Sage Hen Integrated Restoration Project: Botanical Resources Effects Analysis

Prepared by: Jennifer Brickey, Forest Ecologist
For: Emmett Ranger District, Boise National Forest
Date: October 2020

1. Issues Addressed

This report addresses the potential for actions proposed as part of the Sage Hen Integrated Restoration Project (project) to impact endangered, threatened, proposed (TEP) and Regional Forester's (R4) Sensitive plant species and Boise National Forest (Boise NF) Forest Watch plant species, referred to collectively in this document as 'botanical resources,' that are known to occur or have probability to occur in the project area or be affected by project activities. This report includes the biological evaluation and determination for Sensitive species as required by Forest Service policy (Forest Service Manual 2670). For this report, I referenced the purpose and need and proposed action for the project as described in its entirety in the Sage Hen Integrated Restoration Project Environmental Assessment (EA).

This section includes issues pertaining to botanical resources that have been identified for detailed analysis. "An issue is a statement of cause and effect linking environmental effects to actions" (Forest Service Handbook 1909.15).

Issue 1: Proposed ground-disturbing and prescribed fire activities may directly or indirectly impact known populations of botanical resources (TEP, R4 Sensitive, and Forest Watch plant species) or unsurveyed suitable habitats in the project area.

Issue 2: Proposed ground-disturbing and prescribed fire activities may directly or indirectly impact known populations of whitebark pine or its habitats in the project area.

Whitebark pine is a candidate species for listing under the federal Endangered Species Act. Whitebark pine is also managed as an R4 Sensitive species. To assist with future conferencing or consultation should whitebark pine be proposed for listing during the implementation phase of this project, I assessed impacts to whitebark pine separately from other R4 Sensitive species.

2. Methodology

This section includes a description of the methods and data used in this analysis. My analysis to estimate impacts to plant species of concern and potential habitats included:

- species list development to determine known occurrences in the project area;
- a review of recent field visits and botanical surveys in or near the project area;
- a review of geospatial data representing species-specific habitat attributes to determine potential for suitable habitats to occur in unsurveyed areas of the project area; and
- an effects analysis in which I break down potential impacts of different project activities on plant species and their associated pollinators.

I summarize results for the first three steps in this section of the report and incorporate the effects analysis results in the "Environmental Consequences" section below.

2.1. Assumptions

Specialists did not complete systematic botanical surveys throughout the entirety of the project area for all botanical resources. My analysis is based on the assumption that available data sets are a sufficient depiction of existing conditions to determine the potential for occurrences and the potential for impacts to occur. I factored the level of efforts and quantity and quality of the best available information with an understanding of the information's strengths and limitations.

The implementation timeframe for this project is 15 to 20 years. The Boise NF has yet to convert to Species of Conservation Concern as directed in the 2012 Planning Rule, so it is very likely the botanical resources list would change during the implementation timeframe. When the Boise NF assesses species for consideration as Species of Conservation Concern and the Intermountain Region approves those species, the Boise NF would need to reassess effects determinations described in this analysis for consistency with relevant laws and regulations, the Boise NF forest plan , and inclusion of any new species. Based on the assumption that the species list conversion would likely occur within the project implementation timeframe, I framed my analysis in a broad context in order to take into consideration possible impacts to species that express a variety of life histories and growth habits.

2.2. Botanical Resources Species List Development

I completed an initial assessment of potential for botanical resources to occur in the project area or with potential to be affected by project activities. I developed the botanical resources list for the project area from:

- The U.S. Fish and Wildlife Services Threatened, Endangered, Proposed and Candidate Species list (July 07, 2020 Consultation Code 01EIFW00-2020-SLI-1268).
- The U.S. Department of Agriculture Forest Service Regional Forester's (R4) Sensitive Plant Species (06/16) (Forest Service 2016).
- The Boise National Forest Land and Resource Management Plan (forest plan) (as amended in 2010) Forest Watch Plants Species List, species list updated April 03, 2015 (Rey-Vizgirdas 2015).

In order to determine habitat types and known occurrences for each plant species, I reviewed the most recent Idaho Natural Heritage Database (IFWIS January 2020); publicly available information from NatureServe (2020) and the Consortium of Pacific Northwest Herbaria (CPNWH) (2020); information available in Forest files and Forest GIS datasets; and recent botanical field visits that occurred in the project area boundaries or general vicinity. I factored level of survey efforts and quantity and quality of existing information in determining the probability that a species may occur in the project area. My initial assessment results are included in the project record (Brickey 2020).

2.3. Past Field Visits and Botanical Surveys Summary

The project area was not surveyed in its entirety for botanical resources prior to this effects analysis. As described in the proposed action design features, the Boise NF would complete site-specific surveys post-decision as part of implementation.

As of the writing of this report, surveys completed include:

- In September 2018, contractors completed focused surveys on potential habitat for botanical resources in roughly 1,900 acres of forested stands in the Tripod and Cottonwood project areas (Forest Service 2020a). These project areas border the project area on the southern boundary line.
- In June, July, and August 2019, the North Zone botanist, contractors, and biological technicians completed focused surveys on potential habitat for botanical resources in roughly 1,880 acres of forested stands in the project area (Forest Service 2020a).

- In May and June 2020, the North Zone botanist and biological technicians completed focused surveys on potential habitat for botanical resources in roughly162 acres of forested stands in the project area (Forest Service 2020a). Surveys for 2020 are still ongoing as of the authorship of this report.

Anecdotal reports indicate some sections of the project area may have been surveyed prior to 2018 by previous botanists. I was unable to locate survey methodologies or results for these older botanical surveys and was, therefore, unable to incorporate the missing information into this assessment. My initial assessment and effects analyses are based on information available to the author at the time of the assessment.

2.4. Species to Be Evaluated

Based on my initial assessment and review of past field visits and botanical surveys, I evaluated impacts to botanical resources that are known to occur or have the potential to occur in the project area (Table 1). Botanical resources not included in this list do not have the potential to occur in the project area or would not be affected directly or indirectly by project activities. I included rationale for their exclusion in my initial assessment results included in the project record (Brickey 2020). This includes slickspot peppergrass (*Lepidium papilliferum*) (Threatened) and its proposed designated critical habitat.

Table 1. Plant species on the U.S. Fish and Wildlife Services Listed, Proposed and Candidate species lists, the R4 Sensitive species list and the Forest Watch plant species list that occur or have the potential to occur in the Sage Hen Integrated Restoration Project area.

Species	Conservation Status	Presence	Analysis
Whitebark pine (*Pinus albicaulis*)	Candidate, R4 Sensitive	Known occurrences and modeled habitats in Snowbank Inventoried Roadless Area	Analyzed separately
Seven devil's onion (*Allium tolmiei* var. *persimile*)	R4 Sensitive	Known occurrences and potential habitats in project area	Populations and habitats analyzed under Botanical Resources
Sacajawea's bitterroot (*Lewisia sacajaweana*)	R4 Sensitive	Potential habitats in Snowbank Inventoried Roadless Area and upper elevations outside the roadless area	Potential habitats analyzed under Botanical Resources
bryum moss (*Bryum calobryoides*)	R4 Sensitive	Potential habitats in project area	Potential habitats analyzed under Riparian habitats
Least phacelia (*Phacelia minutissima*)	R4 Sensitive	Potential habitats in project area	Potential habitats analyzed under Riparian and Aspen habitats
Scalloped moonwort (*Botrychium crenulatum*)	Forest Watch	Potential habitats in project area	Potential habitats analyzed under Botanical Resources, Riparian and Aspen habitats
Little grapefern (*Botrychium simplex*)	Forest Watch	Potential habitats in project area	Potential habitats analyzed under Botanical Resources, Riparian and Aspen habitats
Parry's sedge (Indian Valley sedge) (*Carex parryana* var. *brevisquama,* aka *C. abooriginum*)	Forest Watch	Known occurrences and potential habitats in project area	Populations and habitats analyzed under Riparian habitats
Sweetgrass (*Hierochloe odorata*)	Forest Watch	Potential habitats in project area	Potential habitats analyzed under Riparian habitats
Tufted penstemon (*Penstemon laxus*)	Forest Watch	Potential habitats in project area	Potential habitats analyzed under Botanical Resources, Riparian and Aspen habitats

Species	Conservation Status	Presence	Analysis
Northern sanicle (*Sanicula graveolens*)	Forest Watch	Potential habitats in project area	Potential habitats analyzed under Botanical Resources, Riparian and Aspen habitats
Sticky tofieldia (*Triantha occidentalis* ssp. *brevistyla,* aka *Tofieldia glutinosa*)	Forest Watch	Potential habitats in project area	Potential habitats analyzed under Riparian habitats

2.5. Affected Analysis Area

My spatial analysis area for direct and indirect effects to botanical resources is National Forest System lands in the project area boundary. The project area boundary is consistent with the Upper Squaw Creek watershed ridgeline and mimics an ecological boundary within which impacts to botanical resources may be best addressed. On a temporal scale, my direct and indirect analysis includes the timeframe when the proposed action would occur and three to five years after operations cease.

My spatial analysis area for cumulative effects is the Upper Squaw Creek watershed boundary. On a temporal scale, my cumulative effects analysis includes the timeframe when the proposed action would occur and three to five years after operations cease. Given the absence of long-term genetics, seed dispersal and pollination studies for botanical resources, our best surrogate for relationships is proximity. The Upper Squaw Creek watershed is an ecological boundary within which impacts to botanical resources may be most appropriately addressed. While it is possible for genetic interactions to occur between populations across watershed boundaries, it is more probably that interactions through pollination and seed dispersal occur between populations within the Upper Squaw Creek watershed.

For whitebark pine, the West Mountains ridgeline mimics an ecological boundary in which cumulative effects may be appropriately addressed. Whitebark pine stands extend along the West Mountains' highest ridges and shoulder slopes on the Boise and Payette national forests (IFWIS 2020; Forest Service 2020b; Forest Service 2017a, 2017b). Whitebark pine stands in the project area extend beyond the Upper Squaw Creek watershed boundary, and likely interact genetically with stands outside the watershed boundary along the ridgeline and shoulder slopes. The next nearest stands on the Boise NF occur roughly 10 aerial miles east of the project area in the North Fork Range. Pollen exchange by wind and seed dispersal by Clark's nutcracker between the West Mountain and North Fork mountain ranges stands may occur but are likely to be infrequent.

In order to assess impacts to botanical resources, I identified habitat attributes for each species that may be assessed based on known occurrences and potential habitats described below. These habitat attributes include what is known for each species' reproductive biology (pollination and seed dispersal) and associated vegetation communities.

- Whitebark pine known and modeled occurrences: Suitable habitats span a wide range of precipitation zones from about 20 to 100 inches per year (Farnes 1990, page 303). May occur as a climax species, early successional species, or seral (mid-successional stage) codominant associated with other tree species (USFWS 2016). On the Boise NF, generally above 6,800 to 7,000 feet in elevation though isolated individuals and stands may occur at lower elevations where microclimatic conditions create suitable habitats. Either in monotypic stands at higher elevations or in mixed stands with other conifers such as subalpine fir, Douglas fir, and Rocky Mountain lodgepole pine. Modeled Mid-Scale Potential Vegetation Groups in which potential habitat may occur: PVG 10, 11, Other (98) Barren Rock (Snow, Clouds), Other (99) Non-Forested (Shrub, grassland, aspen and sparse vegetation) (Beall 2017).

- To estimate known and modeled occurrences in relation to the proposed action, I relied on 4 data sets: point observations reported to the Idaho Fish and Wildlife Information System (IFWIS 2020); a mid-scale level existing vegetation communities model (Existing VCMQ) identifying stands in which whitebark pine is the dominant overstory (Forest Service 2020b); common stand exam results for past site-specific needs as reported in the Field Sampled Vegetation (FSVeg) database (Forest Service 2017b); and an older 2008 existing vegetation model (Raster Data Refresh of GIS Vegetation Layers to 2008 Conditions or VegRefresh) which identified stands in which whitebark pine is the dominant or co-dominant overstory using different modeling methodologies (Forest Service 2017a).
- Seven devil's onion known occurrences and potential habitat: Suitable habitat includes mixed semiarid shrub and grasslands in swales, ephemeral watercourses or seeps primarily on basalt land types though some known populations occur on granitic land types. Seasonally wet soil dry by late summer on primarily south-facing slopes though may also occur on east- and west-facing slopes with tree canopy cover less than 30 percent.
- Sacajawea's bitterroot potential habitat: Suitable habitat includes sparsely vegetated upper slopes and ridgelines primarily on granitic land types and soils. Associated with forested stands that may include Douglas fir, ponderosa pine, lodgepole pine, subalpine fir and whitebark pine with tree canopy cover less than 30 percent though some known populations occur in forested stands with tree canopy cover up to 45 percent.
- Tufted penstemon potential habitat: potential habitat may include forested and non-forested habitats, including Douglas fir, ponderosa pine, riparian and sagebrush communities. All vegetation communities in the project area outside the Snowbank Inventoried Roadless Area and riparian communities inside the Snowbank Inventoried Roadless Area may be considered potential habitat for tufted penstemon.
- Scalloped moonwort and little grapefern: potential habitat may include forested and non-forested habitats, including meadows, riparian and sagebrush communities as well as seeps on forested edges. All vegetation communities in the project area may be considered potential habitat for both these species.
- Riparian habitats: To estimate species occurrences that may inhabit riparian corridors in relation to the proposed action, I relied on riparian conservation area (RCA) delineations developed through modeling efforts for project planning. Impacts to modeled RCAs may account for direct and indirect impacts to potential habitats attributes, including pollinators, for least phacelia, Bryum moss, scalloped moonwort, grapefern and tufted penstemon. For assessing impacts to botanical resources, I assumed the first two RCA zones capture the majority of the riparian habitats because, while it is possible that riparian habitats may extend beyond the delineated RCA zones, it is more probable that the full extents of the RCA delineations (up to 130 and 260 feet from streambank for intermittent and perennial streams, respectively) include the full extent of riparian habitats.
- Modeled aspen stands: To estimate species occurrences that may inhabit aspen stands in relation to the proposed action, I relied on a mid-scale level existing vegetation communities model (Existing VCMQ) identifying stands in which aspen is the dominant overstory (Forest Service 2020). Impacts to aspen stands may account for direct and indirect impacts to potential habitat attributes, including pollinators, for the R4 Sensitive plants least phacelia and Bryum moss, and Forest Watch plants scalloped moonwort, grapefern and tufted penstemon.
- For RCAs, given on-the-ground riparian conditions, the widths are delineated into three separate zones for the proposed action. Zones 1 and 2, 0 to 30 feet and 30 to 130 feet slope-distance respectively, would be delineated on each side of perennial and intermittent streambanks. Zone 3, 130 to 260 feet slope-distance, would be delineated only for perennial streambanks. Different levels of project activities would be permitted within each zone with backing fire as the only activity proposed within 30 feet of streambank in Zone 1. In site-specific instances, the proposed action includes the option to delineate RCA zones on the ground based on unique riparian functions and ecological processes for which implementers determine the prescribed buffer limits do not adequately address needs.

2.6. Resource Indicators and Measures

Table 2. Resource condition indicators and measures for assessing effects

Issue	Indicator or Measure	Source
Proposed ground-disturbing and prescribed fire activities may directly or indirectly impact known populations of botanical resources or unsurveyed suitable habitats in the project area.	Presence of known botanical resources; change in area or occupancy of documented occurrences (number of species, populations, individuals affected); proximity of existing occurrences to project activities; proximity of unsurveyed suitable habitats to project activities	NFMA 16 U.S. Code 1604 (g)(3)(B); ESA; 16 U.S. Code 1531 Sec. 5 (a); Departmental Regulation 9500.4; FSM 2670.22 FSM 2670.32 (3,4) FSM 2672.1
Proposed ground-disturbing and prescribed fire activities may directly or indirectly impact known populations of whitebark pine or its habitats in the project area.	Presence of whitebark pine; change in area or occupancy of documented occurrences (number of species, populations, individuals affected); proximity of existing occurrences to project activities; proximity of suitable habitats to project activities.	NFMA 16 U.S. Code 1604 (g)(3)(B); ESA; 16 U.S. Code 1531 Sec. 5 (a); Departmental Regulation 9500.4; FSM 2670.22 FSM 2670.32 (3,4) FSM 2672.1

3. Environmental Consequences

3.1. Environmental Consequences of No Action

This section discloses the environmental impacts of not taking action.

Direct and Indirect Effects of No Action

Under No Action, no changes would occur in current land management activities. No new ground-disturbing management activities or changes to the transportation system would occur. The botanical resources currently occupying the project area are likely to continue to persist. Habitat conditions would remain on their current trajectories as described in the Sage Hen EA. The existing conditions of Riparian Conservation Areas, aspen stands, and whitebark pine habitats would not be restored to desired conditions but remain the same or continue to decline. The lack of blister rust- resilient whitebark pine and adequate natural regeneration in the Snowbank Inventoried Roadless Area stands would exacerbate whitebark pine decline with no action. While some existing noxious and non-native invasive weed infestations would naturally increase in size and new infestations would arise from ongoing activities such as recreation and road maintenance, the Emmett Ranger District would continue to carry out its noxious weed and non-native plant treatment program as described in the Boise National Forest Weed Management Strategy and authorized under the 2019 Record of Decision for the Boise National Forest Invasive Species Project.

3.2. Environmental Consequences of the Proposed Action

This section discloses the environmental impacts of the proposed action.

During project development, the project interdisciplinary team developed design features incorporated as part of the proposed action to reduce impacts to resources. I reviewed the complete design features list included in Appendix B of the Sage Hen EA for this effects analysis. In addition to the design features developed specifically for botanical resources, design features developed for hydrology, soils, and non-

native invasive species management may directly or indirectly reduce project activities' impacts on botanical resources and their potential habitats.

Effectiveness Assessment of Botanical Resources Design Features

For field surveys in the project area, the level of effectiveness is moderate to high. Design feature BT-1 (see Sage Hen EA, Appendix B: Design Features) defers surveys for botanical surveys to the project's implementation phase. While the potential exists for surveyors to miss an undocumented plant species of concern occurrence, the majority of project activity locations do not likely include suitable habitats for botanical resources. The likelihood of missing an occurrence is low and the likelihood of effectiveness is moderate to high.

Design feature BT-2 (see Sage Hen EA, Appendix B: Design Features) defers the development of activity-specific avoidance or minimization measures until field surveys are completed during the project's implementation phase. The design feature states that, during implementation, the Boise NF would protect known R4 Sensitive plant populations during project implementation and would conserve known Forest Watch plant populations to the extent practicable during project implementation. The implementation team and assigned project botanist would develop site- and activity-specific mitigation measures to be included in contract specifications or as standard operating procedures during the project implementation phase.

Avoidance or minimization measures for botanical resources would be developed after the project decision notice is signed. When implemented, avoidance measures provide the best assurances for minimizing the possibility of unintentionally extirpating a population. Minimization measures would have different levels of effectiveness, depending on methods employed and timing. During development, avoidance and minimization measures would need to be assessed for effectiveness and whether they fit within the effects disclosed.

The intent for activity-specific botanical design features is to reduce potential for direct loss of individuals and seed banks, each of which are a part of the whole population. For this project, the primary intent for design features development post-decision would be to reduce impacts to botanical resources and to improve those resources' abilities to recover from the disturbances. The currently known occurrences of botanical resources in the project area are relatively small in scale and would be at risk of extirpation from what may appear to be minor disturbances. Design features should protect the viability and persistence of populations within the management area and reduce the potential for extirpation from unintended or seemingly minor project-related disturbances.

An example of differing levels of effectiveness for design features would be different methods employed to reduce fugitive dust. Fugitive dust may directly impact plants by covering leaves, reducing photosynthesis potential and disrupting evapotranspiration by interfering with stomatal function. Insect pollinators may avoid plants in close proximity to native surface roads and may be less likely to visit flowers coated in dust as dust may reduce the flowers' desirability and interfere with pollen and nectar harvest. Dust may also directly impact insect pollinators by clogging insects' spiracles, the breathing holes located at the exoskeleton surface, which may lead to an overall reduction in the insect's health and vigor.

For dust abatement, different modes for reducing fugitive dust have different levels of effectiveness, with speed limits being less effective than road salt or water applications or aggregate installation. Road salt applications are only effective when sufficient moisture is present in the road substrate to bind to the road surface and may exacerbate drought stress if the road salts migrate to roadside soils, altering soil water potentials and interfering with soil water uptake by roots. Water applications and aggregate installation pose additional logistical challenges from sourcing materials to hauling and materials application. All

options have the potential to alter direct and indirect impacts to botanical resources and associated pollinators to differing degrees.

Direct and Indirect Effects of the Proposed Action

For the purposes of this analysis, I use qualitative measures to describe the anticipated probability of impact and the anticipated severity of impact from a project activity should the impact occur.

Probability refers to the likelihood of the impact. I define the qualitative descriptions as follows:

- Low Probability: Direct or indirect impacts are possible to occur in time with a low frequency of occurrence.
- Moderate Probability: Direct or indirect impacts are likely to occur and would occur at least one time.
- High Probability: Direct or indirect impacts are likely to occur and would occur multiple times.

Intensity refers to the severity of the impact without regard to the likelihood of the impact. I define the qualitative descriptions as follows:

- Low Intensity: project activity may impact the vigor or reproductive success of one to several individuals in a population. Project activity is unlikely to lead to death of individuals and is unlikely to impact most individuals in a population.
- Moderate Intensity: project activity may impact the vigor and reproductive success, either directly or indirectly, to most individuals in a population. Project activity may lead to the death of one to several individuals and may impact the vigor or persistence of the population.
- High Intensity: project activity may impact the overall vigor or reproductive success of the majority of individuals in a population. Project activity is likely to lead to the death of individuals and would likely impact the persistence of the population.

Impacts may be both beneficial and negative An overall negative impact may exist even with the conclusion that in the long term the project activity may be beneficial. For example, a project activity may reduce canopy cover over the long term, improving light exposure and indirectly improving habitat suitability. If the project activity also impacts a population's vigor or persistence in the short term, the overall impact would be direct and negative as the population may no longer be able to take advantage of the improved habitat in the long term.

Impacts of multiple project activities would not occur in isolation of other project activities and many are highly likely to overlap in both time and space. For example, while the probability of a single project activity may be low in probability and low in intensity, its overlap with impacts from other activities with low or moderate probabilities and intensities may act synergistically and lead to an overall impact that is greater than the sums of the project activities individually.

In order to assess multiple project activities that may overlap or occur sequentially, I broke down project activities into associated activities or consequences that are a part of the project activities (Table 3). I determined the probability of direct and indirect impacts to botanical resources from associated activities and the possible intensity of those impacts. I summarize my findings in Table 3 and describe the impacts in greater detail below. My effects analysis took into consideration applicable design features for other resources that may also reduce the probability for and intensity of impacts to botanical resource populations or habitats.

Table 3. Associated Activities Assessed for Impacts to Botanical Resources for Upland Habitats in the Sage Hen Integrated Restoration Project

Project Activities Described in Activity Cards and EA	Associated Activities Assessed for Potential Impacts to Botanical Resources
Non-commercial Tree Thinning	On-foot preparatory work Forest Service and Contractor Vehicular Access Contractor camping sites Tree felling without removal Hand pile creation and prescribed burning Lop and scatter slash Broadcast burning, Understory burning, Jackpot burning
Non-mechanical Hazardous Fuels Reduction	On-foot preparatory work Forest Service and Contractor Vehicular Access Contractor camping sites Tree felling without removal Hand pile creation and prescribed burning Lop and scatter slash Broadcast burning, Understory burning, Jackpot burning
Mechanical Hazardous Fuels Reduction	On-foot preparatory work Forest Service and Contractor Vehicular Access Fugitive dust Contractor camping sites Heavy equipment operations Landings/Staging areas Hand pile creation and prescribed burning Lop and scatter slash Broadcast burning, Understory burning, Jackpot burning Machine piling
Prescribed Burning	On-foot preparatory work Forest Service and Contractor Vehicular Access Tree felling without removal Hand pile creation and prescribed burning Lop and scatter slash Broadcast burning, Understory burning, Jackpot burning Hand fireline construction and reclamation Machine fireline construction and reclamation
Reforestation	On-foot preparatory work Forest Service and Contractor Vehicular Access Contractor camping sites Reforestation – planting conifer species Reforestation – site preparation with a salmon blade
Timber Harvest	On-foot preparatory work Forest Service and Contractor Vehicular Access Fugitive dust Contractor camping sites Tree felling with removal Heavy equipment operations Landings/Staging areas Machine piling
Snowplowing	Snowplowing

Project Activities Described in Activity Cards and EA	**Associated Activities Assessed for Potential Impacts to Botanical Resources**
Temporary Road Construction	On-foot preparatory work Forest Service and Contractor Vehicular Access Fugitive dust Tree felling with removal Heavy equipment operations Road maintenance Culvert installation and removal Aggregate Sources Expansion and Development Road construction, realignments and decommissioning
Road Reconstruction	On-foot preparatory work Forest Service and Contractor Vehicular Access Fugitive dust Tree felling with removal Heavy equipment operations Road maintenance Culvert installation and removal Aggregate Sources Expansion and Development Road construction, realignments and decommissioning
National Forest System (NFS) Road Construction	On-foot preparatory work Forest Service and Contractor Vehicular Access Fugitive dust Tree felling with removal Heavy equipment operations Road maintenance Culvert installation and removal Aggregate Sources Expansion and Development Road construction, realignments and decommissioning
Road Storage	On-foot preparatory work Forest Service and Contractor Vehicular Access Fugitive dust Heavy equipment operations Culvert installation and removal Road construction, realignments and decommissioning
Aquatic Organism Passage (AOP) Improvement	On-foot preparatory work Forest Service and Contractor Vehicular Access Fugitive dust Heavy equipment operations Culvert installation and removal
Road and Trail Decommissioning	On-foot preparatory work Forest Service and Contractor Vehicular Access Fugitive dust Heavy equipment operations Culvert installation and removal Road construction, realignments and decommissioning

Project Activities Described in Activity Cards and EA	Associated Activities Assessed for Potential Impacts to Botanical Resources
Recreation Management	On-foot preparatory work Forest Service and Contractor Vehicular Access Fugitive dust Campground improvements Trailhead improvements – new parking area construction Trailhead improvements – vault toilet installation Kiosk installation at select trailheads Dispersed camping management changes

Issue 1: Proposed ground-disturbing and prescribed fire activities may directly or indirectly impact known populations of botanical resources (TEP, R4 Sensitive, and Forest Watch plant species) or unsurveyed suitable habitats in the project area.

Slickspot Peppergrass

Slickspot peppergrass is a small rare plant currently listed as a threatened species under the ESA. Slickspot peppergrass occurs in slickspots (mini-playas) in late seral Wyoming big sagebrush habitat types on the Snake River plains outside of the project area. During my initial assessment, the only associated activity I identified that may occur outside the project area and had the potential to effect slickspot peppergrass habitats is the use of haul routes outside the project area.

According to 16 U.S.C. 1531 Section 402.02, one needs to consider all 'effects of the action' to a listed species. The regulatory definition provided in 16 U.S.C. 1531 Section 402.02 states:

> *Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action.*

Effects from increased use or maintenance of haul routes outside the project area may need to be considered as effects of the action should the routes pass through known occurrences or proposed designated critical habitats for slickspot peppergrass. Based on best available information and past experiences with ongoing vegetation management projects in the immediate vicinity of the project area, the project interdisciplinary team identified no haul routes outside the project area that would go through potential or known occupied habitats for slickspot peppergrass. In addition, haul routes outside the project area are generally paved or regularly maintained by county entities and would not require additional maintenance work.

Forested and Nonforested Upland Habitats

Seven devil's onion, Sacajawea's bitterroot, Scalloped moonwort, little grapefern, tufted penstemon and northern sanicle either occur or have the potential to occur in forested and nonforested upland habitats of the project area. These species' known occurrences and potential habitats overlap with project activities and may be impacted directly or indirectly during implementation.

On-foot Preparatory Work

On-foot preparatory work would occur for all project activities described in the Activity Cards. Sacajawea's bitterroot grows in loose, granitic soils. Foot slips walking through occupied habitat may

disturb soils, roots and damage meristematic tissues near the soil surface; may disturb seed banks or new germinants not well rooted; when actively growing, may damage aboveground structures including leaves and flowers, reducing photosynthate production and may indirectly impact reproductive success by disturbing visiting pollinators. In general, on-foot preparatory work would occur within a relatively short timeframe (estimated 1 to 2 days maximum total in a specific area).

Potential impacts would be direct and *low in probability* and *low to moderate in intensity*. Because of the low probability for and intensity of impacts, the project interdisciplinary team proposed no project design features related to on-foot preparatory work.

Forest Service and Contractor Vehicular Access

Project activities described in Activity Cards (see Sage Hen EA, Appendix A) would increase vehicular use on existing roads and introduce vehicular traffic on temporary roads. Forest Service and contractor crew vehicular access would be limited to existing and temporary roads. In addition, activity-specific design features proposed for weeds (NX-1, NX-3) reduce the potential for impacts but not the intensity of the impacts. Botanical surveys (design feature BT-1) along existing and temporary roads would inform implementers whether botanical resources are present and may be impacted from this associated activity. Avoidance measures would be difficult to implement as road templates are difficult to move on steep slopes.

This activity could directly impact upland habitats when drivers pull onto the side of the road to park, crushing individual plants, compacting soils along the roadside, and increasing soil erosion potential in the road prism. A temporary increase in road densities from temporary road construction would increase the potential for roads to be built through or near populations, increasing potential for impacts. With an increase in use along haul routes inside the project area, vehicle operators may need to pull vehicles off road and into existing vegetation to allow log trucks to pass. If botanical surveyors identify botanical resources along existing or temporary road templates, the implementation team may identify mitigation measures to reduce impacts to the viability and persistence of a population. Under botanical design feature BT-2 the implementation team would identify mitigation measures after post-decision botanical surveys.

With project design features and possible botanical resources mitigation measures, the potential impacts would be *moderate in probability* and *low to moderate in intensity* as vehicular access may kill individuals or reduce individuals' vigor, including seed germination potential. Indirect impacts from the introduction and spreading of non-native invasive species would be *high in probability* but *moderate in intensity* as new introductions could lead to habitat alterations, reducing suitability for native botanical resources.

Fugitive Dust

Fugitive dust is associated with all project activities described in Activity Cards that require road use, construction, decommissioning, and landing construction. To address fugitive dust, timber sale contracts include a provision in which purchasers may need to address dust abatement unless application is conditionally accepted as not necessary. These provisions do not apply to fuels contracts. In addition, the proposed action would resurface or apply new aggregate on up to 14.4% (28.4 miles) of existing National Forest System roads to reduce fugitive dust and sediment delivery to streams in known problem areas. Botanical surveys (design feature BT-1) along existing and temporary roads would inform implementers whether botanical resources are present and may be impacted from this associated activity.

Vehicles and log trucks would increase vehicular traffic on existing roads and would be newly introduced in areas where implementers would construct new temporary roads and realignments. Up to 92.4 miles of temporary roads could be constructed within the project area to facilitate commercial harvest activities of

which approximately 27% would be on existing templates. The temporary increase in road densities combined with increased vehicular traffic and large vehicle size compared to existing uses would increase the amount of fugitive dust as well as the distance fugitive dust may travel. All temporary roads would be decommissioned upon completion of project activities in a timber sale area.

In upland plant communities, dust may directly impact plants by covering leaves and flowers, reducing photosynthesis by preventing light from fully penetrating to leaves and by disrupting evapotranspiration by interfering with stomate function which may in turn exacerbate impacts from drought. Increase in the amount and nature of fugitive dust may changes soil particle types on the soil surface, altering soil structure and texture. Over an extended time of increased use, fugitive dust may increase the soil depths where plants reside, potentially altering germination depth of seed beds, reducing germination potential for plant species that require exposure to sunlight to initiate germination.

Existing roads bisect known Seven devil's onion occurrences with individuals occupying soils up to the road's edge. Existing roads and proposed temporary roads also pass through potential habitats for other botanical resources. With the dust abatement measures incorporated in the proposed action, potential direct and indirect impacts would be *moderate in probability* and *low to moderate in intensity* as the degree of impact depends on the distance from the road.

Contractor Camping Sites

Contractor camping sites may be required for all project activities for which the Forest may contract services. Contractor camping sites typically occur on existing dispersed camp sites and turnouts. Camping activities are typically self-contained in highly disturbed locations. Activity-specific design features for weeds (NX-1, NX-4) would reduce the potential for impacts but not the intensity of the impacts. Botanical surveys (design feature BT-1) may inform implementers whether botanical resources are present and may be impacted from this associated activity.

This activity may indirectly impact potential and occupied habitats through the introduction or spread of non-native invasive plant species from camp sites into areas contractors may be working. New introductions of non-native invasive plant species could lead to habitat alterations, reducing suitability for botanical resources. Given the high dispersed recreational usage in the project area, potential impacts from this activity would not likely exceed the baseline threshold from existing dispersed camping activities throughout the project area. With potential use of existing disturbances and potential for new introductions of non-native invasive plant species, potential impacts would be *low in probability* and *low in intensity*.

Tree Felling without Removal

Tree felling without removal may occur with Non-commercial Thinning, Non-mechanical Hazardous Fuels Reduction and Prescribed burning activities. Botanical surveys (design feature BT-1) would inform implementers whether botanical resources are present where tree felling would occur and may be impacted from this associated activity. Avoidance measures are possible and the implementation team would need to determine whether avoidance is feasible or mitigation measures are more appropriate on a case-by-case basis. Mitigation measures would need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2).

In all habitats, tree felling into occupied habitats may directly harm individual plants by crushing aboveground and belowground meristematic tissues through the force of impact on the ground, even when the plant is dormant. Seed banks may be buried to deeper depths than for which the species is adapted for germination, reducing seed bank germination potential.

After crews fell trees, implementers may lop and scatter slash or hand pile slash as preparatory work for slash removal. Impacts from slash removal methods are described below. Given avoidance measures are

possible but may not always be logistically feasible, potential impacts may be *moderate in probability* and *moderate in intensity*. Potential indirect impacts may be *low in probability* and *moderate in intensity*.

Tree Felling with Removal

Tree felling with removal would occur during NFS and Temporary Road Construction and Reconstruction and Timber Harvest activities. Project design features for vegetation, wildlife, soils, water fisheries and weeds (SW-8, SW-9, VM-10, WL-8) would reduce the potential for and intensity of the impacts from tree felling with removal. Botanical surveys (design feature BT-1) would inform implementers whether botanical resources are present in these locations and may be impacted from this associated activity. The logistical feasibility of avoidance measures depends on the activity for which tree felling with removal occurs. Avoidance measures for road construction tree removal may be difficult to implement as road templates require specific gradations to minimize impacts to hydrologic functions, reducing maneuverability of activity for complete avoidance. Avoidance measures for timber harvest tree removal are possible and the implementation team would determine whether avoidance is feasible or mitigation measures are more appropriate on a case-by-case basis. Under botanical design feature BT-2 the implementation team would identify mitigation measures after post-decision botanical surveys.

The potential for loss of individuals or unintended extirpation of populations still exists with this activity. Tree removal along skid trails or skyline corridors may directly harm individual plants and seed banks through ground disturbance, especially if meristematic tissues, roots, and seed banks reside close to the soils surface. Seed banks may be buried to deeper depths than for which the species is adapted for germination, reducing seed bank germination potential. Tree felling and removal may also indirectly impact populations and suitable habitat if soil disturbances alter the soil moisture regimes, alter surface water flow direction, and temporarily increase erosion and water channeling. Potential direct impacts may be *moderate in probability* and *moderate to high in intensity* depending on the removal method and mitigation measures effectiveness. Potential indirect impacts may be *low to moderate in probability* and *moderate in intensity*.

Heavy Equipment Operations

Heavy equipment operations include, but are not limited to, the use of yarders, processors, masticators, feller bunchers, and tractor jammers. Heavy equipment operations would be associated with AOP Improvement, NFS and Temporary Road Construction and Reconstruction, Road Storage, Road Decommissioning, Mechanical Hazardous Fuels Reduction, and Timber Harvest activities. Yarders, processors, log loaders and rubber-tired skidders typically operate on road templates and landings. Large equipment such as masticators, feller bunchers and tractor jammers may operate off-road and require areas with open tree canopies for turning and maneuvering during operations. Design features for weeds (NX-1, NX-3, NX-4) would reduce potential for and intensity of indirect impacts from the introduction and expansion of noxious and non-native invasive plant species. Botanical surveys (design feature BT-1) would inform implementers whether botanical resources are present and may be impacted from this associated activity.

Avoidance measures effectiveness depends on the project activities under which heavy equipment operations occur. I assess effectiveness of avoidance measures for roads in the appropriate sections below. Fuels and timber harvest equipment limited to road templates and landings would also apply under the appropriate roads and landings sections below. Avoidance measures for off-road fuels and timber harvest equipment are possible and the implementation team would determine whether avoidance is feasible or mitigation measures are more appropriate on a case-by-case basis. Under botanical design feature BT-2 the implementation team would identify mitigation measures after post-decision botanical surveys.

Seven devil's onion and Sacajawea's bitterroot typically occupy open tree canopies adjacent to forest edges and may be susceptible to heavy equipment maneuvering. In all habitats, continued occupation of a

location may increase soil compaction or disturb soils by creating berms when maneuvering, directly impacting individuals, seed banks, and habitat suitability. Continued occupation of a location may also indirectly harm a population if soils compaction near occupied habitat alters soil moisture regimes and directional surface water flows.

Soil movement may damage meristematic buds and root structures located near the soil surface. Seed banks may be buried at deeper depths than for which the species is adapted for germination, reducing seed bank germination potential. Masticator heads typically disturb the ground when placed in rest within a canopy opening. Large equipment use for tree removal may also impact occurrences that are nearby through the creation of slash and debris which may inadvertently land in the occurrence with enough force to dislodge plants and disturb seed banks. If enough slash builds up, the depths may be enough to suppress the population and seed banks, reducing overall population vigor.

Given avoidance measures may be possible but not always logistically feasible, potential direct impacts would be *moderate in probability* and *moderate to high in intensity* depending on mitigation measures effectiveness. Potential indirect impacts would be *moderate in probability* and *moderate to high in intensity*.

Road Maintenance

Road maintenance is associated with NFS and Temporary Road Construction and Reconstruction activities. The weight and tire size and numbers on log trucks would increase existing route wear and tear, increasing road maintenance needs. Design features for soils, water and weeds (NX-2, NX-3, NX-4, NX-5, NX-6, SW-6) would reduce the potential for and intensity of long-term impacts to habitats. Existing roads bisect known Seven devil's onion occurrences with individuals occupying soils up to the road's edge. Existing roads and proposed temporary roads also pass through potential habitats for other botanical resources. Botanical surveys (design feature BT-1) along existing and temporary roads would inform implementers whether additional botanical resources are present and may be impacted from this associated activity. Avoidance measures would be difficult to implement as road templates are difficult to move once in place. Under botanical design feature BT-2 the implementation team would identify mitigation measures after post-decision botanical surveys.

Road maintenance includes ground disturbance such as blading and shaping existing roadbed, vegetation clearing near road edges, ditch and culvert cleaning and replacement, water bar removal and installation, and surface repair including fill and aggregate sourcing and placement. As native surface roads are maintained, berms develop along road edges, requiring spoils disposal. Spoils may be disposed of by casting off the roadside but is more typically reused by pulling back into the road center for resurfacing. Road maintenance preferably occurs during the times of year when moisture remains in the roadbed surface materials, increasing the surface's ability to bind and hold, decreasing the surface materials loss and creation of fugitive dust. Soil erosion and surface water flows may increase and lead to gullies, increasing impacts through soil loss, habitat degradation, loss of individuals and seed banks in a population, and an increased risk of gullies reaching the road surface, resulting in roadbed surface loss. Well-placed and regularly maintained water bars would direct water into a natural drainage and be spaced frequently enough to reduce an increase in surface water flows that may scour the drainages to reduce soil erosion and gullying.

During road maintenance activities, whole plants and seed banks may be directly lost through physical removal and burial. Individuals and seed banks may be lost from crushing, tearing, unearthing, and burial from heavy equipment. Road maintenance activities may alter surface water flows. An indirect impact may be surface water flow redirection from natural drainages and alter occupied habitats' water tables for Seven devil's onion, or other botanical resources, altering habitat suitability.

The implementation team would need to determine whether avoidance is feasible or mitigation measures are more appropriate on a case-by-case basis. Mitigation measures would need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2). With project design features and possible botanical resources mitigation measures, the potential impacts would be *moderate in probability* and *moderate in intensity* as road maintenance could kill or reduce individuals' vigor, including seed germination potential, for members of the population near the roadbed. Indirect impacts from altered surface water flows and non-native invasive species would be *moderate to high in probability* and *moderate in intensity* as indirect impacts could lead to habitat alterations, reducing habitat suitability.

Landings/Staging Areas (New and Existing)

Typically, landings and staging areas are wide sections or turnouts on existing road systems. In some circumstances, purchasers need to construct new landings for better access and timber harvest processing as landing locations need to be near treatment units. Design features for soils during post-implementation rehabilitation (SW-7) and weeds (NX-1, NX-3, NX-4) would reduce the potential for and intensity of long-term impacts to habitats. Botanical surveys (design feature BT-1) would inform implementers whether botanical resources are present at existing or new landings and may be impacted from this associated activity. Under botanical design feature BT-2 the implementation team would identify mitigation measures after post-decision botanical surveys. The potential for loss of individuals or unintended extirpation of populations still exists during construction and use of landings and staging areas.

The impacts for using existing disturbed sites for landings and staging areas would be similar to road maintenance described above. The focused activities may increase the potential for introducing non-native invasive species to the location. With increased use by heavy equipment, localized soil compaction may increase. Occasionally, new landings or staging areas need to be constructed to accommodate harvesting activities. The potential impacts for constructing new landings and staging areas would be similar to those described for road reconstruction, realignment and decommissioning below. The localized vegetation removal, excavation and fill installation may be more comparable to road construction activities.

For known Seven devil's onion occurrences near existing roads, vegetation removal, excavation and infilling during landing construction could unintentionally remove or bury individuals and seed banks and degrade habitat suitability. Through excavation and infilling, surface water flows would shift. An indirect impact from using existing or new landings may be surface water flows redirection from natural drainages. This may alter water tables for Seven devil's onion occupied habitats or other species occupying upland habitats, altering habitat suitability.

The implementation team would need to determine whether avoidance is feasible or mitigation measures are more appropriate on a case-by-case basis. Mitigation measures would need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2). With project design features and possible botanical resources mitigation measures, the potential impacts from landings construction and use would be *low in probability* and *low to moderate in intensity* as activities could kill or reduce individuals' vigor, including seed germination potential. Indirect impacts from non-native invasive species would be *moderate to high in probability* but *moderate in intensity* as new introductions could lead to habitat alterations, reducing suitability for botanical resources.

Culvert Installation and Removal

Culverts installation and removal is associated with AOP Improvement, NFS and Temporary Road Construction and Reconstruction, Road Storage, and Road Decommissioning activities. Design features for soils, water, fisheries and weeds (NS-2, NX-3, NX-4, NX-5, NX-6, SW-6, SW-13) would reduce

potential for impacts but not the intensity of the impacts. Botanical surveys (design feature BT-1) along existing and temporary roads would inform implementers whether additional botanical resources are present and may be impacted from this associated activity. Avoidance measures would be difficult to implement as culvert locations are fixed and immovable. Potential for loss of individuals of unintended extirpation of populations exist during implementation.

Culvert installation and removal would include vegetation clearing to access the drainage, materials excavation to place or remove the culvert, and temporary surface disturbance and hyporheic water flows. Seven devil's onion occupies ephemeral watercourses and seeps with several known occurrences bisected by existing routes. Locations where culverts may be appropriate may coincide with potential habitats for Seven devil's onion, Scalloped moonwort, little grapefern, or tufted penstemon. The implementation team would need to determine whether avoidance is feasible or mitigation measures are more appropriate on a case-by-case basis. Mitigation measures would need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2).

With project design features and possible botanical resources mitigation measures, the potential impacts would be *low to moderate in probability* and *moderate in intensity*. Potential indirect impacts would be *low to moderate in probability* and *moderate in intensity*.

Aggregate Sources Expansion and Development

Mineral aggregate sources development would be associated with NFS and Temporary Road Construction and Reconstruction and Road Maintenance activities. Design features for weeds (NX-1, NX-3, NX-4, NX-7) would reduce the potential for impacts but not the intensity of the impacts. Botanical surveys (design feature BT-1) along existing and temporary roads would inform implementers whether additional botanical resources are present and may be impacted from this associated activity. Avoidance measures for aggregate sources development are possible and the implementation team would determine whether avoidance is feasible or mitigation measures are more appropriate on a case-by-case basis. Under botanical design feature BT-2 the implementation team would identify mitigation measures after post-decision botanical surveys.

The potential loss of individuals or unintended extirpation of populations still exists during implementation. The expansion and development of existing aggregate sources would require direct ground disturbance through excavation and mineral materials removal. All existing vegetation in the expansion or development area would be physically removed and destroyed from the slopes' surface into which the aggregate sources would be expanded. Excavation would also temporarily increase fugitive dust in adjacent plant communities (see Fugitive dust discussion).

During these activities, whole plants and seed banks may be directly lost through physical removal, crushing, tearing, unearthing or burial. The native soil environment would decrease in suitability for native plant species through soil structure and soil aggregation loss. With increased use by heavy equipment, localized soil compaction immediately adjacent to the aggregate sources may increase. An indirect impact may be surface water flow redirection from natural drainages and towards occupied habitat.

Existing aggregate sources are low in numbers and activities would be concentrated and localized. Given avoidance measures may be possible but not always logistically feasible, potential impacts would be *low in probability* and *moderate in intensity* as activity could kill or reduce individuals' vigor, including seed germination potential. Indirect impacts from non-native invasive species would be *moderate in probability* and *moderate in intensity* as new introductions or expansion of existing occurrences could lead to habitat alterations, reducing habitat suitability for botanical resources.

Road Construction, Realignments and Decommissioning

Road Construction is associated with NFS and Temporary Road Construction and Reconstruction, Road Storage and Road Decommissioning activities. Road construction activities require direct ground disturbance through the scraping off topsoil layers and materials excavation to improve the grade. Design features for soils, water, fisheries and weeds (NX-1, NX-2, NX-3, NX-4, NX-5, NX-6, SW-6, SW-13) would reduce the potential for impacts but not the intensity of the impacts. Botanical surveys (design feature BT-1) along new and temporary roads would inform implementers whether botanical resources are present and may be impacted from this associated activity. Avoidance measures would be difficult to implement as road templates are difficult to move on steep slopes. Potential for loss of individuals or unintended extirpation of populations still exist during implementation.

Road decommissioning, moving a road into storage or converting a road into a motorized trail also requires direct ground disturbance through materials excavation stored downslope of the road back onto the roadbed and recontouring the grade back to the original slope. With temporary roads remaining in service for a minimum of 3 to 5 years and possibly longer, plants may become established on these stored materials by the time decommissioning commences. Nearby vegetation, particularly trees, may be physically uprooted and moved from their current locations and placed along the recontoured surface to reduce soil erosion. Excavation and vegetation removal would disturb surrounding adjacent soils. Road reconstruction and realignments would also temporarily introduce fugitive dust from road use into new areas that had not previously experienced impacts from fugitive dust given prior distance from existing roads.

During these activities, whole plants and seed banks may be directly lost through physical removal and burial. The native materials used for road construction would further lose suitability for native plant species through compaction from frequent use. Individuals and seed banks may be lost from crushing, tearing, unearthing, and burial through compaction, future road maintenance activities, excavation and filling during decommissioning.

For botanical resources with potential habitat in the project area, the temporary increase in road densities may temporarily impact habitat suitability in the project area. Motorized public use would be prohibited on temporary roads. Potential impacts from an increase in recreational vehicles displaced from project activities into other parts of the project area would be similar to the impacts described above for crew and contractor vehicle access and travel routes.

Avoidance measures along temporary road templates may be difficult to implement as road templates require specific gradations to minimize impacts to hydrologic functions, reducing maneuverability for complete avoidance. The implementation team would need to determine whether avoidance is feasible or mitigation measures are more appropriate on a case-by-case basis. Mitigation measures would need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2).

With project design features and possible botanical resources mitigation measures, the potential impacts in upland habitats would be *high in probability* and *low to high in intensity* depending on the distance of botanical resources from the roads. Potential indirect impacts from non-native invasive species would be *high in probability* and *moderate in intensity* as the known infestations are along road corridors, including proposed intersections for temporary roads.

Snowplowing

Snowplowing is associated with Timber Harvest and Reforestation activities. Design features developed for recreation and roads (RM-2, RR-4) may reduce the potential for and intensity of impacts. The proposed action would limit snowplowing to existing road prisms and turnouts, minimizing snowplowing

activities that may occur in areas adjacent to but outside the road prisms. The proposed action would also limit snow removal depths by requiring a minimum of 4 inches of snow remain on the road surface to protect the road surface. In some circumstances with an uneven or undulating roadbed, the plow could still scrape to the mineral substrate, potentially disturbing relatively small areas of the road surface.

Road prisms typically extend beyond the immediately perceived road surface and include drainage ditches, culverts and side slopes adjacent to the road surface which are typically occupied by native or non-native plant communities. Some herbaceous plants, such as Seven devil's onion and Sacajawea's bitterroot, emerge in late winter to early spring under the snow on the landscape and meristematic tissues and flower buds may be present near or above the snow surface. Snowplowing in the road prism may unintentionally clip individuals' meristematic tissues and flowers buds. If a plant's growth habit only produces a single meristematic apical bud, the individual may be unable to continue growth or reproduction during the growing season. In the long run, the individual may be unable to produce enough photosynthates to store in underground structures for future growing seasons. Indirect impacts may include snow pile or snow berm creation that may alter snow melt timing. An indirect impact may be surface water flows redirection from natural drainages and towards occupied habitat.

With project design features, potential impacts would be *low in probability* and *low to moderate in intensity* depending on the proportion of a population located in a road prism. Indirect impacts from non-native invasive species would be *low to moderate in probability* and *moderate in intensity* as new introductions could lead to habitat alterations, reducing habitat suitability for botanical resources.

Hand Pile Creation and Prescribed Burning

Hand pile creation and prescribed burning is associated with Mechanical Hazardous Fuels Reduction, Non-mechanical Hazardous Fuels Reduction, Non-commercial Tree Thinning, and Prescribed burning. Hand piling is a method of rearranging slash in preparation for its removal. Botanical surveys (design feature BT-1) would inform implementers whether botanical resources are present in hand pile units and may be impacted from this associated activity. The implementation team would need to determine whether avoidance is feasible for hand pile creation and prescribed burning or whether mitigation measures are more appropriate. Mitigation measures would need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2).

Slash depths that exceed 7.5 cm (roughly 3 inches) may suppress seed germination and herbaceous plant growth. When slash is hand-piled and allowed to dry for 1 to 2 years prior to prescribe burning, the pile's presence would suppress plants located directly beneath the piles. Prescribed burning hand-piled slash as a method of slash removal results in higher intensity and longer residence time of lethal temperatures and lethal temperatures may penetrate deeply enough to kill regenerative structures and seed banks, reducing recovery of individuals located directly under the piles. Bare, sterilized soils resulting from lethal temperatures at pile locations may persist for years or be invaded by non-native invasive species.

With possible mitigation measures that ensure viability and persistence of a botanical resources population, the potential impacts from hand pile burning would be *moderate in probability* and *moderate in intensity* for all botanical resources. Indirect impacts from invasions by non-native invasive species would be *moderate in probability* and *moderate in intensity*.

Machine Piling

Machine piling is associated with mechanical hazardous fuels reduction and timber harvest activities. Botanical surveys (design feature BT-1) may inform implementers whether botanical resources are present in units with machine piling and may be impacted from this associated activity. Avoidance measures are possible for machine piling and the implementation team would determine whether avoidance is feasible or whether mitigation measures are more appropriate. Mitigation measures would

need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2).

For machine piling, direct and indirect impacts from heavy equipment such as feller-bunchers and masticators are similar to impacts described for heavy equipment operations. Machine piles are larger than hand piles, increasing fire intensities and longer residence times of lethal temperatures compared to hand piles. The size of machine piles may unintentionally bury or smother an entire population.

Given avoidance measures may be possible but not always logistically feasible, potential direct impacts would be *low to moderate in probability* and *moderate to high in intensity*. Potential indirect impacts may be *moderate in probability* and *moderate in intensity*.

Lop and Scatter Slash

Lop and Scatter is associated with Mechanical Hazardous Fuels Reduction, Non-mechanical Hazardous Fuels Reduction, Non-commercial Tree Thinning and Prescribed burning activities. Botanical surveys (design feature BT-1) would inform implementers whether botanical resources are present in hand pile units and may be impacted from this associated activity. Under botanical design feature BT-2 the implementation team would identify mitigation measures after post-decision botanical surveys.

Lopping and scattering slash is another method of rearranging slash in preparation for its removal. Lop and scatter work typically occurs by hand crews walking into treatment areas. As described for hand piling, slash depths that exceed 7.5 cm (roughly 3 inches) may suppress seed germination and herbaceous plant growth. When slash is hand-piled and allowed to dry for 1 to 2 years prior to prescribe burning, the pile's presence would suppress plants located directly beneath the piles. Lopping and scattering slash may reduce materials depths and densities compared to hand piles with slash depths no greater than 36 inches but may increase the overall slash ground coverage.

As lop and scatter distributes slash across an entire treatment unit, avoidance measures for botanical resources within a treatment unit may not be feasible in all circumstances. The implementation team would need to determine whether avoidance is feasible for lopping and scattering slash or whether mitigation measures are more appropriate. Mitigation measures would need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2). The potential for slash to be spread throughout a plant specie's population increases with proximity to treatment areas. The potential for direct and indirect impacts would be *moderate in probability* and *moderate to high in intensity* for botanical resources.

Broadcast Burning, Understory Burning, and Jackpot Burning

Broadcast, understory or jackpot burning are methods for slash removal and are associated with mechanical hazardous fuels reduction, non-mechanical hazardous fuels reduction, non-commercial tree thinning and prescribed burning activities. Design features for weeds (NX-1, NX-2, NX-3, NX-4) would reduce the potential for and intensity of impacts. Botanical surveys (design feature BT-1) would inform implementers whether botanical resources are present in burn units and may be impacted from this associated activity. Under botanical design feature BT-2 the implementation team would identify mitigation measures after post-decision botanical surveys.

The intensity and residence time of lethal temperatures from burning slash depends on the depth, fuels size, moisture content, and seasonal timing. Drier, deeper fuels may burn at higher intensities with increased residence times of lethal temperatures. Coarser woody debris would burn longer, lengthening the residence time of lethal temperatures required to consume the fuels compared with fine and mixed woody debris. Understory burning to remove needle cast and accumulated duff may also increase residence times of lethal temperatures if duff depths exceed 7.5 cm (roughly 3 inches). In general, proposed prescriptions would attempt to achieve a low severity surface fire in which shrubs, needle cast

and upper duff layers would be consumed. In some instances, including dense stands in which commercial or non-commercial thinning is not feasible, higher severity fire effects may be preferred to achieve the desired condition for those forested stands.

Burning during times of the year when fuels and soils are moist decreases the soil surface heat penetration and reduces temperatures to non-lethal levels even under high fuel load conditions. In addition, plant recovery post-burn depends in part on stored plant carbohydrate levels, meristematic tissues locations susceptible to fire, and the presence of actively growing tissues that are more sensitive to high temperatures than dormant tissues. Jackpot burning typically occurs in late fall when fuel moistures and weather conditions favor low severity fire behavior and lower residence times of lethal temperatures. Broadcast burning may occur in spring or fall depending on fuel moistures and weather conditions.

Additionally, maintenance burn timing may impact long-term plant recovery between burns. The proposed action would permit maintenance burning as often as every 5 to 20 years and would depend on vegetation post-burn responses. Repeat burning may impact plant species by reducing their carbohydrate reserves or seed banks over time through repeated disturbances. The more growing seasons between repeat maintenance burning, the more a plant may recover lost carbohydrate reserves and seed banks.

Given broadcast, understory and jackpot burning are blunt management tools applied across an entire treatment unit, avoidance measures for botanical resources may not be feasible in all circumstances. The implementation team would need to determine whether avoidance is feasible for burning operations or whether mitigation measures are more appropriate. Mitigation measures would need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2). The potential impacts would be *high in probability* and *moderate to high in intensity* for botanical resources depending on the effectiveness of mitigation measures. Indirect impacts from non-native invasive species would be *moderate in probability* and *moderate in intensity* as post-burning invasions could lead to habitat alteration, reducing habitat suitability.

Hand Fireline Construction and Reclamation

Hand fireline construction and reclamation is associated with prescribed burning and may occur in all habitats. Design features for soils, water and weeds (NX-1, NX-2, NX-3, NX-4, SW-11, SW-12) would reduce the potential for and intensity of impacts. Avoidance measures are possible for hand fireline construction and reclamation but may not be feasible in some circumstances. Avoidance measures or mitigation measures would need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2).

The potential for loss of individuals still exists during implementation. Hand line construction requires scraping to bare mineral soils along a linear corridor up to 24 inches wide. Scraping physically removes all living and dead plant materials, including roots, and aboveground stems of brush and understory trees along both sides of the corridor edge. The scraping is completed with hand tools and does not typically remove materials below the soil's organic layer. The width of the hand fireline, and tools used to construct the line, improve the maneuverability of fireline on the landscape to reduce impacts to aboveground plant structures.

Impacts may still occur to underground structures and seed beds less visible aboveground. Soil scraping may damage underground meristematic buds and root structures located near the soil surface or may physically dislodge the entire plant. Seed banks may be disrupted with species requiring light exposure for germination buried at deeper depths than for which the species is adapted for germination, reducing seed bank germination potential. During these activities, whole plants and seed banks may be directly lost through physical removal and burial.

An indirect impact may be surface water flow redirection from natural drainages and towards or away from occupied habitat. Typical hand line construction specifications include water bar construction throughout the linear corridor, reducing the potential for this impact.

Hand lines are typically constructed and rehabilitated in the same burn season or after the burn is declared out, reducing the timeframe of its presence on the landscape. In addition, the native materials removed would not lose their suitability for native plant species during the short timeframe, reducing the impact's timeframe.

Given avoidance measures may be possible and the width and maneuverability of hand lines assist with reducing impacts where avoidance is not possible, potential impacts would be *low in probability* and *low to moderate in intensity*. Indirect impacts from non-native invasive species would be *low in probability* and *moderate in intensity* as new introductions could lead to habitat alteration, reducing habitat suitability.

Machine Fireline Construction and Reclamation

Machine fireline construction is associated with prescribed burning activities. Design features for soils, water and weeds (NX-1, NX-2, NX-3, NX-4, SW-11, SW-12) would reduce the potential for and intensity of impacts to botanical resources. Botanical surveys (design feature BT-1) would inform implementers whether botanical resources are present where machine fireline construction would occur and may be impacted from this associated activity. Avoidance measures are possible and the implementation team would need to determine whether avoidance is feasible or mitigation measures are more appropriate on a case-by-case basis. Mitigation measures would need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2).

The potential for loss of individuals or unintended extirpation of populations still exists as machine fireline is constructed with heavy equipment with limited mobility compared to hand crews constructing hand fireline. Machine fireline construction requires scraping to bare mineral soils along a linear corridor up to 4 feet wide. If a dozer is used for construction, the linear corridor could be scraped to bare mineral soils up to 12 feet wide. Machine firelines are typically deeper than hand firelines given it is easier to control the scraping depth of hand tools than machine tools. Materials may be removed below the soils organic layer. Scraping physically removes all living and dead plant materials, including roots, in the linear corridor and physically removing aboveground stems of brush and understory trees along both sides of the corridor edge.

During machine fireline construction, whole plants and seed banks may be directly lost through physical removal, crushing, unearthing, and burial. Soil scraping would physically remove aboveground structures and may damage meristematic buds and root structures located near the soil surface or may physically dislodge the entire plant. Seed banks may be disrupted with species requiring light exposure for germination buried at deeper depths than for which the species is adapted for germination, reducing seed bank germination potential. During these activities, whole plants and seed banks may be directly lost through physical removal and burial. Vegetation removal would disturb surrounding adjacent soils. Soils berms may unintentionally bury others residing adjacent to the machine fireline.

Machine firelines are typically constructed and rehabilitated in the same burn season or when feasible to do so, reducing the timeframe of its presence on the landscape. In addition, the native materials removed would not lose their suitability for native plant species during the short timeframe, reducing the impact's timeframe.

An indirect impact may be the surface water flow redirection from natural drainages and towards or away from occupied habitat. Typical machine fireline construction specifications include water bar construction throughout the linear corridor, reducing the potential for this impact.

Given avoidance measures may be possible but not always logistically feasible, potential impacts would be *moderate in probability* and *moderate to high in intensity* given the width and limited mobility of the machine line, particularly if the line is constructed through occupied habitat. Indirect impacts from non-native invasive species would be *moderate in probability* and *moderate in intensity* as new introductions could lead to habitat alteration, reducing suitability for botanical resources.

Reforestation – Planting Conifer Species

Reforestation includes planting conifer seedlings where desirable tree species may not regenerate naturally. Design features for weeds (NX-2, NX-8, NX-9) would reduce the potential for but not the intensity of impacts from noxious and non-native invasive species. Botanical surveys (design feature BT-1) in reforestation units would inform implementers whether additional botanical resources are present and may be impacted from this associated activity. Avoidance measures are both feasible and effective for reforestation units as crews plant conifer seedlings by hand and can easily maneuver around botanical resources. Avoidance measures would need to ensure conifer planting does not impact botanical resources populations (see design feature BT-2).

Tree planting could indirectly impact botanical resources through long-term alteration of suitable habitat. Seven devil's onion and Sacajawea's bitterroot occur in forest openings or forested landscapes with low tree densities. Planting trees in occupied habitat or nearby may increase canopy cover, reducing the occupied habitat suitability for duration of the trees' lives. The increase in tree densities may also increase competition for scarce soil and water resources, reducing population vigor.

Given avoidance measures are feasible for reforestation efforts, impacts would be *low in probability* and *moderate in intensity* if planting occurs in occupied habitats. Potential indirect impacts would be *low in probability* and *moderate in intensity* through a gradual decrease in habitat suitability.

Reforestation – Site Preparation with a Salmon Blade

In some locations, site preparation with a salmon blade may be required to improve natural regeneration of desirable conifer species. A salmon blade is a specialized blade typically attached to a bulldozer or crawler tractor to scarify and prepare the seed bed. The salmon blade is a modified dozer blade with teeth two- to three-feet long that move slash and create a seeding microsite by creating furrows two to five inches deep in the soil, exposing mineral soil and reducing or incorporating slash into the soils. Design features for weeds (NX-2, NX-3) would reduce the potential for but not the intensity of impacts from noxious and non-native invasive species. Botanical surveys (design feature BT-1) in reforestation units would inform implementers whether additional botanical resources are present and may be impacted from this associated activity.

Potential for loss of individuals or unintended extirpation of populations still exists. Impacts from its use would be similar to heavy equipment operations that may operate off-road as described above. In addition, the furrowing teeth on the salmon blade are designed to sever roots of plants to reduce competition for trees seedlings, which would lead to reduced vigor or survival of plant species impacted. An indirect impact may be surface water flow redirection from natural drainages and towards or away from occupied habitat. The salmon blade would be used on less than 35-percent slopes predominantly in Potential Vegetation Group 6 habitat types (Cool, Moist Grand fir) following regenerative cuts. The salmon blade would not be used in the Snowbank Inventoried Roadless Area.

Given avoidance measures may be possible but not always logistically feasible, potential impacts would be *low to moderate in probability* and *moderate to high in intensity* particularly if applied in or near occupied habitats. Potential indirect impacts would be *moderate in probability* and *moderate in intensity* through decreased habitat suitability over time from noxious and non-native invasive species.

Campground Improvements

Campground improvements are associated with recreation management activities. Campground construction would be limited to existing campground footprints in which limited botanical resources currently exist. Direct impacts from construction would be similar to heavy equipment operations and road construction impacts described above. Construction could indirectly impact surrounding habitats through excavation and infilling, shifting surface water flows. An indirect impact may be surface water flow redirection from natural drainages and alter water tables or surface flows of surrounding habitats for upland species. This may potentially degrade habitat suitability outside the campgrounds' existing footprints.

The potential direct impacts may be *low in probability* and *moderate to high in intensity*. Potential indirect impacts may be *low to moderate in probability* and *moderate in intensity*.

Trailhead Improvements – New Parking Area Construction

Trailhead improvements are associated with recreation management activities. The potential impacts for constructing a new parking area for a trailhead and staging areas would be similar to those described for road construction, including localized vegetation removal, excavation fill installation and compaction. The location of the new parking area would be in an existing disturbed site currently used for dispersed recreation. Some vegetation removal may be required to expand and grade the site. Vegetation removal, excavation and infilling could remove or bury individuals and seed banks and degrade habitat suitability. Plant species occupying the location would experience a direct long-term loss of individuals and habitat. Through excavation and infilling, surface water flows would shift. An indirect impact may be surface water flow redirection from natural drainages and altering surrounding habitats' water tables or surface flows for upland and riparian species, potentially degrading habitat suitability.

Potential direct impacts may be *low in probability* and *moderate in intensity*. Potential indirect impacts may be *moderate in probability* and *moderate in intensity*.

Trailhead Improvements – Vault Toilet Installation

Trailhead improvements are associated with recreation management activities. Vault toilet installation includes physical vegetation removal in the immediate vicinity; excavation of a large pit in which the vault would be installed; and prefabricated structure installation. The installation would require large heavy equipment which need large open spaces for access and maneuverability. The proposed vault toilet would be installed in a new trailhead parking area, reducing the need to construct or enlarge turn-around spaces for installation. In the long term, vault toilet installation may indirectly impact surrounding upland and riparian habitats by improving human waste management, reducing impacts from human waste dispersal in surrounding habitats.

Potential direct impacts may be *low in probability* and *low to Moderate in intensity*. Potential indirect impacts may be *moderate in probability* and *moderate in intensity*.

Kiosk Installation at Select Trailheads

Kiosk installation is associated with recreation management activities. Kiosk installation includes localized hole digging (soils excavation) for post installation and physical removal or pruning of vegetation in the immediate vicinity to create physical space for the kiosk. Post hole excavation, while small in scale, could directly impact individuals and seed banks if the excavation occurs in the same location occupied by another plant.

Potential direct and indirect impacts would be *low in probability* and *low to moderate in intensity* should botanical resources be present in the same location as post holes.

Dispersed Camping Management Changes

Dispersed camping management is associated with recreation management activities. The proposed action includes a proposition to close dispersed camping areas near a developed campground. Dispersed camping closures would displace dispersed campers, leading the dispersed campers to seek alternative sites in nearby areas. The ability to predict where displaced dispersed campers may seek out and create alternative dispersed sites is difficult. Therefore, the implementation team would need to assess impacts as they occur and develop mitigation measures in response to changing patterns of dispersed camping (see design feature BT-2).

The potential direct impacts may be *moderate in probability* and *low to moderate in intensity*, depending on presence of botanical resources. Potential indirect impacts may be *moderate in probability* and *moderate in intensity*.

Riparian and Aspen Habitats

As I describe above, I relied on riparian conservation area (RCA) delineations as a generalized model to account for direct and indirect impacts to species that may inhabit riparian areas, including least phacelia, Bryum moss, scalloped moonwort, grapefern and tufted penstemon. Impacts to modeled aspen stands may account for direct and indirect impacts to potential habitat attributes for the R4 Sensitive plants least phacelia and Bryum moss, and Forest Watch plants scalloped moonwort, grapefern and tufted penstemon.

The mechanisms that may directly or indirectly impact botanical resources that occur in riparian and aspen habitats are the same mechanisms described above with a few key differences. The proposed action and design features include restrictions on the activities that may occur in RCAs. For associated activities for which the impacts would be similar, I concluded the probability and intensity of impacts would be the same for riparian and aspen habitats.

Fugitive Dust

To reduce fugitive dust and sediment delivery to streams in known problem areas, the proposed action would resurface or apply new aggregate on 14.4% (28.4 miles) of existing National Forest System roads. This includes 2.8 miles of existing National Forest System roads in RCAs. With the additional dust abatement measures incorporated in the proposed action for riparian habitats, potential direct and indirect impacts would be *low in probability* and *low to moderate in intensity* as the degree of impact depends on the distance from the road. Dust abatement measures in aspen habitats are the same as described for upland habitats, so the potential direct and indirect impacts would be *moderate in probability* and *low to moderate in intensity* as the degree of impact depends on the distance from the road.

Vegetation Management Activities

Associated activities for vegetation management inside RCAs and aspen habitats include tree felling without removal; tree felling with removal; heavy equipment operations; and machine piling. The proposed action limits vegetation management within RCAs with no vegetation management within the 30-foot RCA buffer and noncommercial hand thinning followed by lop and scatter or hand piling and burning from 30 to 130 feet in the delineated RCA. In RCAs and wet meadows, heavy equipment operations are limited to existing road templates. Vegetation design features require that trees felled on the perimeter of and landing inside the RCA 130-foot buffer would not be removed and would be left in place to reduce soil disturbance unless determined necessary. Trees may be felled and removed by whole tree yarding within the RCA buffer from 130 feet to 260 feet but equipment tracks would not be allowed within the 260-foot buffer unless deemed necessary on a case-by-case basis. In the long-term, the proposed action would maintain the riparian functions as they relate to water quality which would indirectly maintain riparian habitats in their existing conditions.

In aspen stands, conifer trees would be felled and may be left in place or removed to reduce negative impacts from conifer encroachment. In the short term, individual aspen ramets may be harmed during the conifer felling and removal. Aspen generally recover quickly from disturbances, generally within 3 to 5 years of treatment, as adventitious buds of healthy clones quickly sprout from the roots, replacing any damaged ramets. In the long-term, the proposed action would improve aspen stand ecological functions and both directly and indirectly improve the habitat suitability of aspen stands for other botanical resources. Machine piling typically occurs within the Wildland-Urban Interface to assist private lands risk reduction during prescribed burning operations. With a few small exceptions, aspen stands in the project area occur in higher elevations and are not near Wildland-Urban Interface boundaries. For the small exceptions, machine piling would impact aspen habitats similarly to other botanical resources.

For these vegetation management activities, botanical surveys (design feature BT-1) would inform implementers whether additional botanical resources are present and may be impacted from this associated activity. Avoidance measures are possible and the implementation team would need to determine whether avoidance is feasible or mitigation measures are more appropriate on a case-by-case basis. Mitigation measures would need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2). Given the proposed action reduces activities permitted in RCAs and avoidance measures may be possible, potential impacts would be *low in probability* and *moderate in intensity*. Potential indirect impacts may be *moderate in probability* and *moderate in intensity*.

Culvert Installation and Removal

In addition to the impacts described for forested and nonforested upland habitats, culverts can reduce impacts to surface water flows in existing drainages. Culvert installation and removal may temporarily impact potential riparian habitats through alterations in the vegetation stream banks immediately adjacent to culverts and temporary water flow disruptions. In aspen stands, aspen growth habits generally recover quickly from disturbances as adventitious buds of healthy clones quickly sprout from the roots, replacing any damaged ramets or meristematic buds. With project design features and botanical resources mitigation measures, the potential impacts in riparian and aspen habitats would be *moderate to high in probability* and *moderate in intensity*. Potential indirect impacts would be *moderate in probability* and *moderate in intensity*.

Road Construction, Realignments and Decommissioning

The Boise NF modified the proposed action to reduce temporary road construction in RCAs from 7.2 miles to 2.6 miles, of which 46% of miles are on existing road prisms. Temporary road construction may occur in existing aspen stands. In addition, Project design features include erosion reduction measures to reduce the delivery of sediment to streams during road maintenance activities. Aspen growth habits generally recover quickly from disturbances as adventitious buds of healthy clones quickly sprout from the roots, replacing any damaged ramets or meristematic buds. An indirect impact may be surface water flow redirection from natural drainages and alter occupied habitats' water flows and water tables for riparian species, altering habitat suitability.

With project design features and possible botanical resources mitigation measures, the potential impacts in riparian and aspen habitats would be *moderate in probability* and *low to moderate in intensity* depending on the distance of botanical resources from the roads. Potential indirect impacts from non-native invasive species would be *high in probability* and *moderate in intensity* as the known infestations are along road corridors and riparian habitats are more conducive to infestation establishment.

Fuels Management Activities

Associated activities for vegetation management inside RCAs and aspen habitats include non-commercial hand thinning, hand pile creation and prescribed burning and lop and scatter slash. The proposed action also limits fuels management within RCAs. No fuels management activities would be allowed within 30 feet of the streambank. Noncommercial hand thinning followed by lop and scatter or hand piling and burning could occur from 30 to 130 feet of the streambank. The proposed action does not limit fuels management activities in aspen stands outside delineated RCAs. If botanical resources are present, individuals and seed banks may be impacted. In the long-term, the proposed action would maintain the riparian functions as they relate to water quality which would indirectly maintain the riparian habitats in their existing conditions. RCA restrictions preclude machine piling in delineated buffers.

In aspen stands, fuels management would target conifer trees for removal which may include hand piling and burning piles or lopping and scattering felled conifers followed by broadcast or understory burning. In the short term, individual aspen ramets and underground meristematic buds may be harmed or killed during burning operations. Aspen growth habits generally lend the species towards a quick recovery from disturbances as adventitious buds of healthy clones quickly sprout from the roots, replacing any damaged ramets, generally within 3 to 5 years of treatment.

For these fuels management activities, botanical surveys (design feature BT-1) would inform implementers whether additional botanical resources are present and may be impacted from this associated activity. Avoidance measures are possible and the implementation team would need to determine whether avoidance is feasible or mitigation measures are more appropriate on a case-by-case basis. Mitigation measures would need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2). Given the proposed action reduces fuels activities permitted in RCAs and avoidance measures may be possible, potential impacts would be *low in probability* and *moderate in intensity*. Potential indirect impacts may be *moderate in probability* and *moderate in intensity*.

Broadcast Burning, Understory Burning, Jackpot Burning

Backing fires may also impact botanical resources in RCAs. The degree of impacts depends primarily on the fuels depths and size, moisture content, and seasonal timing. Drier, deeper fuels in RCAs may burn at higher intensities with increased residence times of lethal temperatures. Coarser woody debris burns longer, lengthening the residence time of lethal temperatures required to consume the fuels compared with fine- and mixed woody debris. Burning during times of the year when fuels and soils are moist decreases the soil surface heat penetration and may reduce temperatures to non-lethal levels. In RCAs the prescription would attempt to achieve a low severity surface fire.

In the long-term, the proposed action would improve aspen stand ecological functions and both directly and indirectly improve the habitat suitability of aspen stands for other botanical resources. In aspen stands, the timing of burning may achieve different objectives. Spring burning when conditions are moist may kill smaller-size conifers whereas fall burning may allow for greater ground and ladder fuels consumption as well as expose minerals soils to stimulate aspen regeneration.

Given broadcast, understory and jackpot burning are blunt management tools applied across an entire treatment unit, avoidance measures for botanical resources in riparian and aspen habitats may not be feasible in all circumstances. The implementation team would need to determine whether avoidance is feasible for burning operations or whether mitigation measures are more appropriate. Mitigation measures would need to ensure activities do not impact the viability or persistence of a botanical resources population (see design feature BT-2). The potential impacts would be *moderate in probability* and *moderate in intensity* for botanical resources in riparian and aspen habitats. Indirect impacts from non-

native invasive species would be *moderate in probability* and *moderate in intensity* as post-burning invasions could lead to habitat alteration, reducing habitat suitability.

Hand and Machine Fireline Construction and Reclamation

Hand and machine fireline construction may occur in riparian and aspen habitats with impacts similar to those described above. The proposed action limits equipment in RCAs, including machine fireline construction. In aspen stands, aspen growth habits generally recover quickly from disturbances as adventitious buds of healthy clones quickly sprout from the roots, replacing any damaged ramets or meristematic buds, generally within 3 to 5 years of treatment. An indirect impact may be surface water flow redirection from natural drainages and towards or away from occupied habitat. Typical machine fireline construction specifications include water bars construction throughout the linear corridor, reducing the potential for this impact.

Given avoidance measures may be possible and the degree of activities limited by the proposed action, potential impacts would be *low in probability* and *low to moderate in intensity*. Indirect impacts from non-native invasive species would be *low in probability* and *moderate in intensity* as new introductions could lead to habitat alteration, reducing habitat suitability.

Reforestation – Planting Conifer Species

Tree planting may occur in RCAs should the stands not meet relative stocking requirements for shade bearing trees. This focus would improve riparian ecological functions and improve habitat suitability in the long term. In aspen stands, conifer trees would be removed to reduce negative impacts from conifer encroachment. Reforestation efforts that plant conifer seedlings would not include aspen stands as it would be contrary to the long-term objective of conifer tree removal in aspen stands.

As with upland habitats, given avoidance measures are feasible for reforestation efforts, short-term impacts would be *low in probability* and *moderate in intensity* if planting occurs in occupied habitats. Potential indirect impacts would be *low in probability* and *moderate in intensity* through a gradual decrease in habitat suitability.

Recreation Management Activities

For proposed action that improve recreation management, campground and trailhead improvements that require construction, impacts would be similar to heavy equipment operations and road construction impacts described for upland habitats. In addition, construction may alter surface water flows way from natural drainages and alter water tables of adjacent riparian habitats or increase sedimentation, potentially degrading habitat suitability outside the construction footprints. Dispersed camping closures would displace dispersed campers, leading the dispersed campers to seek alternative sites in nearby areas, including aspen and riparian habitats. A vault toilet installation may indirectly impact surrounding riparian habitats by improving human waste management, reducing impacts of human waste dispersal into nearby streams. In the long term, improved recreation management would improve riparian and aspen habitats suitability for botanical resources by managing impacts from dispersed recreationists.

Potential direct impacts may be *moderate in probability* and *moderate in intensity*. Potential indirect impacts may be *moderate in probability* and *moderate in intensity*.

Issue 2: Proposed ground-disturbing and prescribed fire activities may directly or indirectly impact known populations of whitebark pine or its habitats in the project area.

Many of the proposed action and their associated activities would not occur in whitebark pine modeled or known occupied habitats. The associated activities that would occur in habitats and may impact whitebark pine include on-foot preparatory work; Forest Service and contractor crew vehicular access; fugitive dust; tree felling without removal; road maintenance; snowplowing; broadcast burning; hand fireline

construction and reclamation; and reforestation by planting whitebark pine seedlings. Silvicultural models predict the actions in the Snowbank Inventoried Roadless Area would improve the presence and health of whitebark pine stands by doubling its composition by 2074 with a slight reduction in larger trees through time (see the Vegetation, Fire and Fuels Effects Analysis in support of the Sage Hen EA). The slight reduction in large trees would be due to their eventual loss as they succumbed to white pine blister rust infections.

On-foot preparatory work would occur within a relatively short timeframe (estimated 1 to 2 days maximum total in a specific area) and would be limited in both time and scale, reducing potential impacts to an immeasurable intensity. As whitebark pine and its habitats occur within the Snowbank Inventoried Roadless Area boundary in the project area, motorized use would be limited to existing roads and trails and would likely be several days per year. In addition, I do not anticipate a need to increase existing road maintenance or snowplowing as the increased need would be associated with the proposed action outside the Snowbank Inventoried Roadless Area.

In whitebark pine stands, hazard trees may be felled to reduce safety hazards for burn crews while working in the Snowbank Inventoried Roadless Area. Individual whitebark pine trees that pose a safety risk to burn crews may be felled. Additional whitebark pine trees may be injured should crews fall neighboring hazard trees that directly hit whitebark pine trees when falling to the ground. Injuries may include breaking off branches, scraping off bark which create wounds that may serve as entry points for white pine blister rust infections or mountain pine beetle infestations.

Broadcast and jackpot burning are proposed for the Snowbank Inventoried Roadless Area where known and modeled whitebark pine occurrences exist. For whitebark pine, spring or fall burning may kill seedlings susceptible to fire. For mature whitebark pine trees, the bark is relatively thin compared to other species such as ponderosa pine and susceptible to scorching from fire. Fires that approach the tree trunks may scorch the bark, diminishing the bark's protective properties from other stressors. Depending on the fireline intensity and residence time of lethal temperatures, the heat from the fire may also penetrate the bark, killing the underlying cambium layer. Harm to the bark and cambium may reduce individual tree vigor and also increase susceptibility to infections such as white pine blister rust or infestations by the mountain pine beetle.

Whitebark pine seed banks and fine roots may also be impacted should fire move through an area when fuels and soil moisture is conducive to longer residence time of lethal temperatures. Seeds are buried by Clark's nutcrackers generally within one inch of the soil surface and may be susceptible to longer residence time of lethal temperatures. Fine roots located near the soil surface serve as the primary water absorbing roots for trees and may be harmed or killed with longer residence times of lethal temperatures when soil moisture is low which would lead to an increase in the penetration depth of lethal temperatures. In general, the proposed prescription would attempt to achieve a low severity surface fire in which shrubs, needle cast and upper duff layers would be consumed. In some instances, including dense stands in which commercial or non-commercial thinning is not feasible, higher severity fire effects may be preferred to achieve the desired condition for those forested stands.

In the long term, broadcast burning in the vicinity of living whitebark pine stands may improve the habitat suitability for seed caching by Clark's nutcracker; seed germination; and whitebark pine seedling establishment. Clark's nutcrackers prefer to cache seeds in recently burned areas as fire removes understory plants and creates soils surfaces that are easier to penetrate for seed caching. In addition, in the long term, broadcast burning may reduce the vigor of other species that would compete with whitebark pine seedlings for sunlight, soil water, and nutrients.

Hand fireline construction and reclamation may unintentionally physically disrupt or dislodge seed banks or emerging seedlings, reducing natural recruitment during the season of the burn. Saplings that occur

along hand line edges may be physically cut down to improve the safe use of a control line during fire operations. In isolated circumstances, older whitebark pine trees may pose a hazard to firefighter safety and may be physically felled to remove the hazard. Hazard tree identification would occur during the construction phase of containment lines. Tree felling would be kept as minimal as possible and would occur solely to facilitate safety on control lines.

For whitebark pine, the proposed action provides the opportunity to grow out and plant seedlings should the Boise NF determine natural regeneration or seedling recruitment is less than the desired conditions. In order to have seedlings to plant, seed cones would need to be collected in either the population located in the project area or in another location. Seed cone collections would reduce the reproductive outputs of a tree stand in the year collected as a percentage of the seed cones produced are physically removed from the site. An indirect impact, seed cone collections reduce the number of cones available to Clark's nutcrackers who frequent stands with substantial available cones to support their own populations. As cone availability decreases, the possibility that Clark's nutcrackers may occupy a stand and planting seeds for whitebark pine decreases.

Not all whitebark pine trees produce female cones and the female cones develop for two years to fully ripen before the cone is viable for harvest. Whitebark pine stands do not produce cones on a regular basis and cone production cannot be predicted beyond one year prior to ripening. Seed cone collection could impact a stand's reproductive success for as many years as the stand goes without producing female cones. The whitebark pine stands in the Snowbank Inventoried Roadless Area express a genetically low resistance to white pine blister rust, making the stands in the project area a less desirable seed source. Stands with a more desirable expression of white pine blister rust resistance exist on the Payette National Forest and may be a more desirable seed source. In order to reduce the long-term impacts to a stand's reproductive success, typical silvicultural practices focus on limiting the bushels of cones removed from a stand. In the long term, planting blister rust resilient whitebark pine would help to conserve and restore whitebark pine.

In the short-term, the proposed action may impact some individuals of whitebark pine but maintain the viability and persistence of the stands as a whole. In the long-term, the proposed action would improve the health and viability of whitebark pine stands by reducing competition, improving seed beds for natural regeneration, and improving the stands' long-term resilience by improving the stands' genetic resistance to white pine blister rust.

Additional Botanical Resources Concerns: Non-Native Invasive Species

The up-front inclusion of project design features that focus on prevention and reduction of spread would reduce or limit the risk of exposure to a manageable level but would not remove all potential effects to native plant communities. As discussed in the Noxious Weeds Technical Report, the risk of exposure to noxious and non-native invasive species infesting new areas and leading to a decrease in vegetation community integrity and resilience is high for the project. The degree of risk exposure differs by the activity. The Noxious Weeds Technical Report describes different mechanisms by which noxious and non-native invasive species may spread because of proposed action.

For botanical resources, associated activities may indirectly impact potential and occupied habitats through the introduction and establishment of new or expansion of existing noxious and non-native invasive species infestations. Non-native invasive species may alter habitats' character, reducing suitability for botanical resources. Propagules (seeds, rhizomes, plant parts capable of rooting) may spread into areas where weeds do not occur at present and that are closer to intact or resilient populations or habitats for botanical resources. In addition, non-native invasive species may outcompete native plants for limited resources, which may lead to an overall decline in population vigor populations or a reduced

ability to persist in the project area. While the project may introduce new or expand existing noxious and non-native invasive species, project design features would reduce the risks of noxious and non-native invasive species to manageable levels.

Additional Botanical Resources Concerns: Pollinators

All associated activities of the proposed action may indirectly impact individuals or populations of pollinators by temporarily disturbing pollinator behaviors, including foraging, mate searching, breeding, and nest building.

The proposed action may impact pollinators through an increase in vehicular traffic. Pollinators generally avoid areas near roads. For insect pollinators that may be present near roadside, increased vehicular traffic may indirectly disturb pollinator behaviors. Individuals may be harmed or killed during collisions with vehicles. Combined with an increase in vehicular traffic, a temporary increase in road densities would reduce the area of contiguous pollinator habitats and reduce pollen movement across the landscape and between plant populations. The increase in the numbers of roads, which would result in a temporary increase in road densities, and increased areas in which fugitive dust may disperse would degrade pollinator habitat through habitat fragmentation. An increase in the numbers of roads may also alter surface water flows and natural drainages, altering habitat suitability for pollinators in areas without roads.

Insect pollinators may be less likely to visit flowers coated in dust as dust may reduce flower desirability. Dust may obscure flower color patterns on which insect pollinators rely to locate food sources and may interfere with nectar and pollen production. Dust may impact insect pollinators by clogging insects' breathing holes, reducing an individual's overall health and survivability.

Tree felling may impact insect pollinators by directly harming individuals by crushing aboveground adults or larvae or nests that reside near the soil surface or belowground. Leaving felled trees in-place may create temporary nest sites for cavity and wood-nesting insect pollinators. Tree removal reduces potential nest sites for cavity or wood-nesting insect pollinators. For activities where tree removal is proposed, some snags and coarse woody debris would be left on-site to improve vertebrate wildlife habitats and would indirectly maintain these habitat needs for insect pollinators. Thinning tree canopies in upland vegetation communities and conifer removal from existing aspen stands would temporarily improve light infiltration to the forest floor, improving understory health and habitat suitability for several pollinator guilds.

Heavy equipment operations proposed for fuels management, vegetation management and roads may impact pollinators by crushing adults, larvae or pupae residing on or near the soil surface, burying individuals or nests, or indirectly impacting by removing food plant sources, nesting materials and compacting soils, making the soils more difficult to dig out nests. Flying adult insect pollinators may be unintentionally harmed or killed on windshields, grills, tires or tracks as heavy equipment moves through their flight corridors. Through soil disturbances such as grading or excavation, heavy equipment operations may impact insect pollinator adults, larvae or nests residing in the location by physically crushing or excavating individuals or nests, exposing those individuals or nests to predators. An increased exposure to heavy equipment operations for prolonged periods may indirectly impact pollinators by altering foraging and nesting behaviors or encouraging adults to abandon active nests.

Fuels management activities focus on reorganizing or physically removing vegetation that may function as habitat structure for pollinators. Pollinators may be indirectly impacted from piling or lopping and scattering materials by the rearranged habitat structures. For ground-nesting insect pollinators that require bare ground, lop and scatter may temporarily reduce exposed bare ground for building nests. For wood-

nesting insect pollinators, this activity may alter habitat structures but may in the short term maintain the woody debris needed for nests. The size of machine piles may also unintentionally bury or smother ground-dwelling insect pollinators.

Prescribed fire may impact pollinators both directly and indirectly. Smoke from fires may interfere with an insect's sense of smell, impacting their ability to sense alarm pheromones from other insects, reducing their ability to react to the danger. Lethal temperatures at the fireline may kill exposed individuals or entire nests. Prescribed burning may indirectly improve pollinator habitat suitability if time of year and methods employed promote fire regimes and burn heterogeneity that promote floral diversity and nesting materials retention such as snags or coarse woody debris. In general, most pollinator guilds respond positively after a single fire event but recurrent fires with short fire return intervals may, over time, reduce pollinators' recovery in a given area. Indirectly, the degree repeat burning impacts food sources depends whether enough growing seasons occur between repeat maintenance burning for plants that serve as food sources to recover lost carbohydrate reserves and seed banks. In addition, different food plants are likely to respond and recover differently from fire, which may indirectly lead some pollinator species to thrive in a post-fire environment while other pollinator species may decline. This may lead to changes in pollinator species composition across a landscape.

Insect pollinators that nest or whose larvae reside deep inside wood cavities or deep burrows in soils may be buffered from lethal temperatures, especially if the fire is a low severity surface fire with a short residence time. Insect pollinators with eggs, larvae or adults that reside above ground or near the soil surface may be killed outright from lethal temperatures. Burning during times of the year when fuels and soils are moist decreases the soil surface heat penetration and reduces temperatures to non-lethal levels even under high fuel load conditions. Broadcast burning may occur in spring or fall depending on fuel moistures and weather conditions. If burning occurs early enough in the spring or late enough in the fall, some pollinator guilds may no longer be active aboveground. An indirect impact may be the physical removal of pollinator eggs, larvae, ground-dwelling adults or nests during hand or machine fireline construction in preparation for burning.

In recreation management, the infrastructure reconfiguration within the campgrounds' existing footprints may alter the habitat suitability of surrounding areas for pollinators. Construction may directly impact pollinators by crushing aboveground adults or larvae, pupae or nests near the soil surface or belowground by crushing or excavating. For trailhead improvements such as parking lot construction and vault toilet installation, grading and excavation may impact insect pollinator larvae, pupae or nests residing in the location by physically crushing or excavating and exposing individuals or nests to predators. In the long term, vault toilet installation may indirectly impact surrounding upland and riparian habitats by improving human waste management, reducing impacts of human waste dispersal into the surrounding habitats.

The dispersed camping closure near developed campgrounds would displace dispersed campers, leading them to seek alternative sites in nearby areas. This activity may directly impact pollinators when dispersed campers pull off the road onto the roadside or pullouts to camp, increasing the size of existing disturbed sites and potentially crushing individual plants or pollinators, compacting soils along the roadside, increasing soil erosion potential in the road prism and altering pollinator foraging or reproductive behaviors.

Cumulative Effects of the Proposed Action

The cumulative effects of the proposed action include impacts from fire suppression , prescribed fire, commercial timber harvests and vegetation management on National Forest System lands, past reforestation efforts, existing roads and trails maintenance, road decommissioning, motorized and

nonmotorized recreational use including snowmobiles, noxious weeds treatments, grazing, special use permits, dispersed recreation and developed recreation infrastructure.

Nearly all past wildfires in the cumulative effects analysis area occurred before 1950 and any impacts from fire suppression would have recovered in the 70+ years since. Only one recent fire, the 2016 Third Fork Fire, occurred in the Upper Squaw Creek watershed since 1950 and burned less than 10 acres. In general, fire suppression has the potential to alter habitat suitability and impact existing occurrences directly or indirectly. The existing condition of vegetation communities in the project area may lead to uncharacteristic wildfire behaviors in the future should a natural or human-caused ignition start a fire which may lead to the need for fire suppression that impacts known occurrences or suitable habitats.

Since 1989, the Boise NF implemented one prescribed fire project in the Upper Squaw Creek watershed. The Boise NF burned roughly 1,600+ acres as part of the Mill Creek Prescribed Burn Project from 2004 to 2007. The prescribed burns were low intensity under-burns in the west section of the project area just east of the project area boundary and west of County Road 618. Under the proposed action, this area would be reburned at least one time in the next 15 to 20 years to maintain desired conditions with reduced fuel loads.

The Boise NF implemented timber stand improvement, salvage sales and vegetation management projects throughout the Upper Squaw Creek watershed from the 1980's to present day. Many of these activities are part of the baseline for the existing condition of vegetation communities as described in the Sage Hen EA. Ongoing management activities that span across multiple decades may alter suitable habitats and maintain those alterations within the time scales experienced by botanical resources populations. These altered habitats may improve or degrade habitat suitability for different species, depending on the scope, scale and nature of the management activities.

Reforestation efforts associated with vegetation management focus on planting tree species adapted to the local climate and suited for long-term habitation of the environment. Reforestation efforts typically focus tree plantings in microclimates best suited for the species being planted. Reforestation efforts may plant tree species in riparian systems that are adapted to the microclimate and may improve riparian functions in the long-term. Planting trees outside of these systems and in upland communities may indirectly benefit riparian and aspen communities through the improvement of soil and hydrologic functions upslope.

Existing roads and trails in the cumulative effects analysis area are managed and maintained by multiple entities. The Boise NF employs best management practices for maintaining or improving hydrologic function to maintain or improve water quality for Forest System roads and trails that bisect RCAs. When opportunities arise, the Boise NF may decommission roads no longer needed for administrative uses or public access. Road decommissioning also employs best management practices to reduce short-term impacts to water quality and result in long-term benefits from hydrologic function restoration and reduction in road densities in a localized area.

Nonmotorized and motorized recreational use occur throughout the cumulative effects analysis area. Nonmotorized recreational use is encouraged on existing trails, developed sites, and existing disturbed areas but may occur throughout National Forest System lands. Impacts from nonmotorized recreational use in riparian systems may include tramping and breaking down the streambanks along intermittent and perennial streams. The Boise NF allows motorized recreational use on designated system routes (roads and trails) or areas designated as open to motorized travel, as communicated to the public through the Motorized Vehicle Use Maps for each district. Unauthorized motorized recreational use does occur and may impact upland plant communities, riparian systems and aspen stands if the unauthorized use occurs in these communities.

Noxious weeds treatments completed by the Boise NF and its partners employ targeted treatment methods to reduce impacts to non-target plants and wildlife. Invasive crews employ treatment methods authorized under the 2019 Record of Decision for the Boise National Forest Invasive Species Project and approved annually through the Forest's Pesticide Use Proposals for use in riparian systems, further reducing potential impacts to non-target plants and wildlife and human health and safety. In the long term, continued noxious weeds treatments reduce the potential for non-native invasive species to alter upland plant communities, riparian systems and aspen stands, degrading their ecological functions.

Riparian and aspen communities occur throughout the cumulative effects analysis area. On National Forest System lands, vegetation and fuels treatments, including commercial and noncommercial timber stand improvement projects, incorporate design features and best management practices that reduce impacts to RCAs. Design features and best management practices are similar to the ones proposed for this project and maintain or improve riparian functions as those functions relate to water quality. Vegetation and fuels management activities may impact RCAs and aspen stands in the short-term and may improve the vegetation communities' long-term resiliency to future disturbances. In the long-term, vegetation and fuels management may reduce the potential for uncharacteristic wildfires, reducing the potential for catastrophic change and long-term degradation of the communities.

Additional considerations include potential impacts from existing and ongoing activities in vegetation communities throughout the Upper Squaw Creek Watershed that may act as travel corridors for pollinators. Currently, these vegetation communities are bisected by numerous administrative roads and recreational trails. Proposed increases in temporary roads would increase the roads and trails densities, decreasing the vegetation communities' suitability for the duration of the temporary roads' presence to act as travel corridors as pollinators tend to avoid frequently used trails. Vegetation and fuels management projects that improve forest health may impact pollinator behaviors and foraging and nesting habitats in the short term and may improve the vegetation communities' suitability in the long term.

The cumulative effects analysis area includes grazing allotments and special use permit operating areas. Annual Operating Instructions for each allotment include direction for livestock management that reduce impacts to riparian systems and their hydrologic functions. Special use permits include conditions for outfitters to follow to reduce impacts to riparian systems and their hydrologic functions.

Potential and occupied habitats occur in close proximity to popular hiking trails and dispersed camp sites and may be impacted from repeated trampling by recreationists. Dispersed recreation and trails maintenance would continue into the foreseeable future. With the increase in human populations in the greater Treasure Valley, the Boise NF is experiencing an increase in dispersed recreational use throughout the cumulative effects analysis area which may increase the probability and intensity of impacts over time.

Existing developed campgrounds adjacent to the Sage Hen Reservoir were initially constructed in the 1960's with additional campground and trailhead development over the following decades. Initial development and follow-up maintenance and reconstruction over the decades would have converted habitats for botanical resources to unsuitable or degraded habitats in the developed sites. Ongoing infrastructure maintenance would continue into the foreseeable future. For campgrounds not listed in the proposed action for improvements, the increased demand for camping facilities by the growing human populations in the greater Treasure Valley would likely lead to a need for renovations and upgrades to additional infrastructure in the foreseeable future.

For whitebark pine, past, existing and reasonably foreseeable activities that would overlap in time and space with project activities in whitebark pine modeled and known occurrences include past whitebark pine reforestation efforts, prescribed burning, existing roads and trails maintenance, motorized and nonmotorized recreational use including snowmobiles, noxious weeds treatments, grazing, and special use

permits. Cumulative impacts to whitebark pine and suitable habitats are similar to those described above for botanical resources. Whitebark pine is wind-pollinated, so impacts described for pollinators do not apply this species.

Recent reforestation efforts focused on planting whitebark pine seedlings as an effort to improve whitebark pine recruitment and overall stand health with limited success. Past cone collections for whitebark pine reforestation efforts in the Snowbank Inventoried Roadless Area focused on collecting from trees that reside in the same area. The seedlings were planted in the same area, reducing long-term impacts to stand reproductive success from removal of progeny.

In the project area, whitebark pine occurs entirely in the Snowbank Inventoried Roadless Area boundary, so the potential cumulative impacts from a temporary increase in road densities do not apply to this species. Only a few existing roads and trails exist and are maintained to reduce soil erosion and improve hydrologic function, reducing surrounding habitat degradation. The Boise NF allows motorized and nonmotorized recreational use on designated system routes (roads and trails), as communicated to the public through the Motorized Vehicle Use Maps for each district. Unauthorized motorized and nonmotorized recreational use does occur in the Snowbank Inventoried Roadless Area and may impact whitebark pine and its habitats. Unauthorized uses tend to be concentrated near existing designated system routes.

At the time of this analysis, Annual Operating Instructions for allotments do not include direction to reduce impacts to whitebark pine. Some special use permits do include conditions to reduce impacts to whitebark pine where activities may overlap with known occurrences.

4. Consistency with Relevant Laws, Regulations, and Policy

This document is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act of 1973, the Joint Counterpart Endangered Species Act Section 7 Consultation Regulations (50 CFR Part 402), and follows standards established in the Forest Service Manual direction (FSM 2672.42).

4.1. Land and Resource Management Plan

The Boise NF's forest plan (as amended in 2010) provides standards and guidelines for botanical resources under the heading "Botanical Resources." As part of the planning process, the project's interdisciplinary team completed a forest plan consistency review, including management of botanical resources. This document complies with relevant Boise NF's forest plan objectives, standards and guidelines as summarized in the Forest Plan Consistency Checklist included in the project record.

4.2. Other Relevant Law, Regulation, or Policy

The project interdisciplinary team developed design features incorporated into the proposed action that would reduce impacts of proposed action on botanical resources. These design features ensure the proposed action complies with relevant laws, regulations and policies.

Relevant laws, regulations and policies include:

1. National Forest Management Act (NFMA) 16 U.S. Code 1604 National Forest System land and resource management plans. The 16 U.S. Code 1604 (g)(3)(B) directs the USDA Forest Service to provide for a diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives, and within the multiple-use objectives of a land management plan provide for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan.

2. Departmental Regulation 9500-4. This regulation sets policy for the USDA to ensure the presence of diverse, native and desired nonnative populations of wildlife, fish, and plant species, while fully considering other Department missions, resources, and services. This regulation also directs the USDA to conduct its activities and programs to assist in the identification and recovery of threatened and endangered plant and animal species and to avoid actions which may cause a species to become threatened or endangered.
3. The Endangered Species Act (Act) of 1973 (16 U.S. Code 1531 et seq.). Provides for the conservation of threatened and endangered species of plants and animals. Section 5 of the Act requires Federal agencies to establish and implement a program to conserve fish, wildlife, and plants, including those which are listed as endangered or threatened species. Section 7 of the Act requires Federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of the species' critical habitat. This section also requires Federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) (for non-marine species) or the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) whenever an agency action is likely to affect a threatened or endangered species or result in the destruction or adverse modification of its critical habitat.
4. Joint Counterpart Endangered Species Act Section 7 Consultation Regulations (50 CFR Part 402). Establishes procedures for Federal agencies to consult with USFWS or NOAA NMFS under Section 7 of the Act.
5. Forest Service Manual (FSM) 2670, Threatened, Endangered and Sensitive Plants and Animals. Provides policy, responsibilities and direction on management of TEP and Regional Forester's Sensitive species. The FSM 2670 directs USDA Forest Service to develop and implement management activities to ensure species not become threatened or endangered because of agency actions and to maintain viable populations.
6. Presidential Memorandum issued June 20, 2014. The 2014 Presidential Memorandum "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators" directs the heads of executive departments and agencies to create a Federal strategy to promote the health of pollinators. The Presidential Memorandum directs Federal departments and agencies to evaluate and use their resources, facilities, and land management responsibilities to expand knowledge of pollinator health and to increase habitat quality and availability. Section 3(e) of the Presidential Memorandum instructs the U.S. Department of Agriculture (USDA) and the Department of the Interior (DOI) to develop best management practices (BMPs) for executive departments and agencies to enhance pollinator habitat on Federal lands. The USDA Forest Service released Draft BMPs in May 2015 (USDA USDOI 2015).

5. Conclusion

For botanical resources not discussed in this report, I concluded the project would have ***no effect*** on slickspot peppergrass or its proposed designated critical habitat and ***no impac***t on the viability of populations on R4 Sensitive plants.

Rationale: My conclusions of no effect and no impact are based on my assessment that these plant species do not have the potential to occur in the project area and would not be affected by project activities. My assessment also concludes no interdependent or interrelated actions outside the project area would affect slickspot peppergrass or its proposed designated critical habitat.

For botanical resources discussed in this report, I conclude the Sage Hen Integrated Restoration Project ***may impact individuals but is not likely to cause a trend to federal listing or loss of viability*** for the R4

Sensitive species whitebark pine, seven devil's onion, Bryum moss, Sacajawea's bitterroot, and least phacelia.

For the Forest Watch plant species, I conclude the Sage Hen Integrated Restoration Project ***may impact individuals but poses a low risk of long-term loss of population viability and persistence or habitat*** for scalloped moonwort, little grapefern, Parry's sedge, sweetgrass, tufted penstemon, northern sanicle, and sticky tofieldia. I anticipate no risks for other Boise NF Forest Watch plant species relative to the implementation of this project.

Rationale: My conclusion is based on my assessment of existing conditions and potential impacts from the associated activities of project activities of the proposed action.

- In the short term, project activities may impact potential habitats or individuals and seed banks that may be present.
- Design features BT-1 and BT-2 require implementation surveys and development of mitigation measures to protect R4 Sensitive plant species when found.
- The proposed action includes coordinating implementation of project activities with resource specialists to identify needs and watch out situations. See Sage Hen EA, Appendix E: Implementation Guide for a description of the coordination process and steps required to ensure reduced impacts from the proposed action.
- For riparian habitats, project activities may temporarily impact riparian systems. Project activities would be limited in riparian habitats within Riparian Conservation Areas. In the long-term, the project activities would maintain or improve the long-term functionality of riparian systems.
- For aspen stand habitats, in the short-term, project activities may impact aspen stands and understory species and their pollinators. The project may maintain or improve the long-term presence and ecological function of aspen stands through targeted removal of conifers.
- For all habitats, the improvement of forest health and reduction of fuels would in the long-term reduce the possibility of uncharacteristic fires that may lead to long-term degradation or loss of suitable habitats.

6. References Cited

Beall, K. 2017. Potential for TES/FW species within uplands and riparian by Potential Vegetation Group. Updated October 17, 2017. Unpublished document in project record and on file at United States Department of Agriculture, Forest Service Boise National Forest Supervisor's Office, Boise, ID.

Brickey, J. 2020. Assessment of Species Considered for Evaluation: Sage Hen Integrated Restoration Project. Unpublished document in project record and on file at United States Department of Agriculture, Forest Service Boise National Forest, Supervisor's Office, Boise, ID.

Consortium of Pacific Northwest Herbaria Specimen Database (CPNWH). 2020. Web site http://www.pnwherbaria.org (accessed September 20, 2020).

Farnes, P.E. 1990. SNOTEL and snow course data: describing the hydrology of whitebark pine ecosystems. Pages 302, 304 In Schmidt, W.C. and K.J. McDonald (compilers). Proceedings Symposium on Whitebark Pine Ecosystems: Ecology and Management of a High-Mountain Resource. 1989 March 29,31. Boseman, Montana. General Technical Report INT,270. Ogden, Utah. USDA Forest Service, Intermountain Research Station, Ogden, UT.

Forest Service. 2016. Intermountain Region (R4) Threatened, Endangered, Proposed, and Sensitive Species. June 2016. Known/Suspected Distribution by Forest. In project record and on file at

United States Department of Agriculture, Forest Service Intermountain Region Office, Ogden, UT.

Forest Service. 2017. Raster data refresh of GIS vegetation layers to 2008 conditions (VegRefresh). Digital data. Prepared by PhotoScience Inc. for the Boise National Forest. Available through the United States Department of Agriculture, Forest Service, Boise National Forest Supervisor's Office, Boise, ID.

Forest Service. 2017b. Field Sampled Vegetation (FSVeg) corporate database. Accessed on July 13, 2017. Available through the United States Department of Agriculture, Forest Service, Boise National Forest Supervisor's Office, Boise, ID.

Forest Service. 2020a. Natural Resource Inventory System (NRIS) TESP-IS corporate database. Accessed on September 21, 2020. Available through the United States Department of Agriculture, Forest Service, Boise National Forest Supervisor's Office, Boise, ID.

Forest Service. 2020b. Existing Vegetation Existing Dominance Type Classification Update GCDB-based, Vector digital data. Available through the United States Department of Agriculture, Forest Service Boise National Forest Supervisor's Office, Boise, ID.

Idaho Fish and Wildlife Information System (IFWIS). 2020. Plant Element Occurrence Database. Idaho Department of Fish and Game (IDFG), Boise, ID. Accessed January 2020. Idaho National Heritage Data is managed within and available from IFWIS IDFG, Boise, ID.

NatureServe. 2019. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed October 28, 2019).

Rey-Vizgirdas, E. 2015. Boise NF Rare Plant List (April 2015). Unpublished document in project record and on file at United States Department of Agriculture, Forest Service Boise National Forest Supervisor's Office, Boise, ID.

US Department of Agriculture and US Department of Interior (USDA USDOI). 2015. Draft pollinator-friendly best management practices for federal lands. May 11, 2015. Available online at www.fs.fed.us/wildflowers/pollinators/BMPs/. Access verified August 25, 2020.

United States Fish and Wildlife Service (USFWS). 2016. U.S. Fish and Wildlife Service Species Assessment and Listing Priority Assignment Form for Pinus albicaulis (Whitebark pine). May 16, 2015. US Fish and Wildlife Service Region 6, Wyoming Ecological Services Field Office, Cheyenne, WY.