and Analysis plots
FW	forestwide (reference to Forest Plan component)
GA	Geographic Area
GBCS	Grizzly Bear Conservation Strategy
GDL	guideline (reference to Forest Plan component)
GIS	geographic information system
HLC NF	Helena-Lewis and Clark National Forest
MA	Management Area
mmbf	million board feet
mmcf	million cubic feet
MFWP	Montana Fish, Wildlife and Parks
NCDE	Northern Continental Divide Ecosystem
NEPA	National Environmental Policy Act
NFS	National Forest System
NRLMD	Northern Rockies Lynx Management Direction
SIMPPLLE	Simulating Patterns and Processes at Landscape Scales Model
STD	standard (reference to Forest Plan component)
TMDL	total maximum daily load
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

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Introduction

Threatened, endangered, and proposed species are managed under the authority of the Federal Endangered Species Act (PL 93-205, as amended) and the National Forest Management Act (PL-940588). Under provisions of the Endangered Species Act (ESA), federal agencies shall use their authorities to carry out programs for the conservation of listed species, and shall ensure that any action authorized, funded, or implemented by a federal agency is not likely to (1) adversely affect listed species or designated critical habitat, (2) jeopardize the continued existence of a proposed species, or (3) adversely modify proposed critical habitat (16 USC 1536).

The purpose of this programmatic biological assessment (BA) is to analyze the potential impacts of implementing a framework programmatic action, the proposed Land and Resource Management Plan (hereafter referred to as the "Forest Plan") for the Helena-Lewis and Clark National Forest (HLC NF), in sufficient detail to determine the extent to which implementation of the 2020 Forest Plan may affect any of the threatened, endangered, proposed, or candidate species listed below or their designated or proposed critical habitats. This BA is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act ((ESA); 16 U.S.C. 1536 (c)), and follows the standards established in the Forest Service's National Environmental Policy Act (NEPA) and ESA guidance. The proposed action is a framework programmatic action that does not approve or authorize specific actions or activities, but instead guides development of future actions that will be authorized, funded, and carried out at a later time. As such, take of listed species would occur only at such time as future actions are authorized, funded, or carried out subject to future section 7 consultation (50 CFR Part 402 Amended. Federal Register, Vol. 80. No. 90, Monday May 11, 2015. 26832-26845).

This document includes a description of the proposed federal action, and the biological assessment for whitebark pine (*Pinus albicaulis)*, a candidate species for federal listing. Biological assessments for the listed terrestrial wildlife (Canada lynx, grizzly bear, and wolverine) and aquatic (bull trout) species are provided under separate cover as part of the complete consultation package for the proposed federal action.

Federally designated species and designated critical habitat

In accordance with section 7(c) of the ESA, the U.S. Fish and Wildlife Service (USFWS) has determined that the following federally designated species may be present on the HLC NF as of 12 December 2019, per the list posted at https://www.fws.gov/montanafieldoffice/Endangered_Species/Listed_Species/Forests/Helena-L&C_sp_list.pdf as checked on 13 January 2020 (Table 1).

Table 1. Federally designated species on the HLC NF

Common Name	Scientific Name	Status[1]	Distribution in Planning Area
Bull trout	*Salvelinus confluentus*	Threatened; critical habitat	West of the Continental Divide (Upper Blackfoot and portion of Divide geographic areas only) in cold water streams, rivers, and lakes.
Canada lynx	*Lynx Canadensis*	Threatened; critical habitat	Resident in core lynx habitat (montane spruce/fir forests of western Montana, including the Rocky Mountain Range, Upper Blackfoot, and north portion of Divide GAs. Transient in secondary/peripheral lynx habitat, (south portion of Divide Geographic Area and other geographic areas not listed above).

Common Name	Scientific Name	Status[1]	Distribution in Planning Area
			Critical habitat area corresponds with area where lynx are identified as resident (core habitat).
Grizzly bear	*Ursus arctos*	Threatened	Resident or transient in all parts of HLC NF except the Snowies, Crazies, and Castles GAs and the portion of the Big Belts GA south of U.S. Highway 12[2]. Alpine/subalpine coniferous forests of primarily western Montana, increasingly also lower elevation riparian and prairie east of the Continental Divide.
Wolverine	*Gulo luscus*	Proposed	Throughout the HLC NF. High elevation alpine and boreal forests that are cold and receive enough winter precipitation to reliably maintain deep persistent snow late into the warm season.
Whitebark pine	*Pinus albicaulis*	Candidate	Throughout the HLC NF. Forested areas in western and central Montana, in high-elevation, upper montane habitat near treeline.

[1]Status refers to listing designation under the Endangered Species Act
[2]Grizzly bear 'may be present' area described according to USFWS map dated October 2018 (see project file)

Consultation history

The combined HLC NF has been managed to date under two separate Forest Plans, both approved in 1986. This is the first conference requested for whitebark pine for either the Helena or the Lewis and Clark Forest Plans. It is currently a candidate species.

Description of the proposed action

The 2020 Forest Plan is programmatic in scope. It provides the framework for future site-specific actions that are subject to section 7 consultation but does not authorize, fund, or carry out future site-specific actions. Future project-level activities must be consistent with the direction in the 2020 Forest Plan and must undergo their own NEPA planning and decision-making procedures, including the appropriate ESA section 7 consultation. The management direction contained in the 2020 Forest Plan will go into effect once the final record of decision is signed by the Forest Supervisor. Project-level environmental analysis will still need to be completed for proposals that would implement the direction in the Forest Plan.

The 2020 Forest Plan is described in more detail below under the heading "Description of the Preferred Alternative". Specific plan components included in the 2020 Forest Plan are discussed where relevant in the analysis found under the heading "Effects of the Programmatic Action". The 2020 Forest Plan is expected to guide management and decision-making on the HLC NF for approximately 15 years after it is completed. Forest Plans are not commitments or decisions approving or prohibiting specific actions or activities, but rather are programmatic direction that guides subsequent site-specific planning and decision-making.

Need for and purpose of the proposed action

Need

In 2015, the formerly separate Helena National Forest and Lewis and Clark National Forest were combined administratively to form the HLC NF. Each separate forest had its own Forest Plan that has continued to direct management on the formerly separate portions of the combined HLC NF. As a result of combining the two forests to be managed as one unit, there is a need to develop a single Forest Plan for the entire administrative area.

The HNF and LCNF Forest Plans were both completed in 1986, over 30 years ago. Since that time, some conditions of the land and resources have changed, some social, economic, or ecological needs and conditions have changed, and new scientific and other information has become available. There is a need to revise the Forest Plans to consider or incorporate those changes.

In May of 2012 the United States Forest Service (USFS) began using new planning regulations (hereafter referred to as the "2012 Planning Rule" or simply as "the planning rule") to guide collaborative and science-based revision of Forest Plans. Specific requirements of the 2012 Planning Rule are described below; there is a need to develop and implement a revised Forest Plan for the HLC NF that complies with the direction provided in those regulations.

Purpose

The purpose of this proposed action is to revise and combine the former HNF and LCNF Forest Plans into a single plan for the entire administrative unit, and to incorporate new information, consider changed conditions, and provide integrated direction for social, economic, and ecological sustainability and multiple uses of the HLC NF land and resources in compliance with the 2012 Planning Rule.

The purpose of the 2020 Forest Plan is to set direction for management of NFS lands administered by the HLC NF, based on an integrated evaluation of social, economic, and ecological considerations. This direction is used to guide programs, practices, and uses of HLC NF lands. A Forest Plan is a framework programmatic document that provides broad direction similar to zoning in a community. As such, it does not authorize site-specific prohibitions, actions or activities, all of which will continue to require site-specific analysis and decision-making.

Action area

The action area, also referred to in this document as the "planning area", is the HLC NF which is located in central Montana and includes approximately 2,883,227 acres of public National Forest System (NFS) lands within its administrative boundaries. The plan area also includes slightly more than 30,000 acres of NFS land on the Beaverhead-Deerlodge National Forest administered by the HLC NF, and slightly more than 2,000 acres of NFS lands in isolated parcels outside the administrative boundaries. Inholdings of other ownerships occur within the HLC NF administrative boundaries; those are not included in the total acreages above and are not subject to management by the Forest Service. The HLC NF includes portions of 17 counties and is managed as eight ranger districts: Rocky Mountain, Lincoln, Helena, Townsend, White Sulphur Springs, Belt Creek, Judith, and Musselshell.

The HLC NF straddles the Continental Divide and includes several island mountain ranges. Because of its diversity and extent, and because the island mountain ranges each include unique ecological and social context, the plan area is divided into ten geographic areas (GAs). GAs provide a means for describing conditions and trends at a more local scale than forestwide, where appropriate. Some plan components in the revised plan are unique to individual GAs, reflecting the specific ecological and/or social context of NFS land management there. Table 2 displays the acres of the HLC NF by GA, and Figure 1 displays the GAs in geographic context.

Table 2. Acres within the ten GAs on the HLC NF

Geographic Area	Total Acres (all ownerships)	NFS Acres within GA	% of GA in NFS lands
Big Belts	452,292	312,983	69
Castles	79,862	69,610	87
Crazies	70,036	57,618	82
Divide	232,890	202,577	87

Geographic Area	Total Acres (all ownerships)	NFS Acres within GA	% of GA in NFS lands
Elkhorns	175,259	160,599	92
Highwoods	44,495	42,315	95
Little Belts	900,961	802,711	89
Rocky Mountain Range	782,986	777,963	99
Snowies	121,897	117,989	98
Upper Blackfoot	348,185	333,215	96

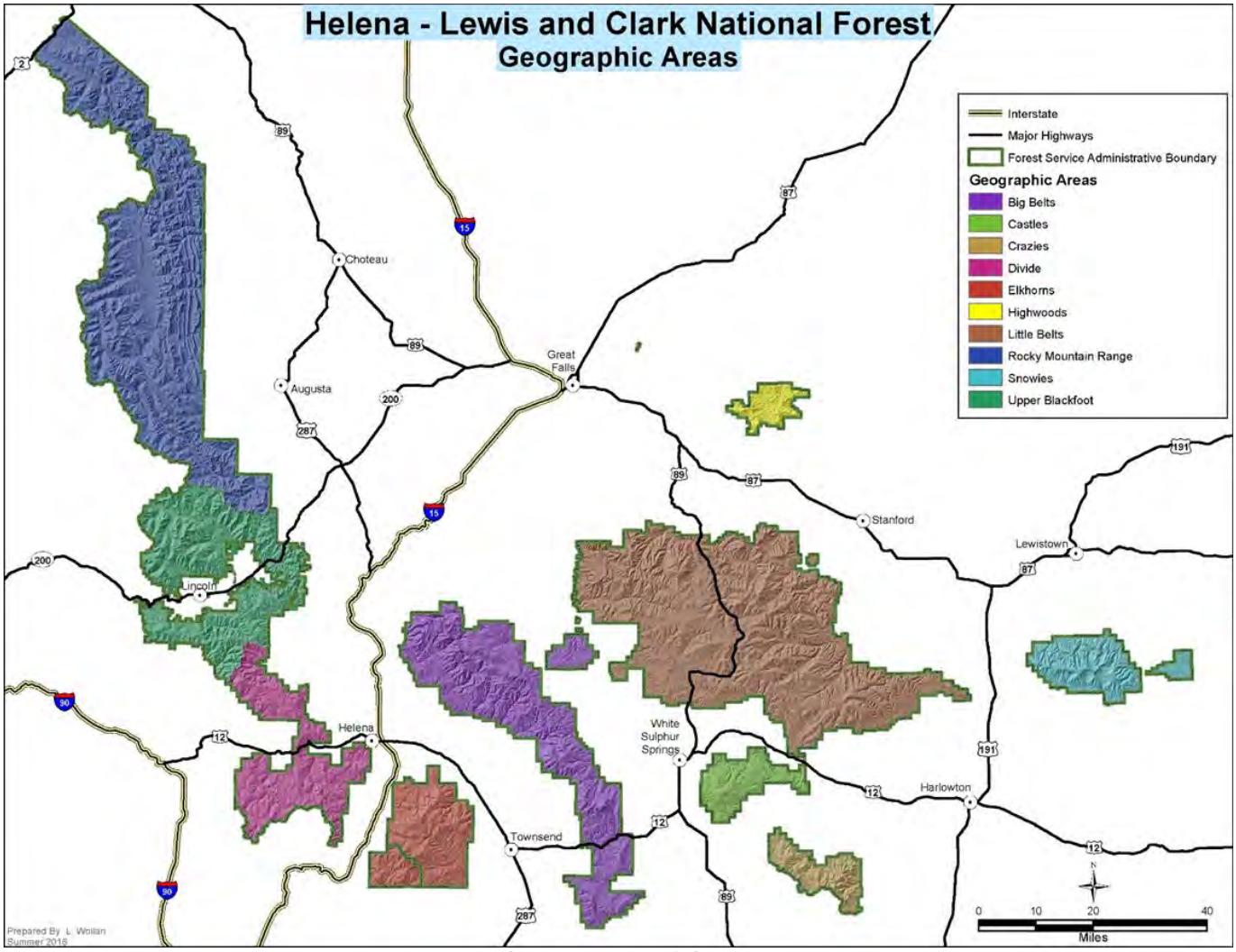

Figure 1. GAs of the HLC NF

Forest planning framework

The proposed action is a framework programmatic action that approves a framework for the development of future actions that will be authorized, funded, or carried out at a later time (50 CFR Part 402 Amended. Federal Register, Vol. 80. No. 90, Monday May 11, 2015. 26832-26845).

The 2012 Planning Rule

The United States Forest Service (USFS) carries out land and resource management planning under regulations referred to as the 2012 Planning Rule, that call for collaborative and science-based revision of Forest Plans. The 2012 Planning Rule requires Forest Plans to include certain types of components (refer to "Plan Components" section below) that must meet requirements within the rule for sustainability (36 CFR 219.8), plant and animal diversity (36 CFR 219.9), multiple use (36 CFR 219.10), and timber (36 CFR 219.11).

In order to meet the requirements for plant and animal diversity, the rule calls for a complementary ecosystem and species-specific approach to forest management. Plan components must provide for ecosystem integrity and diversity by maintaining or restoring the structure, function, composition, and connectivity of ecosystems, and by maintaining key ecological characteristics (36 CFR 219.9(a)(1) and (2)). If those "coarse filter" components are not sufficient to provide conditions that will contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern (SCC) within the plan area, then additional, species-specific plan components must be included (36 CFR 219.9(b)).

In addition to the above requirements, the 2012 Planning Rule contains several other requirements that shape the Forest Plan and therefore may influence Forest resources, including wildlife and habitats. The rule requires that Forest Plans identify:

- Lands suitable for inclusion in the National Wilderness Preservation System (36 CFR 219.7(c)(2)(v)), and/or rivers eligible for inclusion in the National Wild and Scenic Rivers System (36 CFR 219.7(c)(2)(vi))
- Existing designated areas and any additional areas recommended for designation (36 CFR 219.7(c)(2)(vii)
- Suitability of areas for appropriate integration of resource management and uses, including identifying lands not suitable for timber production (36 CFR 219.7(c)(2)(viii)
- The maximum quantity of timber that may be removed from the plan area (36 CFR 219.7(c)(2)(ix)
- Questions and indicators for monitoring (36 CFR 219.7(c)(2)(x) and the monitoring program itself (36 CFR 219.7(c)(3)(iii)
- Management areas and/or geographic areas (36 CFR 219.7(e))
- Watersheds that are a priority for maintenance or restoration (36 CFR 219.7(f)(i))
- Distinctive roles and contributions of the plan area to the broader landscape (36 CFR 219.7(f)(iii))
- Proposed and possible actions that may occur on the plan area during the life of the plan, including the planned timber sale program, timber harvesting levels, and the proportion of probable methods of vegetation management to be used (36 CFR 219.7(f)(iv))

Plan components

Plan components are specific statements that guide future projects and activities and the monitoring program in the plan area. Plan components may apply to the entire plan area (i.e., the entire HLC NF), or to identified geographic or management areas (36 CFR 219.7(e)). The 2012 Planning Rule requires that Forest Plans include all the following types of components except goals, which are optional.

- **Desired Condition** (DC) - a description of specific social, economic, and/or ecological characteristics 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 not include completion dates (36 CFR 219.7 (e)(1)(i)).
- **Goal** (GO) –a broad statement of intent, other than desired conditions, usually related to process or interaction with the public or other agencies. Goals are expressed in broad, general terms, and do not usually include completion dates (36 CFR 219.7 (e)(2)). Goals may be dependent on conditions beyond the plan area or outside USFS authority.
- **Objective** (OBJ) - a concise, measurable, and time-specific statement of a desired rate of progress toward one or more desired conditions. Objectives should be based on reasonably foreseeable budgets (36 CFR 219.7(e)(1)(ii)) and will occur over the life of the Forest Plan.
- **Standard** (STD) - a mandatory constraint on project and activity decision-making, established to help achieve or maintain one or more desired conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements (36 CFR 219.7(e)(1)(iii)).
- **Guideline** (GDL) - 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 one or more desired conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements (36 CFR 219.7(e)(1)(iii)).
- **Suitability of Lands** (SUIT) - specific lands within the Forest are to be identified as suitable or not suitable for various multiple uses or activities, based on the desired conditions applicable to those lands. The suitability of lands need not be identified for every use or activity (36 CFR 219.7(e)(1)(v)). Identifying suitability does not make a specific commitment to authorize the use(s) identified, but is instead simply an indication that a type of use may be appropriate. Site, project, or activity-specific decision-making procedures must occur before a specific use is authorized in an area.

Monitoring program

The 2012 Planning Rule requires development of a monitoring program to provide feedback for the planning cycle by testing relevant assumptions, tracking relevant conditions over time, and measuring management effectiveness (36 CFR 219.12). The monitoring program includes plan-level and broader-scale monitoring, and biennial monitoring evaluation reports document whether changes to the plan or to the monitoring program is warranted (36 CFR 219.5). The monitoring program can be found as appendix B of the "2020 Forest Plan for the Helena-Lewis and Clark National Forest" and is not included with this document.

Planning directives

Procedural guidance for implementing the 2012 Planning Rule in revising Forest Plans is found in the Final Land Management Planning Directives (FSH 1909.12 – Land Management Planning Handbook) issued in January 2015. Chapter 20, Section 23 provides considerations and guidance for developing plan components that will provide for ecological sustainability and diversity of plant and animal communities. The planning directives are revised and updated periodically.

Other required plan content

Proposed and possible actions

The 2012 Planning Rule requires land management plans to "…contain information reflecting proposed and possible actions that may occur on the plan area during the life of the plan, including: the planned

timber sale program; timber harvesting levels; and the proportion of probable methods of forest vegetation management practices expected to be used (16 United States Code 1604(e)(2) and (f)(2)). Such information is not a commitment to take any action and is not a 'proposal' as defined by the Council on Environmental Quality regulations for implementing the National Environmental Policy Act (40 Code of Federal Regulations 1508.23, 42 U.S.C. 4322(2)(C)). (36 Code of Federal Regulations 219.7(f)(1)).” Management approaches and strategies presented in this section may include suggestions for on-the-ground implementation, analysis, assessment, inventory or monitoring, and partnership and coordination opportunities the Forest is proposing as helpful to make progress in achieving its desired conditions. The potential approaches and strategies are not intended to be all-inclusive, nor commitments to perform particular actions.

The possible actions and potential management approaches and strategies the HLC NF may undertake to make progress in achieving the desired conditions described in the 2020 Forest Plan can be found in appendix C of the plan.

Description of the preferred alternative – alternative F

The 2012 Planning Rule anchors Forest Plans in desired conditions that are to be achieved through application of other plan components during forest management activities. The preferred alternative (alternative F) identifies the types of uses and management activities that would be allowed on the HLC NF, by identifying areas such as recommended wilderness areas, special emphasis areas, and other designations where certain uses would be allowed. The preferred alternatives also identifies lands suitable or not suitable for specific management activities such as timber production, saleable mineral activities, and others. Table 3 displays the total HLC NF acres on which specific uses would be allowed, and the acres on which those activities are currently allowed under the 1986 Forest Plans, for comparison. In the framework programmatic context of a Forest Plan, acres where activities or uses would be allowed reflect a general designation where that activity or use could potentially be planned and implemented. The location, type, and extent of actual uses or activities is determined by site specific planning and analysis and therefore would occur on a much smaller acreage than that shown in Table 3. Additional details regarding the acreage or amount of activities and uses that would be allowed under the preferred alternative are provided as needed in the individual species assessments.

Table 3. Summary of activities and uses that would be allowed under the preferred alternative (alternative F) and the 1986 Forest Plans (alternative A)

Type of activity/use	Alternative F		1986 plans	
	Acres	Percent of forest	Acres	Percent of forest
Land suitable for timber production[1]	368,814	13%	414,936	14%
Land unsuitable for timber production but where harvest[2] may occur	1,673,853	58%	1,167,247	40%
Personal use of forest products	2,874,356	100%	2,874,356	100%
Commercial use of forest products	2,037,261	71%	2,092,374	73%
Recommended Wilderness	153,136	5%	34,212	1%
Eligible Wild and Scenic Rivers	361 miles	NA	140 miles	NA
Research Natural Areas	18,447	1%	16,870	1%
Green Timber Botanical Area	1,167	0%	NA	NA
Badger Two Medicine Special Area	129,740	4%	NA	NA
Experimental and demonstration forests	8,871	<1%	8,871	<1%

Type of activity/use	Alternative F		1986 plans	
Recreation Emphasis Areas	89,439	3%	0	NA
Grazing allotments	1,355,143	47%	1,355,143	47%
Riparian Management Zones	496,212	17%	0	NA
Wheeled motorized vehicle use (spring-summer-fall)	1,098,892	38%	1,099,010	38%
Over-snow motorized use (winter)	1,875,187	65%	1,875,187	65%
Summer non-motorized	1,784,322	62%	1,784,204	62%
Winter non-motorized	1,875,187	65%	1,839,900	64%

[1] Timber production is the purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use (36 CFR 219.9).
[2] Timber harvest is the removal of trees for wood fiber use and other multiple-use purposes (36 CFR 219.9)

The 2020 Forest Plan includes components that guide management of a variety of resources and activities on the HLC NF toward achieving DCs. The 2020 HLC NF plan (proposed action) describes management direction at both the forestwide scale and, where needed, specifically within one or more of ten GAs. The following summary provides an overview of plan direction for several broad resource areas, focusing largely on direction that could impact terrestrial and aquatic wildlife and habitats. For a complete list of goals, desired conditions, objectives, guidelines, and standards in the proposed action, see the 2020 Forest Plan. The direction from the 2020 Forest Plan that is cited in this BA can be found in appendix A.

Aquatic ecosystems

Desired conditions for aquatic ecosystems in the proposed action emphasize maintaining or restoring the distribution, diversity, and resilience of and connectivity among aquatic systems and riparian habitats on the HLC NF. Desired conditions also emphasize maintenance or restoration of natural ranges of flows, flooding, and sediment load. Objectives set specific goals for restoration of watersheds and groundwater-dependent ecosystems and connectivity among them, improvement of soil and hydrologic function, improvement of aquatic habitat. Plan components guide or constrain management activities and uses in riparian and aquatic habitats in order to achieve DCs and to limit or prevent introduction of pollutants, minimize disturbance to in-stream structure and flows, and minimize alterations to riparian habitats.

Fire and fuels management

The proposed action includes DCs that would allow wildland fire to play its natural ecological role as nearly as possible and that wildland fire would be managed where possible to meet resource objectives (FW-FIRE-DC-01). FW-FIRE-DC-02 states that fuel conditions in the wildland-urban interface (WUI) would provide for low-severity surface fire that minimizes threats to values. The DCs would be met in part by achieving a specified amount of hazardous fuels treatments in the wildland-urban interface (FW-FIRE-OBJ-01). Plan components would encourage the use of vegetation treatments to create conditions that allow for naturally ignited fires to occur in a “self-regulating” fashion (FW-FIRE-GDL-01 and 02).

Vegetation management

Desired conditions for vegetation are based on maintaining and promoting forest conditions that are resilient in the face of potential future disturbances and climate change and that contribute to social and economic sustainability. Under alternative F, a variety of vegetation management techniques would be employed, including timber harvesting, planting, thinning, fuel treatments, natural unplanned ignitions, and prescribed burns. Biodiversity is addressed by providing desired conditions and management direction associated with a diverse array of plant communities and species, such as aquatic and riparian areas, deciduous forests, burned forests, grasslands and shrublands, whitebark pine. Groundwater

dependent ecosystems such as fens and other unique botanical areas are provided protection by various plan components.

Wildlife

The 2020 Forest Plan includes DCs to maintain the vegetation composition, structure, and distribution needed by wildlife for their life history requirements and for connectivity among habitats and seasonal ranges. Desired conditions also direct management to maintain large, unroaded areas to provide for species that require seclusion and to minimize disturbance in key seasonal habitats. The 2020 Forest Plan directs managers to work closely with other state and federal wildlife and land management agencies to manage habitats across jurisdictions and to collaborate on conservation and recovery of federally listed species. Plan components in some GAs emphasize specific habitat needs based on species' ranges and call for maintenance or restoration of connectivity for wide-ranging wildlife species. Plan components specifically addressing management of habitat to conserve and recover Canada lynx and grizzly bear are included through incorporation of the Northern Rockies Lynx Management Direction and the Amendments to Incorporate Management Direction in the NCDE Grizzly Bear Conservation Strategy into Forest Plans.

Recreation

Direction in the 2020 Forest Plan for managing recreation on the HLC NF is divided into several topics. In addition to those described below, the plan includes guidance for maintaining scenic character.

Recreation Settings

The 2020 Forest Plan identifies desired Recreation Opportunity Settings (ROS) and includes plan components for each that direct or constrain uses such as motorized access, scenery, and vegetation management to be consistent with each ROS (FW-ROS-DC-01 and associated Table 14 and 15 in the 2020 Forest Plan). The amount of each ROS identified in the preferred alternative is shown in Table 4, below. Descriptions of each ROS, along with plan components supporting each, can be found in the 2020 Forest Plan.

Table 4. Forestwide ROS Classes in the preferred alternative (alternative F)

ROS classification	Acres - summer	Percent of total NFS lands - summer	Acres- winter	Percent of total NFS lands - winter
Primitive	1,034,673	36%	1,018,346	35%
Semi-primitive non-motorized	749,649	26%	856,841	30%
Semi-primitive motorized	375,866	13%	725,625	25%
Roaded natural	694,044	24%	253,979	9%
Rural	28,982	1%	28,432	1%
Urban	0	NA	0	NA

Recreation opportunities, special uses, and access

The 2020 Forest Plan identifies scales of development associated with recreation and includes DCs to provide a variety of types of recreation opportunities while protecting other resources. The plan includes objectives for removing and rehabilitating recreations sites where resource damage or conflict has occurred, and guidelines to manage recreation sites to be responsive to wildlife habitat needs or potential for conflict and to prevent specific types of resource damage or conflict, with emphasis on riparian and

aquatic ecosystems. The plan also includes statements about management activities that are suitable or not in various recreation sites.

Designated areas

Designated areas are areas or features identified and managed to maintain their unique special character or purpose. They fall into several categories.

Administratively designated areas

These areas are designated in the 2020 Forest Plan or by other administrative action for a variety of purposes. Those purposes include maintaining natural ecological processes and/or systems [inventoried roadless areas (IRAs)], research or monitoring of natural and managed systems (research natural areas, experimental forests), wildlife management (Elkhorns Wildlife Management Unit), recreation and/or scenic values (national recreation trails, recreation areas, scenic byways, and the Smith and Missouri River corridors), and culturally significant landscapes (Badger-Two Medicine area). Desired conditions and other plan components are focused on maintaining the characteristics and supporting the purposes for the area designations. Plan components for some areas support large, undeveloped landscapes in a relatively primitive state, with little or no motorized access (IRAs, Badger-Two Medicine area). Others, such as national recreation trails or recreation areas have plan components specific to the individual area that may include motorized or other developed recreation opportunities.

In addition to these types of designations, the Planning Rule requires that plans evaluate and, if appropriate, recommend areas to be considered and potentially designated by Congress as wilderness (recommended wilderness areas) and as wild and scenic rivers. Although the final designation of these areas as Wilderness or as Wild and Scenic Rivers is made by Congress, the recommendations are made in Forest Plans, along with management direction related to those recommendations. Plan components for recommended wilderness areas focus on maintaining the characteristics that make each area suitable for wilderness recommendation (e.g. maintaining natural processes, large undeveloped areas, no motorized or mechanized travel, and others). Plan components for eligible wild and scenic rivers are based on maintaining the "outstanding remarkable values" for which they were identified. Depending on the values associated with each river or segment, certain management or recreational activities may be restricted or constrained for that river or segment. Plan components for inventoried roadless areas must comply with the 2001 Roadless Area Conservation Rule (36 CFR 294 Subpart B, published at 66 Fed Reg. 3244-3273), which prohibits activities that have the greatest likelihood of altering and fragmenting landscapes or the loss of roadless area values and characteristics.

The acres of activity types and uses areas that would allowed under the preferred alternative are shown in Table 3 above, along with the acres under the two 1986 Forest Plans for comparison.

Congressionally designated areas

Congressionally designated areas include wilderness, wilderness study areas (WSAs), the Rocky Mountain Front Conservation Management Area (CMA), national historic trails, and the Continental Divide National Scenic Trail (CDNST). Management of these areas is directed by regulation and is supplemented by plan components that support those regulations and maintain the characteristics and support the purposes for the area designations (refer to appropriate sections in the 2020 Forest Plan for components that support these designations). Plan components for wilderness, WSAs, and the Rocky Mountain Front CMA all emphasize natural ecological processes, limited evidence of humans, limited or no motorized or mechanized uses, and large expanses of undeveloped landscape. Historic and scenic trail plan components support historic, cultural, and scenic values through limited evidence of motorized uses, timber harvest, and other specified activities. The acreage or miles of area or trail under these designations is not established in the Forest Plan and therefore would not change under the proposed plan.

Amount of area or miles in these designated area types is discussed in the context of specific habitats in the species assessments. Table 5 shows the approximate acres in each designated area for the 1986 Forest Plans compared to the 2020 Forest Plan preferred alternative, alternative F.

Table 5. Summary of existing designated area allocations (alternative A)[1] and proposed designated area allocations (alternative F) in the 2020 Forest Plan.

Designated Area	Number in alternative A	Alternative A, acres	Number in alternative F	Alternative F acres
Designated wilderness (WILD)	3	564,115	3	564,115
Recommended Wilderness (RECWILD)	3	34,226	7	153,325
Wilderness Study Areas (WSA)	2	170,095	2	170,095
Inventoried Roadless Area (IRA)	49	1,499,181	49	1,499,181
Research Natural Areas	12	16,475	13	18,053
Total **Forest Acres**	-	2,284,092 acres	-	2,404,769 acres

1 Acres and percentage calculated from GIS dataset. The official acres for NFS lands and wilderness areas may be found in a land area report.

The three designated wilderness areas contain 98,148 acres of whitebark pine (32%). The recommended wilderness areas have 22,946 acres of whitebark pine (7%). The IRAs contain (54%) of whitebark pine. Designated wilderness and recommended wilderness would be managed to maintain their wilderness character and mechanical vegetation manipulation would not be permitted. The Roadless Area Conservation Rule prohibits road construction or reconstruction and cutting, selling, or removing timber in IRAs unless a listed exemption applies. The 2020 Forest Plan cannot modify Roadless Area Conservation Rule direction.

Benefits to people: multiple uses and ecosystem services

Timber

Timber harvest is conducted to provide for societal goods and to move the vegetation towards desired conditions. Under alternative F, within the budget and organizational constraints the projected timber quantity per decade that may be sold from lands both suitable and not suitable for timber production shall not exceed the sustained yield limit of 5.75 MMCF (27 MMBF) per year on the HLC. An exception exists for salvage or sanitation cutting of trees damaged by fire, windthrow, or other disturbance or to manage insect infestation or disease spread. Such trees may be harvested above the sustained yield limit, where it is not feasible to substitute such timber for timber that would otherwise be sold under the plan and where such harvest is consistent with desired conditions for terrestrial and aquatic ecosystems. Timber harvest on all NFS lands would have to be consistent with other plan components and direction.

In addition to lands suitable for timber production, timber harvest is allowable on some lands not suitable for timber production. Harvest or other vegetation management for other resource benefits is allowed as appropriate under the RMZ plan components, to address safety concerns in developed recreation areas, or to achieve desired conditions that address recreational values, public safety, or ecological restoration. Wilderness study areas are not suitable for timber production or timber harvest.

Grazing

The proposed action would not change the amount of land in grazing allotments. The amount and type of grazing allowed on those lands is established through planning and analysis specific to grazing allotments and grazing permits. The proposed plan includes components that could influence decisions about the amount and type of grazing allowed when permits or annual operating plans are issued or renewed. The

plan establishes as desired conditions that sustainable grazing opportunities exist, and that grazing allotments have stable and healthy soils, native forage, and hydrologic integrity and provide for wildlife habitat and forage needs. Standards and guidelines in the proposed action guide managers to conserve and maintain vegetation and habitats particularly in riparian and aquatic systems.

Minerals and energy

The proposed plan includes desired conditions to supply mineral and energy resources while assuring sustainability and resiliency of other resources and consistency with other desired conditions. Guidelines in the proposed plan would minimize potential adverse effects to riparian and aquatic resources.

Other resources

In addition to plan direction for the resource areas described above, the 2020 Forest Plan includes programmatic direction addressing soil, air quality, cultural, historic and tribal resources, land status and ownership, infrastructure, forest products, non-recreation special uses, public information and education, and carbon storage and sequestration. Some of these plan components for management of these activities and uses do not have direct relevance to whitebark pine and are not addressed in this assessment unless specifically noted in the assessment section.

Summary of plan components specific to whitebark pine

The Terrestrial and Forested Vegetation and Plants Species at-risk (threatened, endangered, proposed, and candidate plant species and plant species of conservation concern) plan components are designed to maintain and enhance the diversity of species in the plan area and maintain population levels within the natural range of variation. Natural ecological conditions promote healthy, diverse, and resilient plant communities. Whitebark pine is specifically called out within the suite of cover type and individual tree species presence desired conditions at both the forestwide and GA scales and is described within narrative plan components that address the ‘cold’ broad potential vegetation type.

Terrestrial and forested vegetation plan components

The terrestrial and forested vegetation plan direction contains a suite of plan components that specifically relate to whitebark pine. These include quantitative desired conditions for the cover types that typically support whitebark pine and whitebark pine at the species level, at both the forestwide and geographic area scales, as well as narrative descriptions of the desired compositions, structures, and landscape patterns necessary to promote resilience of cold and alpine potential vegetation types.

To maintain and/or move towards these desired conditions, whitebark pine would be promoted through direct management activities such as restoration treatments, as well as allowing natural processes such as fire to occur on the landscape when possible. The desired conditions would also result in whitebark pine being considered in the decision-making processes related to appropriate wildfire response (for example, allowing fire use in areas where suitable seedbeds for regeneration can be created, while potentially avoiding areas with mature seed producing trees). Plan components related to landscape pattern and connectivity would help ensure an appropriate genetic flow of surviving whitebark pine is present to the extent possible. Under the 1986 Forest Plans (existing condition), there are no such specific desired conditions that relate to whitebark pine.

At-risk plant plan direction

The at-risk plant plan components further address whitebark pine as an at-risk species. The components further support the recovery and long-term persistence of whitebark pine and ecological conditions and

processes that sustain the habitats currently or potentially occupied by these plant species are maintained or restored. Key whitebark pine areas, such as cone collection sites, rust resistant trees, and seed orchards would be maintained on the landscape. A goal to work with partners to promote whitebark pine and restore this species and other at-risk species on the landscape is included, along with an objective to treat 4,500 acres of whitebark pine over the life often plan (15 years) with the purpose of sustaining and restoring the species. Any impacts to whitebark pine would be considered prior to forest activities affecting vegetation.

Species assessment

Whitebark pine

Whitebark pine (*Pinus albicaulis*), in the family Pinaceae, was determined by the USFWS to be a species warranted for federal listing but precluded under the Endangered Species Act on July 19, 2011 (76 FR 76 42631) (U.S. Department of the Interior, 2011). Following a 12-month review, the USFWS determined on July 19, 2011, that whitebark pine is a candidate species, with listing as threatened or endangered warranted but precluded by higher priority actions (FR 76(138): 42631-42654). As a result, Region 1 added whitebark pine to the Regional Forester Sensitive Species list on December 24, 2011. USFWS reviewed and retained whitebark pine's candidate status and priority rank December 2, 2016 (FR *81*(232), 87263). Any critical habitat designation will be determined during the development of the proposed listing rule.

Existing condition

Habitat

This species is considered a keystone, or foundation species in western North America, where it increases biodiversity and contributes to ecosystem functions. It grows at the highest forested elevations in cold, windy, snowy, and on relatively moist sites within the semiarid Rockies (Arno & Hoff, 1989) that are difficult areas for plants and animals to inhabit. Whitebark pine occurs both as a climax species in these upper subalpine habitats, but it also occurs as a seral species on more productive sites, typically lower in elevation. Its' cold tolerance, superior hardiness on harsh microsites that exist after a fire, unique method of seed dispersal, and resistance to lower intensity fires, allows it to compete successfully in the upper subalpine zone. It often grows in a krummholz form (stunted, shrub-like growth) at tree line. Whitebark is the major seral species that is eventually replaced over time and in the absence of fire by more shade tolerant species, mainly subalpine fir and occasionally Engelmann spruce on the HLC NF, while on harsh upper subalpine forests and at tree line it can successfully dominate as climax vegetation (Keane et al., 2012). Whitebark pine ecosystems were maintained through fire and insect regimes, and regenerate best in open, sunny conditions (Tomback, Arno, & Keane, 2001). Whitebark pine has fairly low resistance to fire damage due to its thin bark; the benefits of fire reset the seral stage and provide ideal regeneration sites. Whitebark pine, however, is more resistant than its associates, subalpine fir and Engelmann spruce. High-severity fires are likely to kill even the largest whitebark pine (Keane & Arno, 1993) but, in areas with low fuel levels and more widely scattered trees, some whitebark pine may survive the wildfire (Lorenz, Aubry, & Shoal, 2008).

Whitebark pine has a unique method of seed dispersal and regeneration that involves a mutualistic relationship that has evolved between whitebark pine and the Clark's nutcracker (*Nucifraga columbiana*) for seed dissemination. While some seed dispersal could occur without Clark's nutcracker, the nutcracker

is the primary vector for whitebark pine seeds dispersal (Tomback, 1982). The bird extracts the seed from the cones and, if they do not immediately consume it, they cache the seed in small stores often in the ground and sometimes many miles from their source. The birds are estimated to consume 55% of the cached seeds (ibid). Unretrieved seeds that are buried in the soil and on sites suitable for seed germination and establishment, such as open or fire-burned areas, are able to germinate, thus establishing new whitebark pine seedlings often further than wind distributed seeds of competing conifers.

Occurrence

Table 6 and Figure 2 display the occurrence of whitebark pine on NFS lands on the HLC NF (both where it is dominant as a cover type and the total area where it is present), based on forest inventory and analysis plots (FIA), including intensified grid plots installed on the HLC NF. These data represent the best statistically reliable estimates of whitebark pine occurrence. Whitebark pine is present on all GAs except the Highwoods. Approximately 64% of the whitebark pine present occurs on the cold broad potential vegetation group, and to a lesser extent on cool moist and alpine sites.

Table 6. Whitebark pine occurrence on NFS lands on the HLC NF[1]

	Whitebark pine cover type[2]		Whitebark pine presence[3]	
Scale	**% of area**	**Acres**	**% of area**	**Acres**
Forestwide	3.5 (2.3-4.8)	98,858 (65,627-135,899)	11.2 (8.9-13.6)	320,112 (255,839-388,689)
Big Belts	3.4 (1.3-5.8)	9,153 (3,481-15,956)	6.3 (3.3-9.4)	17,163 (9,136-25,765)
Castles	3.7 (3.7-8.0)	2,487 (2,487-5,387)	18.5 (9.5-28.1)	12,436 (6,375-18,872)
Crazies	4.8 (4.8-12.1)	2,552 (2,552-6,502)	21.4 (10.9-34.7)	11,483 (5,815-18,603)
Divide	1.1 (1.1-2.8)	2,190 (2,189-5,449)	7.8 (4.2-11.1)	15,327 (8,320-21,850)
Elkhorns	3.5 (3.5-6.6)	3,968 (3,968-7,588)	13.8 (6.1-19.6)	15,872 (7,024-22,598)
Highwoods	0	0	0	0
Little Belts	1.4 (0.6-2.2)	10,707 (4,537-16,375)	9.9 (7.9-11.9)	74,950 (60,537-90,546)
Rocky Mountain Range	4.6 (1.9-7.7)	35,228 (14,387-59,700)	14.3 (9.3-19.8)	110,487 (71,678-152,780)
Snowies	0	0	1 (1-2.3)	1,158 (1,158-2,713)
Upper Blackfoot	0.7 (0.7-1.7)	2,117 (2,116-4,864)	6.8 (3.4-8.9)	20,110 (10,013-26,091)

1 Data for Forestwide and the Rocky Mountain Range GA are from national base Forest Inventory Analysis (FIA plots), using the Hybrid 2011 dataset. Data for all other GAs is from the 2016 hybrid dataset that includes base FIA plots as well as the 4x intensified grid installed on the HLC NF. The ranges shown are the 95% confidence intervals around the estimates.

2 Cover type indicates areas where whitebark pine is dominant, as indicated by dominance types.

3 Presence indicates areas where at least 1 whitebark pine tree is present.

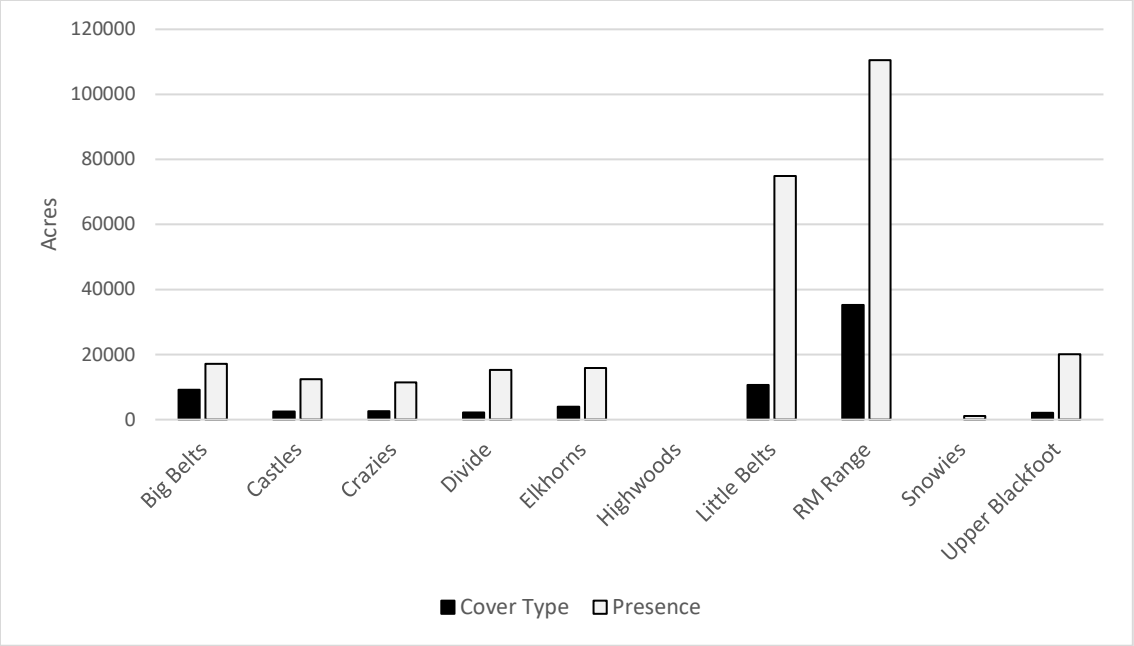

Figure 2. Whitebark pine occurrence on NFS lands on GAs of the HLC NF

The relationship between cover type and species presence shows that whitebark pine is dominant on far fewer acres than the total area where it is present. This indicates that in many areas whitebark is a minor component growing in areas dominated by other species. This relationship can be demonstrated by summarizing the cover type distribution within the areas where whitebark pine is present, as shown in Table 7. These data indicate that where whitebark pine is present, it is often dominated by lodgepole pine or spruce/fir. Whitebark pine is dominant on just under 30% of the areas where it occurs in the plan area.

Table 7. Distribution of cover types found on areas where whitebark pine is present[1]

Cover Type	% of area where whitebark pine is present
Aspen/hardwood	<1%
Douglas fir[2]	12%
Lodgepole pine	28%
Ponderosa pine	1%
Spruce/fir	28%
Whitebark pine	19%
None (nonforested)	9%

1 Data source: Hybrid 2011 dataset of base Forest Inventory Analysis (FIA) plots
2 The Douglas-fir cover type for the HLC includes the R1 dry Douglas-fir and Mixed Mesic Conifer cover types.

Although FIA plot data provides the best estimate of whitebark pine occurrence, maps of whitebark pine must also be used to facilitate a spatial analysis. It is difficult to map all areas where whitebark is present, because trees present in the understory or those that are a minor component in the overstory cannot be detected with remote sensing techniques, and there is no comprehensive field inventory on the HLC NF (such as stand exams). The R1 VMap is generally the best source of spatial data for vegetation using the R1 Vegetation Classification System. This layer depicts dominance types across the landscapes. However, this layer does not fully represent the total area where whitebark pine is known to occur (based on FIA estimates) because these minor occurrences or understory presence of whitebark pine cannot be

detected with remote imagery. The whitebark pine spatial data layer used to analyze the effects of the 2020 Forest Plan alternatives is the Simulating Patterns and Processes at Landscape Scales Model (SIMPPLLE). This layer was built using VMap as a base, and then attributing detailed vegetation information (including minor species components) to all polygons using FIA data. The species labels applied to the modeling layer were derived by relating VMap dominance type information to detailed plot information from FIA. This layer also was updated to capture the changes caused by wildfires and land management that occurred since the remotely sensed imagery was gathered. This layer includes the areas where whitebark pine is dominant and also areas where it may occur as a minor component. It maps a total of 309,348 acres of whitebark pine across the Forest on NFS Service lands, which closely resembles the FIA estimates. This is the best available spatial information to quantitatively analyze whitebark pine on the HLC NF.

Trends

A severe and steep downward trend has been occurring in the whitebark pine population and health over the past few decades, especially in the northern Rocky Mountains (Keane et al., 2012). This decline is expected to continue into the foreseeable future, although the rate may lessen simply because there are fewer live trees left to be impacted by disease or other threats. Recent predictions by the USFWS conclude that the threats to whitebark pine (blister rust, mountain pine beetle, fire suppression, and climate change) affect the species throughout its range and are expected to continue to impact the species into the foreseeable future (U.S. Department of Interior, 2011).

The declining trend occurs across the Region. Analysis at the Regional scale indicates that the abundance of live whitebark pine has decreased from 18.3% of FIA plots containing at least one live whitebark pine tree, to 15.8% in the annualized inventory. Studies in the 1990s that were specifically designed to document the presence and health of this species in western Montana estimated that an average of around half of the whitebark pine had died by that time (ranging from 30 to 90 percent), and up to 99 percent of the remaining trees were infected with blister rust (ranging from 20 to 99 percent) (Keane, Morgan, & Menakis, 1994). Recent remeasurement of a subset of these plots within the Bob Marshall Wilderness Complex show that the mortality of whitebark pine trees has more than doubled in the past two decades, primarily as a result of blister rust infection and to a lesser extent of mountain pine beetle and wildfire (Retzlaff, Leirfallom, & Keane, 2016). Blister rust is now present in all surveyed stands, although infection rates have slowed since 1994. This could be due to a lack of living host trees coupled with some amount of natural rust resistance in the remaining trees. Fiedler and McKinney (2014) also reported a high mortality of whitebark pine in recent decades in the Northern Continental Divide Ecosystem (which includes part of the HLC NF), with nearly three quarters of the whitebark pine trees dead and over 90 percent of the remaining live trees infected with blister rust. In addition, there was a virtual absence of uninfected large (e.g., greater than 14 inch d.b.h.) cone- bearing whitebark pine, which makes the sustainability of this whitebark pine ecosystem more tenuous.

Multiple data sources also indicate whitebark pine mortality and percent of diseased trees has increased specifically on the HLC NF. A stand-level study conducted on the HLC NF found mortality of whitebark pine to be up to 95% (Sturdevant & Kegley, 2006). Further, surveys conducted in 2005 on four whitebark areas found that percent mortality from blister rust was up to 95%, and that rust was present in 29-100% of the stands in the survey areas (Milburn, 2012). The Big Belts GA appears to be one of the heaviest infection areas of white pine blister rust on the east side of Region 1 (Meyer, 2003). Aerial detection survey data can also be used to assess the levels of insect and disease mortality specific to the HLC NF. These surveys are done annually to map insect and pathogen activity, and information from 2000-2015 is available for both mountain pine beetle and whitebark pine blister rust. These data show that nearly 80%

of the whitebark pine mapped for the HLC NF has been affected by one or both mortality agents to some degree since 2000. Because not all areas are surveyed each year and blister rust can be difficult to detect aerially (and not coded when another agent such as mountain pine beetle is present), it is likely that this is a very conservative estimate. Anecdotally, specialists have noted the presence of blister rust in all whitebark pine areas on the Forest. The loss of whitebark pine has altered the structure, wildlife habitat values, and long-term stability of high elevation ecosystems on the HLC NF.

The HLC NF developed desired conditions within the 2020 Forest Plan for whitebark pine based on a natural range of variation (NRV) analysis that was conducted with the SIMPPLLE model. Based on this modeling, the whitebark pine cover type is currently estimated to be within its natural range of abundance, although at the low end of the range in the cold broad potential vegetation type, and at the low end or below the natural range in several of the GAs. The extent (presence) of whitebark pine showed similar trends. However, for the NRV there is a model weakness due to the methodology used to assign cover types (based on relationships with existing VMap dominance types) which may underrepresent whitebark pine in the historic condition. For this reason, and the preponderance of other scientific literature documenting the decline of whitebark pine, the NRV analysis concluded that whitebark pine was likely further below its natural abundance than shown by the modeling. Desired conditions for the 2020 Forest Plan were refined slightly, and specifically increased where the existing presence of whitebark pine exceeded that of natural range of variation modeling.

There is substantial concern over the ability of whitebark pine to successfully sustain itself within the ecosystem through natural regeneration. Some natural selection for resistance to blister rust is likely occurring (Hoff, Ferguson, McDonald, & Keane, 2001), but the recovery of the species will be slow. Whitebark pine grows slowly and has a long generation time (trees need to be 60 to 80 years old before they produce sizable cone crops), and, as noted, there has been an especially dramatic decline in mature, cone-producing trees. The regeneration potential of the species is further exacerbated by evidence suggesting that stands with less than about 21 square feet per acre of live whitebark pine basal area, which is defined as the cross-sectional area of the target tree species at breast height used to measure stand density, provide too little cone production to reliably attract nutcracker seed dispersal (Shawn T. McKinney, Fiedler, & Tomback, 2009). A recent study suggests that in highly damaged whitebark pine stands, most seeds produced are consumed by nutcrackers and red squirrels rather than dispersed (S. T. McKinney, Tomback, & Fiedler, 2011). Data from FIA plots show that where whitebark pine is present on the HLC NF, about 40% of it occurs where the basal area of whitebark pine trees is currently below this threshold of 21 square feet. The basal area of whitebark tends to be higher within the designated wilderness areas where it occurs. In the Bob Marshall and Scapegoat wilderness areas, the basal area of whitebark is below the threshold on 23% and 24% respectively. Therefore, particularly outside designated wilderness areas, there is an urgent need to focus on conservation and restoration efforts for this keystone species across the extent of its range and within the Forest (Keane et al., 2012).

The development of climate models have indicated that the range of whitebark pine will decrease over time as a result of changing conditions. In a presentation at a reforestation and timber stand improvement meeting, Regional geneticist Mary-Francis Maholovich presented model runs indicating that whitebark pine will occupy 0-36% of its current interior distribution (model included habitat range in Idaho, Wyoming and Montana) as climate refugia based on different models. Refugium is defined in the presentation as an area of relatively unaltered climate that is inhabited by plant during a period of continental climatic change from which a new dispersion may take place after climatic readjustment. The models indicate that it will shift downwards in elevation and shift towards a higher precipitation and temperature. It will occur within a narrower band of elevation and climate (Mahalovich, Kimsey, &

Winward, 2018). While an average of 48% of present-day whitebark pine in the interior distribution occurs in designated wilderness, our results indicate less than 1% of the projected refugia are located within the boundaries of these unmanaged areas.

Threat factors

Several interrelated threats to whitebark are identified range-wide (U.S. Department of Interior, 2011) and are present on the HLC NF, which raise concerns about the long-term viability of whitebark ecosystems:

- Fire Suppression: After a century of suppression, many whitebark stands are experiencing a species conversion to shade-tolerant trees, and a lack of suitable seedbeds for regeneration. The balance of a natural fire regime with related vegetative successive processes has been disrupted, and as a result whitebark pine has lost its competitive advantage. Historically, the replacement of whitebark pine by later successional species, such as spruce and subalpine fir, was usually interrupted by naturally occurring fires. Whitebark pine is exceptionally well adapted to re-establishing after a fire event. However, decades of fire suppression have allowed subalpine fir and Engelmann spruce to achieve dominance in many forests that were historically dominated by whitebark pine. When a fire does occur, it tends to be more severe due to the increase in tree density, ladder fuels and downed woody material as well as the overwhelming presence of non-fire-resistant species. Although open, burned, and favorable habitat for whitebark pine regeneration is created by the fire, the lack of a sufficient number of cone-producing trees within caching distance severely limits the ability of this species to re-establish itself in areas where it historically was present or dominant.
- White Pine Blister Rust: White pine blister rust (*Cronartium ribicola*) is an exotic fungal disease against which whitebark has limited resistance. Since blister rust was introduced to North America in 1910, it has spread through the range of five-needled pines. As this disease has moved into fragile, high-elevation ecosystems, normal successional pathways have been altered. Because the disease is exotic, these trees have limited defenses. Blister rust typically infects nearly all individuals of the host species, causing branch and stem cankers in trees that eventually kill most trees. In addition, whitebark pine trees stressed by blister rust are more susceptible to attack by mountain pine beetle. Whitebark pine mortality from the combination of blister rust and mountain pine beetle exceeds 50 percent in some areas of the Rocky Mountain forests (Keane et al., 1994; Kendall & Keane, 2001; Schwandt, 2006) including the HLC NF (Sturdevant & Kegley, 2006). The high levels of mortality from bark beetles and blister rust have not only decreased the whitebark pine population but have also reduced the ability of the species to successfully re-establish in areas it formerly occupied due to the loss of mature cone-producing trees. Since blister rust kills individual branches years before the death of a tree, cone and seed production can be significantly reduced even when the tree is still alive.
- Mountain Pine Beetle: 5-needled pines are susceptible to this aggressive bark beetle. In densely stocked stands, whitebark is more likely to be attacked because of stress from competition. Mountain pine beetle (*Dendroctonus ponderosae*) accelerates the loss of key mature cone-bearing trees. Several large, widespread epidemics of mountain pine beetle caused high mortality of whitebark pine throughout the U.S. Rocky Mountains between 1909 and 1940 and again from the 1970s to the 1980s (Arno & Hoff, 1989). Drought and warmer temperatures in recent years have allowed large increases in beetle abundance and distribution, again resulting in high mortality of trees in portions of the range of whitebark pine in the early 2000's. Unusually high levels of mountain pine beetle-caused mortality of whitebark pine was recorded in 2005 totaling 143,000 acres in Region 1 and 8,600 on the administrative boundary of the former Helena National Forest alone (Sturdevant & Kegley, 2006). Although whitebark pine is still also experiencing some mortality from predation by the native mountain pine beetle, the current epidemic is subsiding from a range-wide perspective, based on aerial detection surveys conducted 2000-2013. These surveys

recorded mountain pine beetle activity on over 230,000 acres, 74%, of mapped whitebark pine areas since 2000.

- Climate change: Direct habitat loss is anticipated to occur due to increased competition from species that normally cannot persist in whitebark pine habitats. Habitat loss will also occur if temperatures exceed the thermal tolerance for whitebark pine and the species is unable to survive the new conditions, though given its wide range and ecological tolerance, this is not likely to be as large a driver of reduced habitat availability. Rapid warming is expected to out-pace species migration to suitable habitats. There is high uncertainty inherent in most current climate and ecosystem models and assessments which may limit our ability to design restoration treatments that are effective in the face of climate change (Keane, Holsinger, Mahalovich, & Tomback, 2017). Some feel that the projected warmer conditions will severely reduce whitebark pine habitat and its distribution, perhaps restricting it to only the highest elevations (Dietz, Belote, David-Chavez, & Aplet, 2015; Warwell, Rehfeldt, & Crookston, 2007); (Lenoir, Gegout, Marquet, de Ruffray, & Brisse, 2008). Others feel that climate-mediated changes in disturbance regimes, such as increased fire frequencies, will reduce whitebark pine populations but not alter its current range (Loehman, Clark, & Keane, 2011). Anecdotal evidence suggests that some whitebark pine forests are experiencing abnormally high growth and more frequent cone crops with warmer summers and longer growing seasons (Keane et al., 2017). Recent models indicate that climate change refugia trends will decrease the area of distribution to 0%-36% of what is currently known in the interior distribution and limit its elevational range (Mahalovich et al., 2018). The reality is complex because of the high uncertainty in regional climate change predictions, the high genetic diversity and resilience of the species, and the localized changes in disturbance regimes and interactions. Overall, whitebark pine is not expected to do well under future climates, primarily because of the current threats and severely declined population, its confinement to upper subalpine environments, and its lack of ability to regenerate because of nutcracker consumption of seed in areas of low whitebark pine populations (Keane et al., 2017).

Current management

There is no plan direction specific to whitebark pine in the current 1986 Forest Plans for the Helena National Forest and Lewis and Clark National Forest. As a candidate species, whitebark pine is managed as a Regional Forester's Sensitive Species in Region 1. Projects are designed to maintain or increase populations and restoration treatments are typically included in project areas that overlap with whitebark following the whitebark pine restoration strategy and adjoining climate change document (Keane et al., 2017; Keane et al., 2012).

Keane et al. (2012) outlines a strategy for restoring whitebark pine that includes promoting rust resistance, conserving genetic diversity, save seed sources, and employ restoration treatments. Restoration treatments should be considered in areas where whitebark pine forests are declining due to insects, disease, or advanced succession to create sustainable whitebark pine populations. Areas with higher levels of mountain pine beetle and white pine blister rust are prioritized for restoration treatment. Effective proactive restoration methods spelled out in the management strategy include:

- managing to limit the spread of blister rust;
- using fire in successional advanced communities to encourage whitebark pine regeneration;
- implementing silvicultural cuttings to reduce competing vegetation to increase the vigor of surviving trees and reduce the likelihood of mountain pine beetle attacks;
- planting rust-resistant seedlings to accelerate the effects of selection;
- promoting natural regeneration and diverse age class structures to maintain ecosystem function and reduce landscape level beetle hazard, and to provide large populations for selection for rust resistance.

Restoration efforts are typically project related and occur as specialists' time, project timelines and budgets allow. In addition, the HLC NF is an active participant in the Regional whitebark pine breeding program, which includes not only seed and material collections from disease-resistant "plus trees", but also hosting several tree improvement out-planting sites, including a test plantation and a seed orchard, which over time would provide locally-adapted and rust-resistant seed for restoration plantings. Contributions to this breeding program are designed to yield rust-resistant seedlings to be used in restoration planting projects. Known areas of whitebark pine resistant to disease are included in wildfire response decision making tools and considered in fire management and project decisions.

Stressors under Forest Service control

The factors contributing to the declining trend of whitebark pine are largely outside of HLC NF control and are occurring range-wide, but there are some opportunities for forest management to restore whitebark pine habitats, reduce threats, and follow the range-wide restoration strategy. One tool to reduce stressors and improve whitebark pine populations is through restoration treatments. The priority for restoration is in areas with both mountain pine beetle and blister rust present. Management restrictions that limit restoration would be a potential stressor in the plan area if these limitations prevent priority treatments from occurring. Much of the whitebark pine in the plan area overlaps with lynx habitat, inventoried roadless, recommended wilderness, and/or designated wilderness areas where additional management restrictions apply. Fire management on the forest is another way to address stressors to whitebark pine. The location of wildfire starts, however, is entirely outside of USFS control and wildfire could damage or remove genetically important trees if not managed to enhance whitebark. Timber harvest is not listed as a threat factor in whitebark pine listing (U.S. Department of Interior, 2011), but timber management activities could impact whitebark pine positively or negatively by damaging individual trees or providing some restoration opportunities. The 2020 Forest Plan cannot eliminate the unknown effects of climate change as a stressor to whitebark pine, although there are some opportunities to use climate change data and refugia data to improve the effectiveness of future restoration treatments and adjust treatments over time based on effectiveness and new climate response information (Keane et al., 2017). White pine blister rust and mountain pine beetle both occur range-wide and are outside of HLC NF control to eradicate. There are restoration strategy opportunities to contribute to the success of rust-resistant whitebark pine and to prioritize treatments. Some of these are currently on-going and it is possible that additional resources and tools will be available in the future.

Environmental consequences

Analysis approach

The 2020 Forest Plan provides a programmatic framework that guides site-specific actions but does not authorize, fund, or carry out any project or activity. Because the land management plan does not authorize or mandate any site-specific activities or ground-disturbing actions, there can be no direct effects.

The preferred alternative for the 2020 Forest Plan would establish new management direction goals, desired conditions, objectives, guidelines, and standards for the recently combined HLC NF. This action would place the newly combined forests under the management of a single land and resource management plan, where it was previously under two separate plans. This action would establish permissions and prohibitions on allowable activities including, timber harvest, commercial and personal use of forest products, prescribed and natural fire, livestock grazing, motorized uses and access, mineral activities, special uses and describes the vegetation desired conditions. These plan components would direct the management of whitebark pine directly and indirectly through changes to habitat and activities allowed on the landscape.

The effects of the 2020 Forest Plan will be addressed by reviewing all pertinent plan components and the level of restoration opportunity for whitebark pine to ensure that the plan would contribute to the viability and maintenance of this species in the plan area. Due to the range-wide decline, and diseased condition within the plan area, the USFS must be sure to preserve our ability to treat this species effectively to improve habitat conditions overall and apply the range-wide restoration strategy for whitebark pine (Keane et al., 2012) and the associated climate change document (Keane et al., 2017).

Direct and indirect effects

All federally recognized threatened, endangered, and candidate species would continue to be managed and protected across the Forest in accordance with Forest Service policy, recommended protection measures in recovery plans (if available), and all applicable state and federal laws. Project-level analysis would evaluate site-specific impacts to this species as a candidate, and consultation with the USFWS would take place for all projects potentially affecting threatened and endangered species. Additional design features or mitigation measures at the project level may be developed if it is determined that they are needed. As a result, there are no direct impacts for whitebark pine associated with this decision since this is a management plan and not dictating any action. Two levels of analysis are addressed: a coarse filter and a fine filter. Coarse filter modeling was used to broadly predict the response of whitebark pine and its associated broad potential vegetation type to climate, disturbance, and vegetation management for each alternative as a part of Forest Plan revision. This model's predicted effects of the preferred action are discussed below. The fine filter analysis considers the plan components and directions impacts to various aspects of the habitats and ecosystems conditions needed to maintain whitebark pine on the landscape (e.g. soils, wildlife, carbon storage) and opportunities for restoration.

Expected future trend of whitebark pine in the preferred alternative

SIMPPLLE modeling was utilized to predict the future trends of whitebark pine on the HLC NF under the 2020 Forest Plan and shown in the following series of figures. This modeling predicts that with expected climate, disturbance, and vegetation management whitebark pine may remain relatively static over the next five decades, with the whitebark cover type generally remaining the same or slightly increasing and the overall presence of whitebark decreasing slightly, remaining either below or within the low end of the desired ranges. See Figure 3 and Figure 4. The preferred alternative is similar to the no-action alternative. However, due to the width of the confidence intervals, it cannot be stated with certainty whether whitebark pine would move within the desired condition range during this time period; or, for that matter, if it would measurably increase from the existing condition.

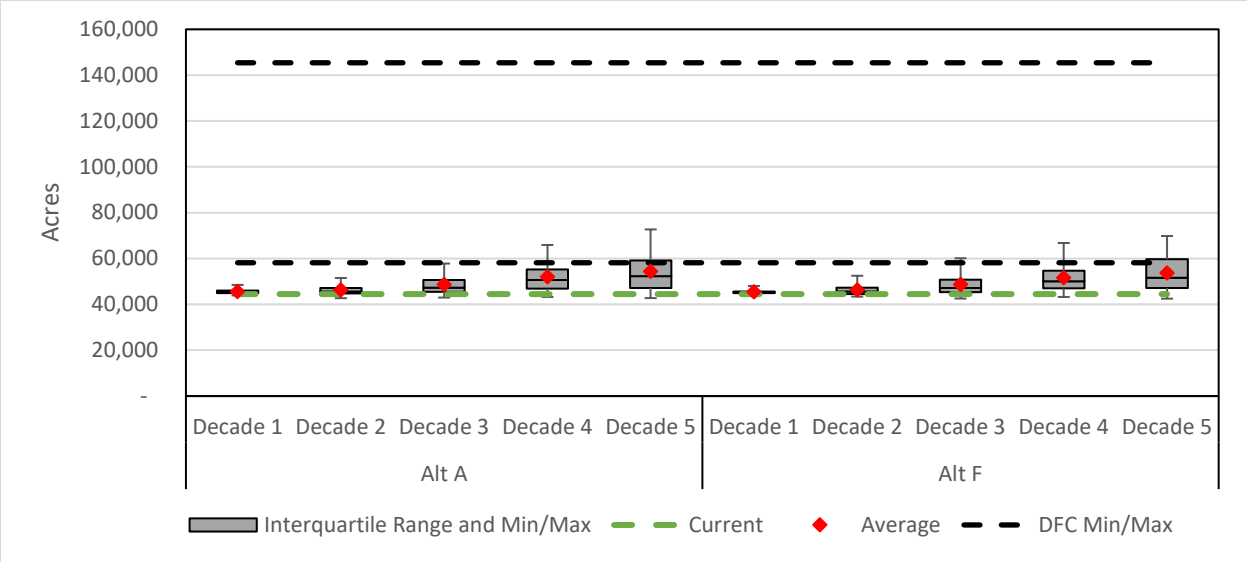

Figure 3. Whitebark pine cover type abundance over five decades, preferred alternative F compared to no-action alternative A

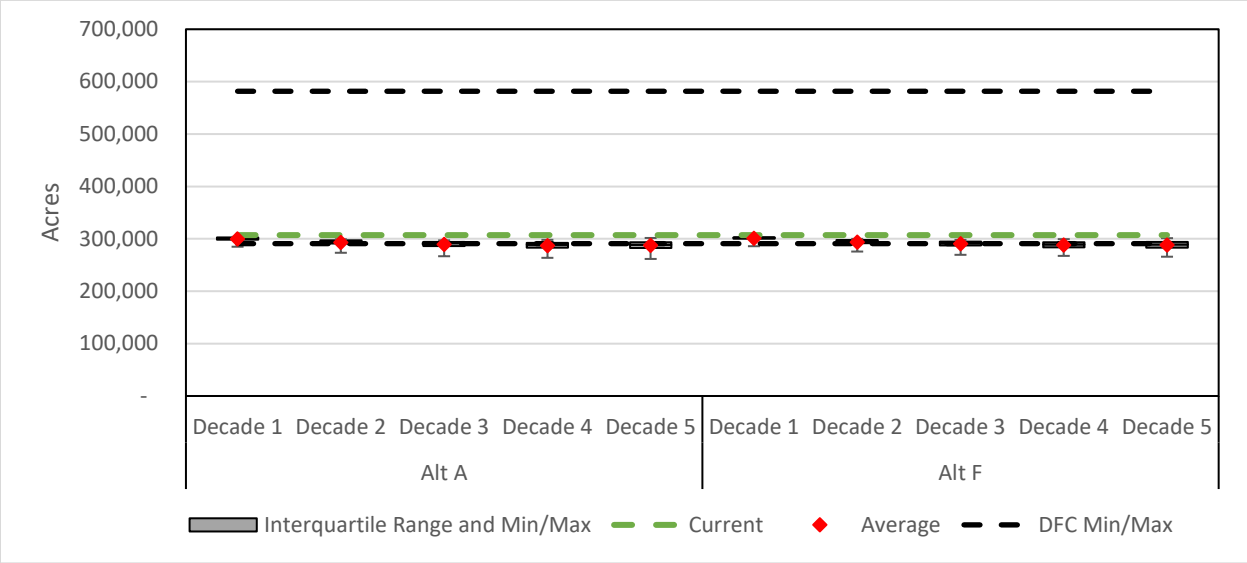

Figure 4. Whitebark pine presence over five decades, preferred alternative F compared to no-action alternative A

Specifically, on the cold broad potential vegetation type, where whitebark pine would be most expected to establish and thrive, the model estimates that the cover type would increase slightly to be within the desired range; whereas the tree species presence would remain fairly static and just below the desired range. See Figure 5 and Figure 6 below. In these charts, the existing condition according to FIA is indicated separately, and is expected to be more accurate than the starting or existing condition for the vegetation modeling. Based on this, it is likely that the whitebark pine cover type would be within the desired range in the cold broad potential vegetation type, but the extent (tree species presence) would be below the desired range.

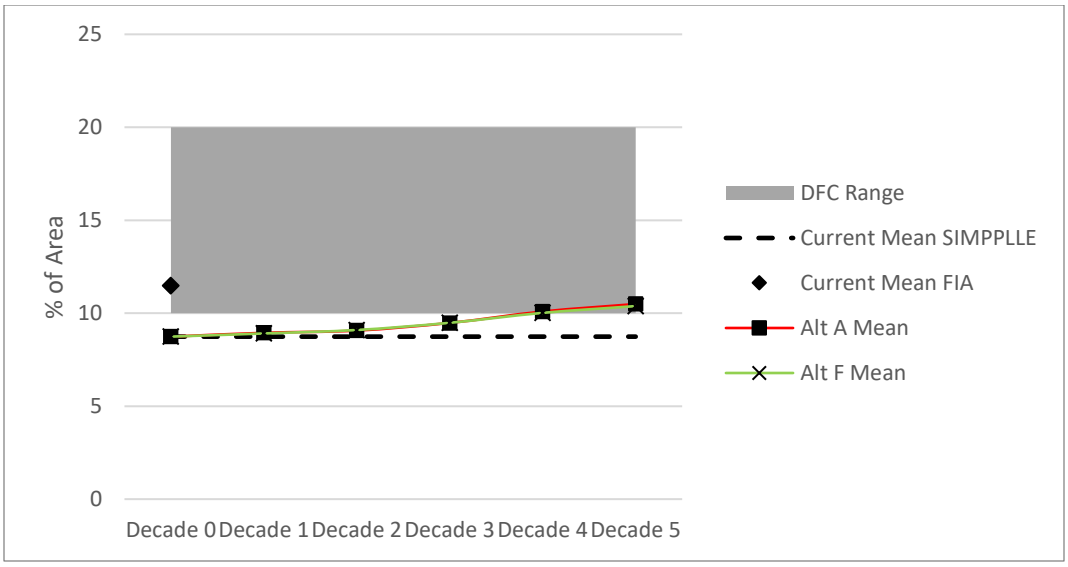

Figure 5. Whitebark pine cover type over five decades, in the cold broad potential vegetation type

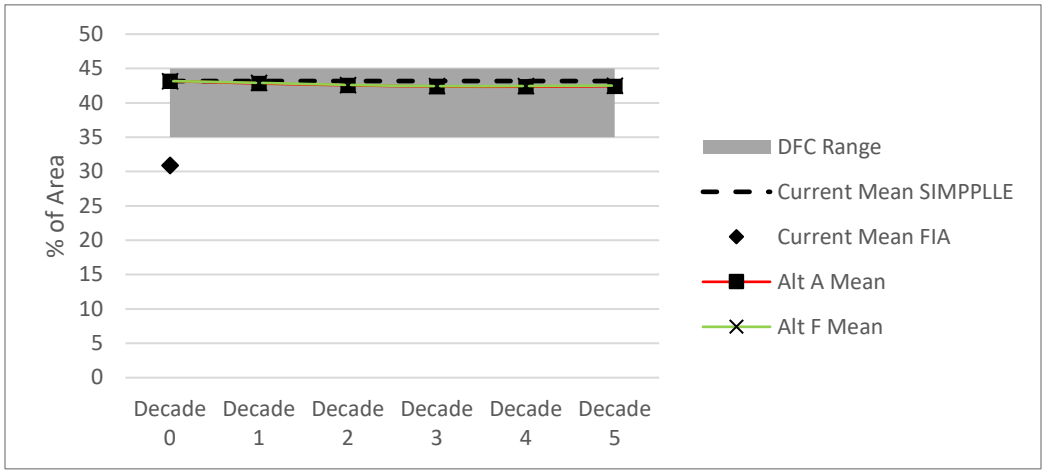

Figure 6. Whitebark pine presence in the cold broad potential vegetation type

Modeling was also done for each GA. In most GAs, the model predicts a fairly static level of the whitebark pine cover type, at or just below the desired range. The Crazies and Upper Blackfoot GAs are exceptions, where the amount of the whitebark pine cover type would increase over time. Further, in the Crazies, Little Belts, and Rocky Mountain Range GAs the presence of whitebark pine would be higher than the other GAs and is modeled to stay well within the desired range. Whitebark pine is not known to be present in the Highwoods GA.

The expected future trends as predicted by SIMPPLLE may initially appear encouraging, and is likely in part due to the increased extent of fire expected to occur on the landscape with a warming climate. However, the model does not precisely account for the lower threshold of tree density necessary for successful seed dispersal (Shawn T. McKinney et al., 2009). Further, it does not reflect the vigor and health of those areas where whitebark remains present or dominant. Finally, the NRV condition of whitebark may be somewhat underrepresented due to the way cover types are classified. Therefore, there

are still substantial concerns over the ability of whitebark pine to regenerate and persist in the future at levels similar to what has been present in the past.

Effects of the proposed action on factors affecting whitebark pine in the action area

The plan components are listed beginning with those most applicable to whitebark pine management. The designated areas are considered together under a combined section titled “Restoration opportunities within designated areas”. The plan components and management guidelines for these areas are each considered separately and together to ensure that the range-wide restoration strategy for whitebark pine (Keane et al., 2012) and priority restoration treatments. The rest of the pertinent plan components are listed by category in the same order that they appear in the 2020 Forest Plan. The direction in the at-risk plant plan components, fire and fuels plan components, and terrestrial vegetation plan components directly apply to the management of this species and the factors that are contributing to the species current population trends. Many of the other plan components would contribute to forest management that encourages conditions beneficial to whitebark pine more indirectly by maintaining habitat conditions and preventing ecosystem degradation.

At-risk plant plan direction

The at-risk plant plan components apply to threatened, endangered, proposed and candidate species listed under the ESA section 7 and Species of Conservation Concern. These components address whitebark pine as an at-risk species in addition to the vegetation plan components that address it as a desired forest type. The at-risk plant components include desired conditions that support the long-term persistence of whitebark pine, an objective to treat a minimum of 4,500 acres of whitebark pine with restoration treatments in over the life of the plan, and a guideline to ensure that whitebark pine would be considered during project levels treatments that could alter vegetation conditions. Based on these components, the likelihood of accomplishing whitebark pine restoration treatments is higher under the preferred alternative than under the no-action alternative, which does not have any components that are specific to whitebark pine, though restoration treatments are often included in projects under the 1986 Forest Plans. The at-risk plan components represent a benefit to this species under the preferred alternative by emphasizing restoration treatments.

- FW-PLANT-DC- 01 Habitat conditions support the recovery and persistence of plant species that are recognized as threatened, endangered, proposed, or candidate under the Endangered Species Act, and those that are identified as species of conservation concern. Ecological conditions and processes that sustain the habitats currently or potentially occupied by these plant species are maintained or restored.
- FW-PLANT-DC-02 Key whitebark pine areas such as cone collection sites, resistant seed-bearing trees, and seed orchards persist on the landscape.
- FW-PLANT-GO-01 Recovery and long-term persistence of plants that are threatened, endangered, proposed, or candidate under the Endangered Species Act or species of conservation concern is supported by cooperation with other agencies and landowners to expand inventories, identify potential habitat for these species, and promote protection and/or restoration of associated habitats.
- FW-PLANT-OBJ-01 Treat at least 4,500 acres over the life of the plan for the purpose of sustaining or restoring whitebark pine and contribute to achieving desired conditions as described in the forested vegetation section. Achieving this would also contribute to FW-VEGT-DC-01. Refer to appendix C for information on possible restoration strategies and activities.
- FW-PLANT-GDL-01 Activities affecting vegetation in known occurrences or suspected habitat of plants listed as threatened, endangered, proposed, or candidate under the Endangered Species Act,

and those that are identified as species of conservation concern should be designed to provide for their long-term persistence.

The greatest opportunity to support this species in the plan area is by restoration treatments to limit the effects of the key stressors and improve the species' resistance to white pine blister rust. Proactive management based on creditable science is assumed to be necessary because whitebark pine's decline is due in part to an exotic disease (Hobbs & Cramer, 2008). Both "reactive" restoration to current conditions and proactive restoration in anticipation of losses are critical for long-term whitebark pine conservation (Schoettle & Sniezko, 2007); (Sniezko et al., 2003) . From a planning perspective, it is vital to ensure that restoration treatments would be effective and would not be limited by other management constraints. The at-risk plants plan component direct the treatment of 4,500 acres to restore whitebark pine habitat. This would have a beneficial effect to this species compared to the no action alternative, which does not specify any objectives for acres of restorative treatment. The action these components direct have the flexibility to be adjusted over time based on the best available science and the effects of these components are expected to be beneficial. The best available science on restoration strategies and methods would all be promoted through the at-risk plan components. The increased restoration activity expected as a result of these components, particularly this objective (FW-PLANT-OBJ-01), is expected to have a beneficial effect on whitebark pine.

Fire and fuels plan direction

One of the factors contributing to the decline of whitebark pine is the absence of natural fire on the landscape due to fire suppression. The desired conditions of the 2020 Forest Plan encourage the use of natural fire as much as possible whenever it is safe to do so. Those areas which are safe to allow natural wildfire often include more remote and high elevation areas of the plan area that are likely to overlap with whitebark pine habitat and this direction would represent an increased opportunity for whitebark pine restoration in the plan area and a reduction in the threat factor of fire suppression. The desired conditions include:

- FW-FIRE-DC-01 Wildfire maintains and enhances resources and, as nearly as possible, can function in its natural ecological role across the landscape. Under favorable conditions, wildfires and prescribed fires are managed to ensure highest probability of success, minimum exposure to responders, and to meet resource objectives.
- FW-FIRE-DC-03 Treated fuel management areas (management actions or wildfire) allow opportunities over time for natural fire occurrence and to provide fuel conditions that benefit fire management operations.

The following fire and fuels plan guidelines also enhance fire opportunities in the plan area to use fire to promote whitebark pine:

- FW-FIRE-GDL-01 To create (and/or minimize threats to) resilient, healthy ecosystems, vegetation treatment projects should allow opportunities for naturally ignited wildfire to occur and provide fuel conditions that benefit fire management operations.
- FW-FIRE-GDL-02 To create (and/or minimize threats to) resilient, healthy ecosystems, wildland fire management strategies should promote desired vegetation conditions where wildfires result in fire severities that are "self-regulating" and reduce future risk.
- FW-FIRE-GDL-04 To maintain the character of designated areas, minimum impact strategies and tactics should be applied if fire management actions are required to manage wildland fire, unless more direct attack is needed to protect life or adjacent property or mitigate risks to responders.

These desired conditions and guidelines are expected to allow wildfire to play a more natural role on the landscape than the 1986 Forest Plans, which are limited by several of the management areas and total acres of wildfire. However, fuel management would be dependent upon the location of the unplanned ignitions and the risk assessment associated with each season and event that may require suppression actions instead. The 2020 Forest Plan direction recognizes the risks to multiple important values and would provide the opportunity to use fire as a management tool when conditions are conducive to meeting various plan objectives. As a result, while fire is expected to increase its ability to play a nature role on the landscape, there would be limitations to the extent that it is applied due to other safety and land management concerns.

Any increase in the return of natural fire on whitebark communities would be beneficial for whitebark pine. Fire suppression is listed as a threat factor (U.S. Department of Interior, 2011) and an increase in fire would contribute to reversing this condition. The reintroduction of fire creates opportunities for whitebark pine to colonize new habitats and more effectively regenerate (Tomback et al., 2001) and also provides restoration opportunities. Several of the whitebark pine restoration strategies outlined by Keane et al. (2012) are employed with increased application of fire. Fire is an effective method of providing suitable seedbeds for regeneration, reducing the competition of shade-tolerant tree species in successional advanced communities, and promoting diverse age class structure to maintain ecosystem function. Frequent low severity fires, such as prescribed burning, that reduce ladder fuels, tree density, and downed woody material can reduce the risk of more catastrophic fire events that wipe out seed sources.

Terrestrial and forested vegetation plan direction

The 2012 Planning Rule adopts a complementary ecosystem and species-specific approach, known as “coarse-filter/fine-filter”, to provide the natural diversity of plant and animal communities and ensure long-term persistence of native species in the plan area. Coarse-filter plan components are designed to maintain or restore ecological conditions for ecosystem integrity and diversity within agency authority and the inherent capability of the land. Fine filter plan components provide additional specific habitat needs, when those needs are not met through the coarse filter. Although many influences on vegetation are not easily controlled, the intent of plan components is to collectively provide for the full suite of native biodiversity across the plan area. Plan components that address composition, structure, and function of vegetation communities represent the coarse filter. The fine filter is addressed by components such as those specific to 1) threatened, endangered, proposed, and candidate species which are designated by the USFWS; 2) species of conservation concern, which are identified by the Regional Forester; and 3) specific structural components of interest such as old growth, downed wood, and snags. Both the coarse and fine filter vegetation plan components contribute to the maintenance and restoration of whitebark pine on the HLC NF landscape both by indicating the desired conditions based on natural range of variation for habitat types and whitebark pine specifically across geographical areas (Table 8, Table 9), but also by maintaining and enhancing vegetation more generally and ensure a natural range of variation across the ecosystem as a whole.

- FW-VEGT-DC-01 Vegetation occurs across the landscape in a diverse pattern of compositions and structures within the natural range of variation that are resilient to future climates and disturbances such as fire, insects, disease, invasive species, floods, and droughts. Conditions are such that effective recovery of vegetation is possible following disturbances. The conditions relevant to whitebark pine are described in Table 8. See appendix A for the full content of this plan component.

Table 8. Excerpt from 2020 Forest Plan Table 4, for cold and alpine broad potential vegetation types

Broad Potential Vegetation Type	Terrestrial Vegetation Desired Conditions
Cold	Forest resilience is achieved by emphasizing the presence of whitebark pine where possible. Increases in whitebark pine occur relative to the existing condition, focusing on open ridges and harsher aspects. On these sites, there is a decrease in subalpine fir and Engelmann spruce relative to the existing condition. Subalpine fir and Engelmann spruce remain common and dominate northerly and easterly aspects, swales, moist basins, and riparian areas. Lodgepole pine is present as well, on warmer sites. The abundance of the small forest size class is decreased relative to the existing condition, with an increase in the large size class. Whitebark pine is maintained across its natural range to the degree possible within the context of climate changes and increasing disturbance, with large trees present that are tolerant of moderate or low severity fires. Large subalpine fir and Engelmann spruce are also promoted on productive sites. The proportion of forests in the low/medium density class is increased with decreases in the high cover class relative to the existing condition, focusing on restoration of resilient, open multi-aged whitebark pine forests where dense multistoried spruce/fir or single-storied lodgepole pine dominate. Natural patch sizes reflect a mixed fire regime. Understory plant species present, such as grouse whortleberry and beargrass, may be sparse at the highest elevations where alpine vegetation is interspersed with bare ground and rock. Snags occur in pulses. Coarse woody debris levels vary widely.
Alpine	Alpine ecosystems occupy harsh high elevation sites, resulting in short stature and relatively slow growth for both shrubs and herbaceous species. Wetland communities are present in snowloaded depressions, and support various willow species (e.g., planeleaf willow), along with wetland herbaceous species (e.g., tufted hairgrass, marsh marigold). Alpine ecosystems are mostly treeless, although some conifers (e.g., subalpine fir, whitebark pine) may be present with minor cover as krummholz patches. Vegetation cover is typically low to moderate, depending on site characteristics. The plant communities are dominated by a number of shrubs, forbs and graminoids including: arctic willow (turf community), mountain avens, (cushion plant community), mountain heather and moss-heather (snow bed communities). Many of these areas experience only patchy fire due to the low amounts and patchiness of fuels. The fire return interval is typically very long (500 years or greater) in alpine ecosystems. Historically, stand-replacing fires occur infrequently in adjacent associated subalpine woodlands. Fire severity and spread is usually variable due to the short duration without snow cover. In addition, limited fuel loading and rock scree fields preclude fires from spreading if lightning strikes do occur. Microphytic crust is maintained as a key feature.

- FW-VEGT-DC-02; FW-VEGF-DC-01 The plan area supports a distribution of cover types Nonforested and Forested cover types can occur on forested broad potential vegetation types and be perpetuated by natural disturbances or restoration activities (Table 9).
- FW-VEGT-DC-03 Vegetation conditions provide habitat requirements to support populations of species of conservation concern, threatened or endangered species, and other native and desired non-native species based upon the inherent capability of lands.
- FW-VEGT-DC-04 Vegetation patterns provide connectivity and allow for potential genetic interchange to occur to support ecosystem functions, including potential species range shifts that may occur in response to climate change.
- FW-VEGF-DC-08 Forest patches of different compositional and structural conditions form a landscape pattern that contributes to resilience and habitat connectivity. Early successional forest patches provide edge habitat and functional openings that contrast sharply with adjacent forests. Patches of different size classes vary in extent, and are generally bounded by ridges, streams, and other topographic or biophysical features. Landscape and within-patch patterns reflect historic natural fire regimes to the extent possible given changing climate conditions. Forest patches are further refined for each PVT (see Appendix A for the full content of this component).

- FW-VEGF-GDL-03 Vegetation management activities in tree improvement areas (such as seed orchards, test plantations, and seed production areas) should be conducted according to regional office assignments, and so as not to impair tree improvement activities.

In addition, at the forestwide level and for each GA with whitebark present, there are DCs for the whitebark pine cover type and whitebark tree species presence expressed at percentages. These DCs are summarized in the table below.

Table 9. Summary of desired cover type abundance and tree species presence for whitebark pine

Desired condition components	Cover type (percent)		Presence (percent)	
	Existing[1]	Desired[2]	Existing	Desired
Forestwide (FW-VEGT-DC-02 & FW-VEGF-DC-01)	4	2-5	11	10-20
Big Belts (BB-VEGT-DC-01 & BB-VEGF-DC-01)	3	2-5	6	5-15
Castles (CA-VEGT-DC-01 & CA-VEGF-DC-01)	4	2-5	19	10-20
Crazies (CR-VEGT-DC-01 & CR-VEGF-DC-01)	5	2-5	21	15-25
Divide (DI-VEGT-DC-01 & DI-VEGF-DC-01)	1	2-5	8	5-15
Elkhorns (EH-VEGT-DC-01 & EH-VEGF-DC-01)	4	5-10	14	10-20
Little Belts (LB-VEGT-DC-01 & LB-VEGF-DC-01)	1	2-5	10	5-15
Rocky Mountain Range (RM-VEGT-DC-01 & RM-VEGF-DC-01)	5	5-10	14	10-20
Snowies (SN-VEGT-DC-01 & SN-VEGF-DC-01)	N/A	N/A	1	5-15
Upper Blackfoot (UB-VEGT-DC-01 & UB-VEGF-DC-01)	1	2-5	7	5-15

1 Existing condition estimates are from FIA and intensified FIA plot data, as of 2018. The Forest Plan discloses the 95% percentile ranges around these estimates.
2 Desired conditions were developed based on natural range of variation modeling with the SIMPPLLE model, as well as additional literature sources. Methodologies for the development of desired conditions is disclosed in detail in Appendix B of the EIS.

The effects of these plan components are expected to be beneficial to whitebark pine. The terrestrial vegetation plan components specifically define the desired cover type abundance for whitebark pine, which at times is below the current conditions (Table 9). The desired cover type across the plan area and in each GA provides the Forest with quantitative management goals to enhance this species on the greater landscape to align with the NRV. The techniques used to promote this species to reach the desired abundance in each GA would apply Keane et al (2012) to treat habitat for this species, producing beneficial effects. The no-action alternative does not include whitebark pine specific desired abundance and condition. These components would establish a more proactive approach to managing for this species on the landscape within the land management plan.

In addition to the plan components in which whitebark pine is referenced, the overall terrestrial vegetation DCs are designed to maintain and enhance ecological integrity, diversity, function, and resilience and provide beneficial effects for whitebark pine. Vegetation plan components would maintain healthy

whitebark pine in the plan area by providing habitat for listed species (FW-VEGT-DC-03), maintaining tree diversity and planting with appropriate stock (FW-VEGT-GDL-03), providing diverse age classes and patches within forests (FW-VEGT-DC-01; FW-VEGF-DC-03; FW-VEGF-DC-08), and continuing to work with the region to maintain tree improvement sites, which contribute to the development and availability of rust-resistant seedlings (FW-VEGF-GDL-03). These desired conditions and guidelines direct management to apply multiple aspects of the Range-Wide Restoration Strategy for Whitebark Pine (Keane et al., 2012) to maintain whitebark pine as a diversity component of the forest ecosystem. Habitat for whitebark pine would be enhanced within project areas using appropriate techniques based on the best available science, appropriate genetic material would be used in coordinate with the Regional Office to supply genetically appropriate seedlings, and diverse age-classes would be promoted in the potential vegetation types that support whitebark pine.

Restoration opportunities within designated areas

Restoration treatment is an important part of the rangewide restoration strategy for whitebark pine. Much of the whitebark pine found in the plan area overlaps with one or multiple designated areas that could restrict restoration treatments. These areas are lynx habitat as defined by the Northern Rockies Lynx Management Direction, inventoried roadless, recommended wilderness, and designated wilderness areas (Table 10). Each of these areas are considered separately below.

Table 10. Whitebark pine occurrence in areas that potentially restrict restoration opportunities

Designation	Acres of whitebark pine presence	% of total whitebark pine acres
Designated wilderness	98,148	32
Recommended wilderness	22,946	7
Potential lynx habitat	213,550	69
Inventoried roadless areas	165,699	54

Lynx plan direction

The 2020 Forest Plan would incorporate the Northern Rockies Lynx Management Direction (NRLMD) (U.S. Department of Agriculture, 2007), which would influence vegetation management and how DCs are applied in potential lynx habitat (51% of the HLC NF). Approximately 214, 039 acres of mapped whitebark pine occurs within potential lynx habitat (69% of the total whitebark pine mapped). This overlap is common because whitebark is found on the potential habitat types and high elevation sites that also characterize lynx habitat (spruce/fir forests). Lynx direction and potential lynx habitat do not vary by alternative, so the preferred alternative has similar effects as the no-action alternative. Occupied lynx habitat has been identified by the USFWS in the plan area, and currently includes only the Upper Blackfoot, Divide, and Rocky Mountain Range GAs. However, because the NRLMD should be considered on all lands, and there is potential for occupied habitat to change, lynx constraints are applied and analyzed across the entire HLC NF for forest planning purposes. The limitations on vegetation management in whitebark pine forests where fire exclusion has allowed spruce/fir canopy layers to develop may result in foregoing some whitebark restoration opportunities.

The NRLMD has the potential to constrain whitebark pine restoration opportunities. There are two standards in the lynx direction that apply most to whitebark pine habitats: standard VEG S5 and standard VEG S6. Standard VEG S5 applies to precommercial thinning areas and limits the amount of precommercial thinning that can overlap with snowshoe hare habitat in the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat. There are exceptions for VEG S5 areas to include allowances for daylight thinning for whitebark pine where 80% of snowshoe hare habitat is

retained and to restore whitebark pine. For the purposes of consultation, the HLC NF is requesting acres of exception for VEG S5 to be able to treat whitebark pine and other desired species (e.g. aspen). See the Lynx Biological Analysis for details on acres. VEG S5 excepted acres do not always overlap with the highest priority areas for whitebark pine restoration, though some overlap would certainly occur. It would be evaluated on a project-by-project basis. Standard VEG S6 most commonly develops on the cool moist and cold broad potential vegetation types and includes late successional forest that has replaced the early successional whitebark pine due to the absence of fire. This standard does not allow vegetation management that reduces winter snowshoe hare habitat in mature multi-story forests or late successional forests but has an exception for research studies or genetic trees tests evaluating genetically improved reforestation stock. An exception for fuels treatments within the WUI for an area up to 6% of the occupied habitat would apply forestwide in both VEG S5 and VEG S6. While these exceptions are limited within occupied habitat, beneficial whitebark pine restoration treatment could occur.

Lynx habitat is one of several area designations with potential limitations for restoration treatments. The list also includes inventoried roadless, recommended wilderness, or designated wilderness, which is discussed in greater detail below. The amount of mapped whitebark pine that is found within potential lynx habitat, but outside of inventoried roadless, recommended wilderness, or designated wilderness is 42,180 acres, or 14% of the total whitebark pine area. In these areas, VEG S6 would be the primary factor that would reduce or delay the ability to perform restoration treatments for whitebark pine, such as removing spruce and fir components in mature, multistoried stands. There are 26,573 acres that occur within the WUI and could be treated to reduce fuels within the expected 6% (Table 11); however, whitebark restoration objectives will not always be able to reconcile with the fuels objectives in these areas.

Table 11. Whitebark pine overlap with WUI, and whitebark pine WUI overlap with areas outside of other management areas that could limit treatment opportunities (RWA, designated wilderness, and IRA)

Alternative	Land Management Designations	Acres
All	Whitebark pine within WUI	99,150
Existing Condition (A)	Whitebark Pine within Potential Lynx Habitat and WUI, but outside of RWA, Wilderness, and IRAs	26,576
Preferred Alternative (F)	Whitebark Pine within Potential Lynx Habitat and WUI, but outside of RWA, Wilderness, and IRAs	26,573

Overall, the effects of the NRLMD would be insignificant. The NRLMD creates some barriers to treating whitebark pine, but despite these limitations, enough treatable acres are available outside of management restrictions to meet the objective of treating 4,500 acres over the life of the plan. The excepted acres within occupied habitat and the number of acres of whitebark pine outside of lynx habitat provides enough acres to meet the plan objective within current budget restraints. Despite conflict between whitebark pine restoration and lynx habitat guidelines, other Forest Plan direction would ensure that an adequate amount of whitebark pine would be treated in the planning area to follow the restoration strategy for whitebark pine (Keane et al., 2012) and reduce threat factors' effects despite some management limitations.

Designated wilderness plan direction

Whitebark currently occurs in two of the three designated wilderness areas on the HLC NF: the Bob Marshall and Scapegoat which represent 46% of the mapped whitebark in the plan area. There is no difference between the preferred alternative and the existing condition with respect to this land

designation. In these areas, essentially no management intervention would occur in whitebark pine areas, except naturally ignited fire may be allowed to burn. There are few to no restoration treatment opportunities for whitebark pine possible in wilderness areas, aside from managing wildfires for resource benefit. Planting and mechanical and mechanized equipment, such as chainsaws, are not permitted in wilderness. This would prohibit silvicultural thinning or planting seedlings within wilderness boundaries.

Three of the threat factors to whitebark pine - fire suppression, mountain pine beetle, and white pine blister rust - have a somewhat reduced effect on whitebark pine in these two existing wilderness areas (Table 12). The mapped levels of blister rust and mountain pine beetle to whitebark are reduced in designated wilderness areas when compared with the rest of the HLC NF, but still present. A review of aerial detection survey data indicates that a lower proportion of the whitebark areas within wilderness areas have been affected by mountain pine beetle or white pine blister rust. However, this information must be tempered by the fact that in many survey years, the wilderness areas were not surveyed due to time constraints.

Wildfires are more likely to be allowed to burn within wilderness areas, and therefore the effects of fire exclusion (and succession to shade tolerant species) may be less prevalent in these areas. Fourteen percent of the total acres within wilderness burned in recent wildfire between 2000-2018, while only 9% of the whitebark pine outside of wilderness burned in the same time period.

Table 12. Wildfire burned acres and aerial detection survey for disease results within and outside of wilderness

Designation	Mountain pine beetle (acres)	Blister rust (acres)	Acres burned (% of mapped whitebark within respective designation)
Wilderness	90,888	7,687	14%
Outside of wilderness	117,743	233,732	9%

The whitebark pine in these wilderness areas generally have a higher basal area per acre which meet the basal area requirements for regeneration potential (21 square feet of basal area) than the Forest overall. If the basal area falls below this threshold it is less likely to support Clark's Nutcracker (Shawn T. McKinney et al., 2009). Still, roughly a quarter of areas where whitebark is present in wilderness areas is below the threshold. The Scapegoat wilderness has 24% below this threshold and the Bob Marshall wilderness has 23% below. The forest as a whole has 39% below the threshold, so the priority to treat would be outside of wilderness. Once whitebark pine stands fall below this threshold, it is recommended to plant resistant seedlings to restore the stand (Keane et al., 2012). Though planting cannot occur within designated wilderness boundaries, planting outside of wilderness areas can provide genetically resistant seed source to the wilderness area given that nutcrackers can fly up to 22 km to cache seeds (Stephen & Balda, 1977), therefore planting along the periphery can be beneficial – particularly following fire. The birds like to cache seeds in open areas (by fires), giving whitebark an early successional advantage over species whose seeds are distributed by wind and typically do not reach that far into a large disturbed area, reducing competition and allowing whitebark seedlings to stash. It is still possible to restore whitebark pine stands within wilderness by applying these restoration principles.

The primary effect of the plan components for designated wilderness would be to limit restoration opportunities for whitebark pine, and while this could have a negative effect, it overall would be offset by 1) broad restoration needs outside of wilderness areas, 2) the benefits of treatments adjacent to wilderness boundaries, and 3) the lower priority of treatments within wilderness due to the relative health of

whitebark pine within wilderness. It is not realistic for the HLC NF to be able to treat all areas of mapped whitebark pine and the current conditions of whitebark pine in designated wilderness reduces the priority of these areas for treatment. There are higher priority whitebark pine restoration opportunities acres outside of wilderness, more than enough to reach the objective to treat 4,500 acres. Restoration treatments could still occur adjacent to wilderness that would benefit whitebark pine (e.g. prescribed fire, mechanical thinning, planting) and management could continue to promote whitebark pine within wilderness boundaries without restoration treatment. The Restoration Strategy (Keane et al., 2012; Schoettle & Sniezko, 2007) recommendations are to promote rust resistance, conserve genetic diversity, save seed sources, and employ restoration treatment. Rust-resistant plus-trees could be identified, seed sources can be preserved and genetic diversity can be enhanced and maintained in the plan area (FW-PLANT-DC-02). The increased use of natural wildfire within designated wilderness is also expected to contribute to restoration goals and reduce threat factor of fire suppression by diversifying age classes, managing forest composition, creating suitable seedbeds for whitebark pine regeneration, and reducing shade tolerant competition, and reducing the fire suppression threat factor in these areas. The restoration strategy activities still permitted would benefit whitebark pine within designated wilderness despite management limitations. These conditions considered with the other plan components that facilitate restoration treatment in other areas result in an overall insignificant effect of designated wilderness for whitebark.

Recommended wilderness plan direction

The preferred alternative identifies several recommended wilderness areas that overlap with approximately 23,000 acres of mapped whitebark pine, which constitutes 7% of all of the mapped whitebark pine. As compared to the existing condition, the preferred alternative has more acres of whitebark pine within recommended wilderness. Approximately 4,560 acres of whitebark pine occur within recommended wilderness in the no - action alternative, while 23,000 acres are within recommended wilderness with the preferred alternative. These areas generally overlap IRAs which already limit, but do not prohibit, mechanical timber harvest and roadbuilding, but in addition recommended wilderness includes more specific prohibitions on potential vegetation treatments. However, as compared to designated wilderness, the following plan components allow for more direct restoration management activities to occur in whitebark pine.

- FW-RECWILD-DC-01 Recommended wilderness areas preserve opportunities for inclusion in the National Wilderness Preservation System. The ecological and social characteristics that provided the basis for each area’s suitability for wilderness recommendation are protected and maintained.
- FW-RECWILD-DC-02 Recommended wilderness areas are characterized by a natural environment where ecological processes such as natural succession, wildfire, avalanches, insects and disease function as the primary forces affecting the environment.
- FW-RECWILD-SUIT-02 Recommended wilderness areas are suitable for restoration activities (such as management ignited fires, active weed management) to protect and/or enhance the wilderness characteristics of these areas.
- FW-RECWILD-SUIT-03 Motorized and mechanized equipment (such as chain saws to clear trails) are suitable for accomplishing restoration activities and/or administrative work.
- FW-RECWILD-SUIT-04 Recommended wilderness areas are not suitable for timber production or timber harvest.

As with designated wilderness and IRAs, natural fire may be more likely to be managed for resource benefit in these areas due to their remoteness and desired character. Natural fire regimes would be encouraged to contribute to a mosaic of different seral stages and diversity habitats as much as possible. This would benefit whitebark pine due to its reproductive advantage following fire, but the extent that

wildfire would be permitted to move through the recommended wilderness would be determined by a number of factors, including seasonal weather conditions, values at risk and safety. All restoration activities could continue in recommended wilderness to benefit whitebark pine, including planting and hand silvicultural treatments. However, if Congress chooses to designate these areas as wilderness, the limitations as described above for designated wilderness areas would then apply.

Overall the addition of 23,000 acres to recommended wilderness would have an insignificant effect on whitebark pine. In these areas, mechanical whitebark pine restoration opportunities may be limited somewhat due to a lack of access or opportunities to mechanically prepare treatment sites. However, other restoration activities for whitebark pine could occur, including prescribed burning and tree planting, and wildfire is expected to play a larger role on the landscape. Since these areas more or less already overlap with IRAs, the restrictions on mechanical treatment are already in place and the reduction of restoration opportunities would be minimal in the preferred alternative.

Inventoried roadless area plan direction

A majority (54%) of the mapped whitebark pine areas on the HLC NF lie within IRAs. No additional acres are being proposed as a part of the 2020 Forest Plan. The relevant plan components include:

- FW-IRA-DC-01: Inventoried roadless areas provide large, undisturbed and unfragmented areas of land. These large land areas sustain high quality or undisturbed soil, water, and air and a diversity of plant and animal communities. They also provide for secure habitats for a variety of fish and wildlife species that are dependent upon large undisturbed, unfragmented areas of land.
- FW-IRA-DC-02: Within inventoried roadless areas, natural, ecological processes and disturbances (such as wildfire, insects, and disease) are the primary forces affecting the composition, structure, and pattern of vegetation. Inventoried roadless areas contribute to reference landscapes for future study and understanding of natural ecological processes.
- FW-IRA-DC-03: Landscapes in inventoried roadless areas are naturally appearing with high scenic quality.
- FW-IRA-SUIT-01: Inventoried roadless areas are unsuitable for timber production. However, timber harvest is suitable within inventoried roadless areas outside of wilderness study areas and recommended wilderness areas to provide for other multiple use values when consistent with the 2001 Roadless Area Conservation Rule. Also see appendix C (of the 2020 Forest Plan).
- FW-IRA-SUIT-03: Inventoried roadless areas are suitable for restoration activities (such as management ignited fires, active weed management) to protect and/or enhance the roadless area values and characteristics of these areas.

One effect of the IRA plan components, and the Roadless Area Conservation Rule, are to somewhat limit treatment opportunities for whitebark pine. Mechanical harvest (while not prohibited) would not occur to a great degree due to the limitations placed on vegetation treatments by the Rule and lack of road access. However, the 2020 Forest Plan emphasizes restoration activities including prescribed fire and tree planting for whitebark pine, which could increase the likelihood of restoration activity within these areas.

These IRA components would have an insignificant effect. Limitations would occur similar to recommended wilderness for mechanical treatment but restoration activities to benefit native communities would be promoted by the plan components. Tree planting would be allowed in these areas, unless prohibited by other direction, wildfires may be more likely to be managed for resource benefit in these areas as opposed to roaded landscapes, due to their remoteness, and silvicultural hand treatments would be allowed.

Summary of restoration opportunities

Overall the effect of the limitations on restoration opportunities would be insignificant for whitebark pine. Restoration treatments would be limited in certain areas, most specifically designated wilderness, recommended wilderness, and potential lynx habitat. Restoration opportunities would be somewhat restricted, but to a lesser degree, in IRAs. The distribution of mapped whitebark pine and these designations are listed in Table 10 above. Of these, only recommended wilderness varies as compared to the existing condition (or no - action alternative). The various designations may overlap one another with similar restrictions so the total acres affected is not cumulative. These limitations to restoration, however, fall short of any negative impacts overall given the remaining acres without restraints and added emphasis on restoration from other plan components.

Priority areas to treat for restoration purposes are those with high levels of disease and whitebark pine trees present demonstrating resistance. Anecdotally the disease is widespread across most if not all whitebark pine areas on the HLC NF. In essence, any area with surviving whitebark pine likely contains some level of resistance. Areas at high risk to mountain pine beetle would also represent a priority; the data show that mountain pine beetle has affected 78% of the whitebark pine areas since 2000. Due to the high levels of disease on the forest, much of the mapped whitebark pine in the plan area would benefit from restoration treatments – both within and outside of these four limiting areas.

The total amount of acres with whitebark pine present that are *not* within designated wilderness, recommended wilderness, potential lynx habitat, and/or IRA is 16,772, about 5% of the total mapped whitebark pine. However, some flexibility exists: IRAs are not overly restrictive to whitebark pine restoration, because prescribed fire, hand treatments, and planting are all allowable even if slightly less feasible due to access and lynx habitat provides exceptions and exempted acres for whitebark pine treatment. The more restrictive areas with respect to restoration activities are lynx habitat, designated wilderness and recommended wilderness. The amount of area with whitebark present that does not occur in those more restrictive areas under the preferred alternative is 58,219, or roughly 20% of the total. This is the area where whitebark restoration opportunities are most feasible and likely to occur; it is most likely that the objective of 4,500 acres of treatment would occur within these areas. The combination of active restoration activities in these areas (such as to meet objective FW-PLANT-OBJ-01) and natural processes (including wildfire for resource benefit) in the remaining 80% of whitebark pine areas, has the potential to positively affect the condition of whitebark pine on the HLC NF over the life of the Forest Plan. Other beneficial activities besides restoration treatment (e.g. seed and material collections from disease-resistant "plus trees") would continue in these areas to enhance and maintain genetic diversity.

Soil plan direction

Soil plan components would maintain soil ecological functions, site productivity and sets limits on the amount of soil disturbance allowed during forest activities and provide best management practices to promote soil stability. These plan components are intended to maintain soil quality and prevent damage to soil while supporting all vegetation types, including whitebark pine. Plan direction for soils has a beneficial effect on whitebark pine. These plan components are intended to help conserve soil productivity and indirectly support whitebark pine establishment and growth, and conversely maintaining whitebark pine would help stabilize soils particularly on high elevation sites where little else can grow.

Timber plan direction

Although whitebark pine is not a commercial timber species, plan direction that guides the management of timber would have impacts to whitebark pine. The 2020 Forest Plan identifies lands suitable for timber production for each GA. On lands suitable for timber production, harvest is more likely to be used as a

tool than in lands unsuitable for timber production, due to access and feasibility of treatments. Approximately 8% of the mapped whitebark pine on the HLC NF occurs in lands suitable for timber production in the preferred alternative, as compared to 9% under the no - action alternative. This amount is relatively minor because the common characteristic of sites where whitebark pine is found (high elevation, remote, steep topography, etc) are not conducive to timber suitability. Nevertheless, unless otherwise prohibited by other plan components or by access and feasibility, timber harvest could also occur in unsuitable lands as well to benefit whitebark pine.

Timber management plan components could have potential for both positive and negative effects. For example, on accessible sites timber harvest could be utilized as a tool to remove competing species such as lodgepole pine or to create openings suitable for whitebark pine regeneration. However, logging methods also create disturbance on the landscape and have the potential to cause incidental damage to undiscovered whitebark pine trees in the understory. Specific timber plan direction relevant to whitebark pine includes a number of components that ensure that timber practices support ecological sustainability and health in a way that would prevent damage and promote healthy stands of whitebark pine. Timber harvest would not occur where soil, slope, or other watershed conditions may be irreversibly damaged, (FW-TIM-STD-01); silvicultural prescriptions would be based on purpose and need and other reconsiderations rather than just dollar amounts (FW-TIM-STD-03) and timber management would contribute to ecological sustainability and ecosystem health, when timber harvest and maintenance activities (such as pre-commercial thinning) are conducted, they should be designed to move the Forest toward achievement of vegetation desired conditions (such as species composition, size class, forest density, and landscape pattern) as well as other resource desired conditions (FW-TIM-GDL-01).

The effects of these plan components are insignificant. The positive effects of logging as restoration tool would be limited given the 8% overlap. These would be balanced by the negative effects of incidental damage associated with timber activities, which would also be minimal with the 8% overlap and the plan components directing the maintenance of or improvement to healthy ecological conditions.

Carbon storage and sequestration direction

The plan also includes direction related to sustaining carbon storage and sequestration potential through maintenance or enhancement of ecosystem biodiversity and function, making forests resilient to natural disturbance processes and changing climates on the HLC NF (FW-CARB-DC-01). This would have a beneficial effect to whitebark pine. As a keystone species and sometimes the only tree component on fragile high elevation sites, whitebark pine represents an important component of the carbon cycle where it grows. The plan direction for carbon further supports the importance of maintaining whitebark pine resilience and presence on the landscape. This additional plan component provides additional support for restoration treatments within whitebark pine habitat that could benefit this species.

Recreation plan direction

The 2020 Forest Plan delineates all lands on the HLC NF into six Recreation Opportunity Spectrum (ROS) settings, which describe the desired recreational setting of each area and are defined in the glossary of the 2020 Forest Plan. The settings include primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, rural, and urban. There are associated plan components for each setting. The table below displays the distribution of mapped whitebark pine with ROS settings under the preferred alternative (Table 13).

Table 13. Whitebark pine occurrence by ROS settings, preferred alternative

ROS Setting	Acres of whitebark pine	% of total mapped whitebark pine
Primitive	163,707	53
Semi-primitive non-motorized	71,831	23
Semi-primitive motorized	29,299	9
Roaded natural	44,124	14
Rural	387	<1
Urban	0	0

Because of its location at high elevation sites, 76% of whitebark pine occurs in primitive or semi-primitive non-motorized settings (which often overlap with other land designations such as inventoried roadless areas). These settings include prohibitions on motorized routes and emphasize the maintenance of natural vegetation and high scenic quality. The 24% of whitebark pine found within semi-primitive motorized and roaded natural settings would be exposed to a greater amount of potential losses from motorized use (such as firewood cutting). Conversely, limited road access may increase the cost and reduce feasibility of some restoration treatments, particularly the opportunity to utilize mechanical equipment.

The 2020 Forest Plan also includes direction for recreation opportunities. Due to its remote location, whitebark pine rarely coexists with developed recreation sites, with the exception of rental lookouts such as Granite Butte. However, dispersed camping may occur in areas with whitebark pine and many hiking trails allow for recreational access into whitebark pine areas. The following desired conditions would help ensure that whitebark pine is not damaged due to activities associated with such sites. Further, these opportunities may help enhance the knowledge and appreciation for whitebark pine with the recreating public.

- FW-REC-DC-01: Recreation opportunities enable visitors to connect with the unique natural environments and historic and cultural occurrences that have taken place throughout the area and instill a culture of stewardship and appreciation.
- FW-REC-DC-04: Recreation facilities, including trails and dispersed sites, and their use have minimal impacts on resources including at-risk species, heritage and cultural sites, water quality, and aquatic species.

The effects of the plan components for ROS settings and recreation are insignificant. The distribution of whitebark pine across ROS settings in the preferred alternative is similar to that of the existing condition, with the only difference being the proportion found within primitive versus semi-primitive non-motorized; the preferred alternative has 12% more whitebark pine found in primitive ROS areas. Motorized use and the associated disturbances are not listed as threat factors for whitebark pine. Restoration opportunities may become more expensive due to the lack of motorized access but still would be able to be completed under current direction.

Wildlife plan direction

Wildlife habitats depend largely on terrestrial vegetation. Therefore, the plan components for terrestrial vegetation represent most of the coarse-filter components that support the persistence of native species within the plan area. There are also forestwide wildlife components that would direct managers to maintain or improve habitat for wildlife species, including grizzly bears (FW-WL-DC-01). Maintaining and improving grizzly bear habitat can include improvement of whitebark pine. Overall the wildlife

components are intended to maintain native vegetation and are expected to contribute to whitebark pine populations in the plan area. The wildlife plan components are expected to provide a beneficial effect to whitebark pine.

Cumulative effects

More than 81% of whitebark pine forests in the United States exists on Forest Service lands, with other public lands bringing that total to 96% (U.S. Department of Interior, 2011). Other management plans may have a cumulative effect on whitebark pine management across its range (Table 14). Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Table 14. Summary of cumulative effects to whitebark pine from other resource management plans

Resource plan	Description and Summary of effects
Adjacent National Forest Plans	The Forest Plans for national forest system lands adjacent to the HLC NF include the Custer-Gallatin, Lolo, Flathead, and Beaverhead-Deerlodge National Forests. All plans address at-risk plant species. Management of vegetation is consistent across all national forests due to law, regulation, and policy. The cumulative effect would be that the management of whitebark pine would be relatively consistent and provide adequate protection to prevent species from decline. This includes specific adjacent landscapes that cross Forest boundaries, such as the Upper Blackfoot, Divide, Elkhorns, Crazies, and the Rocky Mountain Range.
Montana Statewide Forest Resource Strategy (2010)	MT conducted a statewide assessment of forest resources and identified issue-based focus areas with implementation strategies and deliverables for each including Focus area 1: Forest Biodiversity and Resiliency. Strategies include managing ecosystem and biotic composition to achieve ecological integrity through recovery of species diversity, water quality and quantity, soil quality and function by implementing best available science and adaptive management; and increasing terrestrial carbon sequestration and soil carbon sinks. The maintenance of native vegetation and emphasis on diversity is expected to benefit whitebark pine. This management is expected to be complementary, though some impacts to populations could occur.
Bureau of Land Management Resource Management Plans (RMP)	Bureau of Land Management lands near the HLC NF are managed by the Butte, Missoula, and Lewistown field offices. The Butte plan was recently revised (2009) while the existing plans for the Missoula and Lewistown areas are under revision. These resource management plans are the BLM equivalent to a Forest Plan. The primary issues included special status and priority plant and animal species and are complementary to the HLC NF 2020 Forest Plan in terms of managing for multiple uses and sustaining healthy and functional ecosystems. Broadly speaking the plan would likely contribute toward similar desired conditions as the HLC NF and much of the management guidance has similar intent with respect to resource protections and monitoring.
National Park Service - Glacier National Park General Management Plan 1999	The general management plan for Glacier National Park calls for preserving natural vegetation, landscapes, and disturbance processes. Broadly, the terrestrial vegetation characteristics in this area and guidance toward allowing natural processes to benefit natural habitats are therefore likely similar to the wilderness areas in the adjacent Rocky Mountain Range GA and would likely complement these conditions.
National Park Service – Greater Yellowstone Area Whitebark Pine Strategy	This strategy aims to 1) document the status of whitebark pine in the GYA; 2) establish criteria to prioritize restoration; 3) identify techniques and guidelines to protect and restore whitebark pine; and 4) facilitate communication and distribution of this information. This strategy is expected to contribute to the survival of the species and contribute beneficial information to assist in the HLC NF restoration efforts.
County wildfire protection plans	Some county wildfire protection plans map and/or define the wildland urban interface. The HLC NF notes that these areas may be a focus for hazardous fuels reduction, and other plan components (such as Northern Rockies Lynx Management Direction) have guidance specific to these areas. Managing for open forests and fire adapted species may be particularly emphasized in these areas. Overall, the effect of the county plans would be to

Resource plan	Description and Summary of effects
	influence where treatments occur to contribute to desired vegetation conditions, including whitebark pine habitats.
City of Helena Montana Parks, Recreation and Open Space Plan (2010)	This plan is relevant to an area that lies adjacent to national forest system lands in the Divide GA, in proximity to the City of Helena. The plan emphases forest management, wildfire mitigation and noxious weed management. This would be generally complementary and additive to management on some HLC NF lands, specifically the South Hills Special Recreation area. Minimally overlaps with whitebark pine habitats.
County Growth plans (Broadwater, Cascade, Choteau, Jefferson, Judith, Lewis and Clark, Meagher, Ponderosa, Powell, Teton counties)	The counties will work with Forest service to enhance communities. The county plans generally aim to maintain native vegetation communities and reduce noxious weeds. The reservation of native habitats will maintain habitat for whitebark pine where it occurs.

Determination of effects and rationale

Candidate

The preferred alternative is ***not likely to jeopardize*** the continued existence of whitebark pine in the plan area. The 2020 Forest Plan sets the framework for whitebark pine restoration through its plan components and designated areas. Beneficial restoration treatments and management actions could occur under this alternative. The 2020 Forest Plan emphasizes restoration treatments for whitebark pine through the detailed vegetation and at-risk plants plan components and promotes an increase in natural fire, thereby reducing the threat factor of fire suppression. Some limitations on restoration treatment opportunities is expected due to designated areas, but overall whitebark pine restoration opportunities are expected to increase as a result of the preferred alternative.

Overall, the plan direction presented in the preferred alternative represents a benefit to whitebark pine, by specifically addressing it under vegetation and at-risk plant plan components, including an objective for whitebark restoration treatments. Lynx plan direction, as well as designated wilderness and IRA direction, limits restoration opportunities to a degree in many whitebark pine areas; however, this direction applies to the existing condition and no-action alternative as well. The inclusion of recommended wilderness areas in the preferred alternative represents a relatively minor degree of increased limitations on restoration treatment opportunities as compared to the no action alternative. While some management designations impose limitations on treatment, these limitations would not prevent the HLC NF from reaching the objective to treat 4,500 acres over the life of the plan in high priority areas. Below is a summary of the plan components addressed and the expected effects of each.

- At-risk plants plan components would have a beneficial effect on whitebark pine by ensuring habitat conditions are present to support this species and stating restoration treatment acre objectives.
- Fire and fuels plan components would have a beneficial effect by emphasizing the natural role of fire, whether possible and an increase in natural fire reduces the stressor of fire suppression.
- Terrestrial and forested vegetation plan components would have a beneficial effect by promoting whitebark pine by enumerating desired conditions for this species.
- Soil plan components would have a beneficial effect on whitebark pine by ensuring that management maintains soil productivity and prevents soil degradation.
- Lynx direction would limit some whitebark pine restoration treatment opportunities within potential lynx habitat, to the same degree with the preferred alternative as the no - action alternative. These

limitations are expected to have an insignificant effect due to the sufficient amount of whitebark pine that is still treatable within lynx habitat, or that occurs outside of known lynx habitat.

- Designated wilderness would restrict some important restoration opportunities; the preferred alternative is not designating any new wilderness and is identical to the no action alternative in this regard. These limitations are expected to have an insignificant effect due to the sufficient amount of whitebark pine that is still treatable outside of wilderness, the restoration that can occur within and adjacent to wilderness boundaries, and the lower priority of restoration needs within wilderness.
- Recommended wilderness and IRAs may limit restoration opportunities somewhat due to restrictions on mechanically preparing treatment sites; however natural fire may be more likely to be managed for resource benefit in these areas due to their remoteness and desired character and beneficial restoration would still occur in these areas. The overall effect would be insignificant for whitebark pine.
- The effects of the recreation plan components and ROS settings are insignificant.
- Timber management would have an insignificant effect on whitebark pine.
- Carbon storage and sequestration plan components support the importance of maintaining whitebark pine resilience and presence on the landscape and would have a beneficial effect on whitebark pine in the plan area.
- Wildlife plan components, particularly for grizzly bear, would promote native habitats that benefit that species. Since grizzly bears use whitebark pine as a food source, it would benefit from these plan components.

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Appendix A: 2020 Forest Plan Components

Table 15 lists the plan 2020 Forest Plan components referenced in this BA. The full text of all referenced plan components is provided following the table. Acronyms used to identify types of Plan components include: Desired Condition (DC); Goals (GO); Standards (STD); Guidelines (GDL); and Suitability (SUIT).

Table 15. 2020 Plan Components referenced in this BA

Plan Section	Desired Conditions	Goals	Objectives	Standards	Guidelines	Suitability
Soil (SOIL)	FW-SOIL-DC-01			FW-SOIL-STD-01 FW-SOIL-STD-02 FW-SOIL-STD-03		
Fire and Fuels (FUEL)	FW-FIRE-DC-01 FW-FIRE-DC-03				FW-FIRE-GDL-01 FW-FIRE-GDL-02 FW-FIRE-GDL-04	
Terrestrial Vegetation (VEGT)	FW-VEGT-DC-01 FW-VEGT-DC-02 FW-VEGT-DC-03 FW-VEGT-DC-04		FW-VEGT-OBJ-01		FW-VEGT-GDL-01 FW-VEGT-GDL-03	
Forested Vegetation (VEGF)	FW-VEGF-DC-01 FW-VEGF-DC-08 FW-VEGF-DC-09				FW-VEGF-GDL-03	
TEPC and plant SCC (PLANT)	FW-PLANT-DC-01 FW-PLANT-DC-02	FW-PLANT-GO-01	FW-PLANT-OBJ-01		FW-PLANT-GDL-01	
Wildlife (WL)	FW-WL-DC-01					
N. Continental Divide Ecosystem Grizzly Bear Amdt (NCDE)	PCA-NCDE-DC-04					
Recreation Settings (ROS)	FW-ROS-DC-01					
Recreation Opportunities (REC)	FW-REC-DC-01 FW-REC-DC-04					
Designated Wilderness (WILD)	FW-WILD-DC-02					

Recommended Wilderness (RECWILD)	FW-RECWILD-DC-01 FW-RECWILD-DC-02					FW-RECWILD-SUIT-02 FW-RECWILD-SUIT-03 FW-RECWILD-SUIT-04
Wilderness Study Areas (WSA)	FW-WSA-DC-01					FW-WSA-SUIT-03 FW-WSA-SUIT-04
Inventoried Roadless Areas (IRA)	FW-IRA-DC-01 FW-IRA-DC-02 FW-IRA-DC-03					FW-IRA-SUIT-01 FW-IRA-SUIT-03
Timber (TIM)				FW-TIM-STD-01 FW-TIM-STD-03	FW-TIM-GDL-01	
Carbon Sequestration (CARB)	FW-CARB-DC-01					
Big Belts GA (BB)	BB-VEGT-DC-01 BB-VEGF-DC-01					
Castles GA (CA)	CA-VEGT-DC-01 CA-VEGF-DC-01					
Crazies GA (CR)	CR-VEGT-DC- 01 CR-VEGF-DC-01					
Divide GA (DI)	DI-VEGT-DC-01 DI-VEGF-DC-01					
Elkhorns GA (EH)	EH-VEGT-DC-01 EH-VEGF-DC-01					
Little Belts GA (LB)	LB-VEGT-DC-01 LB-VEGF-DC-01					
Rocky Mountain Range GA (RM)	RM-VEGT-DC-01 RM-VEGF-DC-01					
Snowies GA (SN)	SN-VEGT-DC-01 SN-VEGF-DC-01					
Upper Blackfoot GA (UB)	UB-VEGT-DC-01 UB-VEGF-DC-01					

Soil (SOIL)

Desired Conditions

FW-SOIL-DC-01: Soil quality and productivity are not impaired and support desired conditions for terrestrial and aquatic ecosystems. See Table 3.

Table 3. Soil ecological functions with attributes, indicators, and desired conditions

Soil function[1]	Selected attributes	Soil quality indicator	Desired condition
Soil biology	Roots and aeration	Root growth	Root growth, both vertically and laterally, is unimpeded by compaction.
	Flora and fauna	Community composition	The soil is capable of supporting a distribution of desirable plant species by vegetative layer (trees, shrubs, herbaceous) as identified in the potential plant community (based on ecological site descriptions or equivalent). The site has not transitioned to an undesirable state.
		Canopy cover and ground cover	Soil temperature and moisture regimes are maintained in conditions to support desired plant communities.
Soil hydrology	Infiltration	Surfaces	Surface structure is as expected for the site (for example, granular, subangular blocky, single grain). Surface crusting and pore space are as expected for the site.
Nutrient cycling	Organic matter composition	Forest or rangeland floor	Forest and rangeland floor are appropriate for vegetation type and successional stage. Rangeland to be determined by field analysis and USDA-NRCS Soil Survey descriptions specific to soil type.
		Coarse woody material (greater than 3 inches)	Coarse woody material is on site in various stages of decay and size classes in amounts appropriate for habitat type. See FW-DC-VEGF-07 and FW-GDL-VEGF-05.
	Nutrient availability	Surface (A) horizon or mollic layer	"A" horizon is present, well distributed, not fragmented.
Support and stability	Stability	Surface erosion (wind, rill, or sheet)	Erosion is occurring at natural rates or not evident. Bare ground is within expected ranges base on USDA-NRCS Soil Survey descriptions for soil type.
		Site stability (mass erosion, landslide prone)	Site stability potential is unchanged or stability has been improved.

Standards

FW-SOIL-STD-01: Land management activities shall be designed and implemented in a manner that conserves soil physical, chemical, and biological functions, improves these functions, and maintains site productivity.

FW-SOIL-STD-02: Land management activities shall not create detrimental soil conditions on more than 15 percent of an activity area. In activity areas where less than 15 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effect of the current activity following project

implementation and restoration must not exceed 15 percent. In areas where more than 15 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and restoration must not exceed the conditions prior to the planned activity and rehabilitation must address the current impaired soil functions to improve the long-term soil condition.

FW-SOIL-STD-03: Project specific best management practices and design features shall be incorporated into land management activities as a principle mechanism for protecting soil resources.

Fire and Fuels Management (FIRE)

Desired Conditions

FW-FIRE-DC-01: Wildfire maintains and enhances resources and, as nearly as possible, is allowed to function in its natural ecological role across the landscape, including wilderness. Under favorable conditions, wildfires and prescribed fires are managed to ensure highest probability of success, minimum exposure to responders, and to meet resource objectives.

FW-FIRE-DC-03: Treated fuel management areas (management actions or wildfire) allow opportunities over time for natural fire occurrence and provide fuel conditions that benefit fire management operations.

Guidelines

FW-FIRE-GDL-01: To create (and/or minimize threats to) resilient, healthy ecosystems, vegetation treatment projects should allow opportunities for naturally ignited wildfire to occur and provide fuel conditions that benefit fire management operations.

FW-FIRE-GDL-02: To create (and/or minimize threats to) resilient, healthy ecosystems, wildland fire management strategies should promote desired vegetation conditions where wildfires result in fire severities that are "self-regulating" and reduce future risk.

FW-FIRE-GDL-04: To maintain the character of designated areas, minimum impact strategies and tactics should be applied if fire management actions are required to manage wildland fire, unless more direct attack is needed to protect life or adjacent property or mitigate risks to responders.

All Terrestrial Vegetation (VEGT)

Desired Conditions

FW-VEGT-DC-01: Vegetation occurs across the landscape in a diverse pattern of compositions and structures within the natural range of variation that are resilient to future climates and disturbances such as fire, insects, disease, invasive species, floods, and droughts. Conditions are such that effective recovery of vegetation is possible following disturbances. These conditions are described in Table 4 and further quantified under desired conditions in the VEGF and VEGNF sections.

Table 4. Forestwide terrestrial vegetation desired conditions by broad potential vegetation types

Broad potential vegetation type	Terrestrial vegetation desired conditions
Warm dry	Forest resilience is achieved by emphasizing fire adapted species and structures. An increase in the extent and dominance of ponderosa pine, limber pine, and aspen occurs relative to the existing condition, while Douglas-fir decreases (but remains common). Rocky mountain juniper occurs but its abundance is limited on historically nonforested areas. Other species such as Engelmann spruce and lodgepole pine may thrive where moisture is less limiting. The quantity and extent of large and very large trees increases relative to the existing condition. Savannas

Broad potential vegetation type	Terrestrial vegetation desired conditions
	occur on the driest sites, and some sites may be maintained in a nonforested condition by frequent disturbance or restoration. Seedling/sapling and small forest size classes occur but are limited, because large tree remnants are retained as is characteristic of a high frequency, low intensity disturbance regime. Stands in the large and very large tree size classes are often open or clumpy, with the large tree component comprised of long-lived fire-resistant species (ponderosa pine and Douglas-fir). Complex landscape patterns of size class and density occur, with open, uneven-aged forests and high within-stand variability common. Forests with low to medium density increase relative to the existing condition, while forests with high density decrease. Stands with higher densities occur on more mesic sites and are interspersed with open forests and meadows. Early successional forest patches are relatively small. Plant understories include rough fescue, Idaho fescue, bluebunch wheatgrass, sagebrush, common juniper, and bitterbrush on the driest sites and Oregon grape, snowberry, pinegrass, kinnickinnick, white spiraea, heartleaf arnica, elk sedge, and ninebark on more mesic sites. Snags are scattered as individuals or small groups. Coarse woody debris is fairly low.
Cool moist	Forest resilience is achieved through diversity of species and age/size class. The extent and dominance of aspen, Engelmann spruce, and whitebark pine increase relative to the existing condition, with lodgepole pine and Douglas-fir remaining abundant and subalpine fir also common. Minor amounts of ponderosa pine may also occur, on the warmest/driest sites. The spruce/fir cover type includes dense, multistoried stands that provide high quality multistory lynx habitat. Small size classes are common due to preponderance of lodgepole pine; but a decrease in the small size class with increases in large and very large classes still occurs relative to the existing condition. There is wide variability in size class because of the high severity, low frequency disturbance regime. Most especially, high diversity in size class occurs in lodgepole pine to ensure insect and fire disturbances occur at a scope and scale within their natural range of variation. The amount of low/medium and medium/high density classes increase while the high-density class decreases relative to the existing condition primarily in lodgepole pine and Douglas-fir forests. Large and very large trees, primarily Douglas-fir, are clumpy but scattered across the landscape to provide seed. Single-storied and single-aged conditions are common in lodgepole pine. Early successional forest patches tend to be fairly large. Understory plant species present may include twinflower, beargrass, huckleberry, grouse whortleberry, pinegrass, heartleaf arnica, elk sedge, and western meadowrue. Other species such as menziesia and alder may be found on the wettest sites. Snags occur in pulses and in clumpy distribution. Coarse woody debris levels vary widely.
Cold	Forest resilience is achieved by emphasizing the presence of whitebark pine where possible. Increases in whitebark pine occur relative to the existing condition, focusing on open ridges and harsher aspects. On these sites, there is a decrease in subalpine fir and Engelmann spruce relative to the existing condition. Subalpine fir and Engelmann spruce remain common and dominate northerly and easterly aspects, swales, moist basins, and riparian areas. Lodgepole pine is present as well, on warmer sites. The abundance of the small forest size class is decreased relative to the existing condition, with an increase in the large size class. Whitebark pine is maintained across its natural range to the degree possible within the context of climate changes and increasing disturbance, with large trees present that are tolerant of moderate or low severity fires. Large subalpine fir and Engelmann spruce are also promoted on productive sites. The proportion of forests in the low/medium density class is increased with decreases in the high cover class relative to the existing condition, focusing on restoration of resilient, open multi-aged whitebark pine forests where dense multistoried spruce/fir or single-storied lodgepole pine dominate. Natural patch sizes reflect a mixed fire regime. Understory plant species present, such as grouse whortleberry and beargrass, may be sparse at the highest elevations where alpine vegetation is interspersed with bare ground and rock. Snags occur in pulses. Coarse woody debris levels vary widely.

Broad potential vegetation type	Terrestrial vegetation desired conditions
Xeric grass-land	Xeric grassland plant communities are dominated by native species, and have high diversity of tall and medium height, cool and warm season grasses (for example, bluebunch wheatgrass, western needlegrass, needle-and-thread, blue grama), and short grasses (for example, Sandberg bluegrass, pine junegrass). Sub-shrubs and shrubs are present at less than 10% canopy cover. There is a variety of native forbs in varying amounts. The diversity of native plant species present allows for drought tolerance. Individual species can vary greatly in the amount of production depending on growing conditions. Vegetation typically has strong and robust root systems that allow production to increase considerably with favorable growing conditions. This plant community provides for soil stability and a properly functioning hydrologic cycle. Plant litter is a common component and is available for soil building and moisture retention. Plant litter is properly distributed with very little movement off-site, with natural plant mortality typically being low. Bare ground is present because of the warm dry nature of these sites but at low amounts. Encroachment by conifers and juniper is limited, since these grasslands are either maintained by a natural high frequency low severity fire regime, or are maintained by site conditions (i.e., they do not require fire to maintain the grassland vegetation). These vegetation types are generally tolerant of fire when fire frequency is in the range of 5 -15 years, although recovery is dependent on fire intensity and species. Maintenance of grasslands is dependent, in part, on periodic fires to remove residual litter and encroaching shrubs and trees, which may increase the burn intensity and possibly damage the dominant grassland species. Microphytic crust is maintained as a key feature.
Mesic grass-land	Mesic grassland communities are dominated by native species, and have greater amounts of mesic forbs, denser cover, and more species richness than xeric grasslands. The functional plant groups are characterized by long lived, moderately deep-rooted cool grass species (for example, rough fescue, Idaho fescue, timber oatgrass, upland sedges, tufted hairgrass, etc.) with a wide variety of mesic forbs present in varying amounts. Shrubs may be present with minor cover. Introduced species are rare. Bare ground is typically low (less than 3%) across most sites with litter being a common component and available for soil building and moisture retention. Plant litter movement is expected to be limited with plant litter being properly distributed and rarely moving off-site. These vegetation types are generally tolerant of moderate intensity wildfire. Common dominant grasses, such as rough fescue and Idaho fescue, may be topkilled, but the root crowns and associated growing points are protected and they respond favorably with vigorous regrowth. Within just a few years these species usually recover to pre-fire levels. Frequent burning maintains diversity in these vegetation types. Microphytic crust is maintained as a key feature.
Xeric shrubland /woodland	Xeric shrubland plant communities support shrub species such as Wyoming big sagebrush, basin big sagebrush, rabbitbrush, horsebrush, broom snakeweed, low sagebrush and black sagebrush. Overstory species vary by location and site type. For example, low sagebrush tends to occupy the lower, drier and hotter sites with shallow soils whereas basin big sagebrush typically dominates sites with deeper soils and more plant available moisture. The understory is typically dominated by graminoid species such as needle-and-thread, Sandberg bluegrass and bluebunch wheatgrass. Canopy cover varies depending on the site and growing conditions but is typically low to moderate. Bare ground is present in higher amounts relative to mesic shrubland sites. Xeric woodlands are typically hot and dry or are steep, with shallow, skeletal soil. The dominant overstory species varies but includes Rocky Mountain juniper and mountain mahogany. Mountain mahogany is restricted to steep rocky soils and rock outcrops. Encroachment by conifers is limited, as it is maintained by a natural high frequency low severity fire regime. While sagebrush and mountain mahogany are often killed by fire, nonlethal or mixed severity fires that burn in a mosaic pattern leave live individuals and promote age class diversity while promoting the sprouting of other shrub (e.g. rabbitbrush, horsebrush) and grass species. The natural fire regime of this vegetation type maintains a patchy distribution of shrubs, so the general aspect of the vegetation is shrub-steppe grassland. Periodic low intensity burns can reduce sagebrush cover and increase herbaceous abundance of herbaceous species, creating a mosaic of burned and unburned patches. Microphytic crust is maintained.

Broad potential vegetation type	Terrestrial vegetation desired conditions
Mesic shrubland	Mesic shrubland plant communities are generally more moist and productive than xeric sites. Shrub species such as mountain big sagebrush and mesic deciduous shrubs (for example, bitterbrush, snowberry, ninebark, serviceberry) are the dominant over story species with grass species (such as rough fescue, Idaho fescue, mountain brome) and various mesic forbs (for example, cinquefoil, prairie smoke) typically dominating the understory. Canopy cover varies depending on the site and growing conditions (for example, temperature, timing and amount of precipitation), but is typically moderate to high, and may result in lower cover of understory species. Encroachment by conifers is limited. Most shrub species respond well to light and mixed severity fire. With the exception of mountain big sagebrush, most of the mesic shrub species are vigorous root crown sprouters and respond favorably to fire, typically sprouting immediately following fire. However, extremely hot and intense fires that occur during summer months can cause damage to these shrublands and seed banks. Periodic burns can maintain this system. Microphytic crust is maintained as a key feature.
Riparian/ wetland	Riparian systems are comprised of a mosaic of communities dominated by species which tolerate and are adapted to periodic flooding and an associated seasonally high water table. Deciduous trees, particularly cottonwood, may be present along with riparian shrubs and herbaceous species. In wide valley bottoms, the vegetation typically is a mosaic of all lifeforms with patterns reflecting the meander patterns of the stream/river. Black cottonwood is the dominant tree species although other tree species may include aspen, narrowleaf cottonwood, Engelmann spruce and subalpine fir; on drier sites, Douglas fir and Rocky Mountain juniper may be present with low cover and scattered distribution. Dominant shrubs may include mountain alder, various species of willows, river birch, dogwood, hawthorn, chokecherry, rose, silver buffaloberry, Rocky Mountain maple and/or snowberry, among others. A wide variety of herbaceous species, including, grasses, sedges, rushes, spikerushes, bulrushes and forbs, are present in the understory in varying amounts. Wetlands are characterized by dominant vegetation adapted to saturated (anaerobic) soil conditions. The vegetation complex is usually represented by a mosaic of herbaceous and woody plant communities that armor streambanks and create floodplain roughness, slowing flows and facilitating bank and floodplain development. Low willow species (e.g., wolf willow), bog birch and bog blueberry are typically present in subalpine wetlands. Herbaceous species may be dominated by sedges, rushes, spikerushes cattails, and/or bulrushes. Bryophytes, including sphagnum, are often well represented in fens. Also see forestwide components for RMZs. Rare species, such as sundew, may also be present in peatlands. Typically, with the exception of conifers, species in riparian/wetland systems respond favorably to fire. The growing points of the vegetation are usually protected in the moist to saturated soil. Regrowth typically occurs within the same growing season. Microphytic crust is maintained.
Alpine	Alpine ecosystems occupy harsh high elevation sites, resulting in short stature and relatively slow growth for both shrubs and herbaceous species. Wetland communities are present in snowloaded depressions, and support various willow species (e.g., planeleaf willow), along with wetland herbaceous species (e.g., tufted hairgrass, marsh marigold). Alpine ecosystems are mostly treeless, although some conifers (e.g., subalpine fir, whitebark pine) may be present with minor cover as krummholtz patches. Vegetation cover is typically low to moderate, depending on site characteristics. The plant communities are dominated by a number of shrubs, forbs and graminoids including: arctic willow (turf community), mountain avens, (cushion plant community), mountain heather and moss-heather (snow bed communities). Many of these areas experience only patchy fire due to the low amounts and patchiness of fuels. The fire return interval is typically very long (500 years or greater) in alpine ecosystems. Historically, stand-replacing fires occur infrequently in adjacent associated subalpine woodlands. Fire severity and spread is usually variable due to the short duration without snow cover. In addition, limited fuel loading and rock scree fields preclude fires from spreading if lightning strikes do occur. Microphytic crust is maintained as a key feature.

FW-VEGT-DC-02: The plan area supports a distribution of cover types shown in Table 5. Nonforested cover types can occur on forested broad potential vegetation types and be perpetuated by natural disturbances or restoration activities.

Table 5. Forestwide existing and desired conditions for cover types (percent of area)

Cover Type[1]	Forestwide		Warm dry, Region 1 broad potential vegetation type		Cool moist, Region 1 broad potential vegetation type		Cold, Region 1 broad potential vegetation type	
	Existing[3]	Desired	Existing[3]	Desired	Existing[3]	Desired	Existing[3]	Desired
Nonforested[2]	14 (11-16)	15-25	13 (10-17)	5-20	10 (6-14)	5-10	11 (7-16)	1-10
Aspen/hardwood	1 (0.4-2)	2-5	1 (0.3-2)	2-5	2 (0.2-3)	2-5	Trace	Trace
Ponderosa pine	8 (6-10)	15-25	16 (12-20)	40-60	2 (0.6-4)	1-5	Trace	Trace
Douglas-fir	29 (25-35)	15-25	52 (42-61)	30-40	23 (17-28)	5-15	5 (2-8)	2-5
Lodgepole pine	27 (24-30)	15-25	16 (12-21)	2-7	35 (29-42)	25-35	37 (29-44)	40-50
Spruce/Fir	12 (10-15)	10-20	Trace	Trace	19 (14-24)	35-45	27 (21-34)	40-45
Whitebark pine	4 (2-5)	2-5	Trace	Trace	2 (0.6-4)	2-5	12 (7-16)	10-20

1 Cover types are broad groups of vegetation based on the dominant species. A cover type often contains multiple species (see appendix D for a more detailed description).
2 Nonforested areas include grass and shrub cover types, which may support widely scattered trees in some cases.
3 Existing condition shown is the mean percent of the area with the 90% confidence interval in parenthesis. Source is R1 Summary Database, FIA data. Existing condition represents 2018 conditions. Estimates are rounded to the nearest whole number unless the value is less than 1%, in which case it is rounded to the nearest 10th. The totals do not necessarily equal 100% due to non-vegetated areas (water or rock).

FW-VEGT-DC-03: Vegetation conditions provide habitat requirements to support populations of species of conservation concern, threatened or endangered species, and other native and desired non-native species based upon the inherent capability of lands.

FW-VEGT-DC-04: Vegetation patterns provide connectivity and allow for potential genetic interchange to occur to support ecosystem functions, including potential species range shifts that may occur in response to climate change.

Objectives

FW-VEGT-OBJ-01: Vegetation management occurs on at least 130,000 acres per decade to maintain, restore, or move vegetation towards desired conditions. See appendix C. Control of invasive species and livestock grazing also may contribute to the achievement of desired conditions; these activities are addressed in the Invasive Plants and Livestock Grazing sections. Also see FW-FIRE-OBJ-01. Treatments to achieve this objective may occur on forested or nonforested vegetation communities and include, but are not limited to, the following activities:

- Planned or unplanned fire ignitions
- Fuel reduction treatments such as thinning, piling, chipping, and mastication
- Removal of encroaching trees in nonforested ecosystems

- Timber harvest
- Tree planting and revegetation of native plants
- Noncommercial thinning of forests,

Guidelines

FW-VEGT-GDL-01: Removal of native vegetation during nonvegetation management activities (for example, road maintenance) should be limited to the extent needed to achieve the project purpose and need.

FW-VEGT-GDL-03: To maintain the diversity of native tree species, when artificial reforestation is prescribed locally, adapted tree stock should be used unless nonlocal stock is deemed appropriate based on an assisted migration strategy.

Forested Vegetation (VEGF)

Desired Conditions

FW-VEGF-DC-01: The plan area supports a distribution of individual tree species as described in Table 6. This distribution supports the natural species diversity across the landscape and allows for recruitment following disturbances.

Table 6. Forestwide existing and desired conditions for tree species presence (percent of area[1])

Tree species	Forestwide[3]		Warm dry, Region 1 broad potential vegetation type		Cool moist, Region 1 broad potential vegetation type		Cold, Region 1 broad potential vegetation type	
	Existing[2]	Desired	Existing[2]	Desired	Existing[2]	Desired	Existing[2]	Desired
limber pine	11 (9-13)	10-15	16 (12-20)	15-25	9 (6-13)	5-15	5 (2-9)	5-15
Rocky Mountain juniper	5 (4-7)	2-5	12 (9-15)	5-15	1 (1-2)	0-5	0.2 (0.2-1)	0-5
ponderosa pine	7 (5-9)	15-25	17 (13-21)	55-65	0.4 (0.4-1)	1-10	Trace	Trace
Douglas-fir	46 (43-50)	35-45	70 (65-75)	65-75	43 (37-49)	25-35	15 (9-20)	10-20
Aspen and cottonwood	2 (1-3)	2-5	2 (1-4)	5-10	3 (1-5)	2-10	Trace	Trace
Engelmann spruce	23 (20-26)	15-25	5 (3-7)	1-5	42 (36-49)	30-40	32 (25-39)	30-40
lodgepole pine	38 (35-42)	20-30	24 (19-29)	5-15	52 (46-58)	30-40	51 (43-59)	45-55
subalpine fir	27 (24-31)	15-25	Trace	Trace	46 (39-52)	45-55	54 (47-61)	40-50
whitebark pine	11 (9-14)	10-20	Trace	Trace	10 (6-14)	5-15	31 (24-38)	35-45

1 Percent of area where at least one tree of the species is present.
2 Total may be greater 100% because more than 1 species can be present on a site. Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data.

3 Forestwide distributions include trees that occur on nonforested potential vegetation type.

FW-VEGF-DC-08: Forest patches of different compositional and structural conditions form a landscape pattern that contributes to resilience and habitat connectivity. Early successional forest patches provide edge habitat and functional openings that contrast sharply with adjacent forests. Patches of different size classes vary in extent, and are generally bounded by ridges, streams, and other topographic or biophysical features. Landscape and within-patch patterns reflect nautral fire regimes to the extent possible given changing climate conditions.

- In the warm dry broad potential vegetation type, forest patches are indicative of low severity underburns as well as mixed severity and occasional stand replacing events. Early successional forest patches tend to be smaller than the other potential vegetation types, due to the more frequent disturbance regimes which tend to cause a complex mosaic of within-stand structures and small gap openings with mature tree remnants as opposed to patches dominated by seedlings.
- In the cool moist and cold potential vegetation types, patches reflect more mixed severity and stand replacing disturbance regimes. Early successional forest patches in these potential vegetation types tend to be larger than in the warm dry potential vegetation type, due to high severity disturbances.

FW-VEGF-DC-09: Forest composition, structure, and pattern allow for native forest insect and diseases to occur across their native extent and affect vegetation at a scope and scale consistent with their natural endemic role. Forests impacted by insects and disease provide structural features including snags, downed wood, and decaying live trees.

Guidelines

FW-VEGF-GDL-03: Vegetation management activities in tree improvement areas (such as seed orchards, test plantations, and seed production areas) should be conducted according to regional office assignments, and so as not to impair tree improvement activities.

Threatened, endangered, proposed and candidate plant species; and plant species of conservation concern (PLANT)

Desired Conditions

FW-PLANT-DC-01: Habitat conditions support the recovery and persistence of plant species that are recognized as threatened, endangered, proposed, or candidate under the Endangered Species Act, and those that are identified as species of conservation concern. Ecological conditions and processes that sustain the habitats currently or potentially occupied by these plant species are maintained or restored.

FW-PLANT-DC-02: Key whitebark pine areas such as cone collection sites, resistant seed-bearing trees, and seed orchards persist on the landscape.

Goals

FW-PLANT-GO-01: Recovery and long-term persistence of plants that are threatened, endangered, proposed, or candidate under the Endangered Species Act or species of conservation concern is supported by cooperation with other agencies and landowners to expand inventories, identify potential habitat for these species, and promote protection and/or restoration of associated habitats.

Objectives

FW-PLANT-OBJ-01: Treat at least 4,500 acres over the life of the plan for the purpose of sustaining or restoring whitebark pine and contribute to achieving desired conditions as described in the forested vegetation section. Achieving this would also contribute to FW-VEGT-DC-01. Refer to appendix C for information on possible restoration strategies and activities.

Guidelines

FW-PLANT-GDL-01: Activities affecting vegetation in known occurrences or suspected habitat of plants listed as threatened, endangered, proposed, or candidate under the Endangered Species Act, and those that are identified as species of conservation concern should be designed to provide for their long-term persistence.

Wildlife (WL)

Desired Conditions

FW-WL-DC-01: Habitats for native wildlife species are available throughout those species' potential natural ranges on NFS lands. Habitats for desired nonnative wildlife species are available on NFS lands where they can be supported by healthy, functioning ecosystems, as described in the vegetation section.

Northern Continental Divide Ecosystem Grizzly Bear Amendment (NCDE)

NCDE PCA Plan Components

Desired Conditions

PCA-NCDE-DC-04: Within the NCDE primary conservation area, the amount, type, and distribution of vegetation provide for the ecological, social, and economic sustainability of NFS lands while providing habitat components that contribute to sustaining the recovery of the grizzly bear population in the NCDE. *NCDE-DC-VEG-01*

Recreation Settings (ROS)

Desired Conditions

FW-ROS-DC-01: Outdoor recreation opportunities and experiences are available year-round in a range of settings as described by the desired recreation opportunity spectrum. These settings reflect the integration of other resource values with the desired recreation opportunities, access, facilities, and infrastructure provided within those settings.

The desired distribution of forestwide recreation opportunity settings are described in Table 14. Specific locations and distribution of desired recreation opportunity spectrum settings are mapped for each GA and are in appendix A.

Table 14. Desired recreation opportunity spectrum settings

Desired recreation opportunity spectrum settings	ROS		Winter ROS	
	Acres	Percent of total forest[1]	Acres	Percent of total forest[1]
Primitive	1,034,673	36	1,018,346	35
Semi-primitive nonmotorized	749,649	26	856,841	30
Semi-primitive motorized	375,866	13	725,625	25
Roaded natural	694,044	24	253,979	9
Rural	28,982	1	28,432	1
Urban	0	0	0	0

Recreation Opportunities (REC)

Desired Conditions

FW-REC-DC-01: Recreation opportunities enable visitors to connect with the unique natural environments and historic and cultural occurrences that have taken place throughout the area and instill a culture of stewardship and appreciation.

FW-REC-DC-04: Recreation facilities, including trails and dispersed sites, and their uses have minimal impacts on resources including at risk species, heritage and cultural sites, water quality, and aquatic species.

Designated Wilderness (WILD)

Desired Conditions

FW-WILD-DC-02: Natural ecological processes (e.g., plant succession) and disturbances (e.g., wildfire, insects, and disease) are the primary forces affecting the composition, structure, and pattern of vegetation. Fire plays a role as a natural disturbance agent within designated wilderness areas.

Recommended Wilderness Areas (RECWILD)

Desired Conditions

FW-RECWILD-DC-01: Recommended wilderness areas preserve opportunities for inclusion in the National Wilderness Preservation System. The ecological and social characteristics that provided the basis for each area's suitability for wilderness recommendation are protected and maintained.

FW-RECWILD-DC-02: Recommended wilderness areas are characterized by a natural environment where ecological processes such as natural succession, wildfire, avalanches, insects and disease function as the primary forces affecting the environment.

Suitability

FW-RECWILD-SUIT-02: Recommended wilderness areas are suitable for restoration activities (such as management ignited fires, active weed management) to protect and/or enhance the wilderness characteristics of these areas.

FW-RECWILD-SUIT-03: Motorized and mechanized equipment (such as chain saws to clear trails) are suitable for accomplishing restoration activities and/or administrative work.

FW-RECWILD-SUIT-04: Recommended wilderness areas are not suitable for timber production or timber harvest.

Wilderness Study Areas (WSA)

Desired conditions

FW-WSA-DC-01: Wilderness study areas are characterized by a natural environment where ecological processes such as natural succession, wildfire, avalanches, insects and disease function as the primary forces affecting the environment.

Suitability

FW-WSA-SUIT-03: Wilderness study areas are suitable for restoration activities (such as management ignited fires, active weed management) to protect and/or enhance the wilderness characteristics of these areas.

FW-WSA-SUIT-04: Motorized and mechanized equipment (such as chain saws to clear trails) is suitable for accomplishing restoration activities and/or administrative work.

Inventoried Roadless Areas (IRA)

Desired Conditions

FW-IRA-DC-01: Inventoried roadless areas provide large, undisturbed, and unfragmented areas of land. These large land areas sustain high quality or undisturbed soil, water, and air and a diversity of plant and animal communities. They also provide for secure habitats for a variety of fish and wildlife species that are dependent upon large, undisturbed, unfragmented areas of land.

FW-IRA-DC-02: Within inventoried roadless areas, natural, ecological processes and disturbances (such as wildfire, insects, and disease) are the primary forces affecting the composition, structure, and pattern of vegetation. Inventoried roadless areas contribute to reference landscapes for future study and understanding of natural ecological processes.

FW-IRA-DC-03: Landscapes in inventoried roadless areas are naturally appearing with high scenic quality.

Suitability

FW-IRA-SUIT-01: Inventoried roadless areas are unsuitable for timber production. However, timber harvest is suitable within inventoried roadless areas outside of wilderness study areas and recommended wilderness areas to provide for other multiple use values when consistent with the 2001 Roadless Area Conservation Rule. Also see appendix C.

FW-IRA-SUIT-03: Inventoried roadless areas are suitable for restoration activities (such as management ignited fires, active weed management) to protect and/or enhance the roadless area values and characteristics of these areas.

Benefits to People - Timber (TIM)

Standards

FW-TIM-STD-01: On lands both suitable and unsuitable for timber production, timber harvest will not occur where soil, slope, or other watershed conditions may be irreversibly damaged, as identified in project specific findings. Also see Aquatic Ecosystems and Soil sections.

FW-TIM-STD-03: On lands both suitable and unsuitable for timber production, silvicultural treatments shall not be selected based solely on their ability to provide the greatest dollar return or output of timber; other considerations such as the purpose and need shall inform the selection of silvicultural treatments.

Guidelines

FW-TIM-GDL-01: To contribute to ecological sustainability and ecosystem health, when timber harvest and maintenance activities (such as precommercial thinning) are conducted, they should be designed to move the Forest toward achievement of vegetation desired conditions (such as species composition, size class, forest density, and landscape pattern) as well as other resource desired conditions.

Benefits to People – Carbon Sequestration (CARB)

Desired Conditions

FW-CARB-DC-01: Forests are resilient to natural disturbance processes and changing climates and maintain ecosystem biodiversity and function, which sustains carbon sequestration storage and potential. Also see Forested Vegetation and Soils.

Big Belts Geographic Area (BB)

Terrestrial Vegetation

Desired Conditions

BB-VEGT-DC-01: Table 38 shows the desired condition for cover types in the Big Belts GA.

Table 38. Big Belts GA existing and desired conditions for cover type (percent of area)

Cover type[1]	Existing (percent)[3]	Desired range (percent)
Nonforested[2]	21 (18-28)	15-25
Aspen/hardwood	0	2-5
Ponderosa pine	9 (5-12)	25-40
Douglas-fir	41 (31-50)	15-30
Lodgepole pine	8 (5-12)	5-10
Spruce/fir	5 (2-7)	5-10
Whitebark pine	3 (1-6)	2-5

1 Cover types reflect the most common species in a stand (see appendix D).
2 Nonforested areas include grass and shrub cover types, which may support widely scattered trees in some cases.
3 Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data. Existing condition represents 2018 conditions and will change through time. Estimates are rounded to the nearest whole number unless the value is less than 1%, in which case it is rounded to the nearest 10th. The totals do not necessarily equal 100% due to non-vegetated areas (water or rock)

Forested Vegetation

Desired Conditions

BB-VEGF-DC-01: Table 39 shows the existing and desired conditions for tree species presence in the Big Belts GA.

Table 39. Big Belts GA existing and desired conditions for tree species presence (percent of area)[1, 2, 3]

Tree species	Existing (percent)	Desired range (percent)
limber pine	3 (1-6)	5-15
Rocky Mountain juniper	17 (12-21)	5-15
ponderosa pine	10 (6-13)	40-50
Douglas-fir	49 (42-54)	50-60
aspen	1 (0.3-3)	2-10
Engelmann spruce	4 (1-6)	5-15
lodgepole pine	16 (12-2)	10-20
subalpine fir	15 (10-19)	5-15
whitebark pine	6 (3-9)	5-15

1 Percent of area where at least one tree of the species is present.

2 Totals may be greater 100% because more than 1 species can be present on a site. Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data.
3 Distributions include trees that occur on nonforested potential vegetation type.

Castles GA (CA)

Terrestrial Vegetation

Desired Conditions

CA-VEGT-DC-01: Table 47 shows the existing and desired condition for cover types in the Castles GA.

Table 47. Castles GA existing and desired conditions for cover type (percent of area)

Cover type[1]	Existing (percent)[3]	Desired range (percent)
Nonforested[2]	15 (6-23)	10-20
Aspen/hardwood	2 (2-6)	2-5
Ponderosa pine	0	15-30
Douglas-fir	35 (23-46)	10-20
Lodgepole pine	35 (23-46)	30-40
Spruce/fir	6 (1-12)	5-10
Whitebark pine	4 (3-8)	2-5

1 Cover types reflect the most common species in a stand (see appendix D).
2 Nonforested areas include grass and shrub cover types, which may support widely scattered trees in some cases.
3 Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data. Existing condition represents 2018 conditions and will change through time. Estimates are rounded to the nearest whole number unless the value is less than 1%, in which case it is rounded to the nearest 10th. The totals do not necessarily equal 100% due to non-vegetated areas (water or rock)

Forested Vegetation

Desired Conditions

CA-VEGF-DC-01: Table 48 shows the existing and desired conditions for tree species presence in the Castles GA.

Table 48. Castles GA existing and desired conditions for tree species presence (percent of area)[1, 2, 3]

Tree species	Existing (percent)	Desired range (percent)
limber pine	15 (6-23)	35-45
Rocky Mountain juniper	2 (1-6)	1-5
ponderosa pine	6 (5-12)	20-30
Douglas-fir	48 (38-62)	20-30
aspen	2 (1-6)	2-10
Engelmann spruce	2 (1-6)	2-10
lodgepole pine	44 (32-56)	35-45

Tree species	Existing (percent)	Desired range (percent)
subalpine fir	15 (7-24)	5-15
whitebark pine	19 (10-28)	10-20

1 Percent of area where at least one tree of the species is present.
2 Totals may be greater 100% because more than 1 species can be present on a site. Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data.
3 Distributions include trees that occur on nonforested potential vegetation type.

Crazies GA

Terrestrial Vegetation

Desired Conditions

CR-VEGT-DC- 01: Table 55 shows the desired condition for cover types in the Crazies GA.

Table 55. Crazies GA existing and desired conditions for cover type (percent of area)

Cover type[1]	Existing (percent)[3]	Desired range (percent)
Nonforested[2]	19 (9-32)	10-20
Aspen/hardwood	0	1-2
Ponderosa pine	0	5-15
Douglas-fir	34 (14-55)	5-15
Lodgepole pine	14 (5-24)	25-35
Spruce/fir	21 (10-34)	15-25
Whitebark pine	5 (4-12)	2-5

1 Cover types reflect the most common species in a stand (see appendix D).
2 Nonforested areas include grass and shrub cover types, which may support widely scattered trees in some cases.
3 Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data. Existing condition represents 2018 conditions and will change through time. Estimates are rounded to the nearest whole number unless the value is less than 1%, in which case it is rounded to the nearest 10th. The totals do not necessarily equal 100% due to non-vegetated areas (water or rock)

Forested Vegetation

Desired Conditions

CR-VEGF-DC-01: Table 56 shows the desired condition for tree species presence in the Crazies GA.

Table 56. Crazies GA existing and desired conditions for tree species presence (percent of area)[1, 2, 3]

Tree species	Existing (percent)	Desired range (percent)
limber pine	12 (4-23)	20-30
Rocky Mountain juniper	0	1-5
ponderosa pine	0	2-10
Douglas-fir	45 (30-58)	10-20

Tree species	Existing (percent)	Desired range (percent)
aspen	0	1-10
Engelmann spruce	12 (2-21)	15-25
lodgepole pine	33 (20-46)	25-40
subalpine fir	45 (33-60)	15-30
whitebark pine	21 (11-35)	15-25

1 Percent of area where at least one tree of the species is present.
2 Totals may be greater 100% because more than 1 species can be present on a site. Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data.
3 Distributions include trees that occur on nonforested potential vegetation type.

Divide Geographic Area (DI)

Terrestrial Vegetation

Desired Conditions

DI-VEGT-DC-01: Table 65 shows the desired condition for cover types in the Divide GA.

Table 65. Divide GA existing and desired conditions for cover type (percent of area)

Cover type[1]	Existing (percent)[3]	Desired range (percent)
Nonforested[2]	8 (5-12)	5-15
Aspen/hardwood	1 (1-3)	2-5
Ponderosa pine	0	10-20
Douglas-fir	40 (31-52)	20-30
Lodgepole pine	37 (29-42)	20-30
Spruce/fir	10 (7-14)	5-15
Whitebark pine	1 (1-3)	2-5

1 Cover types reflect the most common species in a stand (see appendix D).
2 Nonforested areas include grass and shrub cover types, which may support widely scattered trees in some cases.
3 Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data. Existing condition represents 2018 conditions and will change through time. Estimates are rounded to the nearest whole number unless the value is less than 1%, in which case it is rounded to the nearest 10th. The totals do not necessarily equal 100% due to non-vegetated areas (water or rock)

Forested Vegetation

Desired Conditions

DI-VEGF-DC-01: Table 66 shows the desired condition for tree species presence in the Divide GA.

Table 66. Divide GA existing and desired conditions for tree species presence (percent of area)[1, 2, 3]

Tree species	Existing (percent)	Desired range (percent)
limber pine	2 (2-3)	5-15

Tree species	Existing (percent)	Desired range (percent)
Rocky Mountain juniper	3 (1-5)	1-5
ponderosa pine	3 (1-5)	25-35
Douglas-fir	53 (46-59)	45-55
aspen	6 (3-9)	2-10
Engelmann spruce	13 (10-19)	5-15
lodgepole pine	59 (53-65)	25-35
subalpine fir	23 (18-29)	10-20
whitebark pine	8 (4-11)	5-15

1 Percent of area where at least one tree of the species is present.
2 Totals may be greater 100% because more than 1 species can be present on a site. Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data.
3 Distributions include trees that occur on nonforested potential vegetation type.

Elkhorns Geographic Area and Wildlife Management Unit (EH)

Terrestrial Vegetation

Desired Conditions

EH-VEGT-DC-01: Table 73 shows the desired condition for cover types in the Elkhorns GA.

Table 73. Elkhorns GA existing and desired conditions for cover type (percent of area)

Cover type[1]	Existing (percent)[3]	Desired range (percent)
Nonforested[2]	23 (15-31)	20-30
Aspen/hardwood	1 (1-3)	2-5
Ponderosa pine	1 (1-4)	10-20
Douglas-fir	19 (13-33)	10-20
Lodgepole pine	23 (14-30)	20-30
Spruce/fir	17 (10-26)	5-15
Whitebark pine	4 (3-7)	5-10

1 Cover types reflect the most common species in a stand (see appendix D).
2 Nonforested areas include grass and shrub cover types, which may support widely scattered trees in some cases.
3 Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data. Existing condition represents 2018 conditions and will change through time. Estimates are rounded to the nearest whole number unless the value is less than 1%, in which case it is rounded to the nearest 10th. The totals do not necessarily equal 100% due to non-vegetated areas (water or rock).

Forested Vegetation

Desired Conditions

EH-VEGF-DC-01: Table 74 shows the desired condition for tree species presence in the Elkhorns GA.

Table 74. Elkhorns GA existing and desired conditions for tree species presence (percent of area)[1, 2, 3]

Tree species	Existing (percent)	Desired range (percent)
limber pine	1 (0-4)	2-10
Rocky Mountain juniper	5 (1-9)	1-5
ponderosa pine	1 (1-4)	20-30
Douglas-fir	28 (20-38)	20-40
aspen	2 (2-5)	2-10
Engelmann spruce	20 (11-27)	5-15
lodgepole pine	32 (22-41)	25-35
subalpine fir	29 (19-37)	5-15
whitebark pine	14 (6-20)	10-20

1 Percent of area where at least one tree of the species is present.
2 Totals may be greater 100% because more than 1 species can be present on a site. Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data.
3 Distributions include trees that occur on nonforested potential vegetation type.

Little Belts Geographic Area (LB)

Terrestrial Vegetation

Desired Conditions

LB-VEGT-DC-01: Table 89 shows the desired condition for cover types in the Little Belts GA.

Table 89. Little Belts GA existing and desired conditions for cover type (percent of area)

Cover type[1]	Existing (percent)[3]	Desired range (percent)
Nonforested[2]	8 (6-9)	5-10
Aspen/hardwood	<1 (0.4-1)	2-5
Ponderosa pine	9 (7-11)	20-35
Douglas-fir	39 (33-44)	15-25
Lodgepole pine	29 (26-32)	15-25
Spruce/fir	11 (9-13)	15-25
Whitebark pine	1 (0.6-2)	2-5

1 Cover types reflect the most common species in a stand (see appendix D).
2 Nonforested areas include grass and shrub cover types, which may support widely scattered trees in some cases.
3 Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data. Existing condition represents 2018 conditions and will change through time. Estimates are rounded to the nearest whole number unless the value is less than 1%, in which case it is rounded to the nearest 10th. The totals do not necessarily equal 100% due to non-vegetated areas (water or rock).

Forested Vegetation

Desired Conditions

LB-VEGF-DC-01: Table 90 shows the desired condition for tree species presence in the Little Belts GA.

Table 90. Little Belts GA existing and desired conditions for tree species presence (percent of area)[1, 2, 3]

Tree species	Existing (percent)	Desired range (percent)
limber pine	24 (21-26)	15-25
Rocky Mountain juniper	4 (2-5)	1-10
ponderosa pine	8 (6-10)	20-35
Douglas-fir	59 (56-62)	35-50
aspen	1 (0.3-2)	2-10
Engelmann spruce	27 (24-30)	15-25
lodgepole pine	43 (40-46)	20-30
subalpine fir	23 (21-26)	15-25
whitebark pine	10 (8-12)	5-15

1 Percent of area where at least one tree of the species is present.
2 Totals may be greater 100% because more than 1 species can be present on a site. Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data.
3 Distributions include trees that occur on nonforested potential vegetation type.

Rocky Mountain Range Geographic Area (RM)

Terrestrial Vegetation

Desired Conditions

RM-VEGT-DC-01: Table 97 shows the desired condition for cover types in the Rocky Mountain Range GA.

Table 97. Rocky Mountain Range GA existing and desired conditions for cover type (percent of area)

Cover type[1]	Existing (percent)[3]	Desired range (percent)
Nonforested[2]	21 (15-27)	5-15
Aspen/hardwood	3 (1-5)	2-10
Ponderosa pine	2 (0.2-4)	2-5
Douglas-fir	15 (7-22)	10-20
Lodgepole pine	20 (15-27)	10-20
Spruce/fir	22 (16-28)	35-45
Whitebark pine	5 (2-8)	5-10

1 Cover types reflect the most common species in a stand (see appendix D).
2 Nonforested areas include grass and shrub cover types, which may support widely scattered trees in some cases.
3 Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data. Existing condition represents 2018 conditions and will change through time. Estimates are rounded to the nearest whole number unless the value is less than 1%, in which case it is rounded to the nearest 10th. The totals do not necessarily equal 100% due to non-vegetated areas (water or rock).

Forested Vegetation

Desired Conditions

RM-VEGF-DC-01: Table 98 shows the desired condition for tree species presence in the Rocky Mountain Range GA.

Table 98. Rocky Mountain Range GA existing and desired conditions for tree species presence (percent of area)[1, 2, 3]

Tree species	Existing (percent)	Desired range (percent)
limber pine	5 (2-8)	5-15
Rocky Mountain juniper	3 (0.4-5)	1-5
ponderosa pine	0	2-10
Douglas-fir	27 (20-33)	20-40
aspen	5 (2-8)	2-15
Engelmann spruce	33 (27-40)	25-40
lodgepole pine	32 (26-40)	10-25
subalpine fir	36 (29-43)	30-50
whitebark pine	14 (9-20)	10-20

1 Percent of area where at least one tree of the species is present.
2 Totals may be greater 100% because more than 1 species can be present on a site. Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data.
3 Distributions include trees that occur on nonforested potential vegetation type.

Snowies Geographic Area (SN)

Terrestrial Vegetation

Desired Conditions

SN-VEGT-DC-01: Table 107 shows the desired condition for cover types in the Snowies GA.

Table 107. Snowies GA existing and desired conditions for cover type (percent of area)

Cover type[1]	Existing (percent)[3]	Desired range (percent)
Nonforested[2]	9 (4-14)	5-15
Aspen/hardwood	1 (1-3)	2-5
Ponderosa pine	22 (15-30)	15-30
Douglas-fir	37 (24-50)	15-25
Lodgepole pine	10 (5-16)	15-25
Spruce/fir	20 (13-27)	15-30

1 Cover types reflect the most common species in a stand (see appendix D).
2 Nonforested areas include grass and shrub cover types, which may support widely scattered trees in some cases.
3 Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data. Existing condition represents 2018 conditions and will change through time. Estimates are rounded to the nearest whole number unless the value is less than 1%, in which

case it is rounded to the nearest 10th. The totals do not necessarily equal 100% due to non-vegetated areas (water or rock).

Forested Vegetation

Desired Conditions

SN-VEGF-DC-01: Table 108 shows the desired condition for tree species presence in the Snowies GA.

Table 108. Snowies GA existing and desired conditions for tree species presence (percent of area)[1, 2, 3]

Tree species	Existing (percent)	Desired range (percent)
limber pine	26 (19-34)	5-25
Rocky Mountain juniper	2 (2-4)	1-5
ponderosa pine	26 (19-34)	20-35
Douglas-fir	62 (54-70)	35-50
aspen	2 (2-5)	5-15
Engelmann spruce	48 (39-56)	15-30
lodgepole pine	18 (12-25)	20-35
subalpine fir	19 (13-27)	15-30
whitebark pine	1 (1-2)	5-15

1 Percent of area where at least one tree of the species is present.
2 Totals may be greater 100% because more than 1 species can be present on a site. Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data.
3 Distributions include trees that occur on nonforested potential vegetation type.

Upper Blackfoot Geographic Area (UB)

Terrestrial Vegetation

Desired Conditions

UB-VEGT-DC-01: Table 116 shows the desired condition for cover types in the Upper Blackfoot GA.

Table 116. Upper Blackfoot GA existing and desired conditions for cover type (percent of area)

Cover type[1]	Existing (percent)[3]	Desired range (percent)
Nonforested[2]	16 (12-20)	5-15
Aspen/hardwood	<1 (0.4-1.2)	2-5
Ponderosa pine	2 (0.6-4)	10-25
Douglas-fir	33 (26-42)	15-25
Western larch	<1 (0-0.1)	1-5
Lodgepole pine	26 (20-30)	20-30
Spruce/fir	10 (7-14)	15-25
Whitebark pine	1 (1-2)	2-5

1 Cover types reflect the most common species in a stand (see appendix D).
2 Nonforested areas include grass and shrub cover types, which may support widely scattered trees in some cases.

3 Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data. Existing condition represents 2018 conditions and will change through time. Estimates are rounded to the nearest whole number unless the value is less than 1%, in which case it is rounded to the nearest 10th. The totals do not necessarily equal 100% due to non-vegetated areas (water or rock).

Forested Vegetation

Desired Conditions

UB-VEGF-DC-01: Table 117 shows the desired condition for tree species presence in the Upper Blackfoot GA.

Table 117. Upper Blackfoot GA existing and desired conditions for tree species presence (percent of area)[1, 2, 3]

Tree species	Existing (percent)	Desired range (percent)
limber pine	9 (7-13)	5-15
Rocky Mountain juniper	2 (1-4)	1-5
ponderosa pine	1 (1-3)	15-30
Douglas-fir	45 (40-51)	35-50
aspen	1 (0.2-3)	2-10
Engelmann spruce	15 (11-19)	10-25
lodgepole pine	46 (40-51)	20-40
western larch	1 (1-2)	1-10
subalpine fir	34 (28-39)	15-30
whitebark pine	7 (3-9)	5-15

1 Percent of area where at least one tree of the species is present.
2 Totals may be greater 100% because more than 1 species can be present on a site. Existing condition shown is the mean percent of the area with the 90% confidence interval (see glossary) shown in parenthesis. Source is R1 Summary Database, FIA data.
3 Distributions include trees that occur on nonforested potential vegetation type.

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Appendix B: Record of Consultation with the U.S. Fish and Wildlife Service

Date	Consultation
26 February 2019	Meeting (Helena FS office, with some FS personnel on phone) to discuss agenda items outlined in October letter; meeting and BA development had been delayed due to federal government shutdown. FWS recommended to include whitebark pine, currently candidate species, due to possibility of listing in near future.
26 March 2019	Phone call with K Dixon (FWS), and W Clark, D Kemp, and J Dumont (all FS). Discussion of BA format and general content with some discussion about specifics for analysis of grizzly bear, lynx, and whitbark pine.
10 April 2019	Phone call with K Dixon and K Newlon to discuss specifics of how to approach analysis.
28 May 2019	Rough draft of whitebark pine portion of BA sent to K Newlon by J Dumont.
04 October 2019	K Newlon returned draft with revision recommendations and comments.
06 December 2019	Second draft of whitebark pine portion of BA sent to K Newlon by J Dumont with recommended adjustments made.
11 December 2019	K Newlon returned draft with minimal comments.