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DRAFT
Environmental Impact Statement

Vestal Project

Hell Canyon Ranger District, Black Hills National Forest
Custer County, South Dakota

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Vestal Project
Draft
Environmental Impact Statement
Custer County, South Dakota

Lead Agency: **USDA Forest Service**

Cooperating Agencies: **None**

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Abstract: The Hell Canyon Ranger District of the Black Hills National Forest has prepared a Draft Environmental Impact Statement (DEIS) in compliance with the National Environmental Policy Act (NEPA), the Healthy Forest Restoration Act (HFRA) and other relevant Federal and State laws and regulations. The Hell Canyon Ranger District proposes to implement multiple resource management actions within the Vestal project area as guided by the Black Hills National Forest Land and Resource Management Plan as amended. The focus of the proposed action is to reduce mountain pine beetle risk and fire hazard on National Forest lands surrounding the City of Custer, SD. Two alternatives are considered in detail. Alternative 1 is the No Action Alternative. Alternative 2 is the proposed action and includes vegetation treatments designed primarily to reduce the potential for mountain pine beetle caused mortality within the Vestal project area. Proposed treatments are also designed to reduce fire hazard. This DEIS discloses the direct, indirect and cumulative effects resulting from these two alternatives.

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision-making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. City of Angoon v. Hodel (9th Circuit, l986) and Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

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Commonly Used Acronyms and Abbreviations

APE	Area of Potential Effect
ARC	At-Risk-Community
BA	Basal Area
BABE, BA/BE	Biological Assessment/Biological Evaluation
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BHNF	Black Hills National Forest
BHNF LRMP	Black Hills National Forest Revised Land and Resource Management Plan
BMP	Best Management Practices
CCF	Hundred Cubic Feet
CDA	Connected Disturbed Areas
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWD	Coarse Woody Debris
CWPP	Community Wildfire Protection Plan
DBH	Diameter at Breast Height
DENR	Department of Environment and Natural Resources
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FPS&G	Forest Plan Standards and Guidelines
FRCC	Fire Regime Condition Class
FSM	Forest Service Manual
FSPro	Fire Spread Probability
FSR	Forest Service Road
FY	Fiscal Year
GIS	Geographic Information Systems
HFRA	Health Forest Restoration Act
HUC	Hydrologic Unit Code
IDT, ID Team	Interdisciplinary Team
LRMP	Land and Resource Management Plan
MA	Management Area
MBBH	Monitoring Birds of the Black Hills
MIS	Management Indicator Species
MPB	Mountain Pine Beetle
MVUM	Motor Vehicle Use Map
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
NFSR	National Forest System Road
NHPA	National Historic Preservation Act

NRHP National Register of Historic Places

OHV Off Highway Vehicle

POL Products Other than Logs

R2 Forest Service Region 2 (Rocky Mountain Region)

RIS Resource Information System

RMBO Rocky Mountain Bird Observatory

RMRS Rocky Mountain Research Station

ROS Recreation Opportunity Spectrum

ROW Right-of-way

RX Prescribed Fire

SD South Dakota

SDDENR South Dakota Department of Environment and Natural Resources

SDGFP South Dakota Game Fish and Parks

SDNHP South Dakota Natural Heritage Program

SHPO State Historic Preservation Office

SHR Stream Health Rating

SIO Site Integrity Objective

SOLC Species of Local Concern

SOPA Schedule of Proposed Action

SS Structural Stage

SUP Special Use Permits

TES Threatened, Endangered, & Sensitive Species

THPO Tribal Historic Preservation Office

USC United States Code

USDA United States Department of Agriculture

USFS United States Department of Agriculture Forest Service

USFWS United States Fish and Wildlife Service

USGS United States Geological Survey

WCP Watershed Conservation Practice

WIZ Water Influence Zone

WUI Wildland Urban Interface

SUMMARY

The Hell Canyon Ranger District of the Black Hills National Forest proposes to implement multiple resource management actions within the Vestal project area as guided by the Black Hills National Forest Land and Resource Management Plan and Phase II Amendment (Forest Plan). Due to the existing epidemic of mountain pine beetles in the project area (see Appendix H), the Vestal project was developed under the authorities of the Healthy Forest Restoration Act (HFRA). The proposed action includes commercial and non-commercial vegetation treatments and prescribed burning to reduce mountain pine beetle risk and fire hazard on National Forest lands surrounding the City of Custer, SD. Proposed resource management actions apply only to National Forest lands.

The Vestal project area surrounds the city of Custer, South Dakota within Custer County (see Map 1 in Appendix A). The project area includes approximately 43,516 acres; 25,823 (60%) of which are National Forest System lands and 17,693 (40%) which are private lands (including City or County properties). Given the project location around the City of Custer, there are extensive private dwellings, businesses, and government offices in this project area. The Hell Canyon Ranger District office and shop, as well as the Black Hills National Forest Supervisor's Office, are also located within the project area.

High use developed recreation sites occur on private, State and Federal lands within or adjacent to the project area. Sites within the project boundary include; approximately 8 miles of the Mickelson trail, Bismarck Lake campground, Crazy Horse Mountain, and numerous private campgrounds. Recreation areas adjacent to the project area include Custer State Park.

All state and county roads which access the City of Custer are within the project area for at least a portion of their length. Therefore, all visitors to Custer will travel through the project area.

The focus of the proposed action is to treat vegetation on a broad landscape scale to reduce the threat to ecosystem components from the existing MPB epidemic. It would also reduce fire hazard and consequently, the potential for high-intensity, large-scale wildfire.

This action is needed because the Vestal project area is within an expanding mountain pine beetle (MPB) epidemic. The Black Hills National Forest, Forest Supervisor, Craig Bobzien, has determined that a MPB epidemic is occurring in the project area (Appendix H). Over the past 3-4 years there has been a rapidly growing amount of beetle caused mortality in the southern Black Hills around the City of Custer. All measures of MPB activity indicate a rapidly growing MPB epidemic with a substantial increase in tree mortality over the past 3 years. Approximately 61% of ponderosa pine stands in the project area are at high risk for MPB caused mortality.

At this time, there are larger pockets of beetle activity in the northern and western parts of the project area. The southern parts of the project are less impacted at this time, but beetle activity is occurring there at a rapidly growing rate.

The Hell Canyon Ranger District held a public meeting to discuss the Vestal project on Wednesday, May 11, 2011 at the Custer High School, Custer, SD. The proposed action

was described in a scoping document (April 20, 2011) and mailed to approximately 149 individuals, tribal representatives, groups, government entities and other interested members of the public. The proposed action includes vegetation treatments, prescribed fire, and fuel treatments.

The Forest Service evaluated the following alternatives:

> ***Alternative 1 – No Action:*** The National Environmental Policy Act (NEPA) requires the study of the 'No Action' alternative as a basis for comparing effects of the proposed action and other alternatives. The 'No Action' alternative assumes no implementation of any elements of the proposed action or other action alternatives would take place within the Vestal project area. This alternative represents no attempt to actively respond to the purpose and need for action or the issues identified during scoping. For example, there would be no effort to modify existing vegetation or related fuels conditions in the project area; current timber sales, fire suppression efforts, noxious weeds treatments and regular system road maintenance would continue on National Forest lands.

> ***Alternative 2 – Proposed Action:*** The proposed action is designed to address the purpose of and need for action. Strategies proposed to reduce mountain pine beetle caused mortality include, mechanical thinning to reduce density, and sanitation which removes green trees that have live beetle brood in them. It is recommended that treatments be implemented as soon as possible to be most effective. In the Black Hills, stands that are less than 80 ft^2/acre basal area, are at a reduced risk. Therefore, reducing stand basal area is a preventative treatment. Sanitation is considered a suppression strategy because it directly removes beetle larvae from the forest, directly reducing beetle populations. A total of up to 25,449 acres of the project area would receive vegetation treatments under this alternative. Fuel treatments, including thinning, deadfall (mechanical treatment of down logs and branches), and prescribed burning, would occur on up to 25,634 acres. The proposed action includes the following modifications to the transportation system in the project area: 0.6 miles of unauthorized road is needed for access and would be converted to a system road then closed following use; and 0.9 miles of system road would be closed to protect resources either with physical closures or gates. Refer to Appendix A for proposed action maps for both vegetation treatments and fuels treatments, as well as the transportation map noting proposed adjustments to the transportation system.

The deciding official will review the environmental analysis, all supporting documents and public input in order to make the following decisions:

(1) Whether or not active management is appropriate in the Vestal project area at this time and if so, what actions should occur.
(2) Whether the information in this analysis is sufficient to make a reasoned decision.

CHAPTER 1: INTRODUCTION

Document Structure

The Forest Service has prepared this Draft Environmental Impact Statement (DEIS) in compliance with the National Environmental Policy Act (NEPA), the Healthy Forest restoration Act (HFRA) and other relevant Federal and State laws and regulations. This Draft Environmental Impact Statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and no action alternatives. All numbers and figures are approximate measures based on known project conditions. The document is organized into five chapters:

- ***Chapter 1: Introduction****:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- ***Chapter 2: Alternatives, including the Proposed Action****:* This section provides a more detailed description of the agency's proposed action. A summary comparison of the proposed action and no action alternatives is also provided in this chapter.
- ***Chapter 3: Affected Environment and Environmental Consequences****:* This section describes the environmental effects of implementing the proposed action and no action alternatives. This analysis is organized by resource area (i.e. Silviculture, Wildlife, Recreation). The effects of the No Action Alternative provides a baseline for evaluating and comparing to the proposed action alternative.
- ***Chapter 4: Consultation and Coordination****:* This section provides a list of preparers, and also a list of agencies, groups and persons consulted during the development of the Vestal Draft environmental impact statement (DEIS).
- ***Chapter 5: Literature Cited and Glossary***
- ***Index***
- ***Appendices****:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Hell Canyon Ranger District Office in Custer, South Dakota.

Background

The Vestal project area surrounds the city of Custer, South Dakota, encompassing a large amount (40%) of private land. There are extensive private dwellings, businesses, and government offices within the project area. There are many high-use developed recreational sites that occur on private, state, and federal lands within or adjacent to the project area.

The Black Hills National Forest, Forest Supervisor, Craig Bobzien, has determined that a MPB epidemic is occurring in the project area (Appendix H). Over the past 3-4 years there has been a rapidly growing amount of beetle caused mortality in the southern Black Hills around the City of Custer. All measures of MPB activity indicate a rapidly growing MPB epidemic with a substantial increase in tree mortality over the past 3 years. Approximately 61% of ponderosa pine stands in the project area are at high risk for MPB caused mortality.

At this time, there are larger pockets of beetle activity in the northern and western parts of the project area. The southern parts of the project are less impacted at this time, but beetle activity is occurring there at a rapidly growing rate. The primary management tool for reducing MPB-caused mortality is to remove the infested trees and to reduce the overall density of the remaining trees through mechanical thinning.

Fire hazard is currently high to very high on approximately 84% of the project area. This signifies substantial potential for large-scale, high-intensity wildfires to occur. Such fires could threaten lives and property, as well as, resource values. Custer County has developed a Community Wildfire Protection Plan (CWPP) which is a fire mitigation plan for at-risk communities. The plan identifies and prioritizes areas for hazardous fuel reduction; recommends the types and methods of treatment on Federal and non-Federal land; includes actions that would protect 1 or more *at-risk communities* and essential infrastructure, and includes recommendations to reduce structural ignitability of public and private property throughout the *at-risk community (ARC)*. Custer County CWPP identified the City of Custer ARC as an urban interface environment with a high density of structures and infrastructure. In many areas the structures lack defensible fire protection space.

Healthy Forest Restoration Act (HFRA)

The HFRA was signed by President Bush in 2003 for the purpose of expediting hazardous fuels reduction and forest restoration projects on Federal lands at risk of wildland fire or insect and disease epidemics. The Vestal project area meets the insect and disease criteria set forth by HFRA in that there is a mountain pine beetle epidemic occurring within the project area. The Vestal project will be analyzed under the provisions of the HFRA, Section 102(a)(4).

Location

The Vestal project area is located surrounding the city of Custer, South Dakota within Custer County (see Map 1, Appendix A). The project area includes approximately 43,516 acres; 25,823 (60%) of which are National Forest System lands and 17,693 (40%) which are private lands (including City or County properties). Given the project location around the City of Custer, there are extensive private dwellings, businesses, and government offices in this project area. The Hell Canyon Ranger District office and shop, as well as the Black Hills National Forest Supervisor's Office, are also located within the project area.

All state and county roads which access the City of Custer are within the project area for at least a portion of their length. Therefore, all visitors to Custer will travel through the project area.

The project area includes all or portions of lands with the following legal descriptions, Black Hills Meridian.

Table 1: Vestal Project Area Legal Description

Township	Range	Section
2S	3E	36
2S	4E	25-36
3S	3E	1,12,13,24,25,36
3S	4E	All
3S	5E	7-10, 15-22, 27-34
4S	4E	1-3, 12, 13, 24
4S	5E	3-8, 17, 18

Management Direction

The Revised Land and Resource Management Plan (Forest Plan), as amended (2006), provides direction for the management of the forest. The Forest Plan contains management goals and objectives, management area direction, and identifies desired future conditions for the forest. Resource specialists reviewed the current condition of the project area and compared these conditions with the desired conditions identified in the Forest Plan including applicable goals and objectives. Opportunities for improvement were identified.

Management Areas

The Forest Plan assigns a management emphasis to each portion of the Forest to meet multiple-use objectives. For each designated Management Area (MA), Chapter 3 of the Forest Plan includes a description of desired future conditions, goals, objectives, standards, and guidelines. Specific direction is provided for management of mountain pine beetle outbreaks and fuels. There are 4 management areas within the Vestal project area (Map 2, Appendix A). Table 2 displays the Management Area designations and acreage within the Vestal project area.

Table 2. Management Area Direction in the Vestal Project Area – On National Forest System Lands Only (60% of total lands within the project boundary).

Management Area	Acres in Project Area	Percent (%) of Project Area	Management Emphasis and Management Theme
5.4	10,723	42%	**Big Game Winter Range**: These areas are managed to provide high-quality winter and transitional habitat for deer and elk, high-quality turkey habitat, habitat for other species, and a variety of multiple uses.
5.1	10,325	40%	**Resource Production**: These areas are managed for wood products, water yield, and forage production, while providing other commercial products, visual quality, diversity of wildlife and a variety of other goods and services.
4.1	4,472	17%	**Limited Motorized Use and Forest Products (Buckhorn Mountain)**: These areas are managed for

Management Area	Acres in Project Area	Percent (%) of Project Area	Management Emphasis and Management Theme
			non-motorized recreation, while providing for timber production, forage production, visual quality and a diversity of wildlife. Roads provide intermittent commercial access, but are normally closed to other than administrative use.
8.2	303	1%	**Developed Recreation Complex (Bismarck Lake)**: These areas are managed for recreational opportunities and visual qualities adjacent to developed recreation sites and bodies of water.

Forest Plan Goals and Objectives

The Forest Plan establishes eleven multiple use goals and associated objectives for management of the Forest. The goals and objectives, applicable to specific resource management issues needing resolution, provide the basic direction for defining the purpose and need and subsequently developing the project proposal. The eleven Forest Plan goals are discussed in Chapter I of the Forest Plan. The Responsible Official for the Vestal Project has chosen to propose resource management actions that respond to Forest Plan Goals 2, 4, and 10.

Goal 2: Provide for a variety of life through management of biologically diverse ecosystems.

> *Objective 201*: Manage for a minimum of 92,000 acres of aspen, and 16,000 acres of bur oak during the life of the Plan. The highest priority for hardwood restoration is where conifers (e.g., spruce and pine) have out-competed aspen adjacent to riparian systems that once supported beaver.
>
> - *Opportunity exists to increase/maintain hardwood communities by reducing pine competition within these stands. In addition, opportunities exist to enhance and expand hardwood inclusions by opening stand canopies and removing conifers.*
>
> *Objective 205:* Manage for 122,000 acres of prairie grassland and 3,600 acres of meadow during the life of the Plan.
>
> - *Opportunity exists to maintain existing meadows within the project area. Most of these meadows are currently experiencing encroachment by pine. Meadows act as natural fuelbreaks.*

Goal 4: Provide for scenic quality, a range of recreational opportunities, and protection of heritage resources in response to the needs of the Black Hills National Forest visitors and local communities.

> *Objective 402*: Provide natural appearing landscapes with diverse scenery and enhance opportunities to enjoy attractive settings...

- *Opportunity exists to enhance/maintain landscapes in and around existing recreation sites by removing MPB infested trees and thinning stands to reduce insect damage and wildfire hazard. In addition, removal of MPB infested trees would enhance public safety in these areas.*

Goal 10: Establish and maintain a mosaic of vegetation conditions to reduce occurrences of catastrophic fire, insect, and disease events, and facilitate insect and disease management and firefighting capability.

Objective 10-01: Manage for 50 to 75 percent moderate-to-low fire hazard in the wildland-urban interface and reduce fire hazard within proximity of structures to current NFPA standards…

- *Opportunity exists to reduce existing fire hazard that currently exceeds objectives on National Forest System lands within the project area.*

Objective 10-04: Reduce or otherwise treat fuels commensurate with risks (fire occurrence), hazard (fuel flammability), and land and resource values common to the area, using the criteria in Forest-wide Guideline 4110.

- *Opportunity exists to treat fuels and reduce hazards within the project area.*

Objective 10-05: Manage wildfires using the appropriate response based on management area emphasis, existing values, risk of ignition, and fuel hazards within a given area.

- *Opportunity exists to reduce existing and activity fuels to a manageable level, facilitating a proactive and effective response to wildfire.*

Objective 10-06: Develop fuel management and protection strategies for intermixed land ownerships in partnership with private, state, and other federal agencies.

- *Opportunity exists to coordinate with the State and County based on goals established in the Custer County Community Wildfire Protection Plan (CWPP) to reduce fuels on both public and private lands in order to reduce the potential for large wildfires that could affect homes, infrastructure, and other ecosystem values.*

Objective 10-07: Where outbreaks of mountain pine beetle could present risks to management objectives for ponderosa pine, reduce acreage of ponderosa pine stands that are in medium or high risk for infestation.

- *Opportunity exists to reduce the acreage of pine stands at high risk of MPB infestations by removing infested trees and reducing the overall stand density.*

Forest-wide standards and guidelines related to insects and disease:

Guideline 4201a: Plan management activities with consideration for potential insect or disease outbreaks. Use integrated pest management strategies where insect or disease outbreaks may adversely affect management objectives. Utilize preventive vegetation management practices, including silvicultural treatments, to protect forest stands from insect and disease epidemics.

Standard 4201b: During scheduled management activities, minimize susceptibility to mountain-pine-beetle epidemics by reducing average basal area to 70 or less in pine stands, except where denser stands are needed to meet other management objectives.

Standard 4201c: Use the following insect-and-disease protection measures: Manage vegetation in and adjacent to high-use recreation areas to improve forest conditions, as needed to maintain or improve the desired recreation settings(s) or to conserve R2 sensitive or species of local concern and snails. In and adjacent to developed recreation sites actively treat insect and diseases to reduce pest populations.

Standard 4201d: Consider spatial array of stand conditions when planning harvests to reduce their potential for mountain pine beetle epidemics. For example, silvicultural treatments may be appropriate within or adjacent to dense mature stands.

Guideline 4205: Consider applying preventive silvicultural treatments or other integrated pest management strategies to National Forest System land adjoining other land ownerships to reduce the likelihood of insect and disease epidemics and spread. Plan suppression strategies to reduce mountain pine beetle populations in pine stands during epidemics. Prioritize according to values, risk and management objectives. Priority should be given to areas in which values to be protected exceed the cost of protection.

Guideline 4206: Project plans should consider existing infestations of insects or disease within a project area. Activities should be designed to minimize the risks of spreading the infestation while still providing habitat for those wildlife species dependent upon the presence of insects and disease.

Management Area-specific Goals and Objectives

In addition to the Forest-wide goals and objectives outlined in Chapter 1 of the Forest Plan, each Management Area (MA) has goals and objectives specific to that area (see Chapter 3 of the Forest Plan). In the event that a Forest-wide goal or objective conflicts with a MA-specific goal or objective, the more restrictive goal or objective will take precedent. Below is a summary of the needs and opportunities associated with the MA-specific goals and objectives in the Vestal project area.

MA 5.4 Big Game Winter Range Emphasis (42% of the project area)

Goal 5.4-201: Manage tree stands for wildlife habitat and vegetative diversity.

- *Opportunity exists to manage vegetation for insect, fuels and fire hazard reduction while concurrently benefiting wildlife habitat and vegetative diversity.*

Objective 5.4-206: Manage for the following percentages of structural stages in ponderosa pine across the management area in a variety of sizes and shapes. (Reference structural stage table, Forest Plan pg III-92)

- *Opportunity exists to manage vegetation focused on reducing insect, fire and fuels hazard to be compatible with structural stage objectives.*

Guideline 5.4-4101: Utilize appropriate fuel treatment practices, including prescribed fire, to achieve resource management objectives.

- *Opportunity exists to utilize fuel treatments (including prescribed fire) in accomplishing insect, fuels and fire hazard reduction objectives.*

MA 5.1 Resource Production Emphasis (40% of the project area)

Goal 5.1-201: Manage tree stands to emphasize timber products, forage production, and water yield.

- *Opportunity exists to manage vegetation for insect, fuels and fire hazard reduction while concurrently providing timber products, forage production, and contributing to increased water yield.*

Objective 5.1-202: While meeting other objectives for this management area, provide variety in stand sizes, shape, crown closure, age structure and interspersion.

- *Opportunity exists to manage vegetation focused on reducing insect, fire and fuels hazard to be compatible with objective of providing variety in the forested setting.*

Objective 5.1-203: Maintain or enhance hardwood shrub communities where biologically feasible, and within management objectives.

- *Opportunity exists to manage vegetation geared to improve hardwoods and also contribute to the fuel break benefits that hardwoods naturally provide.*

Objective 5.1-204: Manage for the following percentages of structural stages in ponderosa pine across the management area in a variety of sizes and shapes. (Reference structural stage table, Forest Plan pg III-67)

- *Opportunity exists to manage vegetation focused on reducing insect, fire and fuels hazard to be compatible with objective of providing variety in the forested setting.*

Guideline 5.1-4101: Utilize appropriate fuel treatment practices, including prescribed fire, to meet management objectives.

- *Opportunity exists to utilize fuel treatments (including prescribed fire) in accomplishing insect, fuels and fire hazard reduction objectives.*

MA 4.1 Limited Motorized Use and Forest Product Emphasis (17% of the project area)

Goal 4.1-201: Emphasize wood-fiber production, wildlife habitat, and visual quality.

- *Opportunity exists to manage vegetation for insect, fuels and fire hazard reduction while concurrently contributing to wood-fiber production and benefiting wildlife habitat and visual quality.*

Goal 4.1-202: Manage forest cover types to provide variety in stand sizes, shape, crown closure, age structure and interspersion.

- *Opportunity exists to manage vegetation focused on reducing insect, fire and fuels hazard to be compatible with objective of providing variety in the forested setting.*

Objective 4.1-203: Manage for the following percentages of structural stages in ponderosa pine across the management area in a variety of sizes and shapes. (Reference structural stage table, Forest Plan pg III-48)

- *Opportunity exists to manage vegetation focused on reducing insect, fire and fuels hazard to be compatible with objective of providing variety in the forested setting.*

Guideline 4.1-4101: Utilize appropriate fuel treatment practices, including prescribed fire, to meet management objectives.

- *Opportunity exists to utilize fuel treatments (including prescribed fire) in accomplishing insect, fuels and fire hazard reduction objectives.*

MA 8.2 Developed Recreation Complexes (1% of the project area)

Goal 8.2-201: Manage vegetation in high-use recreation areas to provide for public safety, to improve forest condition, or protect sensitive plants and plant species of local concern as needed to maintain or improve the desired recreation setting(s) and conserve botanical features.

- *Opportunity exists to manage vegetation for insect, fuels and fire hazard reduction while concurrently providing the public with safe recreation areas, protecting sensitive plant species and habitat and enhancing/maintaining visual quality.*

Goal 8.2-204: Manage fuels to retain a natural forest appearance and to reduce the threat of wildfire damage to forest resources.

- *Opportunity exists to manage vegetation focused on reducing insect, fire and fuels hazard while retaining a natural forested setting.*

Goal 8.2-206: Control insect-and-disease pest populations in and adjacent to the area through active monitoring while reducing pest-population potential through vegetative management…

- *Opportunity exists to manage vegetation focused on reducing insect, fire and fuels hazard to be compatible with goal of controlling and reducing pest populations within and adjacent to recreation areas.*

Other Direction

The Healthy Forests Restoration Act (HFRA) of 2003 (H.R. 1904) provides improved statutory processes for hazardous fuel (including insect/disease) reduction projects and healthy forest restoration on National Forest System lands. Other supporting policy includes the Healthy Forest Initiative, intended to reduce administrative process delays related to implementation of fuels (and insect/disease) reduction projects; National Fire Plan, and The Federal Wildland Fire Management Policy. The main focus of this National guidance is an emphasis on reducing the probability and occurrence of large-scale wildfire in fire adapted ecosystems, especially near at-risk communities and the wildland-urban interface (WUI); and to reduce the levels of insect infestations and disease.

The HFRA contains a variety of provisions to expedite hazardous fuel reductions on specific types of National Forest land. The Vestal Project is an authorized hazardous fuel reduction project under Section 102(a)(4) of the Healthy Forests Restoration Act of 2003. The area qualifies under section 102(a)(4) because there is an existing mountain pine beetle epidemic occurring within and adjacent to the project area which poses a significant risk to resource values on National Forest and private lands (see Determination of Insect Epidemic letter, Appendix H).

Another provision of the HFRA regards the encouragement of communities to prepare a Community Wildfire Protection Plan (CWPP), which identifies areas of wildland-urban interface (WUI) and recommends the types and methods of treatments on Federal and non-Federal land. Custer County has completed a CWPP. The plan designates a 3 mile buffer as WUI. The 'at-risk'-community of Custer lies within the project area. In total, there are 17,693 acres (40%) of private lands, homes and businesses contained within the project area.

The following demonstrates the Vestal project's consistency with applicable portions of the HFRA:

- The proposed action is consistent with the Forest Plan
- The proposed action does not include treatments within designated wilderness, wilderness study areas or other Federal land where timber harvest is prohibited.
- Collaboration with local governments, tribes and fire departments was conducted.
- The proposed action is on land determined to contain a MPB epidemic with imminent risk to ecosystem components.
- The primary objective of the project's purpose and need is to reduce MPB risk.

Purpose and Need for Action

The primary purpose for action in the Vestal project area is to reduce the threat to forest resources from the existing MPB epidemic. This action is needed because there is a rapidly increasing MPB outbreak occurring within the project area which is resulting in substantial levels of pine mortality. Existing stand conditions across the project area are largely at high risk for MPB caused mortality.

A secondary purpose of this project is to protect local communities and watersheds from large-scale, high intensity wildfire. This action is needed because the project area is located within and surrounding the City of Custer, SD and approximately 84% of the project area has a fire hazard rating of high to very high. This is due to dense stand conditions and dead, dry fuels resulting from MPB caused mortality. Approximately 40% of lands in the project area are privately owned, with an estimated 3,194 private structures.

Proposed Action

The action proposed by the Forest Service is designed to address the purpose and need for action described above. All proposed activities would occur on National Forest lands. Refer to proposed action maps 6, 7, and 8 in Appendix A for both vegetation treatments and fuels treatments, as well as the transportation map noting proposed adjustments to the transportation system. The proposed action and no action alternatives are presented in more detail in Chapter 2.

Strategies proposed to reduce mountain pine beetle caused mortality include, mechanical thinning to reduce stand density to reduce risk, and sanitation which removes green trees that have live beetle brood in them. It is recommended that treatments be implemented as soon as possible to be most effective. In the Black Hills, stands that are less than 80 ft^2/acre basal area, are at a reduced risk. Further lowering densities would further lower the MPB risk. Therefore, reducing stand basal area is a preventative treatment. Sanitation is considered a suppression strategy because it directly removes beetle larvae from the forest, directly reducing beetle populations.

Proposed activities include vegetation treatments on approximately 25,449 acres. Vegetation treatments would consist of commercial thinning, free selection, group shelterwood, hardwood conversion, hardwood release, overstory removal, pine encroachment, sanitation, shelterwood seedcut, variable density thinning, precommercial thinning, and products other than logs (POL) thinning. Other fuels treatments that focus on further reducing fire hazard within the project area include approximately 180 acres of fuelbreaks, 1,761 acres of prescribed burning and up to 23,693 acres of deadfall treatment. All proposed treatments are described in detail in Chapter 2.

There are approximately 125 miles of Forest Service system roads in the project area. Of these roads, 48 miles are closed yearlong, 35 miles are open seasonally (May 15 to December 15), and 42 miles are open yearlong. In addition to Forest Service system roads, there are approximately 28 miles of County roads. The 2010 Forest Travel Management decision and associated Motorized Vehicle Use Map (MVUM) administratively closed all unauthorized roads in the project area (approximately 39 miles) and prohibited all off-road motorized travel.

The proposed action includes the following modifications to the transportation system in the project area: 0.6 miles of unauthorized road is needed for access and would be converted to system road then closed following use; and 0.9 miles of system road would be closed to protect resources either with physical closures or gates (see Map 8, Appendix A).

Decision Framework

The deciding official will review the environmental analysis, all supporting documents and public input, in order to make the following decisions:

- Whether or not active management is appropriate in the Vestal project area at this time and if so, what actions should occur, and
- Whether the information in this analysis is sufficient to make a reasoned decision.

If the proposed action is selected, project activities could begin as early as spring 2012.

Public Involvement

The following public involvement and collaboration efforts have occurred:

- A Notice of Intent (NOI) to prepare an EIS was published in the *Federal Register* on April 22, 2011. The NOI requested public comment on the proposal and included the date and place of the scheduled public meeting.
- A detailed scoping document was mailed to approximately 150 individuals, tribal representatives, groups, government agencies and other interested members of the public. This document also noted the time and place of the public meeting.
- All scoping documents were posted to the Black Hills National Forest website and Schedule of Proposed Actions.
- The proposal was discussed at the Custer Rotary Club meeting on 4-25-11
- The proposal has been discussed at several of the Custer County Commissioners meetings, as well as the City of Custer.
- The proposal was presented as a topic at the Custer Volunteer Fire Department meeting on 5-3-11.
- A News Release was sent to media outlets on 4-28-11, announcing the Vestal project, requesting comments on the proposal and noting the time and place for the public meeting. Articles appeared in both the Custer Chronicle and the Rapid City Journal.
- A public meeting was held at the Custer High School on May 11, 2011.
- The project was presented at the Tribal consultation meeting on 6-22-11.

Using the comments from the public, other government agencies, groups, and tribal representatives the interdisciplinary team (IDT) identified issues that warranted further design criteria and determined whether additional alternatives or measures were needed.

Issues

Comments received during the scoping process are used to help define issues, determine whether additional actions alternatives or mitigation measures are necessary, and frame the analysis of environmental issues. A total of 27 parties provided feedback via letters, fax, public meeting transcripts, hand delivery, or email during the formal scoping process. Comments received and the agency 'response to comments' are summarized in the Vestal project record located at the Hell Canyon Ranger District office, Custer, SD.

The majority of the concerns raised during the scoping period were relatively minor issues that would be addressed through the application of Forest Plan standards and guidelines or other design criteria. None of the issues raised merited the development of additional action alternatives.

A description of the two key issues, with measurement indicators, follows below:

1. **Mountain Pine Beetle Epidemic**

   Some commentors are concerned that the risk of MPB caused mortality will continue to be too high in the project area after proposed treatments are completed, either because some sites would be deferred or because the proposed treatments are not aggressive enough. Other commentors question whether an epidemic is occurring throughout the project area and suggest that proposed treatments are too aggressive and unnecessary.

   Measurement indicators:
   - Acres of Low MPB Risk
   - Acres of High MPB Risk

2. **Wildfires and Fire Hazard**

   There is internal and external concern that the current MPB epidemic is creating and increasing fuel loadings in the project area. Fire hazard is high or very high over a substantially large portion of the project area (84%). The City of Custer is entirely within the project area boundary and would be threatened if a wildfire were to occur under such fire hazard conditions.

   Measurement indicators:
   - Acres of Fire Hazard Rating
   - Mechanical Treatments
   - Fuel break Construction
   - Natural fuel break maintenance or enhancement (aspen and meadow)
   - Acres of Prescribed burning

These issues lead the IDT to clarify components of the proposed action that were not made explicit during the scoping phase of the project. No issues raised merited the development of additional action alternatives. Documentation of each comment received, the issues identified in the comments and the rationale for identifying them as non-significant are located in the Vestal project record.

CHAPTER 2: COMPARISON OF ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered in detail for the Vestal project, including the No Action Alternative (Alternative 1) and the Proposed Action (Alternative 2). It also briefly describes alternatives not considered in detail and provides rationale for why they are not considered in detail. The alternatives are also presented in comparative form, defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.

Alternatives Considered in Detail

The Forest Service developed two alternatives: a no action and a proposed action alternative. The alternatives considered in detail by the IDT are discussed below. This section provides the summary of activities proposed to occur during implementation of the action alternative. Exact figures, such as acres, miles, or other numerical units of any particular activity, may vary slightly. These figures, which are based on inventory and survey estimates, may vary during preparation of a timber sale, prescribed burn, or other project based upon various site factors such as topography, non-uniform site structure, fuels, refinement of the standard of road needed, etc.

The Vestal project is an authorized hazardous fuels project pursuant to Section 102 (a)(4) of the HFRA. Section 104 of the HFRA provides guidance on the range of alternatives studied in detail and disclosed in the NEPA document.

Alternative 1 – No Action

National Environmental Policy Act (NEPA) requires the study of the 'No Action' alternative as a basis for comparing effects of the proposed action and other alternatives. Under the No Action alternative, current management plans would continue to guide management of the project area. This alternative represents no attempt to actively respond to the purpose and need for action or the issues presented during scoping. No effort would be made to modify existing vegetation or related fuel conditions within the project area. No vegetation treatments, fuels treatments, or prescribed burning would be implemented.

Alternative 2 – Proposed Action

This alternative was developed to meet the purpose and need for action. It would also move conditions within the project area toward desired future conditions as described in the Forest Plan. The proposed action would treat vegetation within the project area on a broad landscape scale to reduce the threat to ecosystem components, including forest resources, from the existing insect and disease (mountain pine beetle) epidemic and reduce the potential for large-scale wildfire.

Strategies proposed to reduce MPB caused mortality include, mechanical thinning to reduce basal area, and sanitation which removes green trees that have live beetle brood in them. It is recommended that treatments be implemented as soon as possible to be most effective. Therefore, reducing stand basal area is a preventative treatment. Sanitation is considered a suppression strategy because it directly removes beetle larvae from the forest, directly reducing beetle populations.

Proposed vegetation treatments for Alternative 2 include both commercial and noncommercial treatments. All treatments would occur on National Forest lands only and all forested acres would include sanitation treatment. Treatments are summarized in Table 3 below and displayed on Maps 6 and 7 in Appendix A.

Table 3. Alternative 2-Proposed Action Vegetation Treatments

Treatment	Acres	Description
CT – Commercial Thinning **CT50**	3,626 1,831	Thinning of trees generally 5-15” DBH. The objective is to reduce susceptibility to mountain pine beetle (MPB) infestation by reducing basal area within sites. The thinning will reduce MPB risk in these stands to Low and will also reduce fire hazard, improve health, tree vigor, and future growth capacity of the site. Sites would be thinned from below, which means that trees would, in general, be removed from the lower crown classes. Typical target basal area (BA) is 60 ft^2/ac. Some sites would be thinned to a BA of 50 ft^2/acre to further reduce fire hazard adjacent to private lands, and are noted as CT50.
FS – Free Selection	1,054	Would reduce susceptibility of stands to MPB infestation by reducing overall basal area within sites. The thinning would not result in a low MPB risk in these stands, but the reduction is density is a benefit to MPB susceptibility and would also reduce fire hazard. This treatment reduces overall density of the site to average 80 ft^2/ac basal area by interspersing dense groups with interlocking crowns of 3 trees up to 2 acres with openings, hardwoods and thinned areas. Within stand densities will vary from 0 to 120 ft^2/ac basal area.
GSH – Group Shelterwood	10,044	Would reduce susceptibility of stands to MPB infestation by reducing overall basal area within sites. Would reduce overall MPB risk in these stands to Low and also reduces fire hazard and maintain stand diversity. This treatment represents the shelterwood silviculture system and is proposed within pine sites which are not homogenous, but rather have 2 or more patches or groups of trees of various age classes throughout the stand. The shelterwood system is a common silvicultural treatment system which begins with a commercial thinning of smaller diameter trees to increase the size and vigor of residual trees, followed by a seedcut which is done to encourage regeneration; then completed with an overstory removal which releases the established regeneration. This prescription is proposed in sites with stand conditions which represent at least 2 phases of a shelterwood system such as a commercial thin, seedcut or overstory. The overall density of these stands would not exceed 60 ft^2/acre basal area.
HC – Hardwood	126	The objective is to increase natural fuelbreaks by

Treatment	Acres	Description
Conversion		converting mixed conifer/hardwood stands to hardwood cover type. It is accomplished by removing all conifers from the stand. Hinging of non-commercial-sized conifers would follow commercial removal.
HR – Hardwood Release	431	The objective is to maintain natural fuelbreaks by removing all conifers from existing hardwood habitat. Hinging of non-commercial-sized conifers would follow commercial removal.
OR – Overstory Removal	1,255	Results in MPB risk of stands to low and reduces fire hazard by removal of mature to over-mature trees in the overstory of sites which have successfully regenerated. This releases the established regeneration, which would also be thinned in a POL or PCT, unless deferred for wildlife cover.
PCT – Precommercial Thinning	*54	Understory thinning of trees that are less than 5" DBH to a spacing of 12 x 12 feet.
PE – Pine Encroachment	1,458	The objective is to maintain natural fuelbreaks by removing all conifers from existing meadows.
POL – Products Other Than Logs Thinning	*617	A thinning of pine sites to reduce MPB risk and fire hazard by reducing stand density. This treatment is proposed in sites generally made up of trees 1-9" DBH that do not contain enough 9" + trees to make sawtimber removal economically viable, or as a follow-up treatment to commercial thinning, variable density thinning, free selection, or the commercial thinning component group shelterwood, when the target basal area cannot be obtained by removal of sawtimber only. Overall stand density will not exceed 60 ft^2/acre except in the VDT and FS sites where density will not exceed 80 ft^2/acre basal area. The target residual tree spacing varies as follows: <u>POL only</u> – 18x18 feet <u>CT60</u> - 20x20 feet <u>CT50</u> - 22x22 feet <u>VDT and FS</u> - variable spacing
Sani – Sanitation	**3,655	Removal of green trees currently infested with MPB. This is a suppression method which directly removes MPBs from the forest. Sanitation may occur for up to 5 consecutive years.
SWSC – Shelterwood Seedcut	226	Would reduce MPB risk in these stands to Low and will also reduce fire hazard, by reducing stand density to a basal area of 30-50 ft^2/acre. This is an even-aged regeneration harvest used in mature sites, in which the most desirable seed trees are retained.
VDT – Variable Density Thinning	1,072	Would reduce overall MPB risk in stands to Low and would also reduce fire hazard, by reducing overall stand density to a basal area of 60-80 ft^2/ac. This thinning maintains or creates diversity within the stand by varying residual density from 30-90 ft^2/acre to avoid even residual tree spacing. Sites would be thinned from below, which

Treatment	Acres	Description
		means that trees would, in general, be removed from the lower crown classes.

* Acres shown are those where PCT or POL are proposed as individual treatments. Both PCT and POL would also occur following other treatments as noted.

** The acres shown for sanitation treatment reflect where sanitation is the only treatment proposed. However, sanitation is included as a companion treatment on all pine sites in the project area.

The vegetation treatments in Table 3 contribute to reducing fire hazard within the project area. Additional treatments that focus specifically on reducing fuels are also proposed, as noted in Table 4.

Table 4. Alternative 2-Proposed Action Fuels Treatments

Treatment	Acres	Description
DF – Dead fall	*23,693	Mechanical treatment of existing slash, resulting from mountain pine beetle caused mortality, to a target height of 18 inches where possible, but no more than 24 inches from the ground. May include various methods but not limited to lopping, chipping, crushing, piling and burning, or mastication. No standing dead would be cut as part of this treatment. The objective of this treatment is to reduce the dead ladder fuels within these stands, thus reducing the potential for a wildfire to move into the crowns.
FB - Fuelbreak	180	Thinning of pine sites to reduce fire hazard adjacent to private lands by reducing stand density. Fuelbreak treatment would occur up to 300 feet from private land boundaries. Trees up to 9" DBH would be cut to a residual tree spacing of 24' x 24'. Residual slash will either be piled for burning, or include mastication of slash rather than piling and burning. This treatment is utilized in areas where no other treatment is proposed, or when proposed treatment does not sufficiently reduce fire hazard adjacent to private lands.
RX – Prescribed Burning	1,761	Controlled application of fire to wildland fuels in either their natural or modified state under specific environmental conditions. Fire is confined to a predetermined area and produces the fire behavior required to achieve planned resource management objectives. Prescribed Burning would establish and maintain a mosaic of vegetation conditions to reduce occurrences of catastrophic fire, and facilitate firefighting capability. Objective of this treatment is to reduce fire hazard by reducing surface fuels.

* Deadfall is included on all pine sites in the project area.

Alternative 2 would produce approximately 85,750 hundred cubic feet (CCF) of commercial sawlog volume (42.875 MMBF) and approximately 33,054 cunits of POL as a byproduct of the mechanical treatments.

There are approximately 125 miles of Forest Service system roads in the project area. Of these roads, 48 miles are closed yearlong, 35 miles are open seasonally (May 15 to December 15), and 42 miles are open yearlong. In addition to Forest Service system roads, there are approximately 28 miles of County roads. The 2010 Forest Travel Management decision and associated Motorized Vehicle Use Map (MVUM) administratively closed all unauthorized roads in the project area (approximately 39 miles) and prohibited all off-road motorized travel.

The proposed action includes the following modifications to the transportation system in the project area: 0.6 miles of unauthorized road is needed for access and would be converted to system road then closed following use; and 0.9 miles of system road would be closed to protect resources either with physical closures or gates (see Map 8, Appendix A).

The law generally prohibits the harvest of even-aged stands before they reach their maximum growth rate (National Forest Management Act (NFMA), 16 U.S.C. 1604(m)). Exceptions in the law allow the harvest of individual trees, or even parts or whole stands of trees, before this time to thin and improve timber stands, and salvage damaged stands of trees (part m1 of the law). Further exceptions are allowed in order to achieve multiple-use objectives other than timber management (part m2).

The proposed action would harvest some trees before the maximum potential growth rate of some stands in the project area has been reached. These harvest treatments are consistent with the exceptions provided in part m2 of the law, and include the following: precommercial thinning, commercial thinning, hardwood conversion or fuelbreak treatments. These treatments are proposed to meet the Forest Plan multiple-use objectives stated earlier in this analysis. Appendix E contains silviculture findings.

Design Criteria

Design criteria include Forest Plan standards and guidelines, USFS Region 2 Watershed Conservation Practices (WCPs), Best Management Practices, and site specific design to avoid resource impacts. They are applicable and to be implemented as a matter of standard operating procedure for the proposed action. Design criteria are applied to protect resources and forest users. All activities proposed in this project, including any post-sale activities or monitoring, must implement these design criteria. A list of project design criteria is available in Appendix B.

Monitoring

The Hell Canyon Ranger District is responsible for monitoring results and effects of the selected actions. The District would ensure that EIS and Record of Decision (ROD) direction including design criteria and any necessary mitigation measures are applied and carried out appropriately. Project and contract administrators would perform much of the project monitoring during project implementation. Other resource specialists would monitor specific progress including application of design criteria and mitigation measures related to their resource of concern (See Appendix C).

Alternatives Not Considered in Detail

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives, and to briefly discuss reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). The HFRA Sec. 104(c)(1)(C)(i)(ii) specifies consideration of additional alternative(s) meets the purpose and need of the project. Public comments received in response to the proposed action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the project, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, the following alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

- An alternative that includes a ½ mile portion of FSR 284.1E to be eliminated and a new road be constructed to connect FSR 284 to FSR 284.1E (within T3S, R3E, Sec 12).
    - The existing FSR 284.1E provides adequate access for project implementation and other access needs. There is an existing Right-Of-Way (ROW) granted to the Forest Service on FSR 284.1E. Therefore it is not necessary to construct a new road and abandon the ROW to achieve project objectives and to provide access. This alternative would not contribute toward meeting the purpose and need for action.
- An alternative that includes Free Selection treatment that retains an overall basal area that would be no higher than 60 BA. Including 'islands' within the sites that would be cut to no less than an 80 BA. Also, Sanitation treatments would occur in these 'islands' to treat MPB infested trees on an annual basis or until the current epidemic ends.
    - The Free Selection treatment is only proposed on approximately 4% of all treated pine stands in the project area. Other proposed treatments would reduce pine stand densities to 60 BA or less. Sanitation is included within sites proposed for Free Selection and other commercial treatments. Sanitation may occur for up to 5 years. Sites where Free Selection is proposed are those which have particular wildlife habitat elements. The proposed action reduces MPB risk to low on 87% of the project area. This landscape reduction of risk is expected to provide some protection to more dense stands identified as important to wildlife which are therefore, expected to withstand the MPB epidemic.
- An alternative that treats sites 030303-01 & 030303-04 with Sanitation only. These sites are adjacent to Calamity Peak, a well known landmark which holds high value for hiking and climbing.
    - The value of Calamity Peak as a hiking and climbing area is well known. The 2 noted sites are fairly large in size and occur on or adjacent to this Peak. Site 030303-04 is proposed as a Commercial Thin and site 030303-01 is on the north side of Calamity Peak and is proposed as a Group Shelterwood. Limitations to harvest capabilities, such as access, soils, and slopes, will dictate where activities may occur in these sites. Very small portions of these two sites will be accessible and feasible to treat, based on project design for soils and slopes. It is expected that only the periphery of these sites would be treated. Due to the very active MPB outbreak, and

the location of these sites near private lands, reducing stand density and MPB risk is a main goal.

- An alternative that includes non-conventional logging systems, such as tractor or skyline systems. These systems would allow for areas with slopes in excess of 50% to be treated.
    - Generally, the inaccessible areas within the project area are due to large granite outcrops and peaks. Tractor logging may occur under the proposed action, although, the area is not conducive to skyline harvest systems due to the granite rock outcrops.
- An alternative that includes: Individual Tree Selection, Group Selection, Group Retention, Hardwood Enhancement, Meadow Enhancement, Old Growth.
    - The proposed action includes treatments which maintain or enhance stand or landscape level diversity, including Free Selection, Variable Density Thinning, and Group Shelterwood. Hardwood enhancement (hardwood release) is included on all existing hardwood stands which contain conifers. Meadow enhancement (pine encroachment) is also included on all meadows that have conifers. The group retention treatment vastly opens stands and is not prescribed in this area due to the MPB epidemic which is actively reducing stand densities. Old growth is not a treatment type. There are currently 107 acres (<1%) of structural stage 5 (late succession) within the project area. Impacts to late succession are discussed in the EIS.
- An alternative that treats all acres considered ‘high risk’ or ‘at-risk’ of being infested with MPB. An alternative that includes additional commercial treatment, besides Sanitation, in the following sites: 030401-36; 030404-21; 030501-18; 030502-11, 19; 030903-20; 030805-10; 030906-4, 9, 27, 29; 030907-14; 030909-13, 23, 37; 030912-12; 030914-6; 031307-2, 34; 031310-4.
    - Sanitation is included for all pine sites within the project area, either as a stand-alone treatment or in conjunction with other treatments. Sanitation only treatments are included in some stands where MPB risk is low or other resource concerns exist. Not all stands with high risk are proposed for treatments to low risk due to other resource concerns.
- An alternative that includes increased Free Selection and Variable Density Thinning, and decreased Commercial Thinning, in order to reduce MPB risk and fire hazard while providing more vegetative and visual diversity.
    - Due to the existing conditions in this area, and the vast amount of private lands, reducing MPB susceptibility is a main goal. Experience has shown that reducing the BA to 60 or less is an effective method of treatment. Free Selection and Variable Density Thinning is proposed in certain areas with specific wildlife habitat concerns. While these treatments would have a positive effect by reducing the overall BA, they are not as effective as standard Commercial Thins in reducing MPB susceptibility.

- An alternative that includes harvest restrictions of the oldest and largest trees. With a main goal of saving these trees, as well as recruit replacements.
    - The purpose and need of this project would not be achieved is all old or large trees were restricted from harvest. The proposed action reduces susceptibility to MPB caused mortality and therefore, improves the potential for old and large trees to remain on the landscape. Each proposed treatment would retain some large trees. Overstory Removal, which generally is a removal of all overstory, includes design criteria to retain at least one large tree per acre.
- An alternative that retains spruce within the following meadow sites: 030305-07, 50, 70, 71, 72.
    - The proposed action includes Pine Encroachment treatment on these sites. Design criteria has been added to not remove any spruce from these sites.
- An alternative that would include Variable Density Thinning in site 030305-38, rather than Commercial Thinning, to manage for stand diversity for goshawks.
    - The proposed action includes treatments which maintain or enhance stand or landscape level diversity, including Free Selection, Variable Density Thinning, and Group Shelterwood. Site specific design criteria are included in the proposed action to manage for goshawk habitat. Field survey for goshawk were conducted in the noted site and surrounding sites.
- An alternative which would split the project into 2 separate projects, removing a portion of the project area which has been proposed by an interest group as the Okawita Paha National Monument and International Peace Park.
    - There is no National Monument in the project area. There is no indication that any portion of the project area is being considered by the President for designation as a National Monument under the Antiquities Act. Therefore, such as designation is not reasonably foreseeable.

Comparison of Alternatives

This section provides a comparison of the two alternatives analyzed in this EIS. The alternatives are described and compared in terms of the effects each has on the project area. Appendix A, Maps 6-7 show vegetation treatments. The environmental consequences of the alternatives are described in detail in Chapter 3 of this EIS.

The existing condition acreages used in the tables below represent conditions in year 2011. Alternative conditions are futured to year 2018 because that is when project actions are expected to be substantially complete and when the MPB epidemic is predicted to have run its course in the project area.

Table 5. Comparison of Cover Types

Cover Type	Existing Condition Year 2011	Alternative 1 No Action Year 2018	Alternative 2 Proposed Action Year 2018
Meadow	1,482	1,482	1,482
Aspen	431	431	557
Spruce	42	42	42
Ponderosa Pine	23,693	23,693	23,567
Water	29	29	29
Rock	146	146	146
Total	***25,823***	***25,823***	***25,823***

The following table presents estimated acres of pine structural stages for the existing condition and both alternatives at year 2018. The changes in Alternative 1 are due to expected changes from MPB caused mortality, based on assumptions developed by the project entomologist. The specific sites on where these structural stages would occur is speculative. Therefore, the total acres of projected structural stages is presented for comparison.

Table 6. Comparison of Ponderosa Pine Structural Stages

Ponderosa Pine Structural Stages (acres)	**Existing Condition** Year 2011	**Alternative 1 No Action** Year 2018*	**Alternative 2 Proposed Action** Year 2018*
SS1	87	7,082	77
SS2	269	2,530	1,275
SS3A	770	4,890	597
SS3B	1,270	1,168	111
SS3C	1,295	0	114
SS4A	6,924	6,716	18,438
SS4B	10,267	1,297	2,496
SS4C	2,704	0	352
SS5	107	10	107
Total	***23,693***	***23,693***	***23,567****

*Total acreage for Alternative 2 is lower than existing and Alternative 1 due to Hardwood Conversion treatment which increases aspen acres by 126 acres.

Table 7 compares MPB risk rating and fire hazard risk rating between alternatives. Mountain pine beetle risk level is determined by structural stage (SS):

Low Risk = SS1, SS2, SS3A, SS3B, & SS 4A
High Risk = SS3C, SS4B, SS4C, & SS5

Table 7. MPB Risk Rating by Alternative

Comparison Value	Existing Condition/ Alternative 1 No Action	Alternative 2 Proposed Action
MPB Risk Rating (acres)		
Low	9,320 (39%)	20,498 (87%)
High	14,373 (61%)	3,069 (13%)
Total	***23,693***	***23,567***

No change to MPB risk would occur with Alternative 1, No Action. Over time, the MPB would cause substantial pine mortality across this landscape because the MPB risk was not reduced. Risk ratings shown in Alternative 2 display how active management would reduce MPB risk.

Table 8. Fire Hazard Rating Acres by Alternative at Year 2018

Comparison Value	**Existing Condition** Year 2011	**Alternative 1 No Action** Year 2018	**Alternative 2 Proposed Action** Year 2018
Low	1,777 (7%)	1,632 (6%)	1,622 (6%)
Moderate	2,309 (9%)	1,264 (5%)	20,737 (82%)
High	11,125 (43%)	10,946 (43%)	160 (1%)
Very High	10,437 (41%)	11,806 (46%)	3,129 (12%)

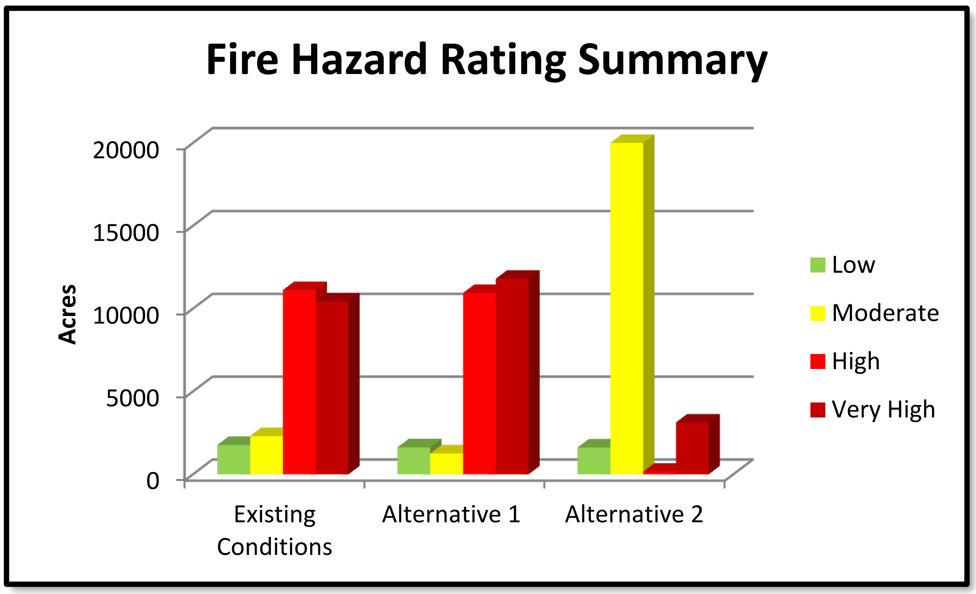

Figure 1. Fire Hazard Rating Summary for Vestal Project Area.

Table 9. Alternative 2 Proposed Mechanical Vegetation Treatments

Treatment	**Acres**
CT- Commercial Thinning – 60 BA	3,626
CT50-Commercial Thinning – 50 BA	1,831
FS – Free Selection	1,054
GSH – Group Shelterwood	10,044
HC – Hardwood Conversion	126
HR – Hardwood Release	431
OR – Overstory Removal	1,255
PCT – Precommercial Thinning	54
PE – Pine Encroachment	1,458
POL – Products Other Than Logs Thinning	617
Sani – Sanitation	*3,655
SWSC – Shelterwood Seedcut	226
VDT – Variable Density Thinning	1,072

*Acres of sanitation presented in this Table represent acres of sanitation treatments where no other treatment is proposed. Sanitation is included as a treatment on the entire project area, for up to 5 years.

Table 10. Alternative 2 Proposed Fuel Reduction Treatments

Treatment	Acres
DF – Dead fall	*23,693
FB - Fuelbreak	180
RX – Prescribed Burning	1,761

Table 11. Total Miles of Forest Service Roads on National Forest Land within the Project Area, by Alternative

	Existing/Alternative 1 No Action	Alternative 2 Proposed Action
Road Miles – *Total*	***125***	***126***
System Roads	125	126
Unauthorized Roads	0	0

Table 12. Designation of National Forest System Roads within the Project Area

	Existing/Alternative 1 No Action	Alternative 2 Proposed Action
System Roads – *Total*	***125***	***126***
Roads Closed to All, Yearlong (as storage)	48	49
Roads Open to All, Seasonal	35	35
Roads Open to All, Yearlong	42	42

CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section summarizes the environment of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in Chapter 2.

The information presented here is based on analysis prepared by resource specialists from the interdisciplinary team (IDT). Analysis was accomplished by field observations and surveys, past experience and professional recommendations, aerial photography, resource modeling, literature review, information obtained through monitoring, Forest Plan direction and associated analysis, and public participation. The specialist reports are included in the project file, which is located at the Black Hills National Forest, Hell Canyon Ranger District, 330 Mount Rushmore Road, Custer, South Dakota. All resource specialists used the best available science in completing their analysis, in accordance with Forest Service Manual (FSM) 1920.

Past, Present, and Reasonably Foreseeable Actions

Analysis of cumulative effects include past, present, and reasonably foreseeable future activities that could affect the biological or social environments. See Appendix F for a listing of past, present, and future activities considered in the Vestal project cumulative effects analysis. The project area boundary was used to address cumulative impacts, unless otherwise noted in the resource discussions. Rationale for cumulative effects boundaries is noted in the cumulative effects discussions by resource.

Forest Vegetation

Affected Environment

Cover Types

Vegetation in the Vestal project area is dominated by ponderosa pine cover type (92%), but also includes aspen (2%) and spruce (<1%) forested types. Aspen also occurs as small inclusions within some pine stands. The project area also contains a minor amount of non-forested cover types. Non-forest cover types currently occupy approximately six percent of the project area. These areas are mostly grasslands, but include rock and water. Table 13 displays acres and percentages of cover types in the project area.

Table 13. Existing Cover Types in the Vestal Project Area

Cover Type	Acres	Percent of Area
Aspen	431	2%
Spruce	42	<1%
Ponderosa Pine	23,693	92%
Meadow	1,482	6%
Water	29	<1%
Rock	146	<1%

Cover Type	Acres	Percent of Area
Total	**25,823**	**100%**

Ponderosa Pine

Ninety-two percent of the project area is vegetated by the ponderosa pine cover type (Table 14). The majority of the project area is densely-stocked mature ponderosa pine. Much of the current tree cover originated with the beginning of extensive fire suppression. As a result of past management activities, natural disturbances such as wildfire and endemic mountain pine beetle activity, some structural stage diversity and vegetation diversity exists. The current mountain pine beetle infestation in the project area threatens to transform much of the area into structural stages 1 and 2 (Allen, July 2011). Table 14 displays existing ponderosa pine structural stages within the entire project area.

Table 14. Existing Ponderosa Pine Structural Stages (SS) in the Entire Vestal Project Area

Structural Stage	Ponderosa Pine Acres
SS1 – *grasses and forbs*	87
SS2 – *seedlings and saplings*	269
SS3A – *young forest, trees <9" dbh, crown cover <40%*	770
SS3B - *young forest, trees <9" dbh, crown cover 40-70%*	1,270
SS3C- *young forest, trees <9" dbh, crown cover >70%*	1,295
SS4A- *mature forest, trees at least 9" dbh, crown cover <40%*	6,924
SS4B- *mature forest, trees at least 9" dbh, crown cover 40-70%*	10,267
SS4C- *mature forest, trees at least 9" dbh, crown cover >70%*	2,704
SS5 – *Late succession*	107
Total Acres	***23,693***

Management Areas 4.1, 5.1 and 5.4 have structural stage objectives (Objectives 4.1-203, 5.1-204, and 5.4-206 respectively) within the ponderosa pine cover type. The objective percentages are the same for each management area and are displayed in Table 15. This objective applies to the entire management area, not the project level.

Table 15. Structural stage objective percentages for ponderosa pine in MAs 4.1, 5.1 and 5.4 across the Black Hills National Forest

Structural Stage	Objective Percentage		Structural Stage	Objective Percentage
SS1	5%		SS4A	25% *
SS2	5%		SS4B	25% *
SS3A	10%		SS4C	5% *
SS3B	15%		SS5	5% **
SS3C	5%			

The current condition of the structural stage percentages for ponderosa pine cover type throughout these three Management Areas, including the Vestal project area, is derived from the 2009 Black Hills Monitoring and Evaluation Report (USDA Forest Service 2010) and is displayed in Tables 16-18 below.

Table 16. Existing Pine Structural Stage Acres and Percentages in MA 4.1

Structural Stage	Forest Plan Objective Percentages	MA 4.1 Existing Condition Acres	MA 4.1 Existing Condition Percentages
1	5%	486	1%
2	5%	461	1%
3A	10%	975	3%
3B	15%	1,253	3%
3C	5%	887	2%
4A	25%	9,668	27%
4B	25%	14,379	40%
4C	5%	7,055	20%
5	5%	896	3%

Table 17. Existing Pine Structural Stage Acres and Percentages in MA 5.1

Structural Stage	Forest Plan Objective Percentages	MA 5.1 Existing Condition Acres	MA 5.1 Existing Condition Percentages
1	5%	26,760	6%
2	5%	16,673	3%
3A	10%	24,236	5%
3B	15%	17,047	4%
3C	5%	10,269	2%
4A	25%	185,062	39%
4B	25%	142,228	30%
4C	5%	50,437	11%
5	5%	1227	<1%

Table 18. Existing Pine Structural Stage Acres and Percentages in MA 5.4

Structural Stage	Forest Plan Objective Percentages	MA 5.4 Existing Condition Acres	MA 5.4 Existing Condition Percentages
1	5%	45,616	13
2	5%	10,152	3
3A	10%	17,454	5
3B	15%	22,227	6
3C	5%	15,763	<5
4A	25%	86,487	25+
4B	25%	87,864	26
4C	5%	52,865	16
5	5%	1066	<1

Very Large Sized Trees

These same MA objectives also state: "10% of the structural stage 4 ponderosa pine acreage in the management area will have an average tree size of 'very large." The project area currently contains approximately 974 acres of SS4 pine which have an average tree size of very large. Table 19 displays current percentage of SS4 pine acreage with an average tree size of very large within each management area, per the 2009 Black Hills Monitoring and Evaluation Report (USDA Forest Service 2010). Based on this data the objective is currently exceeded in MAs 4.1 and 5.1 and is near achievement in MA 5.4.

Table 19. Existing Percentage of Very Large Sized Pine Acres by Management Area

Forest-Wide MA Objective	MA 4.1 - Existing	MA 5.1 - Existing	MA 5.4 - Existing
10%	20%	13%	9%

Late Succession

There are approximately 107 acres of identified late succession (SS5) pine forest in this project area. Late succession forest is at high risk for MPB infestation.

Mountain Pine Beetle

There is currently a mountain pine beetle epidemic occurring within the project area (C.Bobzien, 2011). All measures of beetle activity indicate a rapidly exploding beetle situation with a significant increase in tree mortality over the past 3 years (Allen 2011b). Stand conditions across the project area are largely (61%) at high risk to increasing mountain pine beetle caused mortality (see Table 20). Combine the high stand hazard with the high risk of a large resident beetle population in place would indicate that tree mortality is going to keep increasing and likely increase at a rapid level.

Tree mortality from mountain pine beetle is most evident in the northern and western portions of the project area, at this time. Field surveys completed in the fall of 2011 indicate that approximately 6 trees were infested by MPB in 2011 for every single tree attacked by MPB in 2010. These conditions signify a still rapidly growing outbreak in this area (Allen 2011b).

The risk of mountain pine beetle infestation is predicted from pine structural stages. The Black Hills National Forest Insect Rating Guide (revised August, 2011) identifies risk as either High or Low, as summarized in Table 20.

Table 20. Mountain Pine Beetle Risk Rating by Pine Structural Stage

Structural Stage	Insect Rating
1	Low
2	Low
3A	Low
3B	Low
3C	High
4A	Low
4B	High
4C	High
5	High

Based on this guide, currently, there are approximately 14,373 acres of ponderosa pine at high risk for mountain pine beetle infestation in the Vestal project area. This is about

61% of the pine stands in the analysis area. High-risk pine stands are at a greater potential for increased MPB activity. Most of the mortality is in trees that are greater than 7-inches in diameter, with lesser amounts in small trees. Mortality is also typically concentrated in stands where tree density is highest, typically over 100 basal area (Allen, March 2011). Stands above 60 ft²/ac of basal area or higher (generally structural stages 3C, 4B, 4C and higher density 4A stands) are considered to be at high risk. Table 21 displays existing MPB risk ratings. The SS 4A stands which are identified as having stand density >60 ft²/ac of basal area and therefore are very close to being high risk, are displayed separately.

Table 21. Current MPB Risk Rating for Ponderosa Pine in Vestal

Mountain Pine Beetle Risk	Acres	Percentage
Low	3,145	13
Low (4A>60BA)*	6,175	26
High	14,373	61

Hardwoods

There are 431 acres (~2%) of designated aspen stands within the analysis area. Hardwoods, mainly aspen, can also be found growing as inclusions within some conifer stands in the project area. Aspen is out competed by intruding conifers and aspen numbers could decrease by the reduction in the amount of light they receive.

Spruce

There are 42 acres of designated spruce stands in the project area. These are generally located along north facing slopes and on moist micro-sites. Mixed spruce and pine stands also occur. Spruce also occurs as stringers within some meadow sites.

Meadows

There are 1,482 acres (6%) of meadows in the Vestal area. These meadow sites have been encroached by conifers. Grassland and meadows have increased from 2008 to 2009 forestwide. (Black Hills Forest Monitoring & Evaluation Report Sept 2010).

Environmental Consequences

This section compares the two alternatives at year 2018, when all management activities are expected to be completed and the mountain pine beetle infestation is expected to have run its course in the project area.

Alternative 1

Ponderosa Pine

Under this alternative, no new forest vegetation activities would occur in the project area. However, the project area would still experience change through other processes. The most prevalent process affecting the project area is the current mountain pine beetle infestation. The distribution of ponderosa pine structural stages within the project area would experience great change due to the current mountain pine beetle infestation (Table 22).

Table 22. Alternative 1 Pine Structural Stages in Entire Vestal Project Area, Projected to Year 2018 and Compared to Existing Condition.

Structural Stage	2011 Acres	2011 Existing %	2018 Acres	2018 Alt 1 %
1	87	<.1	7,082	29.9
2	269	1.1	2,530	10.7
3A	770	3.2	4,890	20.6
3B	1,270	5.4	1,168	4.9
3C	1,295	5.5	0	0
4A	6,924	29.2	6,716	28.3
4B	10,267	43.3	1,297	5.5
4C	2,704	11.4	0	0
5	107	<.1	10	<.1
Total	***23,693***	***100***	***23,693***	***100***

Estimates of MPB caused mortality were projected by the entomologist (Allen 2011) based on existing conditions in the project area, high populations of beetles and predominantly high (61%) MPB risk ratings. Field surveys of MPB activity in the fall of 2011 confirm a rapidly increasing MPB outbreak in this area (Allen 2011). The specific sites on where these structural stages would occur is speculative. Therefore, the total acres and percentages of projected structural stages is presented for comparison.

The population of mountain pine beetles would increase at a greater rate because high risk stands would continue to exist and be available for infestation. As the population continues to increase at an epidemic rate more trees in low risk stands would also be attacked. Landscape scale changes in forest structure would occur with vast areas reduced to structural stages 1, 2, and 3A. These changes have been seen in previous outbreaks across the forest.

Infested trees would contain blue stain fungus which would lower the commercial value of the wood. Wood borers and weather checking would render much of the wood useless for commercial purposes within one year. Vast areas would be reduced to a level below the timber management zone (Stocking charts in Appendix H-see Guideline 2409). Structural stage 1 and other low density stands would take decades to reforest due to long distances between residual trees. Stands designated for goshawk and late successional habitat would likely be lost as tree mortality alters their structural stages and thus destroys the characteristics they have been designated for. Standing dead and fallen dead trees would create heavy concentrations of fuels causing large areas to be at high hazard for large scale high intensity wildland fires. These fires would likely spread to stands that have survived the beetle attack thus destroying more resource values. Private forest lands mixed in the project area would be subject to the same destruction and loss of resource and habitat values.

This alternative would not treat any acres to a low insect rating. The percentage of the ponderosa pine stands in the analysis area in 3B, 3C, 4B, and 4C structural stages would go from 66% to 10% (see Table 23). The high population of mountain pine beetle attacks and resulting mortality not only affects the largest trees, but also smaller trees down to 3 inches diameter at breast height. Approximately half of these sites would change to structural stages 1 and 2. Single-storied sites lacking advanced regeneration would change to structural stage 1, while multi-storied sites with advance regeneration would change to structural stage 2. (See Table 23).

Structural stage changes projected to occur with Management Areas 4.1, 5.1 and 5.4 are presented below in Tables 23-25.

Table 23. Alternative 1 Pine SS in MA 4.1, Forestwide

Structural Stage	Forest Plan Objective %	MA 4.1 Existing Condition Pine Acres	MA 4.1 Existing Condition %	Alt 1 2018 Pine Acres	Alt 1 2018 %
1	5%	486	1%	1,716	5%
2	5%	461	1%	899	2%
3A	10%	975	3%	1,438	4%
3B	15%	1,253	3%	1,094	3%
3C	5%	887	2%	475	1%
4A	25%	9,668	27%	9,852	27%
4B	25%	14,379	40%	13,314	37%
4C	5%	7,055	20%	6,376	18%
5	5%	896	2%	896	2%
Total	***100%***	***36,060***	***100%***	***36,060***	***100%***

Table 24. Alternative 1 Pine SS in MA 5.1, Forestwide

Structural Stage	Forest Plan Objective %	MA 5.1 Existing Condition Pine Acres	MA 5.1 Existing Condition %	Alt 1 2018 Pine Acres	Alt 1 2018 %
1	5%	26,760	6%	29,559	6%
2	5%	16,673	4%	17,694	4%
3A	10%	24,236	5%	26,076	6%
3B	15%	17,047	4%	17,243	4%
3C	5%	10,269	2%	9,967	2%
4A	25%	185,062	39%	184,060	39%
4B	25%	142,228	30%	138,404	29%
4C	5%	50,437	11%	49,777	11%
5	5%	1,227	0.3%	1,159	0.2%
Total	***100%***	***473,393***	***100%***	***473,939***	***100%***

Table 25. Alternative 1 Pine SS in MA 5.4, Forestwide

Structural Stage	Forest Plan Objective %	MA 5.4 Existing Condition Pine Acres	MA 5.4 Existing Condition %	Alt 1 2018 Pine Acres	Alt 1 2018 %
1	5%	45,616	13%	48,539	14%
2	5%	10,152	3%	11,005	3%
3A	10%	17,454	5%	19,309	6%
3B	15%	22,227	7%	22,099	7%
3C	5%	15,763	5%	15,182	4%
4A	25%	86,487	25%	87,061	26%
4B	25%	87,864	26%	83,747	25%
4C	5%	52,865	16%	51,500	15%
5	5%	1,066	0.3%	1,052	0.3%
Total	*100%*	*339,494*	*100%*	*339,494*	*100%*

Very Large Sized Trees

The No Action alternative would reduce the acres of SS4 with an average tree size of very large within the project area, due to mountain pine beetle caused mortality, by approximately 67% from 974 acres to 324 acres (see Table 26). This change in acres however would not result in a change to the Forest-wide management area percentages (see Table 26). Objectives 4.1-203 and 5.1-204 would continue to be exceeded. Objective 5.4-206 would retain its percentage, but actually moves away from the objective based on acres.

Table 26. Alternative 1 Acres of SS4 with an Average Tree Size of Very Large at Year 2018

Management Area	Existing Condition Acres	Alt 1 Acres Year 2018
4.1	50	16
5.1	208	69
5.4	716	239
Total	***974***	***324***

Table 27. Alternative 1 Percentage of SS4 with an Average Tree Size of Very Large at Year 2018

Forest-Wide MA Objective	MA 4.1		MA 5.1		MA 5.4	
	Existing	**Alt1**	**Existing**	**Alt1**	**Existing**	**Alt1**
10%	20%	20%	13%	13%	9%	9%

Late Succession

Total acres of late succession would be reduced in this alternative due to MPB caused mortality. Approximately 10 acres are projected to remain within the project area (Allen 2011). The criteria for structural stage 5 is the stand must be at least 160 years old and to have a tree size class of Very Large (V), trees 16-inches in diameter at breast height (DBH) or greater. The remaining structural stage 4A and 4B stands would eventually grow into structural stage 5, however this would take several decades or longer to achieve. With the current MPB infestation it is highly likely that the development of structural stage 5 would be delayed due to an increase in MPB caused tree mortality.

Hardwoods

Aspen would benefit from the mountain pine beetle-caused mortality of overstory ponderosa pine, which decreases competition for sunlight and nutrients. However, ponderosa pine less than 3” DBH escape mortality and remain to compete with quaking aspen. They would eventually shade out the aspen within the following 50 years. Increased sunlight warming the ground would immediately stimulate aspen regeneration through root suckering, expanding existing clones outward a distance up to 1 to 1.5 tree heights (Shepperd & Battaglia 2002). The flush of new aspen suckers increases browsing damage, however, the large amount of ponderosa pine snags falling down mitigate the browsing pressure by physically blocking deer and elk from the suckers. This alternative would move toward forest Objective 201.

Spruce

No change to spruce acres would occur with this alternative. Ponderosa pine within the spruce stands could likely become infested with mountain pine beetle.

Meadows

Meadow sites in the project area continue to experience encroachment from ponderosa pine. The ponderosa pine encroaching on meadow sites is either not large enough or dense enough to experience heavy mountain pine beetle-caused mortality. Meadows are not expected to increase as their extent is limited by soil characteristics. This alternative is consistent with Objective 205.

Alternative 2

Ponderosa Pine

Total acres of ponderosa pine are reduced by 126 due to proposed hardwood conversion treatment. These stands were identified as past aspen sites which had been encroached by pine over time.

Effects to conifer structural stages from mountain pine beetle-caused mortality and vegetation treatments would be expected to move away from the Forest Objectives for structural stages by Management Area, but not as much as in Alternative 1. Conifer sites treated to 3A and 4A or already in 3A or 4A can be expected to survive the mountain pine beetle infestation and grow into structural stages 3B and 4B within 20 to 30 years.

This alternative would create more structural stage 4A than Alternative 1, but would also retain more structural stage 4B (see Table 28).

Table 28. Pine Structural Stages by Alternative

Structural Stage	2011 Acres	2011 Existing Percent	2018 Alt 1 Acres	2018 Alt 1 Percent	2018 Alt 2 Acres	2018 Alt 2 Percent
1	87	<.1	7082	29.9	77	<.1
2	269	1.1	2530	10.7	1275	5.4
3A	770	3.2	4890	20.6	597	2.5
3B	1270	5.4	1168	4.9	111	<.1
3C	1295	5.5	0	0	114	<.1
4A	6924	29.2	6716	28.3	18438	78.2
4B	10,267	43.3	1297	5.5	2496	10.6
4C	2704	11.4	0	0	352	1.5
5	107	<.1	10	<.1	107	<.1
Total	***23,693***	***100***	***23,693***	***100***	***23,567****	***100***

*Pine acres are reduced in Alternative 2 as 126 acres are converted to aspen.

The MPB epidemic is currently threatening forest resources in the project area. Vegetation treatments in Alternative 2 are designed to reduce MPB susceptibility; thereby reducing the potential for MPB caused mortality. Reducing the density of high-risk stands to a basal area of 60ft²/acre or less would dramatically reduce the risk of MPB susceptibility. In areas where there are ongoing beetle epidemics, lowering stand densities to 60ft²/acre provides a higher level of prevention (Allen, March 2011). Approximately 20,000 acres of treatments are proposed within pine stands.

Some stands adjacent to private lands would be thinned to 50ft²/acre for crown fire hazard reduction. A follow up Products Other Than Logs (POL) thinning of trees under 9 inches DBH to a 22’ by 22’ spacing would also be done where the commercial sawtimber harvest (selected trees over 9 inches DBH) does not remove enough trees to reach the 50ft²/ac objective.

Conversely, some stands would be left at higher density for wildlife habitat needs. These stands would receive a free selection thinning (1,054 acres) or sanitation cutting only (3,655 acres). These stands would be at higher risk of infestation but a higher level of infestation risk would be accepted within these stands.

Sanitation, removal of trees currently infested with MPB, would be applied to all forest stands. Sanitation cuts would effectively remove insect broods from infested trees in the forest and destroy the insects. Sanitation cuts would be done for up to five years in each stand if necessary to remove newly infested trees.

All commercial entries would be limited by operability and access limitations resulting in something less than the total acres planned being actually treated with commercial harvest. This would amount to no more than 12% of the planned commercial treatment acres.

The result of this alternative is a lowered risk level and a decreasing level of MPB caused mortality relative to the current epidemic (see Table 29). The landscape is expected to encompass thinned stands, some very open stands, and some openings as a result of the varying levels and concentrations of infested trees. Aspen clones would increase in size and viability as conifers are removed in and around them. As the infestation is slowed in the treated stands, areas left at higher densities for wildlife habitat would be more likely to avoid levels of mortality that reduce their structural stage condition.

Prescribed burning has little effect on the site structure following mechanical treatments that create structural stages 3A or 4A. However, prescribed burning in combination with drought can stress residual trees in mechanically-treated areas and leave them susceptible to mountain pine beetle-caused mortality. Therefore prescribed burning would be delayed until the passing of the mountain pine beetle epidemic.

Table 29. MPB Risk Rating-Alternative 2 Compared to Existing Condition

Mountain Pine Beetle Risk	Existing Acres	Existing Percentage	Alt 2 Acres*	Alt 2 Percentage
Low	9,320	39	20,498	87
High	14,373	61	3,069	13

*Total acres of pine is reduced in Alternative 2 due to hardwood conversion treatment

Thinning treatments would increase growth on remaining trees and improve the overall health of the stands because there would be more water, nutrients and sunlight for each tree. Thinning can put stands at risk to windthrow and breakage. Occurrence of windthrow and breakage would be minimized by thinning from below, i.e. harvesting mostly the smaller, shorter trees and leaving the tallest trees that have had more wind exposure and developed more sturdiness.

Managed healthy stands would maintain options for future forest management. Some reproduction of seedlings can be expected over time after thinning. This change in forest structure may be treated in future entries with prescribed burns or mechanical treatments to eliminate seedlings. Conversely, overstory removals, regeneration cuts or uneven-aged treatments may be prescribed to enhance or maintain the diversity in structure that is developed.

Table 30. Forest-wide Management Area 4.1 Pine Structural Stages by Alternative

Structural Stage	Forest Plan Objective %	Existing Condition Acres	Existing Condition %	Alt 1 Year 2018 Acres	Alt 1 Year 2018 %	Alt 2 Year 2018 Acres	Alt 2 Year 2018 %
1	5%	486	1%	1,716	5%	486	1%
2	5%	461	1%	899	2%	905	3%
3A	10%	975	3%	1,438	4%	646	2%
3B	15%	1,253	3%	1,094	3%	889	2%
3C	5%	887	2%	475	1%	521	2%
4A	25%	9,668	27%	9,852	27%	11,877	1%
4B	25%	14,379	40%	13,314	37%	13,329	33%
4C	5%	7,055	20%	6,376	18%	6,511	37%
5	5%	896	2%	896	2%	896	18%

Structural Stage	Forest Plan Objective %	Existing Condition Acres	Existing Condition %	Alt 1 Year 2018 Acres	Alt 1 Year 2018 %	Alt 2 Year 2018 Acres	Alt 2 Year 2018 %
Total	***100%***	***36,060***	***100%***	***36,060***	***100%***	***36,060***	***2%***

Table 31. Forest-wide Management Area 5.1 Pine Structural Stages by Alternative

Structural Stage	Forest Plan Objective %	Existing Condition Acres	Existing Condition %	Alt 1 Year 2018 Acres	Alt 1 Year 2018 %	Alt 2 Year 2018 Acres	Alt 2 Year 2018 %
1	5%	26,760	6%	29,559	6%	26,753	6%
2	5%	16,673	4%	17,694	4%	16,708	4%
3A	10%	24,236	5%	26,076	6%	24,230	5%
3B	15%	17,047	4%	17,243	4%	16,824	4%
3C	5%	10,269	2%	9,967	2%	10,021	2%
4A	25%	185,062	39%	184,060	39%	189,123	40%
4B	25%	142,228	30%	138,404	29%	139,143	29%
4C	5%	50,437	11%	49,777	11%	49,819	11%
5	5%	1,227	0.3%	1,159	0.2%	1,227	0.3%
Total	***100%***	***473,393***	***100%***	***473,939***	***100%***	***473,848***	***100%***

Table 32. Forest-wide Management Area 5.4 Pine Structural Stages by Alternative

Structural Stage	Forest Plan Objective %	Existing Condition Acres	Existing Condition %	Alt 1 Year 2018 Acres	Alt 1 Year 2018 %	Alt 2 Year 2018 Acres	Alt 2 Year 2018 %
1	5%	45,616	13%	48,539	14%	45,613	13%
2	5%	10,152	3%	11,005	3%	10,672	3%
3A	10%	17,454	5%	19,309	6%	17,616	5%
3B	15%	22,227	7%	22,099	7%	21,660	6%
3C	5%	15,763	5%	15,182	4%	15,196	4%
4A	25%	86,487	25%	87,061	26%	91,683	27%
4B	25%	87,864	26%	83,747	25%	84,278	25%
4C	5%	52,865	16%	51,500	15%	51,675	15%
5	5%	1,066	0.3%	1,052	0.3%	1,066	0.3%
Total	***100%***	***339,494***	***100%***	***339,494***	***100%***	***339,459***	***100%***

Very Large Sized Trees

Alternative 2 would reduce the acres of SS4 with an average tree size of very large within the project area, by approximately 21% from 974 acres to 767 acres (see Table 33), which is less of a change than in Alternative 1. This change in acres however would not result in a change to the Forest-wide management area percentages (see Table 34) for Objectives 5.1-204 or 5.4-206. It would reduce the percentage in MA 4.1 and moves toward objective 4.1-203.

Table 33. All Alternatives: Acres of SS4 with an Average Tree Size of Very Large at Year 2018

Management Area	Existing Condition Acres	Alt 1 Acres Year 2018	Alt 2 Acres Year 2018
4.1	50	16	36
5.1	208	69	178
5.4	716	239	553
Total	*974*	*324*	*767*

Table 34. All Alternatives Percentage of SS4 with an Average Tree Size of Very Large at Year 2018

Forest-Wide MA Objective	MA 4.1			MA 5.1			MA 5.4		
	Existing	Alt1	Alt2	Existing	Alt1	Alt2	Existing	Alt1	Alt2
10%	20%	20%	19%	13%	13%	13%	9%	9%	9%

Late Succession

The action alternative would allow some structural stage 4A and 4B stands to eventually grow into structural stage 5 over several decades or longer. The potential to develop structural stage 5 is improved over the No Action alternative. Reducing the risk for MPB caused mortality increases the possibility of retaining mature stands that could develop into late succession.

Hardwoods

In this alternative, acres of aspen would be increased from an existing 431 to 557 acres. Conifers would be removed from existing hardwood stands and an additional 126 acres of ponderosa pine cover type would be converted to a quaking aspen cover type following treatment. The intolerant hardwoods cannot compete with the more tolerant conifers. Removing conifers from a hardwood stand would ensure that hardwoods would not become shaded out and the stand eventually taken over by conifers. In addition, scattered inclusions of aspen within pine stands would be released from competition by having conifers removed. A 33 foot buffer around each aspen inclusion would also have conifers removed to allow sunlight to the aspen and enhance further expansion of the aspen inclusion. Conifers less than 9” DBH are hinged and left on site to protect aspen suckers from browsing. Hinging is an effective method to deter browsing in the Black

Hills (Kota & Bartos 2005). This alternative moves closer toward Objective 201, than Alternative 1.

Spruce

There are 107 acres of white spruce in the project area within three of the four management areas. White spruce is rare on the landscape and in healthy condition at this time. No treatment within the spruce stands would occur with this entry except for Sanitation to remove MPB infested trees.

Meadows

Approximately 1,458 acres of pine encroachment treatments would occur in historic meadow sites. These historic meadow sites have been encroached upon by pine. They would be restored by removal of conifers of all sizes. As a result, increased grass and forage production would occur. This alternative better moves toward Objective 205, than Alternative 1.

Cumulative Effects

The time boundary used to analyze cumulative effects is 1980-2018. Harvesting and noncommercial treatments in the 1980s are the earliest known activities that still significantly affect the landscape today. The timber sales from this analysis are scheduled to sell in 2012 and 2013. Allowing 2 years for the sales to be harvested and three years for post sale activities to be accomplished all activities should be completed by approximately 2018. Predicted changes in structural stages from mountain pine beetles would be also be expected to occur by at least 2018.

The spatial boundary used to analyze cumulative effects is the project area boundary for all resource elements discussed in this section except for mountain pine beetle. The direct and indirect effects for most elements are contained within the project area boundary. The cumulative effects boundary for mountain pine beetle is the project area and the Wabash Resale Timber Sale area immediately adjacent to the southwest boundary of the project area. This boundary was selected because beetle populations are known to be at high level in the Wabash area and could affect Ponderosa pine within one mile of this sale area. Beetles generally move less than one-tenth of a mile per year but might travel up to several miles on rare occasions.

Ponderosa Pine

Much of the Vestal analysis area has been harvested in the past. At least 25 timber sales have taken place in portions of the project area since 1980. The effect of past treatments has been an increase of merchantable volume growth and improvement in the quality of timber. There has also been an improvement in the quality of timber through removal of damaged, diseased, and poorly formed trees. Precommercial thinning and weed & release have occurred and improved stand health by removing damaged, diseased, and poor quality trees.

Late Succession and Very Large Sized Trees

Past timber harvest has had both positive and negative impacts on late succession. It allowed some mature trees to grow into the ‘Very Large’ tree size (greater than 16+

inches DBH) by increasing diameter growth as a result of less competition. In addition, MPB risk to mature stands has been reduced due to harvest. Past harvest has also removed old trees from stands that may have had the potential to become late successional.

The action alternative would have a beneficial cumulative effect by increasing the potential for retention of Very Large and old trees on the landscape because of reduced MPB risk. The no action alternative would not reduce MPB risk and therefore would not have a beneficial cumulative effect.

Mountain Pine Beetle Risk

The Black Hills, including the Vestal analysis area, has recently emerged from a 10 year on-going drought condition. While MPB does not depend on drought conditions for the insect to continuously increase their population, the drought has aided the MPB by increasing stress in healthy trees thus making the trees more vulnerable to a successful insect attack.

With the no action alternative, lack of vegetation treatment within pine sites would increase the potential for MPB populations to increase within the project area. Pine sites near the most highly infested areas to the north and east and the Wabash Resale Timber Sale would be expected to become affected first. Sites to the south have numerous small infested patches and are probably a year behind in intensity of infestation. The no action alternative would therefore have an adverse cumulative effect on ponderosa pine as related to MPB infestation.

There would be positive cumulative effects to MPB risk under the proposed action alternative. Treatment of pine stands to lower stand density reduces the susceptibility of a stand to MPB infestation. Past and present activities combined with the proposed activities would result in mountain pine beetle-caused mortality being decreased with the action alternative.

Hardwoods

Past treatments have removed conifers from almost all hardwood stands. This action has prevented hardwoods from becoming shaded out and the stand eventually taken over by conifers.

Under no action, the aspen stands and scattered inclusions of aspen within pine stands would be not be released from competition by having conifers removed. Under the proposed action alternative the aspen areas would be released and not be further invaded by conifers as conifer seed sources would be removed.

Meadows

Some meadows have been successfully released from pine competition in the past. Approximately 1,458 acres of pine encroachment would occur in the proposed action alternative. These historic meadow sites have been encroached upon by pine. They would be maintained by removal of conifers of all sizes. As a result, increased grass and forage production would occur.

The cumulative effect under no action would be that pine would remain in these meadows and seed more trees further into the meadows. Grass and forage production would continue to decrease.

Wildlife and Fish

Affected Environment

Existing vegetation habitat conditions are discussed under Forest Vegetation, earlier in this document. Additional discussion of some specific habitat components, snags and down woody material is presented below. Riparian habitat is discussed in the Hydrology specialist report.

Snags and Down Woody Material

The MPB outbreak that has been occurring for the last 3-4 years has created snag habitat in the Vestal Project Area, especially in the northern and western portion of the project area. However, trees killed by MPB are only expected to remain intact on the landscape for about 5 years (Schmid et al. 2009).

Currently, cutting snags for fuelwood is allowed within 300' of roads where dispersed camping is permitted as shown on the Forest Motorized Vehicle Use Map (MVUM). The majority of the Vestal project area is included. No other snag cutting areas occur within the project area.

Down woody material amounts vary across the project area. Most of the project area currently contains down woody material at levels noted in Objective 212.

Management Indicator Species (MIS)

The Phase II Amendment to the 1997 Forest Plan-FEIS (USDA Forest Service 2005) lists MIS to be considered during project-level planning. The MIS species which have habitat or populations present within the Vestal project area were analyzed (see Table 35). Some MIS species have dual designations as also R2 sensitive species or Species of Local Concern (SOLC), as noted in the analysis presented.

Table 35. MIS list and rationale for inclusion in project-level analysis

Species	Analyzed in Rep.	Rationale	Habitat Description
Beaver (*Castor canadensis*)	YES	There is an active colony at Bismark Lake.	Large rivers and lakes down to streams, marshes and small lakes with seepage/weak flows adequate for damming and suitable woody vegetation (Higgins et al. 2000).
White-tailed deer (*Odocoileus virginianus*)	YES	Species was observed throughout the Project Area.	Very adaptable species that can live in almost any habitat. In South Dakota, this includes grasslands, wetlands and woodlands (Higgins et al. 2000).
Golden-crowned kinglet (*Regulus satrapa*)	YES	Suitable habitat is found in spruce stands within the project area.	Found almost exclusively in white spruce habitat but occasionally present in habitats with a spruce component (Panjabi 2003).

Species	Analyzed in Rep.	Rationale	Habitat Description
Grasshopper sparrow (*Ammodramus savannarum*)	NO	Suitable habitat is not found within the Project area.	Found almost exclusively in native mixed-grass prairies (Panjabi 2003).
Black-backed woodpecker (*Picoides arcticus*)	YES	Suitable habitat is found within the project area.	Burned areas with a high density of pre-burn snags; mountain pine beetle infested areas; dense and/or mature forests with a high snag density (Anderson 2003, Panjabi 2003, Bonnot et al. 2008).
Brown creeper (*Certhia americana*)	YES	Species was observed or heard throughout the project area in 4B and 4C pine sites.	In the Black Hills, white spruce and late successional pine appears to be the most important habitat type for this species (Panjabi 2001, 2003).
Ruffed grouse (*Bonasa umbellus*)	YES	Potential habitat exists in aspen throughout the Project area.	Variable aged aspen stands, other hardwoods and pine forests provide habitat. Winter habitat is almost exclusively aspen (DeGraaf et al. 1991, Tallman et al. 2002).
Song sparrow (*Melospiza melodia*)	YES	Riparian corridors provide desirable habitat throughout the project area.	Streamside thickets, particularly shrubby willows, are required for habitat. Occasionally found in adjacent spruce habitat (Panjabi 2003).
Mountain sucker (*Catostomus platyrhynchus*)	YES	French Creek provides potential habitat for this species.	Large rivers, lakes, reservoirs, prairie streams but most often in cool, clear, moderately swift mountain streams with mud, cobble, or boulder substrate (Isaak et al. 2003).

<u>Beaver (MIS)</u>

The beaver was selected as a Forest MIS to evaluate the effects of Forest Plan implementation and natural change on the ability of the Forest to support species that rely on a variety of riparian and hardwood forest conditions to meet their needs (USDA Forest Service 2005a).

In the Project Area, there is an active colony at Bismarck Lake; another active colony is close to the project area up Sylvan Lake Road.

Baseline beaver surveys were conducted on the Forest in the fall of 2004. The species was most commonly found in the Bearlodge Mountains and central Black Hills (USDA Forest Service 2005b). Forest-wide, long-term beaver population trend has increased since heavy trapping has decreased, but it is less than its potential. The current distribution of beaver is reduced based on the number of inactive beaver sites that were observed (during monitoring efforts in 2007), especially in headwater streams, where water and/or a suitable food supply is lacking (USDA Forest Service 2008). In addition, Forest-wide, the long-term trend in beaver habitat is one of decline. The reduction in beaver activity that occurred from heavy trapping likely caused a lowering of water tables and a subsequent loss of willows and other riparian vegetation (Parrish et al. 1996). This, in conjunction with other factors, has reduced the quality and quantity of riparian willow habitat in the Black Hills following European settlement. The amount of aspen and other hardwoods on the Forest has also declined (USDA Forest Service 2005b).

White-tailed Deer (MIS)

White-tailed deer were selected as a Forest MIS to evaluate the effects of Forest Plan implementation and natural change on the ability of the Forest to support species that rely on a variety of forest conditions, including the presence of understory shrubs, to meet their needs (USDA Forest Service 2005a).

White-tailed deer in the Black Hills require a diversity of habitat types. Juxtaposition between cover and forage is crucial year-round. Hardwood stands, which provide abundant forage combined with screening cover, were best predictors of white-tailed deer diurnal, summer use (Stefanich 1995). Peak use of dense aspen habitats with dense, tall shrub cover indicated importance as fawning habitat in the northern and central Black Hills (DePerno et al. 2002). Summer nocturnal habitat use is significantly different with use of open habitat types of meadows, riparian areas, and/or open pine relative to proximity of dense cover (Stefanich 1995). Wet meadows, riparian areas, and open stands of ponderosa pine also provide quality forage. Management actions that increase habitat and structural diversity across the Forest will better meet necessary forage and cover requirements for deer. The primary limiting factor for white-tailed deer in the Black Hills may be a lack of desirable shrubs for food and cover (DePerno et al. 2002). Another factor that can affect deer habitat is road construction and road density (SAIC 2003).

Habitat trend at the Forest-level suggests that summer habitat trend is increasing, and winter habitat trend is stable to slightly decreasing (USDA Forest Service 2005b). The Forest is meeting Objective 238a, with regard to summer habitat, but the Forest may not be maintaining winter habitat, although the decline might not be significant (USDA Forest Service 2009).

During field surveys, deer were often observed throughout the project area. The high amount of meadows (mostly on private land) and SS4A pine stands have provided areas for foraging, although shrubs are lacking in Vestal. Also, much (42%) of the project area is in big game winter range, which contains seasonal motorized use closure areas. The project area contains approximately 2.2 mi/mi^2 of roads (includes Forest Service and county roads), with open road density at approximately 1.5 mi/mi^2. In Management Area 5.4 (Big game winter range) only, road density is higher at approximately 5 mi/mi^2. However, seasonal road closures from December 15-May 15 reduce open road density during this time to approximately 2.2 mi/mi^2.

Big Game Screening

Hiding or Screening cover is defined as: being able to hide 90% of an adult deer or elk from human view at a distance of 200 feet or less. There are 12 collector and arterial roads in the Vestal project area where the screening cover guideline (*Guideline 3203*) applies. Currently adequate screening cover is provided by vegetation or topography on all collector and arterial roads (Table 36).

Table 36. Current Screening Cover in the Vestal Project Area on Forest Service Land

Road Numbers	Functional Class	Percent Screening Cover
285	Collector	50
653	Collector	80
286	Collector	70
284	Arterial	50
297	Arterial	65
336	Collector	20
337	Collector	48
343	Collector	46
342	Collector	55
344	Collector	60*
345.1	Collector	65*

*Screening cover along these roads provided mainly by vegetation.

Golden-crowned Kinglet (MIS)

The golden-crowned kinglet was selected as a Forest MIS to evaluate the effects of Forest Plan implementation and natural change on the ability of the Forest to support species that rely on a variety of conditions in spruce habitat to meet their needs (USDA Forest Service 2005a).

Habitat for the golden-crowned kinglet has increased over the long-term and is exceeding the Forest-wide target of 20,000 acres (Objective 239) (USDA Forest Service 2010).

Forest monitoring results show that kinglet relative densities were highest in 2005 (white spruce) and showed the lowest densities in 2007. Relative densities rebounded in 2009 in both late successional and white spruce habitats (USDA Forest Service 2010). Golden-crowned kinglets were also found in northern ponderosa pine, montane riparian and foothill riparian habitats; however, white spruce was present at some level within each one of these (Beason et al. 2006).

There are currently only 42 acres of designated spruce stands in the project area. Spruce also occurs within some pine and meadow sites, which would also be used by this species.

Black-backed Woodpecker (R2 Sensitive Species and MIS)

Black-backed woodpeckers were selected as an MIS to evaluate the effects of Forest Plan implementation and natural change on the ability of the Forest to support species that rely on mature and late successional forest, burned forest, insects, and snags to meet their needs. The black-backed woodpecker is also a Region 2 sensitive species. The effects to this species are evaluated in the Biological Evaluation.

Overall, habitat for this species is being provided consistent with Objectives 221 and 238b. The “aging” of large burned areas into habitat less suitable for black-backed woodpeckers is likely being offset by the increasing acreage of insect-infested timber stands.

Black-backed woodpecker relative densities (birds/km^2) in burned habitat reached a high in 2002 and declined thereafter until 2009 when it reached the highest density. The jump in relative density in 2009 could be from the abundance of insect activity occurring across the Forest (USDA Forest Service 2010). The Forest-wide relative density for this species is probably higher than “normal” given the current habitat conditions. Black-backed woodpecker populations are “eruptive” as reflected in their densities in burned habitat. This pattern of rapid colonization and subsequent decline is consistent with findings of other studies (Anderson 2003). The overall condition on the Forest is still for a high beetle infestation. This translates into a short-term favorable habitat condition for the black-backed woodpecker (USDA Forest Service 2010). This species’ Forest-wide population trend is likely to decline in the future as vegetation management efforts to reduce the fire-hazard and insect-risk continue. (USDA Forest Service 2010). Additionally, SS4C and 5 (habitat needed when no burned or MPB areas are available) combined declined in 2009.

Potential suitable habitat is present in the project area. Late succession stands containing large diameter dead trees (snags) created by natural events (wind, lightening), and areas of MPB activity are currently present within or adjacent to the Vestal project area. Observations have occurred within the project area.

Brown Creeper (MIS)

The brown creeper is selected as an MIS to evaluate the effects of Forest Plan implementation and natural change on the ability of the Forest to support species that rely on a variety of spruce, late-successional and dense mature pine conditions to meet their needs.

This small forest bird occurs in low abundance throughout the Black Hills and is associated with mature and late succession forest (SS4C and 5) conditions and spruce forests. The preferred nesting habitat for this species is mature, old growth forest (SS5) that is undisturbed and contains a closed canopy (Hejl et al. 2002, Wiggins 2005). Results from monitoring data identify white spruce and late successional pine as the most important habitat type for this species (Panjabi 2001, 2003, 2005). Other important habitat requirements are areas of large trees (i.e., >10” DBH), loose bark, areas infested with bark beetles and snags (DeGraaf et al. 1991, Wiggins 2005). Dead or decaying trees and snags provide substrate for nests and foraging. Nesting habitat generally contains trees that are >9” DBH (Hejl et al. 2002). Evidence also suggests that this species is sensitive to the effects of forest fragmentation (Wiggins 2005). It is considered an uncommon permanent resident of the Black Hills (Tallman et al. 2002), largely tied to late successional pine and white-spruce habitats (Panjabi 2003, 2005).

In 2009, brown creeper relative densities continued to decline in northern pine habitat, rebounded slightly in white spruce habitat and rebounded considerably in southern pine and late successional habitat (SS 4C and 5). Blakesly et al. (2008) determined it may take 25 years to detect a 3% annual decline for this species in pine-north, late successional and white spruce habitats and 30 years in pine-south habitat. However, in the short-term, relative densities declined in 2007 compared to previous years, but rebounded in 2009 in most habitats sampled (USDA Forest Service 2010).

Observation data for the brown creeper reveals a short-term downward Forest-wide population trend. It appears that Objective 238a is being met, although short-term activities to meet the structural stage 4C objective may be affecting the Forest’s ability to provide very large trees in structural stage 4C. Continued effort and additional time is needed to increase the acres of structural stage 5 (USDA Forest Service 2008, 2009).

The species was observed in low numbers but scattered throughout the project area in structural stage 4B and 4C ponderosa pine sites. Currently, there are a total of about 13,000 acres of structural stage 4B, 4C and 5 ponderosa pine, and 42 acres of white spruce in those same structural stages. However, the preferred large diameter trees are only found occasionally. Additionally, there are pockets of MPB that have opened up some of these stands.

Ruffed Grouse (MIS)

The ruffed grouse is selected as a Forest MIS to be an indicator of aspen quantity and vigor in pure and mixed stands. It was selected to evaluate the effects of Forest Plan implementation and natural change on the ability of the Forest to support species that rely on a variety of conditions in aspen to meet their needs (USDA Forest Service 2005a).

Ruffed grouse prefer young to medium -aged aspen stands (Tallman et al. 2002) but have been observed in other habitat types in the Black Hills, including open pine forests (Panjabi 2001, 2003). Ruffed grouse can survive on a diverse diet in the spring, summer and fall (Bolen and Robinson 2003), which may explain the range of habitat types the species has been recorded in from RMBO monitoring data (Panjabi 2001, 2003). However, ruffed grouse feed on tree buds in the winter and are almost completely dependent on aspen for food, shelter and escape cover. Ideal ruffed grouse habitat consists of plentiful aspens in all age-classes (i.e., sapling, pole-sized and mature; Bolen and Robinson 2003).

Ruffed grouse are a resident species where found and range from central Alaska to northwestern California, Idaho, Utah, Wyoming and Montana. They extend east through Minnesota, Ohio and the Appalachian Mountains from Virginia to northeastern Georgia (DeGraaf et al. 1991). It is considered an uncommon permanent resident in the Black Hills (Tallman et al. 2002) with greatest abundance in the northern Hills (Panjabi 2003).

The long-term habitat trend for ruffed grouse is one of decline. Aspen acreage has been reduced from the historic condition overall. However, there has been a slight increase in aspen acres during the past five years. More time and effort will be needed to increase aspen acreage in the future. Implementation of a ruffed grouse monitoring protocol should allow for the detection of a long-term population trend (USDA Forest Service 2010).

Aspen acreage in the project area currently totals 431 acres. This does not include scattered hardwood clones within conifer dominated sites. The hardwood sites represent all of the structural stages. This species has been observed within the project area.

Song Sparrow (MIS)

This species is an indicator of riparian habitat condition. The song sparrow was selected as a Forest MIS to evaluate the effects of Forest Plan implementation and natural change on the ability of the Forest to support characteristic riparian species that rely on a variety of riparian conditions to meet their needs (USDA Forest Service 2005a).

The song sparrow can be found throughout the Black Hills but is primarily dependent on riparian habitat with streamside thickets and willows. Highest densities were recorded in montane riparian habitat and to a lesser extent foothill riparian and white spruce habitat types. The spruce habitat the species was observed in usually occurred adjacent to riparian areas (Panjabi 2003). The latest estimate of riparian habitat on the Forest is about 64,000 acres. This includes riparian areas with an overstory of hardwoods or conifers. Of this acreage, about 12,000 acres have a shrub (willow) component. No Forest-wide data on riparian resource condition was collected in FY 2008 (USDA Forest Service 2009).

Data from the Monitoring the Birds of the Black Hills (MBBH) program show that the song sparrow is well-distributed throughout the northern Black Hills and Bearlodge Mountains, with a more localized distribution in the central and southern Hills (USDA Forest Service 2009). Further monitoring and analysis is required to clarify the population trend. Because the quality of riparian habitat has decreased since pre-European settlement, this would indicate a long-term declining habitat trend. However, in the short-term, small riparian habitat enhancement projects that have improved riparian conditions in some areas contribute to habitat enhancement and to achievement of Objective 238a. More monitoring and habitat restoration projects are warranted for a better assessment of the song sparrow trends (USDA Forest Service 2006b).

Song sparrows have been reported within the Vestal project area. Habitat exists along most perennial streams and even some ephemeral and intermittent streams.

Mountain Sucker (MIS and R2 Sensitive)

The mountain sucker was designated as a Management Indicator Species (MIS) to evaluate the quality and connectivity of stream habitat on the Black Hills National Forest. The mountain sucker is also a Region 2 sensitive species. The effects to the mountain sucker are evaluated in the Biological Evaluation.

The Forestwide trend for this species is one of decline (USDA Forest Service 2005, 2010). The mountain sucker historically occurred in French Creek. The first recorded occurrence was in 1893 at Custer, SD (Evermann and Cox 1896). Stream surveys in French Creek in 1960 found mountain suckers downstream of Stockade Lake/Dam (Stewart and Thilenius 1964). French Creek upstream of Stockade Lake was not surveyed. Surveys in 1984 and 1992-93 captured mountain suckers in French Creek downstream of Stockade Lake, but not upstream of the lake (Ford 1988, SDGFP 2009). SDGFP fisheries surveys in 2009 in streams within the Vestal project area did not collect any mountain suckers.

Species of Local Concern (SOLC)

Black Hills Supplement “r2_bh_2600-2011-1” to Forest Service Manual 2600 became effective September 6, 2011 and provides direction for the management of SOLC (USDA Forest Service 2011). As defined by this supplement, a species of local concern is a plant, fish or wildlife species (including subspecies or varieties) that does not meet the criteria for sensitive status. These could include species with declining trends in only a portion of R2, or those that are important components of diversity in a local area. The local area is defined as Forest Service lands within the Black Hills National Forest. This supplement also provides a detailed explanation of the evaluation criteria used to select species of local concern and a current list for the Black Hills National Forest (USDA Forest Service 2011).

Table 37 lists potential SOLC for the Black Hills National Forest. Rationale is provided for those species not analyzed.

Table 37. SOLC List and Rationale for Project-level Analysis

Species	**Species Present? (Y/N)**	**Habitat Present? (Y/N)**	**Include in NEPA document? (Y/N)**	**Rationale for not carrying species forward into the NEPA document**
Atlantis fritillary (*Speyeria atlantis pahasapae*)	YES	YES	YES	
Tawny crescent (*Phycoides batesii*)	NO	YES	YES	
Callused vertigo (*Vertigo arthuri*)	YES	YES	YES	
Mystery vertigo (*Vertigo paradoxa*)	NO	YES	YES	
Frigid ambersnail (*Catinella gelida*)	NO	YES	YES	
Striate disc (*Discus shimekii*)	NO	YES	YES	
Sharp-shinned hawk (*Accipiter striatus*)	YES	YES	YES	
Cooper's hawk (*Accipiter cooperi*)	YES	YES	YES	
Broad-winged hawk (*Buteo platypterus*)	NO	YES	YES	
Northern saw-whet owl (*Aegolius acadicus*)	YES	YES	YES	
Pygmy nuthatch (*Sitta pygmaea*)	YES	YES	YES	
American dipper (*Cinclus mexicanus*)	NO	NO	NO	The project area lacks habitat for this species. This species inhabits clear, fast-flowing streams (Anderson 2002).
Black and white warbler (*Mniotilta varia*)	NO	NO	NO	This area lacks the lower elevation bur oak woodlands and associated edges that is typical habitat for this species in the Black Hills (Beason et al. 2006)
Northern long-eared myotis (*Myotis septentrionalis*)	NO	YES	YES	
Small-footed myotis (*Myotis ciliolabrum*)	NO	YES	YES	
Long-eared myotis (*Myotis evotis*)	NO	YES	YES	
Long-legged myotis (*Myotis volans*)	NO	YES	YES	
Northern flying squirrel (*Glaucomys sabrinus*)	NO	YES	YES	
Meadow jumping mouse	YES	YES	YES	

Species	Species Present? (Y/N)	Habitat Present? (Y/N)	Include in NEPA document? (Y/N)	Rationale for not carrying species forward into the NEPA document
(*Zapus hudsonius campestris*)				
Mountain goat (*Oreamnos americanus*)	YES	YES	YES	
Bighorn sheep (*Ovis canadensis*)	NO	NO	NO	The Rocky Mountain bighorn sheep is a R2 sensitive species and is analyzed in the Wildlife BA/BE.

Atlantis Fritillary (SOLC)

The Atlantis fritillary is an endemic butterfly of the Black Hills and is restricted to Custer, Lawrence, and Pennington counties. It prefers wet meadows and moist canyons (Marrone 2002). Recent surveys indicate species presence appears to be correlated with spruce, flowing water and relatively high elevation (Reiser and Spomer 2005).

Due to the restricted nature of the Atlantis fritillary's distribution in the Black Hills, development or management activities within suitable habitats pose a risk to long-term persistence. Much of the fritillary's habitat is privately owned. Surveys conducted in 2005 throughout the forest identified 20 sites with Atlantis fritillary. Of these 20 sites, only three were known to have Atlantis fritillary presence prior to this survey. Although the species may be more common than previously thought, it still has a limited range and appears tied to permanent montane wetlands in the Black Hills. Habitat consisted of a wet area along the riparian corridor with some spruce present (Reiser and Spomer 2005). No surveys were conducted within the project area; however, there were observations of this species within the project area (French Creek and Tenderfoot).

Tawny Crescent (SOLC)

The tawny crescent is found in open meadows, stream bottoms, roads, trails, and riparian woodlands (Stefanich 2001). It is also found in mesic forest corridors across an ecotone between mixed-grass meadows or prairie grasslands to adjacent woodlands (Royer and Marrone 1992). Elsewhere in the Dakotas, adults are known to forage for nectar from a variety of floral species, including dogbane, leafy spurge and various composite flowers. Tawny crescent larvae appear dependent on asters as a food source although the specific host species and their relationship remain unclear (Stefanich 2001).

In South Dakota, the tawny crescent is restricted in its distribution to the Black Hills. The populations inhabiting the Black Hills of South Dakota and Wyoming are considered genetically isolated and disjunct from crescents elsewhere (Royer and Marrone 1992). Tawny crescents were observed at two of 20 monitoring sites on the Mystic Ranger District in 2002 (USDA Forest Service 2004). However, there continue to be no reliable estimates of local abundance or population estimates for the Black Hills (Stefanich 2001). Stefanich (2001) hypothesized that the only limiting factor in the Black Hills is the destruction of this butterfly's habitat or isolation of colonies to the extent that populations are unable to disperse. This species was observed several times just outside the project area.

Callused Vertigo (SOLC)

In 2002, the Forest received the final report for a contract to inventory and/or monitor 357 sites for land snails (Frest and Johannes 2002). Callused vertigo was found sparingly in 63 of the 357 sites inventoried/monitored. The sites where callused vertigo was found were wet, relatively undisturbed forest, most often closed canopied white spruce or ponderosa pine with a varied understory containing relatively diverse floras and deep litter, generally on shaded north-facing slopes and often at the slope base or extending slightly onto the adjacent floodplain. The most common substrate was limestone, but callused vertigo also occurred occasionally on schist-derived soils. Down woody material that helps maintain moist soil conditions and lessens sun exposure is an important habitat element. Foraging substrate appears to consist of decayed deciduous leaves and herbaceous plants.

Callused vertigo has been found at one site in (Site 112) the project area and sites near the area, indicating that the species may be found throughout the Project Area in similar habitat (refer to Frest and Johannes 2002 for exact location of that site). The narrowly restricted geographical range of the callused vertigo includes South Dakota (51 sites), Wyoming (12 sites in the Bear Lodge Mountains), North Dakota, Minnesota, and Alberta (Frest and Johannes 2002). The callused vertigo is currently ranked secure globally but imperiled in South Dakota (NatureServe 2011).

The monitoring protocol for snails was not funded in 2005 - 2008 (USDA Forest Service 2006b, 2007, 2008, 2009); therefore data to assess the status of SOLC snails is not available for then. Tronstad and Anderson (2011) modeled potential habitat in the Black Hills for these snails, and monitored some of the Frest and Johannes (2002) sites, but none were monitored in the project area. Avoidance of known sites is currently the best available option for conserving and/or enhancing habitat at known snail colonies.

Mystery Vertigo (SOLC)

In 2002, the Forest received the final report for a contract to inventory and/or monitor 357 sites for land snails (Frest and Johannes 2002). Mystery vertigo was found in 23 of the 357 sites inventoried/monitored. They were not generally abundant at any site. Mystery vertigo is generally restricted to rich lowland wooded sites, quite often in the white spruce community, but occasionally in the ponderosa pine community. The forest canopy is generally closed or nearly so, with well-developed litter and a rich understory. Sites are usually in leaf litter at the base of a wooded, north-facing slope on limestone or schist substrates. Down woody material that helps maintain moist soil conditions and lessens sun exposure is an important habitat element. Mystery vertigo was not common in taluses but could be found crawling on rock surfaces in moist weather and appears to feed on the organic coating of rock surfaces and partially decayed leaves. All sites with mystery vertigo were in the central or northern Black Hills or the Bear Lodge Mountains. This species was not found within the project area, but it was found relatively close to the project area, indicating it could be present.

The mystery vertigo is rare in the United States and occurs only in South Dakota (21 sites); Wyoming (2 sites in the Bear Lodge Mountains); Michigan (1 site); Maine (2 counties); and a few northern Wisconsin, Michigan, and Minnesota sites (Frest and Johannes 2002). The species appears to be more common in adjoining areas of southern

Canada, generally from the Great Lakes eastward. Mystery vertigo is currently ranked "apparently secure" globally and critically imperiled in South Dakota (NatureServe 2011).

Frigid Ambersnail (SOLC)

Nekola (2003) considered this species a "duff-specialist." Duff specialists were strongly affected by human activities, suggesting that protecting soil and surface characteristics are important in their conservation. In 2002, the Forest received the final report for a contract to inventory and/or monitor 357 sites for land snails (Frest and Johannes 2002). The frigid ambersnail was found in 12 of the 357 sites inventoried/monitored. The frigid ambersnail was rare at all locations, and very few live adults were observed during the early 1990s surveys. Live specimens were identified at one site close to the Project Area (Site 349), indicating that the species may be found throughout the project area in similar habitat (refer to Frest and Johannes 2002 for exact location of this site). Locations are widely distributed geographically across the Forest at varying elevations (3,800 to 6,800 feet). The species was usually found on limestone but also on schist soils, and colonies were often found in somewhat dry wooded limestone talus, generally near the slope base. They were most often found in rather open ponderosa pine forest, often with a secondary deciduous tree and shrub component, although white spruce was a minor component at a few sites. According to Frest and Johannes (2002), the family of land mollusks that includes the frigid ambersnail is associated not only with rather moist forest sites but also with quite dry and open settings in much of the western United States.

The frigid ambersnail is currently found only in Iowa (14 sites), South Dakota (12 sites), and Wisconsin (Frest and Johannes 2002). The frigid ambersnail is currently ranked as critically imperiled globally and in South Dakota (NatureServe 2011).

Striate Disc (SOLC)

In 2002, the Forest received the final report for a contract to inventory and/or monitor 357 sites for land snails (Frest and Johannes 2002). The striate disc was found live in only 18 of the 357 sites inventoried/monitored. Striate disc was most often found in litter in rich mesic forest, generally on shaded, north-facing slope bases, often bordering or ranging slightly onto stream floodplains. They were most frequently in white spruce communities but also aspen and riparian habitats at the base of slopes where deciduous trees and shrubs were often common. Most sites had soils derived from weathered limestone, although four sites were on schist substrate. Foraging substrate consists of decayed deciduous leaves and herbaceous plants. Down woody material that helps maintain moist soil conditions and lessens sun exposure is an important habitat element. Sites where the striate disc occurs appear restricted to the higher elevations of the limestone plateau of the west-central and north-central portions of the Black Hills. No specimens were found within or near the Project Area.

The range of the striate disc includes Wyoming (2 sites), Montana (1), Colorado (perhaps 26 sites), South Dakota, Oregon (1), California (2), Utah (5), Arizona (3), and New Mexico (7) (Frest and Johannes 2002). NatureServe (2009) also lists 5 records in Montana. Live sites have also been reported from several Canadian provinces. The striate disc is currently ranked globally as G5 (secure), and S2 (imperiled) in South Dakota (NatureServe 2011).

Sharp-shinned Hawk (SOLC)

Sharp-shinned hawks nest almost exclusively in conifers, with the exception of some densely leafed deciduous trees that also provide nest concealment (Platt 1976, Reynolds et al. 1982, Joy 1990). On the Forest, nests occur in white spruce (Stephens and Anderson 2002) and in pine forest. Sharp-shinned hawks have also recently been detected in ponderosa pine, riparian, aspen, and burned habitats on the Forest, but these were not observations of nest sites (Panjabi 2001, 2003 and 2005).

The association between nesting habitat and young seral stage has been noted by several authors (Bildstein and Meyer 2000, Bosakowski and Smith 2002, Stephens and Anderson 2002), but they have been found nesting in mature sites. On the Black Hills National Forest, one of the two documented sharp-shinned hawk nests was located in a 42-acre stand of white spruce sapling/pole-sized trees. Young stands with mid-to-high canopy cover levels for nesting correspond most closely with structural stages 3B (sapling-pole stands with 40 percent to 70 percent canopy closure) and 3C (sapling-pole stands with greater than 70 percent canopy closure). Canopy closure ranged from 30 to 70 percent, but previous studies have tended to find high canopy closure (i.e., ≥68 percent) characterizing nesting habitat (Bildstein and Meyer 2000, Bosakowski and Smith 2002). Habitat loss or alteration resulting in a loss of suitable nesting habitat as well as a decrease in prey abundance and availability are thought to be the most significant threats to accipiter species' persistence (Reynolds 1983, Stephens and Anderson 2002). Habitat loss may also occur as forests mature beyond early seral stages.

The sharp-shinned hawk breeds from Alaska to Newfoundland, south throughout much of North America, Mexico, and into Central and South America wherever suitable habitat occurs (Stephens and Anderson 2002). The species is considered a partial to long-distance migrant, with northern-most individuals wholly abandoning their breeding ranges and wintering in the southern United States. Other birds may remain on their breeding ranges throughout the winter. In South Dakota, the sharp-shinned hawk is considered "uncommon," with the only recorded occurrences in the western part of the state (Peterson 1995). In the Black Hills, they have been observed at all elevations (Peterson 1995), but estimates of local abundance are not available due to their low numbers (Panjabi 2003). The species has been observed an average of three times per year since bird monitoring began in 2001 (Panjabi 2005). In 2011, an active sharp-shinned nest was found in site 030905-10 in the project area. Additionally, sharp-shinned hawks have been observed within the town of Custer (personal observation).

Currently, the amount of potential nesting habitat (SS 3B and 3C pine) in the project area is 2,565 acres or 10% of the project area.

Cooper's Hawk (SOLC)

The Cooper's hawk has been observed in a variety of habitats in the Black Hills, including ponderosa pine, white spruce, riparian, shrublands, and burned areas (Panjabi 2001, 2003 and 2005; Peterson 1995). The species appears to be widespread but uncommon on the Forest. Bird monitoring over the past three years has yielded an average of about five sightings per year (Giroir et al. 2007).

The Cooper's hawk is considered a habitat generalist but typically requires wooded areas for nesting. The most common forest type in the Black Hills, ponderosa pine, is used for nesting in other areas of the species range (Stephens and Anderson 2002). The bird is known to nest in riparian, conifer, and aspen forests (Stephens and Anderson 2002). Stephens and Anderson (2002) analyzed the likely habitat preferences of the Cooper's hawk on the Forest based on information from nearby regions. Range-wide, most pairs nest in patches of mature forest with moderate-to-high (i.e., 60 to 90 percent) canopy closure near openings (Stephens and Anderson 2002). Nest tree diameters are usually larger than what is randomly available. The Cooper's hawk forages opportunistically across a diversity of habitats and preys on a variety of mid-sized birds and mammals (Stephens and Anderson 2002).

In ponderosa pine, structural stages 4B (mature stands with 40 to 70 percent canopy closure) and 4C (mature stands with >70 percent canopy closure) correspond most closely to the nesting habitat preferences of the Cooper's hawk. The Cooper's hawk often nests near and hunts along forest edges and clearings. Riparian-woodland communities also provide potentially important habitat for the Cooper's hawk.

The Cooper's hawk breeds throughout the United States, southern Canada, and northern Mexico. Some birds may remain on their breeding ranges throughout the winter. In South Dakota, the Cooper's hawk is considered "uncommon," with the only recorded occurrences in the western part of the state (Peterson 1995). In Wyoming, it is regarded as a "common summer resident" (Luce et al. 1999).

Active Cooper's hawk nests (2) were discovered within the project area.

Broad-winged Hawk (SOLC)

The broad-winged hawk is one of eastern North America's most common woodland hawks. It is generally associated with dry to wet deciduous, mixed, or occasionally coniferous forests (Johnsgard 1990). Broad-winged hawks forage in mature to old-growth forests, along forest streams, roads, and openings (Stephens and Anderson 2003).

In the Black Hills, the broad-winged hawk nests primarily in ponderosa pine in mixed pine and deciduous habitats, occasionally with a white spruce component (Powder River Eagle Studies 2000). Although considered rare in both Wyoming (Luce et al. 1999) and South Dakota (Peterson 1995), the species was the second most frequently encountered raptor during surveys in 1996 and 1997 (Powder River Eagle Studies 2000). Of 27 broad-winged hawk nests found on the Forest, 25 were in ponderosa pine while one was in an aspen and one was in a paper birch. Nest trees had an average DBH of about 16 inches; canopy closure in nest stands averaged 66% with a range of 45 to 96% (Stephens and Anderson 2003). These nest-stand characteristics equate to structural stages 4B, 4C and 5. Nest sites typically were in areas with slopes <10%. No association between nest sites and forest openings or wetlands was detected on the Forest (Stephens and Anderson 2003). There were 24 broad-winged hawks identified along transects in 2004, mainly in the northern Black Hills and Bear Lodge mountains. Fourteen of these were located in aspen, eight in late-successional pine and two in the Jasper Burn Area (Panjabi 2005).

Nineteen were detected in 2005. Only two were detected in 2009 (USDA Forest Service 2010), and in 2010, a nesting pair were found within Norbeck Wildlife Preserve (personal observation). The species was not observed in the Project Area during field reconnaissance.

The broad-winged hawk breeds from Nova Scotia to central Alberta, south to Texas, and east to the Atlantic coast (Johnsgard 1990). These hawks are complete migrants, best known for their migratory congregations of thousands of individuals as they head south into Central and South America (Johnsgard 1990, Stephens and Anderson 2003).

Northern Saw-whet Owl (SOLC)

The northern saw-whet owl is a habitat generalist found at lower to middle elevations in forested habitat, particularly in riparian areas. The highest densities of this species tend to be found in coniferous forests (Cannings 1993). This species nests in cavities in snags excavated by flickers (*Collaptes auratus*) and other large woodpeckers. Nests tend to be in mature forest, while dense, sapling-pole-sized stands are preferred for roosting (Johnson and Anderson 2003). Saw-whet owls also utilize dense riparian woodlands for roosting. This species often forages along forest edges, preying on small mammals (Cannings 1993).

Structural stages 4C and 5 most closely resemble the preferred breeding and nesting habitat for the saw-whet owl. These structural stages contain mature and old growth forest with at least 70% canopy cover in the 4C stage. Snags are an integral part of nesting habitat. Snags do not occur evenly across the landscape. There would likely be some areas with higher snag densities that will allow the species to persist. Large trees are also important for this species because they provide future large snags, if not killed by MPB.

Saw-whet owls occur from the southern boundary of Alaska, across most of Canada and into the northern tier of states from Maine to Minnesota (Johnson and Anderson 2003). The Rocky Mountains, the Cascade Range, Coastal Range and the Sierra Nevada Mountains all support year-round populations. In the Black Hills, seasonal migration is likely among high- and low-elevation habitat (Johnson and Anderson 2003). In South Dakota, the northern saw-whet owl is considered an uncommon resident (Tallman et al. 2002). The saw-whet owl was determined to be widely distributed and common in the Black Hills (Fauna West Wildlife Consultants 2003, Drilling 2010). The northern saw-whet owl is tracked by the South Dakota Natural Heritage Program (SDNHP) as a rare species and is ranked three on a rarity scale of one to five, with one being critically imperiled and five being secure (SDNHP 2007). This species has been observed within the project area.

Pygmy Nuthatch (SOLC)

The pygmy nuthatch is a primary cavity nester that also uses secondary cavities (Ghalambor 2003, Kingery and Ghalambor 2001) found in mature yellow-pine communities throughout the West (Ghalambor 2003). Pygmy nuthatches prefer old or mature undisturbed forests, but are also known to use open, park-like stands of ponderosa pine (Kingery and Ghalambor 2001). This presents a challenge in the Black Hills where ponderosa pines typically grow very densely in the absence of disturbance. Roosting habitat for the pygmy nuthatch varies seasonally. Foraging habitat is primarily in pine stands with high canopy closure (Ghalambor 2003). Pygmy nuthatches likely need heterogeneous forests with a mixture of well-spaced old trees and trees of intermediate age (Kingery and Ghalambor 2001).

The preference for undisturbed forests may relate to the availability of large snags. The nuthatch is a weak cavity excavator, requiring soft, large snags for nesting and communal winter roost sites (USDA Forest Service 1996, Appendix H). Dead or decaying coniferous trees and snags provide substrate for nest cavities. Nesting habitat generally includes trees that average 15 to 27 inches in diameter (Ghalambor 2003, Kingery and Ghalambor 2001). Suggested practices include managing for at least three to five snags (19 inches in diameter) per acre (Kingery and Ghalambor 2001).

Structural stages 4C and 5 most closely resemble one component of preferred habitat (old or mature undisturbed forest). Structural stage 4A most closely resembles open, park-like, mature forest conditions. Phase II structural stage objectives are designed to manage for the various structural stages across the landscape in a diversity of sizes and shapes. Snags that are greater than 15 inches in diameter are an integral part of pygmy nuthatch nesting and roosting habitat. Snags do not occur evenly across the landscape. There will likely be some areas with higher snag densities that will allow the species to persist. Large trees are also important for this species because they provide foraging habitat, and because they are source for future large snags used for roosting and nesting.

The pygmy nuthatch subspecies of the Black Hills (*Sitta pygmaea melanotis*) is found from southern interior British Columbia and south throughout the forests of the Rocky Mountain West into Mexico and western Texas (DeGraaf et al. 1991). It is considered an uncommon resident in both Wyoming (Luce et al. 1999) and South Dakota (Peterson 1995). There are no reliable estimates of pygmy nuthatch abundance for the Black Hills (Ghalambor 2003).

On the Black Hills, as elsewhere, identified limiting factors are thought to be the availability of snags for nesting sites and winter roosting habitat and the availability of productive foraging habitat (Ghalambor 2003). Estimates of local abundance are unavailable due to the scarcity of this species and its unpredictable distribution (Panjabi 2003). Three pygmy nuthatches were recorded by RMBO in 2009 (USDA Forest Service 2010). Pygmy nuthatches have been observed within the project area.

Northern Long-eared Myotis (SOLC)

At the western edge of its range, the northern myotis is found in the wooded riparian zone in badlands and prairies to higher elevation coniferous and deciduous woodlands (Schmidt 2003a). In the Black Hills region, this species has been captured at elevations ranging from 4,000 to 6,500 feet (Schmidt 2003a). Luce et al. (1999) listed habitat associations as dense ponderosa pine and mixed coniferous/deciduous forest.

Hibernacula include caves and mines. Individuals tend to wedge into crevices and are not easily detected or counted (Schmidt 2003a). During the summer, non-reproductive bats roost singly or in small groups of fewer than 10 individuals. Day roosts of males and non-reproductive females have been reported in buildings; under shingles; behind shutters of buildings; underneath exfoliating tree bark; inside cavities or crevices of trees; and in caves, mines, and quarries (Schmidt 2003a). Maternity roosts have been reported in buildings, under loose bark, and in crevices and cavities of deciduous trees and ponderosa pines. Northern myotis have been documented using ponderosa pine snags as summer/maternity roosts in the Black Hills (Cryan et al. 2001) and in other regions (Rabe et al. 1998). Rabe et al. (1998) summarize some key snag characteristics for the northern myotis and four other *Myotis* species in Arizona; roost snags were generally larger in diameter, had more loose bark, and were found at higher densities. Cryan et al. (2001) reported the average snag size for roosts in the Black Hills was about 15.6 inches. Maternity roosts are typically small and comprise 5 to 65 individuals (Schmidt 2003a). A single offspring is born in late July (Higgins et al. 2000).

Foraging areas may include hillsides, ridge tops, and riparian woodlands (Luce et at. 1999, Schmidt 2003a). The availability of suitable hibernacula, maternity roosting sites, and foraging areas all represent potential risk factors for this species (Schmidt 2003a).

The northern myotis ranges across most of eastern North America, extending from central Quebec, Ontario, and the southern half of Manitoba, south through all of the Dakotas, eastern Nebraska, Kansas, and Oklahoma, and then east to the Atlantic coast. Turner (1974) reported northern myotis from Pennington and Custer counties in South Dakota and Weston County in Wyoming. The South Dakota Natural Heritage Program reported records of this species from Meade, Lawrence, Jackson, and Harding counties as well. Luce et al. (1999) reported records of northern myotis from latitude 7 and longitude 21, which includes Crook and Weston Counties, Wyoming and one historical record from the western part of the state.

Suitable roosting habitat exists within the project area.

Small-footed Myotis (SOLC)

The small-footed myotis is found in a variety of habitats ranging from arid desert and badland habitats to riparian zones and grasslands. It is usually associated with rocky areas like bluffs, dissected breaks, ridges, cliffs, and major rock outcroppings within these habitats. In the Black Hills region, this species has been captured at elevations ranging from 3,800 to 6,000 feet (Schmidt 2003b).

Hibernacula for this species include mines and caves. Relatively warmer areas of caves with the least climatic fluctuations seem to be the preferred microsite. Mine hibernacula are also documented (Turner 1974). Maternity and summer roosts are usually associated with rock features (e.g., bluffs, ridges, cliffs, boulders, and major outcroppings) within a variety of habitats (Schmidt 2003b). The small-footed myotis is one of the few bat species that actually roosts in cavities at ground level. Day roosts include buildings, behind the bark of pine trees, in rock crevices, under rocks on the ground, in holes in banks and hillsides, and in abandoned swallow nests. The availability of suitable hibernacula, maternity roosting sites, and foraging areas all represent potential risk factors for this species (Schmidt 2003b).

The small-footed myotis ranges across most of western North America, extending from central British Columbia, southern Alberta and southwestern Saskatchewan, south to the central States of Mexico (Schmidt 2003b). It has been reported from all five South Dakota counties of the Black Hills (Turner 1974). Luce et al. (1999) reported records from latitude 7, and longitude 21 and 28 in Wyoming, which is most of the area bordering South Dakota with the possible exception of Weston County. However, Turner (1974) reported seven records from Weston County, Wyoming and recorded this species as widespread but not abundant in the Black Hills.

Suitable roosting habitat exists within the project area.

Long-eared Myotis (SOLC)

The only records of long-eared myotis in the Black Hills come from unpublished reports (Schmidt 2003c). It is unknown whether the Black Hills supports a self-sustaining population (Schmidt 2003c). This species is associated with coniferous montane habitats and has been reported foraging among trees and over woodland ponds (Schmidt 2003c). Limited data suggest that the long-eared myotis uses ponderosa pine snags as summer and maternity roosts in other regions (Rabe et al. 1998, Vonhof and Barclay 1997). Rabe et al. (1998) summarize some key snag characteristics for the long-eared myotis and four other bat species in Arizona: roost snags were generally in larger DBH, had more loose bark, and were found at higher densities. Stumps, also of large diameter, have been documented as summer roost sites for the long-eared myotis in British Columbia (Vonhof and Barclay 1997).

Although relatively little is known about this bat's specific hibernation needs, hibernation sites include caves and mines (Higgins et al. 2000), but there are no known reports of them hibernating in the Black Hills (Schmidt 2003c). Reproductive females have been found in buildings, rock crevices, and hollow trees. Reported day roosts for this species include buildings (often abandoned), under loose tree bark, in hollow trees, among timbers of an unused railroad trestle, in caves and mines, in cliff fissures, and in portable latrines (Schmidt 2003c). This bat often uses caves and mine tunnels as nightly roosts (Higgins et al. 2000, Schmidt 2003c).

The long-eared myotis ranges across much of montane western North America, extending from central British Columbia; the southern half of Alberta and the southwestern corner of Saskatchewan; south to Baja California along the Pacific coast; along the western edges of the Dakotas; and most of Wyoming and Colorado to northwestern New Mexico and northeastern Arizona (Schmidt 2003c).

Suitable roosting habitat exists within the project area.

Long-legged Myotis (SOLC)

The long-legged myotis is primarily associated with montane forest. In the Black Hills, this species occurs primarily at elevations between 4,500 and 6,500 feet (Turner 1974). This species has been documented using ponderosa pine snags as summer/maternity roosts in the Black Hills (Cryan et al. 2001) and in other regions (Rabe et al. 1998). Cryan et al. (2001) found the long-legged myotis roosting in rock crevices in the Black Hills where they may be subject to disturbance by rock climbing activities. Snags used for roosting in the Black Hills were larger in diameter, in a greater state of decay, and were in higher densities when compared to random snags (Cryan et al. 2001). Roosts were generally on south-facing slopes within late-successional pine forests. Day roosts are usually under the bark of ponderosa pine and in snags. These bats prefer dead snags characterized by reduced needles and twigs, loose bark, broken tops, hard-to-spongy heartwood, and spongy-to-soft sapwood. Roost snags are generally taller than surrounding trees, close to other available trees, and surrounded by a relatively open canopy. Reproductive females have been found roosting in buildings, rock crevices, under the bark of trees, and in hollow trees (Schmidt 2003d). Hibernating individuals are known to use caves in the Black Hills, including Bush's and Jewel Caves (Schmidt 2003d, Luce et al. 1999, Turner 1974).

The long-legged myotis forages over meadows, ponds, streams, and open mesic habitats of the Black Hills where it feeds on flying insects, particularly moths (Luce et al. 1999, Turner 1974). Although this species is the most common and widely distributed bat in the Black Hills (Turner 1974), general limits to persistence include availability of roost sites, hibernacula, and foraging areas. The reported preference of this bat for roosting in snags suggests that the availability of mature forests with abundant snags may be a limiting factor (Schmidt 2003d).

The long-legged myotis is common across the western United States. Its range extends across most of western North America, from southeastern Alaska through the western and southern half of British Columbia and the southern half of Alberta, down the western edge of the Great Plains states and into central Mexico (Schmidt 2003d). This species is considered the most common and widely distributed member of the genus *Myotis* in the Black Hills region and has been reported from all counties occupied by the Black Hills in both South Dakota and Wyoming (Schmidt 2003d, Luce et al. 1999, Clark and Stromberg 1987, Turner 1974). Suitable roosting habitat occurs within the project area.

Northern Flying Squirrel (SOLC)

Throughout their range, northern flying squirrels inhabit a wide variety of woodland habitats, typically dominated by conifers or mixed coniferous/deciduous forests (Wells-Gosling and Heaney 1984). Recent studies have indicated northern flying squirrels occupy a variety of forest types and are not necessarily old growth dependent (Cotton and Parker 2000). Turner (1974) noted that the highest densities are likely found in white-spruce forests in moist canyons of the northern Black Hills. Duckwitz (2001) found flying squirrels in Wind Cave National Park in ponderosa pine types that had an open canopy allowing understory grasses to prosper. Open pine types may provide the "openness" necessary for gliding. Locations where flying squirrels were found in Wind Cave National Park did have large pines. Stands of dense doghair pine were avoided (Duckwitz 2001).

Hough (2008) found that ponderosa pine is the most important foraging habitat in the Black Hills. Flying squirrels selected areas with larger trees and more canopy cover. Structural stages 1, 2 and 3B were avoided, structural stages 3C and 4B were selected for, and structural stages 3A, 4A and 4C were used in proportion to availability. Aspen and birch were avoided. Grass and shrub areas do not provide good foraging habitat due to the lack of fungus growth and seed production (Hough 2008). Structural stages 3A, 3C, 4A, 4B, 4C and 5 all provide suitable habitat on the Forest. Standing snags and downed logs are also habitat components. Northern flying squirrels typically nest in tree cavities or abandoned woodpeckers holes in winter and summer. They may also build nests of twigs, bark, and roots and use abandoned bird nest platforms in summer (Wells-Gosling and Heaney 1984).

Although flying squirrels are thought to prefer mesic, mature, spruce forests in the Black Hills, mature and late-successional stage pine forests (structural stages 4C and 5) on more mesic sites may also contain the snag resource northern flying squirrels appear to require. The Forest is conserving habitat for the northern flying squirrel in regards to spruce habitat, but progress towards increasing the acres of structural stage 5 and the very large tree component in Management Areas 5.4 and 5.43 is still needed to enhance habitat (USDA Forest Service 2010).

This nocturnal mammal is a resident of the mountainous areas of the western United States and boreal forests of North America. The northern flying squirrel in the Black Hills is an isolated population with the nearest population located in the forests of western Wyoming (Clark and Stromberg 1987, Wells-Gosling and Heaney 1984).

Meadow Jumping Mouse (SOLC)

This species is strongly associated with riparian habitats along small streams in meadows and habitats beneath forests with an understory of deciduous shrubs, grasses, forbs and fallen logs; it is presumed to disperse primarily along stream corridors (Luce et al. 1999). The meadow jumping mouse is a profound and continuous hibernator, retreating to burrows in dry ground from October to May. Burrows are also used for nests (Luce et al. 1999).

Domestic animal overgrazing, which consistently removes dense vegetation along eastern creeks in Wyoming, is thought to have contributed to this species' scarcity (WYNDD 2002). However, there is little evidence that the mouse is scarce relative to historic abundance. *Zapus* in general tend to occur at relatively low abundance and it is uncertain whether the current abundance is different than the past. Limits to abundance and distribution include reduction of understory shrubs, grasses and forbs in low-to-mid elevation riparian areas (Luce et al. 1999, WYNDD 2002). Fragmentation of appropriate riparian habitat may limit this species' ability to disperse.

Meadow jumping mice range across Alaska through Canada, the northern and eastern United States, and across the Great Plains to the eastern foothills of the Rocky Mountains (WYNDD 2002, Whitaker 1972). The Bear Lodge meadow jumping mouse (*Zapus hudsonius campestris*) is a separate subspecies that occurs in the Black Hills region (Beauvais 2001) and is listed as rare in Wyoming (Luce et al. 1999). There are seven recorded occurrences of this species on the Bearlodge Mountains of the Black Hills, including the type specimen collected in 1864 (WYNDD 2002). Turner (1974) collected a total of 207 specimens from across the Black Hills and Bear Lodge Mountains in South Dakota and Wyoming. He collected the species as far south as Wind Cave National Park and characterized it as common throughout the study area (Black Hills and Bear Lodge Mountains). Cryan and Ellison (2005) found the species still occurs throughout the Black Hills area. An observation of this species occurred within the Vestal project area along Upper French Creek.

Mountain Goat (SOLC)

This species inhabits rugged terrain including cliffs, rock faces, ledges, and talus slopes, typically above timberline. The mountain goat is found most abundantly on rock outcrops and high elevation meadows. The range of the mountain goat extends from the northern United States Rocky Mountains to southeast Alaska (Clark and Stromberg 1987). Mountain goats are characteristically found in sub-alpine and alpine tundra areas in the Northern Rockies and coastal mountain ranges of western North America (Higgins et al. 2000). Foraging habitat is alpine meadow, grassland, and montane shrubland

(Benzon and Rice 1987). Recommendations for improving habitat for the species consist of thinning dense stands of ponderosa pine, maintaining meadows and placing clear-cuts next to or interspersed between granite outcroppings (Ted Benzon, Big Game Biologist, SDGFP, Division of Wildlife, personal communication).

Mountain goats feed throughout the morning, rest at midday, and resume feeding in the late afternoon, continuing into the evening. A wide range of forage is utilized including chokecherry, Russian buffaloberry, grasses and sedges, quaking aspen, serviceberry, wild rose, willow, and hazel (Richardson 1971). Usually the most available forage rather than the most palatable forage is consumed (Richardson 1971).

Primary range and habitat of the mountain goat in the Black Hills covers about 2,000 acres and is centered around Harney Peak and the Needles (Richardson 1971). Mountain goat populations appear to be trending downward from an estimated population of 168 animals in 2002 (USDA Forest Service 2004) to 80 animals in 2009 (Huxoll 2010). However, in 2010, population increased little to 90 animals (Huxoll 2011). The cause of the mountain goat population decline is unknown. Possible causes include high predator (mountain lion) numbers, genetics (all descendants from a small number of goats in 1924), and/or loss of or lack of habitat. The Forest will continue to coordinate with the South Dakota Department of Game, Fish and Parks to determine if more specific habitat management actions are needed to conserve/enhance habitat for this species (USDA Forest Service 2010). Since 2007, no hunting licenses have been issued for this species.

The Black Hills mountain goat population occurs largely within the Black Elk Wilderness (MA 1.1A), somewhat in the Norbeck Wildlife Preserve (MA 5.4A), Buckhorn Mountain (MA 4.1) where patch clearcuts have been created to provide for forage, and within Crazy Horse boundary.

Threatened and Endangered Species

A list of federally threatened, endangered and proposed species has been provided by the U.S. Fish and Wildlife Service (USFWS), South Dakota State Office, and last verified on September 1, 2011 (USFWS 2011a). The USFWS lists the following endangered and/or threatened species for Custer County, South Dakota: whooping crane, sprague's pipit, and black-footed ferret.

The whooping crane and least tern have been removed from the list of species considered on the Black Hills National Forest under Section 7 consultation (letter of concurrence from D. Gober, Field Supervisor, USFWS, Pierre, South Dakota, dated August 8, 2003). It was determined that management activities on the Forest would have 'no effect' on these species because the Black Hills National Forest lacks suitable habitat.

The U.S. Fish and Wildlife Service reviewed the conservation status of Sprague's Pipit to determine whether the species warrants protection under the Endangered Species Act. *The status review found that listing Sprague's Pipit as threatened or endangered is warranted, but that listing the species at this time is precluded by the need to complete other listing actions of a higher priority.* To ensure this review was comprehensive, the Service solicited information from state and federal natural resource agencies and all interested parties regarding the Sprague's pipit and its habitat.

Refer to Appendix G which contains a summary of the BA/BE completed for this project.

Region 2 (R2) Sensitive Species

The current sensitive species list for the Rocky Mountain Region (R2) was renewed on June 10, 2011. Sensitive species for the Black Hills National Forest are listed on the R2 threatened, endangered, and sensitive species home webpage (USDA Forest Service, 2011).

The pre-field review of Region 2 Sensitive Species was completed using survey results, district records, literature reviews, on-line databases, and the South Dakota Natural Heritage Database. There are fourteen R2 sensitive species which occur or could potentially occur (habitat may be present) in the Vestal project area.

Species Presence Confirmed & Habitat Present:

- Bald eagle
- Northern goshawk
- Black-backed woodpecker
- Northern leopard frog
- Black Hills redbelly snake
- Fringed myotis
- Townsend's big-eared bat
- Black-tailed prairie dog
- Mountain sucker

Species Presence Expected and Habitat Present:

- Hoary bat
- American marten
- Flammulated owl
- Cooper's mountain snail
- Regal fritillary butterfly

These sensitive species were analyzed in the Vestal Wildlife BA/BE due to the species presence and/or presence of potential habitat in the project area. Two of the species listed, the black-backed woodpecker and mountain sucker, are also designated as MIS species.

Bald Eagle (R2 Sensitive Species)

Bald Eagles have been documented in all counties in the Black Hills. In South Dakota, approximately 300 bald eagles winter in the Black Hills and along the Missouri River (USFWS 2011d). This species population is a rare breeder in South Dakota, although the nesting population is slowly expanding (South Dakota Game, Fish and Parks [SDGFP] 2011a). South Dakota trends based on mid-winter surveys are reported by the SDGFP (2011b). One eagle successfully fledged in 2008 (USDA Forest Service 2010) and again in 2011 (Patti Lynch, 2011, BHNF, Mystic RD, personal communication).

Bald eagles may roost near Bismarck Lake. This species has been observed within the project area.

<u>Northern Goshawk</u> (R2 Sensitive Species)

In the Black Hills, this species is usually found in ponderosa pine, especially in more closed canopy with multiple vegetation structure. Goshawks typically nest in relatively dense (dependent on forest type) forest areas and use a mosaic of structural stages for foraging within their home range (Kennedy 2003).

In the Black Hills, this species is considered a rare permanent resident and has been found nesting in all the counties in the Black Hills (Tallman et al. 2002).

There are 2 known goshawk territories that are monitored within the project area. Each has been active within 5 years. There is potential over-wintering habitat in the Vestal Project Area. Goshawk surveys were conducted June-July of 2006 through 2011 within the area. In 2011, only one goshawk territory was active; however, sightings of goshawks have occurred within the project area.

<u>Black-backed Woodpecker</u> (R2 Sensitive Species, MIS)

This species existing condition is discussed under MIS, earlier in this document.

<u>Northern Leopard Frog</u> (R2 Sensitive Species)

This species requires three types of habitat. Winter habitat, usually lakes, streams or ponds, is needed for winter torpor. High oxygen saturation is best in the winter waters. Summer habitat for this insectivorous frog is considered upland forage ground often near the breeding ponds. The third habitat is breeding/tadpole habitat. This is usually shallow bodies of water with little to no current, aquatic vegetation, good water quality, and little overhead canopy. Warmth from the sun is needed for proper development of the tadpoles. Larval development becomes an issue if water is too cold. This could explain why frogs are not breeding at springs in the Black Hills (Smith and Keinath 2007).

In the Black Hills, this species' current distribution is considered high where suitable habitat is available (USDA Forest Service 2004). This species is vulnerable to habitat alteration/loss, introduced predaceous fish, susceptible to overgrazing, low water quality and wetland loss (Smith and Keinath 2007).

Suitable habitat exists in the Vestal project area. This species has been observed along streams and at one pond.

<u>Black Hills Redbelly Snake</u> (R2 Sensitive Species)

The Black Hills subspecies is an isolated population; the next nearest population is located in the eastern part of South Dakota, some 300 miles away. Suitable habitat may be broadly distributed or abundant in the Black Hills. The snake is not rare in good habitat and is considered quite common in the Black Hills (USDA Forest Service 2000, SDGFP 2011c). The biggest threat appears to be removal of large, downed woody material and logging in wet areas. Predation, wildfire and road use can impact this species.

Suitable habitat exists in the Vestal project area. Observations have occurred within the project area.

<u>Fringed Myotis</u> (R2 Sensitive Species)

This subspecies only occurs in the Black Hills and possibly northwest Nebraska. This species is considered a rare to uncommon year-round resident. Known locations are found in Lawrence, Meade, Pennington and Custer Counties of South Dakota and possibly Crook and Weston Counties in Wyoming (Luce et. al. 1997, Tigner and Stukel 2003). Factors that affect this species are human disturbance of roosting and hibernation sites, low reproductive rate and habitat loss. Disturbance by humans, especially in hibernacula and maternity roosts, can be a threat to survival of these animals (Keinath 2004).

No known caves that serve as bat hibernacula were identified in the project area; however, there are abandoned mine sites (Ventling) adjacent to and within the project area where this species has been detected hibernating (B. Phillips, District Wildlife Biologist, Black Hills National Forest, 2011). This site most likely serves as a day/night roost site for this species. The entire project area contains many rock outcrops, as well as snags and large trees that may be used as roost sites for many species of bats. There are other mine sites in and around the Project Area that could have potential bat habitat.

<u>Townsend's Big-eared Bat</u> (R2 Sensitive Species)

Within the Black Hills, the species has been recorded in Fall River, Meade, Pennington, Custer and Lawrence counties (Higgins et al. 2000). Population trends appear to be declining in the Black Hills as well as throughout their range. Loss of habitat is the main contributor to lower numbers, which is attributed to the loss of large caves and dilapidation of mines. These bats are extremely sensitive to disturbances in the vicinity of their roosts, including loud noises such as those produced by motorized off-road vehicles, discharging of firearms, and other such activities (Gruver and Keinath 2006).

There are abandoned mine sites within and around the Project Area. There are also man-made structures, rock outcrops, and cliff-face crevices and fissures. This species was detected hibernating at the Ventling mine. This site most likely serves as a day/night roost site for this species. Other abandoned mine sites within or around the project area most likely also provide hibernation and roosting habitat.

<u>Black-tailed Prairie Dog</u> (R2 Sensitive Species)

Suitable prairie dog habitat on the Black Hills National Forest is limited to non-rocky grassland soils on the Hell Canyon RD. In 2005, there were approximately 400 acres of prairie dog towns on the Forest consisting of about 10 active colonies (USDA Forest Service 2009). The colonies are comparatively small and disjunct from adjacent known colonies. Prairie dog towns on the Forest have remained stable or have increased despite recreational shooting and disease. All of the prairie dog towns occur within grazing allotments (District records). Black-tailed prairie dogs are found to be more abundant in heavily grazed areas than in un-grazed areas in the Black Hills of southwestern South Dakota.

In South Dakota the black-tailed prairie dog's range includes most all western counties (Higgins et al. 2000).

There is an active, small prairie dog town (031303-36; Glen Erin) in the project area. This area was mapped in 2011, and is 9.3 acres.

Mountain Sucker (R2 Sensitive Species, MIS)

The mountain sucker occurs most often in cool, clear mountain streams with moderate water velocities. Stream substrate associated with mountain sucker habitat varies widely and ranges from mud to sand, gravel and boulders, although cobbles are most common. This species is found on the stream bottom and is closely associated with cover (exposed roots, undercut banks, log jams and boulders). Mountain suckers are benthic feeders and their diet is primarily simple plants like diatoms and green algae, but small invertebrates are also ingested. Spawning occurs in the spring, but the exact timing varies by elevation and water temperature. In the Black Hills, the spawning period for mountain suckers is probably June and maybe early July (Shearer personal communication, 2006). This species is an open substrate spawner (broadcast spawner), meaning it does not build or defend a nest or redd. The incubation period of mountain sucker embryos is thought to be short, around 8 to 14 days (Belica and Nibbelink 2006).

The status of the mountain sucker in the Rocky Mountain Region and the Black Hills was assessed by Belica and Nibbelink (2006) and Isaak et al. (2003), respectively. Mountain suckers are native to the Black Hills and comprise the eastern-most range of the species. Recent surveys suggest mountain suckers occur in many of its historic drainages throughout the Black Hills (Isaak et al. 2003), but localized population reductions or absence at selected sites has occurred (USDA Forest Service 2010).

The mountain sucker historically occurred in French Creek. The first recorded occurrence was in 1893 at Custer, SD (Evermann and Cox 1896). Stream surveys in French Creek in 1960 found mountain suckers downstream of Stockade Lake/Dam (Stewart and Thilenius 1964). French Creek upstream of Stockade Lake was not surveyed. Surveys in 1984 and 1992-93 captured mountain suckers in French Creek downstream of Stockade Lake, but not upstream of the lake (Ford 1988, SDGFP 2009). SDGFP fisheries surveys in 2009 in streams within the Vestal project area did not collect any mountain suckers.

Hoary Bat (R2 Sensitive Species)

The hoary bat is a solitary species, roosting primarily among foliage in deciduous and coniferous trees, often along the edges of clearings. They have been observed in numerous forested cover types, including mixed conifer, lodgepole pine, ponderosa pine, pinyon-juniper, and riparian areas with cottonwood and willow. Hoary bats forage on a wide variety of insects, especially moths (Shump and Shump 1982, Valdez and Cryan 2009). They are long-distance, seasonal migrants (Cryan et al. 2004).

Because hoary bats are not known to use caves or abandoned mines or go into a prolonged hibernation, they are not thought to be vulnerable to the disease referred to as ‘white-nose syndrome’ (WNS), as are some cave hibernating bat species.

In South Dakota this species is considered state-wide in distribution (Higgins et al. 2000), and the hoary bat is known to occur throughout the Black Hills region.

Data on hoary bat population trends are scarce; however, even in the absence of these data, there is evidence that this species is experiencing a downward population trend. The bark beetle epidemic in R2 has killed more than 3 million acres of pine forests, decreasing the quality and quantity of this vital roosting habitat.

This species is new to the R2 Sensitive Species list as of June 10, 2011. Therefore, this species has not been tracked in the project area, or there are no known observations/recordings of this species. However, it is expected that suitable habitat is present within the project area.

American Marten (R2 Sensitive Species)

Recent research on the Black Hills National Forest indicates that high quality marten habitat consists of mature spruce stands with canopy cover >50% near riparian areas at elevations ≥5,200 feet (Fecske et al. 2002). However, spruce stands that are too small, have little canopy cover and/or located long distances from water provide little suitable habitat (Fecske and Jenks 2002). Ponderosa pine is not considered optimum habitat, although there is evidence that martens use pine habitat in the Black Hills.

In South Dakota, this species was reintroduced to the central Black Hills between 1980 and 1993 (Fecske et al. 2002).

Track-plate boxes for detection of marten were set up in Vestal in the Tenderfoot area. No marten were detected or observed at the track-plate boxes or within project area. However, a small amount of suitable habitat does exist.

Flammulated Owl (R2 Sensitive Species)

There have been two reports of flammulated owls in the past 10 years that could be valid sightings. These could represent periodic use by transient individuals, or the beginning of a range expansion. In 2002 at least two and maybe three flammulated owls were observed in the northern Black Hills (Panjabi 2003).

Migration in this species is still poorly understood but recent review of the data suggests that this species may be a long distance, north-south, migrant. Experiments have found that this owl does not become torpid in cold temperatures. It is likely that prey availability also plays a large role in the migratory behavior of this species (McCallum 1994).

There are no records for this species in the project area, but based on published information, and Black Hills sightings, it is reasonable to expect that suitable habitat for flammulated owls is currently present in the Vestal project area. The ponderosa pine structural stages corresponding most closely to potential flammulated owl nesting and foraging habitat on the Forest are 4A, 4B, and 5 (USDA Forest Service 2005).

Cooper's Mountain Snail (R2 Sensitive Species)

In the Black Hills, the Cooper's mountain snail is mostly found in the higher elevations of the Limestone Plateau, along limestone outcrops, talus, and isolated exposed limestone. Sites range from open to closed canopy coniferous overstory to mixed-coniferous to deciduous tree overstory with well developed litter layer (Anderson 2005). Dead and down woody debris is important characteristic at the micro-site level. Risk factors for the Cooper's mountain snail are loss of moist habitat conditions through drought, fire, vegetation management, trampling, overgrazing, development, road construction, and habitat fragmentation.

Distribution data for the United States and Canadian provinces is known to be incomplete. Current identified distribution is in the Black Hills of South Dakota and Wyoming. Populations are limited in the Black Hills to suitable habitat mostly in Spearfish Creek, upper reaches of Rapid Creek, Higgins Gulch, Prospect Gulch and Grand Canyon near Deadwood, SD. This species could also be found in other drainages in the northwest region of the Black Hills. According to Frest and Johannes (2002), others cited a wider range.

There are 2 Frest snail survey sites that occur within the project area: 030906-9 (#112) and 030904-8 (#67). This species was not found at either site (refer to Frest and Johannes 2002 for details on site location, species found and habitat). Snail surveys were conducted during summers, but no snails were found.

Regal Fritillary Butterfly (R2 Sensitive Species)

Suitable habitat is limited to larger native meadows in the Black Hills where native violets exist (Royer and Marrone 1992, Marrone 2002).

Historically, this species ranged from New England to the Great Plains. The Black Hills is at the western edge of this species' range. Distribution within the Black Hills may be related to moisture gradient (USDA Forest Service 2000). Threats to the species include: overgrazing, herbicide/pesticide use, fire, cultivation of prairie, loss of meadows to trees, and invasion of non-native plants (Royer and Marrone 1992, USDA Forest Service 2000).

The regal fritillary has not been documented within the Vestal project area. Potential suitable habitat occurs in wet meadows and riparian areas.

Migratory Birds

Many species of migratory birds are of international concern due to naturally small ranges, loss of habitat, observed population declines and other factors. Species of concern applicable to project-level conservation are identified by many sources, including the Endangered Species Act, the Regional Forester's sensitive species list, the Black Hills National Forest MIS and Species of Local Concern list, internal and public scoping efforts, and the USFWS Birds of Conservation Concern (BCC) (USFWS 2008). BCC 2008 publication partitions North America into 37 Bird Conservation Regions (BCRs, Fig. I). The Black Hills is included in BCR 17 – Badlands and Prairies, and this table has changed since the existing condition report was written. Of the 28 bird species found in BCR 17, 15 are duplicated on the Regional Forester's sensitive species list, and are evaluated in the BA/BE if they have potential to occur in the Black Hills. Six species are not expected to occur in the Black Hills due to lack of habitat. There are 7 remaining species that could potentially occur in the Black Hills: golden eagle, prairie falcon, upland sandpiper, black-billed cuckoo, red-headed woodpecker, pinyon jay, and dickcissel. Of these seven species, only the golden eagle has the potential to occur within the project area. The prairie falcon, upland sandpiper, black-billed cuckoo, red-headed woodpecker, pinyon jay, and dickcissel will not be analyzed because suitable habitat is not present in the Vestal project area.

<u>Golden Eagle</u> (Migratory Bird)

The golden eagle is typically found in open country from desert grasslands to above timberline. It usually avoids densely forested areas. Typical habitat is grass-shrub, shrub-sapling and/or open coniferous forests (Johnsgard 1990). This species prefers large trees and cliffs for nesting, roosting and perching. Additionally, cliffs overlooking grasslands serve as typical nest sites. They may use the same nest or alternate nests between years (DeGraaf et al. 1991). Golden eagles hunt by soaring-searching and using perch sites to identify prey (Johnsgard 1990). Typical food items include: marmots (*Marmota flaviventris*), prairie dogs (*Cynomys ludovicianus*), ground squirrels (*Spermophilus* spp.), weasels (*Mustela* spp.), lagomorphs (*Sylvilagus* and *Lepus* spp.), rattlesnakes (*Crotalus viridis*), and most medium-sized birds (DeGraaf et al. 1991).

Golden eagles breed from western Alaska east through Canada, south to Baja California, northern Mexico, west-central Texas, western Oklahoma, Nebraska and the Dakotas. The species winters from south-central Alaska, southern Canada and throughout the western breeding range (Johnsgard 1990). They are considered uncommon permanent residents in western South Dakota (Tallman et al. 2002) and only ten have been detected during recent bird monitoring efforts (Giroir et al. 2007). Golden eagles were observed in the project area during 2008 surveys. Golden eagles are commonly seen feeding on carrion along roads in the Black Hills during winter.

Environmental Consequences

Snags and Down Woody Material

Alternative 1

The no action alternative would provide the greatest opportunity for increased snag numbers, in the short-term (approximately 15-20 years) and down woody material. This alternative allows forested stands that are denser and more mature to become more stressed and vulnerable to MPB attack and wildfire – variables that can significantly increase snag densities and downed wood in an area. Mountain pine beetle activity in the project area is increasing, and infestations are spreading across the project area, with most tree mortality currently occurring in the northern part of the project area. It is expected that snag densities would increase as a result of MPB caused mortality in the area. However, these snags are expected to break or fall in about 5 years, contributing to an excess of downed woody material. Species that utilize snags and the provided habitat will benefit with this snag increase in the short-term.

Alternative 2

This Alternative is expected to increase snags and down woody material in the project area, but not as much as Alternative 1 does in the short-term. Design criteria is included with this alternative to protect existing snags. No snags would be cut unless they are deemed a safety hazard during operations, consistent with Standard 2301.

Vegetation treatments, both commercial and non-commercial, have the potential to reduce snags and downed wood. Proposed fuel treatments including mechanical thinning, prescribed burning and deadfall treatment, also have the potential to reduce snags and downed wood. Snags created by fire may stand longer than those created by insect attacks.

This alternative also proposes sanitation treatment on all pine stands within the project area. Sanitation removes trees which are infested with MPB and which would provide short-term snag habitat, if left on site. However, MPB are expected to create a large number of snags, which generally break and fall within 5 years. Down woody material would subsequently increase throughout the project area, as these trees fall.

This alternative increases opportunities for future large snags in this area. The proposed treatments are expected to retain more mature, live trees on the landscape which may become future snags, because it would reduce potential MPB caused mortality. Because snag densities are currently increasing, and snags would be retained, unless a safety hazard, this alternative would meet or even exceed, in the short-term, Forest Plan Objectives 211 and 212.

Cumulative Effects

Past firewood cutting, timber harvest, wildfires and fuels management activities have contributed to the loss of snag and downed wood habitat. Fire, insects and other causes of tree mortality continue to create snag/downed wood habitat. Mountain pine beetle activity and potential wildfires will likely increase snags, although MPB-killed trees may only remain on the landscape for 5 years. Conversely, the current fuelwood cutting policy which allows snags to be removed within 300 feet of many roads in the project area, may cause a decrease in snag numbers, although it would most likely be negligible.

Management Indicator Species (MIS)

Summary of Effects on MIS

The following is a summary of effects to wildlife MIS. A detailed analysis can be found in both the Wildlife and Fisheries Specialist Reports in the project record.

Table 38: Summary of Effects on MIS

	Alternative 1 **No Action**	**Alternative 2** **Proposed Action**
Beaver (*Caster canandensis)*	*Direct and Indirect Effects*	
	No direct effects. Habitat may decrease as pine encroaches into riparian areas and hardwood stands. However, expected MPB caused mortality of pine trees has the potential to increase or improve hardwood and riparian habitats by reducing encroaching pine, generally over 7” diameter. This would benefit Beaver. Smaller pine would likely remain in hardwoods and riparian areas, and would continue to encroach on these habitats.	No direct effects are expected. Treatments would improve or enhance habitat for beaver. Hardwoods along riparian corridors would be released from pine competition. Smaller pines would also be removed to maintain hardwood habitats.
	Cumulative Effects	
	Would not have adverse cumulative effects.	Would not have adverse cumulative effects.

	Summary	
	Beaver habitat at Bismarck Lake would not be negatively impacted by either alternative, although the proposed action would release aspen. Post-harvest activities in hardwoods planned under the proposed action may be beneficial for beaver. Treatment activities within the Vestal project area would meet Forest Plan Objective 238a. Population viability for this species was evaluated during the Phase II Amendment to the 1997 Black Hills National Forest Land and Resource Management Plan (USDA Forest Service 2005a). The Forest Plan Phase II Amendment determined that population viability across the Planning Area would be maintained for this species if pertinent Forest standards and guidelines are followed. The proposed action would meet these standards and guidelines. Therefore, this species is likely to persist on the Forest. Under both alternatives, there would be adequate habitat for maintaining populations for beaver.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
	Direct and Indirect Effects	
White-tailed Deer (*Odocoileus virginianus)*	It is predicted that structural stages 1, 2, 3A and 4A which provide foraging habitat, would increase substantially from the existing condition, due to MPB activity. This increase of forage results in a similar substantial decrease in thermal cover (SS 3C, 4C, and possibly 5) for this species. Fawning cover (eg. logs, shrubs, forest floor debris) would increase due to the expected increase of down woody material, from MPB killed trees. There is potential for shrubs and hardwoods to increase due to predicted open stand conditions created by MPB caused mortality. Competition between livestock and big game is expected for this improved forage. Screening/hiding cover would remain adequate and in time, pine seedlings may provide some additional cover along roads. No change to existing open road densities would occur.	Increased hiding and thermal cover than no action, in the short-term and the long-term. Foraging habitat is expected to increase as a result of proposed activities as well as MPB. Shrubs, hardwoods and meadows may improve habitat enough that deer may increase in number within the project area, but may move outside of the project area to seek denser pine stands. Mountain pine beetle activity is expected to create pockets of forage throughout the Vestal project area. Screening cover of at least 20 percent would be provided along all arterial and collector roads with this alternative. Therefore, Guideline 3203 would be met. Vegetation treatments and/or post-harvest projects proposed under this alternative may disturb individuals and cause temporary displacement. Deer would be expected to return to the affected areas in a short time period. Road density would remain similar to the no action alternative. Open road density does not change, however, total road miles is increased by one mile. A non-system road is proposed to be converted to a system road but would remain closed.
	Cumulative Effects	
	Adverse cumulative effects may occur. Forage is expected to increase, but MPB activities may decrease hiding and thermal cover. Activities from recreational use and private land management would also reduce habitat.	Would add to positive effects of past prescribed burns and timber harvests by increasing diversity of forage, and increasing early successional vegetative stages. May slightly reduce screening cover, and would greatly reduce thermal cover. Potential to decrease winter habitat for big game species.

		Expected to add to disturbance by OHV and recreation use. Activities from recreational use and private land management would also reduce habitat.
	Summary	
	Screening cover would be provided at levels noted in Guideline 3203 on all arterial and collector roads within the project area. Monitoring data suggests habitat is not limiting population growth of deer and the Forest is meeting Objective 238a. Neither of the alternatives would contribute to a Forest-wide loss of summer habitat, therefore, the alternatives would contribute to attainment of Objective 238a. However, because of the current MPB infestation along with treatment, the proposed action is expected to lessen cover habitat, which is important during hunting season and winter for deer and other big game. Adequate habitat across the Forest will allow for the attainment of Forest Plan Objective 217 (USDA Forest Service 2005a and 2006b). Population viability for this species was evaluated during the Phase II Amendment to the 1997 Black Hills National Forest Land and Resource Management Plan (USDA Forest Service 2005a). The Forest Plan Phase II Amendment determined that population viability across the Planning Area would be maintained for this species if pertinent Forest standards and guidelines are followed. The proposed action would meet these standards and guidelines. Therefore, this species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Golden-crowned kinglet (*Regulus satrapa*)	*Direct and Indirect Effects*	
	Under this alternative no spruce sites would receive any treatment, so 42 acres are expected to remain within the project area. Trees may continue to mature and eventually become snags. Small openings may naturally occur in spruce sites allowing succession. However, MPB is expected to spread across the entire project area, killing ponderosa pine trees, which may eventually allow spruce to increase.	No direct effects to this species are expected to occur because of project activities because no spruce habitat is going to be cut or burned, although sanitation may occur. However, vegetation treatments adjacent to spruce sites or skid trails running through spruce may disturb/displace individuals temporarily, but they would be expected to return to the project area. Forty-two acres of spruce habitat are expected to be retained within Vestal. The difference from Alt. 1 is that 7 acres would transition from SS4C to SS4A, which would not be expected to change golden-crowned kinglet density within the project area.
	Cumulative Effects	
	No adverse cumulative effects expected.	No adverse cumulative effects expected.
	Summary	
	The potential habitat available in the project area is on a small scale when compared to Forest-wide potential habitat. This would mean that the Forest-wide habitat trend, population trend and Objective 238c would not be influenced by the Vestal proposed action. As a result, golden-crowned kinglets are likely to persist on the Forest. Adequate habitat across the Forest will maintain a viable population of golden-crowned kinglets (USDA Forest Service 2005a, p. lll-263). Population viability for this species was evaluated during the Phase II Amendment	

	to the 1997 Black Hills National Forest Land and Resource Management Plan (USDA Forest Service 2005a). The Forest Plan Phase II Amendment determined that population viability across the Planning Area would be maintained for this species if pertinent Forest standards and guidelines are followed. The proposed action would meet these standards and guidelines. Therefore, this species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
	Direct and Indirect Effects	
Black-backed Woodpecker (*Picoides articus*) **Note: Also R2 Sensitive Species**	Would provide for an increase in habitat in the short-term due to expected MPB activity. Existing dense stands are more susceptible to MPB infestations and/or wildfires. The risk of stand-replacing fire is very high, and thus, if that were to occur, more habitat, in the short-term, would be available for black-backs because of their association with burned areas. This alternative would provide the greatest potential for increase in woodpecker habitat, short-term. However, it would also result in the greatest decrease in dense habitat types that are used when no burned or MPB habitat is available. Snags would increase due to natural mortality.	Habitat would be provided as MPB caused mortality continues in the project area, short-term. However, actions to reduce MPB risk are expected to result in less mortality than Alternative 1, No Action. The potential for large-scale fire is reduced in this alternative. Proposed actions are expected to retain more mature, dense stands (SS4B, 4C and 5) which are important when mpb stands or recently burned stands are not available. Snags will be plentiful in the short-term. There is potential for accidental removal of snags/cavities being used by woodpeckers by proposed fuel and harvest treatments. Prescribed burning may destroy snags, but it may also create snags. Greatest potential to create future (in the long-term) nest snags for this species. May disturb nesting woodpeckers if harvest occurs during nesting season, expected to be a short-term impact.
	Cumulative Effects	
	Past wildfires and past and existing MPB infestations have created habitat throughout the Forest and project area.	Continued MPB activity throughout the forest and project area would continue to provide habitat for this species. Fuel (fire) management treatments would reduce habitat potential for this species. Privately owned lands within and adjacent to the project area may also provide suitable habitat for the black-backed woodpecker. Fire-hazard and mpb reduction activities are likely to increase on some of these lands in effort to prevent loss from wildfire. Cutting of snags for fuelwood may reduce the number of snags. This could result in a loss of habitat, but the amount of area within these private lands is relatively small compared to what is on the forest (USDA Forest Service 2008). The indirect effects mentioned above would be an incremental impact additional to those on private lands.
	Summary	
	Alternative 1 has the greatest potential for increasing woodpecker habitat.	

<table>
<tr><td></td><td colspan="2">Alternative 2 may decrease preferred and/or potential habitat, but would not affect the habitat or population trend Forest wide because of providing for Objective 211 (snags). Snags are not allowed to be cut unless deemed a safety hazard or within designated firewood cutting areas. The project area is only a small portion of the currently available habitat, new habitat acres are currently being created across the Forest.

Habitat conditions would be provided, consistent with Objective 238b. The proposed action alternatives would meet Forest Plan standards and guidelines; therefore this species is likely to persist on the Forest.</td></tr>
<tr><td></td><td>Alternative 1
No Action</td><td>Alternative 2
Proposed Action</td></tr>
<tr><td rowspan="6">Brown Creeper
(Certhia Americana)</td><td colspan="2">Direct and Indirect Effects</td></tr>
<tr><td>Spruce habitat would remain at 42 acres. Mountain pine beetle caused mortality would substantially reduce preferred habitat in pine (4B, 4C and 5) throughout the project area.
This change in habitat is expected to impact the brown creeper by causing displacement of individuals to more suitable habitat, which may be outside of the project area. In addition, the high fire hazard is a threat to brown creeper habitat. This alternative is expected to increase the risk of habitat fragmentation and loss from stand replacing fire and mountain pine beetles for this species.</td><td>Direct effects to this species may occur during timber harvesting or prescribed burning because nests may be destroyed. Vegetation treatments may temporarily disturb individuals. Mountain pine beetle caused mortality would reduce habitat and may cause displacement of individuals to more suitable habitat, which may be outside of the project area.

Risk of MPB infestation would be reduced. More preferred habitat would remain than in Alternative 1, as pine SS 4B, 4C and 5. In addition, substantially more structural stage 4A would remain and would be expected to develop into preferred habitat in the long-term, creating future habitat.

Fire hazard is also substantially reduced, increasing the potential for retention of preferred habitat. Wildfire threat is less in this alternative than the no action alternative.</td></tr>
<tr><td colspan="2">Cumulative Effects</td></tr>
<tr><td>MPB activity would decrease habitat. Additionally, vegetation treatments on private land may also reduce habitat for this species. Habitat fragmentation is expected.</td><td>Would add to preferred habitat reduction within the project area, however with lack of treatment habitat may be lost to fire or MPB. Additionally, vegetation treatments on private land may also reduce habitat for this species. Habitat fragmentation is expected.</td></tr>
<tr><td colspan="2">Summary</td></tr>
<tr><td colspan="2">Both alternatives retain 42 acres of preferred spruce habitat. However, Alternative 2 would retain more mature and late successional stands and therefore, results in the most potential for preferred habitat for the brown creeper. Both action alternatives would reduce SS4B from the existing condition; however treatment would reduce MPB risk and fire hazard. Habitat would be maintained and the project meets Objective 238a.

The proposed action would meet Forest Plan standards and guidelines; therefore this species is likely to persist on the Forest.</td></tr>
<tr><td></td><td>Alternative 1
No Action</td><td>Alternative 2
Proposed Action</td></tr>
</table>

Ruffed Grouse (*Bonasa umbellus*)	*Direct and Indirect Effects*	
	Habitat may improve due to MPB caused mortality of pine. However, pine encroachment into aspen stands would continue. Fallen MPB killed trees may provide cover for this species and would reduce potential browsing impacts to aspen habitat.	Direct effects may occur from vegetation treatments, but it is expected that individuals would leave the area before that occurs. Individuals would be expected to return to the area. Proposed treatments would increase and enhance habitat. Acres of aspen would be increased. Mountain pine beetle caused mortality may also benefit this species by killing overstory pine. The dead trees that have fallen or the live trees that are hinged would provide cover for this species and would discourage browsing so that suckering may occur. The increased aspen may improve habitat enough to provide the opportunity for a population increase.
	Cumulative Effects	
	Would not have adverse cumulative effects.	Would help offset negative impacts from past activities. Future hardwood treatments would continue to improve habitat.
	Summary	
	Because of proposed hardwood release and hardwood conversion treatments, the proposed action is expected to be more beneficial to ruffed grouse than the no action alternative. However, because of MPB activity killing pine, hardwoods may increase in both alternatives. This project is contributing to **Objective 238a** because the proposed action increases the amount of habitat available for ruffed grouse. The proposed action would meet all standards and guidelines. Therefore, this species is likely to persist on the Forest.	
	Alternative 1 **No Action**	**Alternative 2** **Proposed Action**
Song sparrow (*Melospiza melodia*)	*Direct and Indirect Effects*	
	Ponderosa pine may continue to become denser and encroach into hardwoods and shrubs, competing with them for resources. However, because of the predicted MPB effects to conifers, hardwoods and shrubs may increase, providing improved habitat along riparian corridors for this species. This alternative would be expected to benefit the song sparrow.	Direct effects are possible, but it is expected that individuals would leave the area before that occurs. Vegetation treatments may disturb individuals temporarily, but song sparrows are expected to return to the area. Proposed treatments would increase and enhance habitat. Some meadows and aspen stands near or adjacent to riparian areas would be released from pine encroachment. Mountain pine beetle caused mortality may also benefit this species by killing overstory pine along riparian areas. Because of vegetation treatments and MPB activity, hardwoods will increase. Additionally, pine habitat will become more

		open causing the potential for shrubs to increase in the understory. The additional habitat may increase enough for a population increase of song sparrow.
	Cumulative Effects	
	Adverse cumulative effects may occur because of livestock grazing.	Adverse cumulative effects may occur because of livestock grazing. Project activities are expected to outweigh effects.
	Summary	
	The proposed action is expected to have more beneficial impacts to song sparrows because of treatments within meadows and hardwood stands that may include riparian habitat. Additionally, because of MPB activity, both alternatives have the potential for an increase in hardwoods and shrubs. This project is contributing to **Objective 238a** because all alternatives increase the amount of habitat available for song sparrows. The proposed action would meet these standards and guidelines. Therefore, this species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Mountain sucker (*Catostomus platyrhynchus*) **NOTE: Also an R2 Sensitive Species**	*Direct and Indirect Effects*	
	No direct or indirect effects.	Potential direct effects are largely avoided by the seasonal inwater work restriction to avoid the mountain sucker spawning, incubation and emergence period. Indirect effects to aquatic/riparian habitat are predicted to be negligible. Proposed reconstruction of FSR 342.1E would include one new road-stream crossing on French Creek downstream of Stockade Lake. This may have short-term adverse effects resulting from some streambank disturbance and additional sediment input into the stream. The use of vegetative buffers to trap sediment and other techniques that minimize ground disturbance, protect streambank stability and maintain overhead tree canopy to shade streams will mitigate adverse impacts to fisheries habitat.
	Cumulative Effects	
	Past, present and reasonably foreseeable actions, such as recreational fishing, non-native fish stocking, livestock grazing, road use/maintenance and water impoundment will continue to directly or indirectly affect fish populations and/or their habitat. Existing instream structures that are barriers to fish passage, such as dams and "perched" culverts, will continue to fragment the stream network and affect fish distribution. These conditions and activities may have either a positive or negative effect depending on the fishery resource (native vs. non-native fish) or the type of activity (habitat restoration vs. degradation) being considered. Most of these effects are long-term because of their chronic, ongoing nature though their magnitude and intensity may vary over time.	

	Summary
	This project would have a neutral effect on the Forestwide population trend of the mountain sucker because of the minimal amount of occupied habitat (lower French Creek) in the project area and the minor degree of adverse effects to that habitat. The implementation of resource conservation measures would meet the intent of Forest Plan Objective 238d to maintain stream quality and connectivity. The implementation of Forest Plan standards and guidelines (Standards 1106, 1109, 1113, 1201, 1203 and Guidelines 1115 and 3212), regional watershed conservation practices and project-specific design criteria will avoid and minimize long-term negative indirect effects to fisheries consistent with Forest Plan Objectives 103, 217 and 219. Potential adverse effects to aquatic habitat and control nonpoint surface water pollution are mitigated consistent with Objective 221 of the Forest Plan.

Species of Local Concern (SOLC)

The following is a summary of effects to the previously mentioned wildlife SOLC. A detailed analysis can be found in the Wildlife Report in the project record.

Table 39: Summary of Effects to SOLC

	Alternative 1 No Action	**Alternative 2 Proposed Action**
Atlantis Fritillary *(Speyeria atlantis pahasapae)* **Tawny Crescent** (*Phycoides batesii*)	*Direct and Indirect Effects*	
	Conifers would continue to encroach into meadows/grasslands and riparian hardwood communities, resulting in a decrease in foraging plants for butterflies. Fire hazard would continue to increase. However MPB caused mortality of pine could increase meadow, hardwood, spruce and riparian acreage that would benefit these butterfly species.	These species are expected to benefit more with this alternative because habitat adjacent to riparian areas is expected to increase in size because of vegetation treatments. Even in riparian areas not proposed for any mechanical treatments, spruce, hardwoods and open, grassy areas may increase because of MPB killing encroaching conifers. This increase may improve habitat enough to provide the opportunity for a population increase. Noxious weed treatments would positively impact these species by aiding in native plant restoration, however there is potential to harm the species by treating nectar or larval host plants. Rx burning & vegetative treatments have potential for direct mortality to individuals; however positive impacts would be created through pine encroachment by opening up meadows/grasslands.
	Cumulative Effects	
	Would not have adverse cumulative effects. MPB activity could contribute to enhanced butterfly habitat.	Would have beneficial cumulative effects. Improvement of current habitat conditions would offset negative effects from livestock grazing. Would benefit species due to habitat enhancement from past grazing and timber harvest.
	Summary	
	Both alternatives would improve habitat for these butterflies. Alternative 2 would result in a greater benefit by further enhancing habitat, in particular by removing	

<table>
<tr><td></td><td colspan="2">encroaching pine from hardwoods and meadows, which may be adjacent to riparian areas.

The proposed action would meet these objectives, standards and guidelines. The proposed action alternative would contribute toward meeting Forest Objective 221. Both species are likely to persist on the Forest.</td></tr>
<tr><td></td><td>Alternative 1
No Action</td><td>Alternative 2
Proposed Action</td></tr>
<tr><td rowspan="4">Callused Vertigo
(Vertigo arthuri)

Mystery Veritgo
(Vertigo paradoxa)

Frigid Ambersnail
(Catinella gelida)

Striate Disc
(Discus shimekii)</td><td colspan="2">Direct and Indirect Effects</td></tr>
<tr><td>Existing forested stands would be expected to become more dense. However, because of the current MPB epidemic, dense pine stands (SS 3B, 3C, 4B, 4C, and 5) are expected to decrease from existing condition. Canopy would decrease as well as moisture levels for these snail species. MPB risk and wildfire risk would not be decreased. Conifer would continue to encroach into hardwood stands. Conversely, hardwoods may increase with MPB activity, which would increase deciduous litter.</td><td>The proposed action would allow for more riparian and hardwood enhancement and may provide better habitat conditions for these snail species through post-harvest activities. Overall, this alternative should decrease the risk of stand replacement wildfire, which would more than likely destroy the microclimate and habitat desired by these snail species.

Of the two alternatives, this alternative retains more acres of dense habitat, and increases hardwood stands through hardwood conversion treatments by 126 acres. Therefore more habitat for the callused vertigo, mystery vertigo and striate disc snail species would be provided.

Rx burning and vegetation treatments would have potential to cause direct mortality to individual snails & potential to impact habitat, negatively. However, opening up forested sites would create more potential habitat for the frigid ambersnail. These same treatments may decrease available habitat for the callused vertigo, mystery vertigo and striate disc snails. Hardwood treatments would enhance sites, enhancing snail habitat. MPB & wildfire risk would be reduced.</td></tr>
<tr><td colspan="2">Cumulative Effects</td></tr>
<tr><td>Would not have adverse cumulative effects. Would not enhance snail habitat.</td><td>The trend of forest succession and fire suppression has decreased available water to riparian and mesic hardwood habitat and thus negatively impacted snail habitat. The recent precipitation (past 3 years) may improve this situation. Also, beneficial impacts to water yield, and hardwood and riparian habitat have resulted from past and current removal of pine trees, wildfires and prescribed burns. These treatments may have also negatively impacted snail habitat through eliminating the overstory resulting in drying out of wet sites used by snails. These impacts are site-specific. Timber sales and fuels reduction projects have contributed cumulatively to both the beneficial and negative impacts to snails. Past activities have reduced the area</td></tr>
</table>

		of dense conifer stands while fire suppression has allowed natural succession to occur which has developed dense stands. Past and current off-road motorized traffic has negatively impacted some snail habitat (primarily in riparian areas) through removing plants and cover and compacting soil. Motorized traffic can also cause mortality to snails directly. Livestock grazing and recreational use, both with the potential to cause negative impacts to snails and their habitat, would be expected to continue within the project area.
	Summary	
	The proposed action is expected to increase hardwood acres through hardwood conversion and release treatments and retains more SS4A. Therefore, all snail species' habitat would benefit from this alternative. However, this alternative also has the potential to cause the most impact to the snail species and their habitat due to vegetative treatment as well as prescribed burning. The proposed action alternatives would meet Forest Plan standards and guidelines. Therefore the alternatives would contribute toward meeting **Objective 221**. These species are likely to persist on the Forest. The proposed action would maintain more dense forest conditions than no action due to MPB caused mortality. Both action alternatives would create a more open pine forest condition. These actions would have potential for both positive and negative impacts on individual snails and habitat. The frigid ambersnail would benefit from opening stands. Vegetative treatments along with prescribed burning would follow Forest Plan **Standard 3103**, and would not result in cumulative impacts to known snail colonies.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Sharp-shinned Hawk *(Accipiter striatus)*	*Direct and Indirect Effects*	
	Would reduce nesting habitat due to MPB caused mortality, which may cause displacement. The threat of stand replacing wildfire would increase. However, because of the MPB infestation in the project area, it is predicted that changes from the existing condition will occur. Spruce is expected to remain at 42 acres.	Would reduce nesting habitat. May cause displacement and unknown nests could be disturbed, short term effect. Provides for habitat diversity. Would decrease existing MPB and wildfire risk.
	Cumulative Effects	
	Would have adverse cumulative effects to habitat. Potential for long-term adverse cumulative effects due to stand replacing events.	Activities such as fire suppression, livestock grazing, recreational activities and other management activities have and are expected to continue in the Vestal Project area. These activities will likely occur on private lands as well. The action alternative is expected to

	Alternative 1 No Action	Alternative 2 Proposed Action
		incrementally offset some of the effects of past fire suppression by reducing pine encroachment into spruce, meadow, and hardwood habitat through vegetation treatment activities. Treatment activities are expected to temporarily produce disturbance impacts to sharp-shinned hawks, but the impacts are expected to cease once the project is complete. Mountain pine beetle is also expected to incrementally offset some of the above effects naturally by reducing pine encroachment into spruce, meadow, and hardwood habitat. However, because of the effects of MPB, there is expected to be adverse cumulative effects to sharp-shinned hawks because of loss of suitable nesting habitat. Private lands may continue to be developed, some of which may include roads. All may affect sharp-shinned hawks through direct mortality, modification of behavior, habitat alteration, spread of exotics, or disturbance. There are no known future activities which would affect spruce habitat.
	Summary	
	The no action alternative retains the most suitable nesting habitat, with the most potential for more future nesting habitat than the proposed alternative. However, no SS3C is left because of MPB effects. The same amount of spruce is available in both alternatives. The proposed action is expected to increase hardwood acreage because of hardwood conversion treatments, although this habitat type for nesting is not significant. This alternative would contribute toward meeting Forest Objective 221. This species is likely to persist on the Forest.	
	Alternative 1 **No Action**	**Alternative 2** **Proposed Action**
Cooper's Hawk *(Accipiter cooperi)*	*Direct and Indirect Effects*	
	MPB risk and wildfire risk would not decrease. Nesting habitat would decrease substantially as conifer stands become less dense due to MPB caused mortality.	Preferred nesting habitat would decrease from existing conditions. However, this alternative retains more preferred habitat than no action. Potential for short-term disturbance to known and unknown nests. Reduces the MPB risk and wildfire risk to habitat. Would enhance hardwood sites, adding diversity.
	Cumulative Effects	
	Would have adverse cumulative effects to nesting habitat. Potential for long-term adverse cumulative effects due to stand replacing events.	Would have adverse cumulative effects to nesting habitat, but to a lesser degree than no action. Positive cumulative effects to other habitat components, including meadows, and hardwood stands. Short-term cumulative effects of disturbance.
	Summary	
	Both alternatives would reduce preferred nesting habitat, although Alternative 2 would provide the most acres of preferred nesting habitat, current and future. The	

	potential for loss of habitat to fire or MPB is high in No Action, but reduced in Alternative 2. Known nests would be protected through **Standard 3204**. The alternatives would meet Forest Plan standards and guidelines and would contribute toward meeting **Objective 221**. Therefore this species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Broad-winged Hawk *(Buteo platypterus*	*Direct and Indirect Effects*	
	Under this alternative, pine stands may become denser. Conifers would continue to encroach into meadows and hardwoods. The threat of stand replacing wildfire would increase. Nesting habitat for the broad-winged hawk would most likely decline with the current MPB infestation within the project area. Spruce and hardwoods may increase because of the effects of MPB on conifers.	Retains more preferred nesting habitat than No Action. Spruce acreage would remain the same as Alternative 1. Hardwood habitat would increase. May cause temporary disturbance and displacement.
	Cumulative Effects	
	Would have adverse cumulative effects to nesting habitat. Potential for long-term adverse cumulative effects due to stand replacing events.	Cumulative effects to nesting habitat are offset by reduced potential for loss of habitat to fire and MPB. The action alternative is expected to incrementally offset some of the effects of past fire suppression by reducing pine encroachment into spruce, meadow, and hardwood habitat through vegetation treatment activities. Treatment activities are expected to temporarily produce disturbance impacts to broad-winged hawks, if present, but the impacts are expected to cease once the project is complete. Mountain pine beetle is also expected to incrementally offset some of the above effects naturally by reducing pine encroachment into spruce, meadow, and hardwood habitat. However, because of the effects of MPB, there is expected to be adverse cumulative effects to broad-winged hawks because of loss of suitable nesting habitat. Private lands will likely continue to be developed, some of which may include roads. All may affect broad-winged hawks through direct mortality, modification of behavior, habitat alteration, spread of exotics, or disturbance. Additionally, private lands most likely would continue to be thinned to reduce the threat of MPB.
	Summary	
	Nesting habitat is probably the most important factor for long-term persistence of the broad-winged hawk. The proposed action proposes treatments that could	

	decrease the chances of stand replacement wildfire or MPB activity that may negatively impact the habitat desired by this species. The proposed action provides more acres of nesting habitat, although small in scale, for the broad-winged hawk. It also provides treatments in hardwoods that may increase nesting habitat within hardwood communities because of conifer removal treatments. The proposed action would meet Forest Plan standards and guidelines, but because of MPB activity within the project area, little preferred nesting habitat would remain. The proposed action would contribute toward meeting Forest Objective 221. This species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Northern Saw-whet Owl *(Aegolius acadicus*	*Direct and Indirect Effects*	
	Increased roosting habitat, but little to no nesting habitat would remain. High risk for loss of habitat to MPB and fire.	Preferred nesting habitat would be reduced, although more remains than in No Action. Higher potential for future nesting habitat as more mature stands remain than No Action. Preferred roosting habitat would decrease substantially. Hardwood habitat would increase. Potential for short-term disturbance and displacement.
	Cumulative Effects	
	Adverse cumulative effects to nesting habitat. Potential for long-term adverse cumulative effects due to stand replacing events.	Cumulative effects to nesting habitat are offset by reduced potential for loss of habitat to fire and MPB. The action alternative is expected to incrementally offset some of the effects of past fire suppression by reducing pine encroachment into spruce, meadow, and hardwood habitat through vegetation treatment activities. Treatment activities are expected to temporarily produce disturbance impacts to northern saw-whet owls, but the impacts are expected to cease once the project is complete. Mountain pine beetle is also expected to incrementally offset some of the above effects naturally by reducing pine encroachment into spruce, meadow, and hardwood habitat. However, because of the effects of MPB, there is expected to be adverse cumulative effects under both alternatives to northern saw-whet owls because of loss of suitable nesting habitat. Private lands would likely continue to be developed, some of which may include roads. All may affect northern saw-whet owls through direct mortality, although unlikely, modification of behavior, habitat alteration, spread of exotics, or disturbance. Additionally, private lands will continue to be thinned to reduce the threat of MPB.
	Summary	

	Alternative 2 retains more nesting habitat, but less roosting habitat than No Action. Alternative 2 also increases the potential for retention and development of nesting habitat into the future. The proposed action would meet Forest Plan standards and guidelines. The proposed action would contribute toward meeting Forest Objective 221. This species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Pygmy Nuthatch *(Sitta pygmaea melanotis)*	*Direct and Indirect Effects*	
	Preferred nesting habitat would decrease substantially. Highest potential for snag habitat in the short-term, 5 years. Lowest potential for snag habitat long-term. The threat of loss of nesting habitat to wildfire would increase.	Preferred nesting habitat would decrease, but less than No Action. Increased snag habitat, although less than No Action. Improved potential for development of preferred habitat. Potential for short-term disturbance and displacement.
	Cumulative Effects	
	Greatest potential for adverse cumulative effects due to stand replacing events, MPB and fire.	Adverse cumulative effects may occur because treatments, MPB, or both are expected to significantly decrease nesting habitat, although the proposed action would retain more nesting habitat than No Action. Potential for short-term disturbance cumulative effect. Mountain pine beetle is also expected to incrementally offset. However, because of the effects of MPB, there is expected to be adverse cumulative effects to pygmy nuthatches because of loss of suitable canopy cover in both alternatives. Cumulative benefit to snag habitat in short and long term.
	Summary	
	Alternative 2 provides more nesting habitat for the pygmy nuthatch than the No Action alternative. It also would decrease potential loss of habitat to wildfire. More mature trees would be expected to remain for replacement snags in the future in Alternative 2. The proposed action would meet Forest Plan standards and guidelines and would contribute toward meeting Forest Objective 221. This species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Northern Long-eared Myotis *(Myotis septentrionalis)* **Small-footed**	*Direct and Indirect Effects*	
	Pine may become denser, and increase in size and provide larger future snags. The dense pine conditions could lead to stand	May result in disturbance or displacement of roosting bats, likely short-term. Foraging habitat would be improved.

Myotis *(Myotis ciliolabrum)* **Long-eared Myotis** *(Myotis evotis)* **Long-legged Myotis** *(Myotis volans)*	replacing wildfires and/or beetle infestation. Conifers would continue to encroach into meadows and riparian zones where these species may forage. However, because of the MPB activity already occurring within the project area, large pockets of snags are expected to occur on the landscape; however, MPB-caused snags are expected to only remain standing for 5 years. Mature structural stages are expected to decrease significantly, potentially leaving large trees as snags for the short term. Hardwoods, shrubs, and grasses may increase because of the MPB killing conifers, potentially increasing prey species.	Potential impact to snag roosting habitat, but less than in the no action alternative. Higher potential for future large snag roosting habitat than No Action. The project may somewhat decrease or slow-down snag recruitment because the thinning units would be less susceptible to wildfire and insect outbreaks; however, MPB activity is expected to increase the amount of snags, in the short-term, in parts of the project area. If a stand-replacing wildfire were to occur, snags may be created.
	Cumulative Effects	
	Foraging habitat may have both beneficial and adverse cumulative effects.	The proposed action for this project is not expected to influence spread of white-nosed syndrome. There is only one known abandoned mine, which gated to prohibit unauthorized entry. Possible cumulative impact of disturbance, short-term. Positive cumulative impact to foraging habitat. Possible adverse cumulative impact to snag roosting habitat, but less than in No Action.
	Summary	
	The proposed action is expected to provide the most habitat for bats and prey and the most potential for future large snags remaining on the landscape. Suitable roosting snags would also be available. There are abandoned mines within the project area, but standards, guidelines and design criteria will be implemented to protect the known mines used for roosting/hibernating. Therefore, impacts from the proposed action on these bat species should be minimal. The proposed action would meet Forest Plan standards and guidelines. Therefore, would contribute toward meeting Forest Objective 221. The northern long-eared, small-footed, long-eared and long-legged myotis bat species are likely to persist on the Forest.	
	Alternative 1 **No Action**	**Alternative 2** **Proposed Action**
Northern Flying Squirrel *(Glaucomys sabrinus)*	*Direct and Indirect Effects*	
	Preferred nesting habitat would decrease significantly. Fire hazard and MPB risk would not change and potential for loss of habitat	Direct mortality, although unlikely, from treatment activities may occur. Possible short-term disturbance. Possible long-term

	remains high. Habitat fragmentation is expected to occur. Snag habitat would be increased substantially in the short term. Long term snag potential would be decreased.	displacement. Treatments, in conjunction with MPB activity, are expected to cause habitat fragmentation. In the short-term, snags are expected to be plentiful, although less than No Action. Long term snag potential is improved over No Action. Would reduce MPB and wildfire risk.
	Cumulative Effects	
	Activities such as vegetation management, fuels management, livestock grazing, recreational activities and other management activities have and are expected to continue within the project area. These activities will likely occur on private lands as well. Private lands will likely continue to be developed, some of which may include roads. All may affect flying squirrels through direct mortality, modification of behavior, habitat alteration, spread of exotics, or disturbance. Additionally, private lands will continue to be thinned to reduce the threat of MPB. Northern flying squirrels have relatively small ranges, generally less than 42 acres (Cotton and Parker 2000), and are non-migratory. Privately-owned lands within and adjacent to the project boundary may also provide suitable northern flying squirrel habitat, but resource management and conservation by private citizens and companies depend on a number of factors (e.g., desired goals, market prices, development potential). Private lands managed for timber harvest may tend toward fewer acres in the late-successional stage forest and fewer snags. Potential northern flying squirrel habitat is assumed to occur on private lands across the project area; however, the extent and persistence of such habitat is uncertain.	
	Summary	
	Both alternatives affect habitat for the flying squirrel. However, the proposed action treats stands to mostly SS4A, and more acreage of SS 4B, 4C, and 5 would remain within the project area, providing little more habitat for this species. More future replacement snags would also be expected to remain on the landscape. The proposed action would meet Forest Plan standards and guidelines. Therefore, the alternatives would contribute toward meeting Forest Objective 221. This species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Meadow Jumping Mouse *(Zapus hudsonius campestris)*	*Direct and Indirect Effects*	
	No treatments in riparian areas would occur under this alternative. Conversely, MPB activity is expected to continue in the area, increasing hardwoods and meadows. This may increase quality habitat for this mouse species.	Possible direct effects from proposed activities. Enhancement of meadow and riparian hardwood habitat.
	Cumulative Effects	
	Activities such as vegetation management, fire suppression, livestock grazing, recreational activities and natural events such as drought and flooding have caused	

<table>
<tr><td></td><td colspan="2">impacts to riparian areas within the project area. Fire suppression has resulted in an increase of pine trees which may lead to a change in water tables. Other management activities have and will continue in and adjacent to the project area. These activities will likely occur on private lands as well. Private lands will likely continue to be developed, some of which may include roads. All may affect jumping mice through direct mortality, modification of behavior, habitat alteration, spread of exotics, or disturbance.

Private lands occur frequently within riparian areas. These private lands provide suitable habitat, but conditions may have been altered by private land management activities such as livestock grazing or draining to convert to drier site conditions for subsequent haying.</td></tr>
<tr><td></td><td colspan="2">Summary</td></tr>
<tr><td></td><td colspan="2">Neither of the alternatives is expected to cause detrimental impacts to riparian areas within the project area. The proposed action proposes timber treatments to enhance hardwoods and meadows next to riparian streams, which is expected to benefit this species. Therefore, the proposed action would move the riparian areas to better condition overall in the project area.

The proposed action would meet Forest Plan standards and guidelines. Therefore, the alternatives would contribute toward meeting Forest Objective 221. This species is likely to persist on the Forest.</td></tr>
<tr><td></td><td>Alternative 1
No Action</td><td>Alternative 2
Proposed Action</td></tr>
<tr><td>Mountain Goat
(Oreamnos americanus)</td><td colspan="2">Direct and Indirect Effects</td></tr>
<tr><td></td><td>This alternative would increase the amount of forage and open pine stands available to mountain goats, which would be used for foraging, traveling corridors, and cover. The increased forage and decrease in dense pine sites, especially on Buckhorn Mountain, may improve habitat enough to provide the opportunity for a population increase.</td><td>No direct effects to this species are expected to occur because of project activities. However, vegetation treatments may disturb individuals.

This alternative would increase the amount of forage and open pine stands available to mountain goats, which would be used for foraging, for traveling corridors, and cover. The increased forage and decrease in dense pine sites, especially on Buckhorn Mountain, may improve habitat enough to provide the opportunity for a population increase.</td></tr>
<tr><td></td><td colspan="2">Cumulative Effects</td></tr>
<tr><td></td><td colspan="2">Treatment activities are expected to temporarily produce disturbance impacts to this species in addition to those from recreation activities, but the impacts are expected to lessen once the project is complete; however, recreational disturbance is expected to continue. The proposed action could incrementally lead to additional invasive weeds, but include control activities to mitigate these impacts. Both alternatives are expected to increase forage (grasses/forbs and browse) for these species, which may incrementally reduce conflicts and competition with grazing livestock. However, the proposed action includes vegetation treatments that are expected to further enhance forage. Although there could be short-term adverse indirect effects to this species from the proposed action, adverse cumulative effects are not expected.

Because of current MPB activity, spruce stands and dense stands of pine are expected to be greatly reduced. This is expected to benefit this species.</td></tr>
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	Summary
	Both alternatives increase foraging habitat. However, the proposed action also includes prescribed burning to maintain clearcuts created for mountain goat forage. The proposed action would meet Forest Plan standards and guidelines. Therefore, this project would be consistent with Forest Plan Objective 221 for mountain goat. This species is likely to persist on the Forest.

Threatened and Endangered Species

This project would have 'no effect' on Threatened or Endangered species. Refer to the BA/BE in the project record and Appendix G which contains a summary of the BA/BE completed for this project.

Region 2 (R2) Sensitive Species

Summary of Effects on Sensitive Species

The following is a summary of effects to wildlife Sensitive Species. A detailed analysis can be found in the Wildlife and Fisheries Biological Assessment/Biological Evaluation in the project record.

Table 40: Summary of Effects on Sensitive Species

	Alternative 1 No Action	**Alternative 2 Proposed Action**
Fringed Myotis (*Myotis thysanodes*)	*Direct and Indirect Effects*	
	Short-term increase in snags used for roosting, but substantial decrease in mature pine as roosting habitat. Potential increase in foraging habitat (riparian areas, meadows) due to MPB activity and high fire hazard.	Increase in snag roosting habitat, but less than in Alternative 1. Reduced MPB risk and fire hazard increases potential for maintaining roosting habitat long-term. Foraging habitat is expected to improve. Potential for disturbance of roosting bats.
	Cumulative Effects	
	Incremental impacts to roosting habitat are expected as MPB continues to reduce mature habitat, but create snags, on both National Forest and private lands.	Incremental impacts to habitat quantity are expected to be minimal because direct and indirect impacts are expected to be minimal. The incremental impacts of disturbance are expected to be minimal because bats are normally active during the night when project activities will be minimal.
	Summary	
	The alternatives **'may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing'.** The proposed alternative would be consistent with these standards and guidelines. The Forest is conserving and enhancing habitat (Objective 221) for this species through cave, mine and snag management. This species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**

Townsend's big-eared bat (*Corynorhinus townsendii)*	*Direct and Indirect Effects*	
	Fire hazard remains very high. If wildfire were to occur, conditions at roosting sites may change by changing the microhabitat. Fire is known to affect insect populations which could reduce prey items for bats foraging in the area. In addition MPB activity is expected to continue, which in the long-term, may result in a loss of roosting habitat if conditions change around a roosting area.	Potential for direct impacts and disturbance. Reduced fire hazard. Mountain pine beetle activity is expected to continue, which in the long-term, may result in a loss of roosting habitat if conditions change around a roosting area, but to a lesser degree than No Action. Prescribed burning could affect air quality in cave and mine roosts, as well as further contribute to the loss of existing snag roost habitat. Fire is known to affect insect populations which could reduce prey items for bats foraging in the area.
	Cumulative Effects	
	Incremental impacts to habitat quantity are expected to be minimal.	Incremental impacts to habitat quantity are expected to be minimal for both alternatives because direct and indirect impacts are expected to be minimal. The effects of disturbance are expected to be minimal since bats are normally active during the night when project activities will be minimal.
	Summary	
	The alternatives **'may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing'.** The proposed action would likely have the more impact on the bat species due to the larger acreage of treatment, but it is also expected to retain more live trees into the future. The proposed action would meet Forest Plan standards and guidelines. The Forest is conserving and enhancing habitat for this species through cave and mine management therefore, both alternatives contribute to conservation of bat habitat Forest plan Objective 221. Therefore, this species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Hoary bat (*Lasiurus cinereus)*	*Direct and Indirect Effects*	
	Fire hazard remains very high. If wildfire were to occur, conditions at roosting sites may change by changing the microhabitat. Fire is known to affect insect populations which could reduce prey items for bats foraging in the area. In addition MPB activity is expected to continue, which in the long-term, may result in a loss of roosting habitat if conditions change around a roosting area.	Potential for direct impacts and disturbance. Reduced fire hazard. Mountain pine beetle activity is expected to continue, which in the long-term, may result in a loss of roosting habitat if conditions change around a roosting area, but to a lesser degree than No Action. . Prescribed burning could affect air quality in cave and mine roosts, as well as further contribute to the loss of existing snag roost habitat. Fire is known to affect insect populations which could reduce prey items for bats foraging in the area.

	Cumulative Effects	
	Mountain pine beetle activity will continue in the project area. Increased pine beetle activity and wildfire will create additional dead trees (potential for roosting) and grass/forb structural stage which could increase prey base for this species; however roosting habitat would be lost. These activities will likely occur on private lands as well. Private lands will likely continue to be developed, some of which may include roads. All may affect bats through direct mortality, modification of behavior, habitat alteration, spread of exotics, or disturbance.	Activities such as vegetation management, fuels management, livestock grazing, recreational activities and other management activities have and will continue. Mountain pine beetle activity will continue in the project area. Increased pine beetle activity and wildfire will create additional dead trees (potential for roosting) and grass/forb structural stage which could increase prey base for this species; however roosting habitat would be lost. These activities will likely occur on private lands as well. Private lands will likely continue to be developed, some of which may include roads. All may affect bats through direct mortality, modification of behavior, habitat alteration, spread of exotics, or disturbance.
	Summary	
	The alternatives **<u>'may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing'.</u>** The proposed action may limit individual use of treated areas but would not be expected to affect species viability throughout the planning area. Habitat for this species is expected to remain because both live coniferous and deciduous trees are expected to remain on the landscape. The Forest is conserving and enhancing habitat and contributes to Objective 221.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Black-tailed prairie dog (*Cynomys ludovicianus*)	*Direct and Indirect Effects*	
	No direct or indirect effects.	Potential direct effects. Potential short-term disturbance. Habitat is expected to improve with removal of pine within the known colony. Preferred habitat may increase for this species.
	Cumulative Effects	
	No cumulative effects	Livestock grazing does occur and could lead to expansion of black-tailed prairie dog habitat. Recreational shooting does occur within the prairie dog town. There is always a risk of disease (sylvatic plague) that can eliminate local prairie dog populations. Wildfires may occur, creating openings and, thus, increasing the quantity and quality of grassland forage available to livestock and wildlife. Development on private lands within the project area could occur, decreasing acreage for this dogtown. Additionally, human intolerance of the species is expected to continue, decreasing numbers.
	Summary	

	The determination of **<u>'may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing'</u>**. The No Action alternative would have **<u>'no impact'.</u>** The Forest is meeting Objective 237 which prompts the Forest to manage for 200-300 acres of prairie dog towns in at least 3 different towns (USDA Forest Service 2009). The proposed action would meet Forest Plan standards and guidelines. The Forest is conserving and enhancing habitat for this species and is contributing to Objective 221. Therefore, this species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
American marten (*Martes americana*)	*Direct and Indirect Effects*	
	No direct effects. Mountain pine beetle would impact habitat by reducing preferred dense mature habitat, but also increases down woody material. Preferred spruce habitat would remain.	Possible direct effects. Impacts to marten from any logging activities would mainly be in stands adjacent to occupied habitat. Potential for short-term displacement. No change to spruce stands. Treatments and MPB caused mortality would reduce the amount of dense pine stands and could reduce prey habitat and future downed woody material desired by marten. However, it is expected that downed woody material already present would not be moved and would remain in those areas, and MPB-killed trees would fall, creating sufficient downed material. In addition, treatment to pine adjacent to spruce stands is expected to reduce, in the long-term, the wildfire risk to spruce habitat.
	Cumulative Effects	
	Cumulative effects from MPB caused mortality on private lands. Vegetation treatments and development on private lands may also add to impacts.	Very little marten habitat occurs on forest. Cumulative effects from vegetation management actions that remove spruce, drastically reduce forest canopy, or remove large down woody debris would reduce available habitat for the species. Recreation in suitable habitat may have and may continue to impact the American marten. Where private lands include high quality habitat, it could be subject to low-density development (e.g., rural residences). Landowners may be conducting thinning activities to protect their homes and viewshed from MPB and/or high fuel loading. Furthermore, they would not likely apply any mitigation to minimize effects to marten. Due to the combination of these factors, habitat on the Forest will likely become more important.
	Summary	
	The proposed action **<u>'may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal</u>**	

	<u>listing'.</u> Little preferred spruce habitat is contained within the project area. The proposed action would retain more dense, mature habitat than the no action alternative. However, the proposed action proposes treatments to improve stand health and reduce the risk of wildfire, thus, retaining more acres of dense, mature trees for connectivity. The proposed action contributes to conservation of marten habitat (Forest plan Objective 221). The proposed action would meet these standards and guidelines. Fire suppression during the last century has allowed spruce to increase in abundance and density in the Black Hills. The Forest is conserving habitat for the American marten (USDA Forest Service 2010). Therefore, this species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Bald Eagle (*Haliaeetus leucocephalus*)	*Direct and Indirect Effects*	
	Mountain pine beetle are expected to kill large trees creating snags for roosting. Potential future roosting trees are reduced due to MPB caused mortality of large trees.	No direct effects are expected. Individuals may be displaced Mountain pine beetle are expected to kill large trees creating snags for roosting, but to a lesser degree than No Action. Therefore, the potential to maintain large trees for future roosting sites is improved over No Action.
	Cumulative Effects	
	Cumulative effects expected MPB caused mortality continues on private lands. Treatments to reduce MPB risk on private lands would also remove roosting trees.	Incremental impacts to habitat quantity are expected to be minimal because direct and indirect impacts are expected to be minimal; however, there may be some incremental impacts from disturbance and from MPB activity killing roosting trees.
	Summary	
	Both alternatives would have **<u>'no impact'</u>** on the bald eagle. This project will be implemented consistent with any of the relevant standards, guidelines that protect bald eagles or provide for eagle habitat, and contributes to Objective 221.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Northern goshawk (*Accipiter gentilis)*	*Direct and Indirect Effects*	
	No direct effects. Reduction of suitable nesting habitat throughout the project area due to MPB caused mortality. High fire hazard remain and is a threat to suitable nesting habitat. Increase of foraging habitat due to MPB. Prey species such as chipmunks and some birds would benefit by increasing grasses and forbs (cover and food source) or young-forest conditions, while other prey species like woodpeckers	No direct effects to known nests, potential for direct effects to unknown nests. Would enhance and protect goshawk nesting areas by reducing MPB risk, MPB infested trees and fire hazard. Would retain more suitable nesting habitat on the landscape than No Action. Increase in foraging habitat. Some prey species could be adversely affected as well by removing canopy, snags, down woody material and ground cover. Similar impacts to prey species as No Action.

	and squirrels that favor a mature over-story may decrease.	
	Cumulative Effects	
	Past timber harvest has contributed to the loss of large mature trees, and blocks of mature, dense forested stands have been reduced in size so that they are no longer considered large enough to meet the nesting requirements for the goshawk. Wildfires and pine beetles have also contributed to the loss of large mature pine trees in the area.	Past timber harvest has contributed to the loss of large mature trees, and blocks of mature, dense forested stands have been reduced in size so that they are no longer considered large enough to meet the nesting requirements for the goshawk. Wildfires and pine beetles have also contributed to the loss of large mature pine trees in the area. The proposed action would continue to remove potential nest trees, but would provide protection around the existing nest territory. The possibility of future large-scale, high intensity wildfires does exist for this project area. Development and vegetation treatment of private lands is expected to continue. Any changes to this acreage are not expected to contribute to habitat loss. Incremental impacts from the proposed action are expected to offset some of the potential effects of large wildfires and insect epidemics that result from past, present and future fire suppression. However, because of MPB activity that is already occurring and expected to occur throughout the entire project area, large trees are expected to significantly decrease.
	Summary	
	Both alternatives **‘may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing’.** Alternative 2 would provide more dense habitat, and SS4A habitat that may increase more quickly to become suitable nesting habitat, than No Action. The proposed action would meet Forest Plan standards and guidelines, and meet Objectives 221. Mountain pine beetle is expected to reduce habitat, but the effects would be lessened in Alternative 2, because more suitable habitat would remain. Therefore, this species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Flammulated owl (*Otus flammeolus*)	*Direct and Indirect Effects*	
	High potential for loss of large tree habitat from MPB mortality and wildfire. Reduction of preferred habitat due to expected MPB caused mortality.	Potential direct effects. Potential short-term disturbance. Potential reduction of preferred habitat by removing large over-story trees, and possibly removing snags (if within snag cutting areas or if deemed as safety hazards to harvest operations). The proposed action retains more preferred habitat than the no action. Structural stage 4A, open park-like pine forest, increases greatly in the proposed action. Increases in the owl’s prey population may occur from activities that

		release understory vegetation, thus improving insect and small mammal habitat. There is expected to be sufficient downed woody material remaining in the project area because of snags falling. In addition, the proposed action would increase the potential for maintaining mature pine habitat long-term by reducing MPB susceptibility and fire hazard.
	Cumulative Effects	
	Large areas of snag habitat have been made available from insect outbreaks in the Black Hills and the Vestal project area, and large expanses of MPB-killed trees are expected to cover the landscape. However, these 'open areas' are not considered preferred flammulated owl nesting habitat. They may improve prey species abundance on a general scale. Mature trees, relatively open, park-like, stands are considered more suitable habitat. Timber harvesting, on public or private lands, that removes mature overstory, and a loss of snags would reduce potentially suitable habitat.	
	Summary	
	Both alternatives **'may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing'.** This project is consistent with pertinent standards and guidelines and contributes to Objective 221. However, due to the low occurrence of this species on the Forest in relation to the amount of potentially suitable habitat, no alternative is likely to affect the colonization by or establishment of flammulated owls on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Black-backed woodpecker (*Picoides arcticus*) **Note: is also a Forest MIS**	*Direct and Indirect Effects*	
	Would provide for an increase in habitat in the short-term due to expected MPB activity. Existing dense stands are more susceptible to MPB infestations and/or wildfires. The risk of stand-replacing fire is very high, and thus, if that were to occur, more habitat, in the short-term, would be available for black-backs because of their association with burned areas. This alternative would provide the greatest potential for increase in woodpecker habitat, short-term. However, it would also result in the greatest decrease in dense habitat types that are used when no burned or MPB habitat is available. Snags would increase due to natural mortality.	Habitat would be provided as MPB caused mortality continues in the project area, short-term. However, actions to reduce MPB risk are expected to result in less mortality than Alternative 1, No Action. The potential for large-scale fire is reduced in this alternative. Proposed actions are expected to retain more mature, dense stands (SS4B, 4C and 5) which are important when MPB stands or recently burned stands are not available. Snags will be plentiful in the short-term. There is potential for accidental removal of snags/cavities being used by woodpeckers by proposed fuel and harvest treatments. Prescribed burning may destroy snags, but it may also create snags. Greatest potential to create future (in the long-term) nest snags for this species. May disturb nesting woodpeckers if harvest occurs during nesting season, expected to be a short-term impact.

	Cumulative Effects	
	Past wildfires and past and existing MPB infestations have created habitat throughout the Forest and project area.	Continued MPB activity throughout the forest and project area would continue to provide habitat for this species. Fuel (fire) management treatments would reduce habitat potential for this species. Privately owned lands within and adjacent to the project area may also provide suitable habitat for the black-backed woodpecker. Fire-hazard and MPB reduction activities are likely to increase on some of these lands in effort to prevent loss from wildfire. Cutting of snags for fuelwood may reduce the number of snags. This could result in a loss of habitat, but the amount of area within these private lands is relatively small compared to what is on the forest (USDA Forest Service 2008). The indirect effects mentioned above would be an incremental impact additional to those on private lands.
	Summary	
	The alternatives **<u>'may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing'.</u>** Alternative 1 has the greatest potential for increasing woodpecker habitat. Alternative 2 may decrease preferred and/or potential habitat, but would not affect the habitat or population trend Forest wide because of providing for **Objective 211** (snags). Snags are not allowed to be cut unless deemed a safety hazard or within designated firewood cutting areas. The project area is only a small portion of the currently available habitat, new habitat acres are currently being created across the Forest. Habitat conditions would be provided, consistent with **Objective 238b.** The proposed action alternatives would meet Forest Plan standards and guidelines; therefore this species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Northern leopard frog (*Rana pipiens)*	*Direct and Indirect Effects*	
	Reductions in canopy density may cause surface temperature and soil moisture (drying) changes that would not favor this species.	Potential direct effects. Potential for habitat disturbance or loss. Reductions in canopy density may cause surface temperature and soil moisture (drying) changes that would not favor this species. Herbicide treatment of noxious weeds may potentially affect water quality and plant species diversity. The proposed action is expected to reduce the risk of MPB and wildfire, which is expected to reduce the risk of post-fire flood, erosion and sedimentation in riparian habitat.
	Cumulative Effects	

<table>
<tr><td></td><td colspan="2">Livestock grazing at breeding sites (streams) is expected to negatively impact this species. Recreational activities that use and/or impact streams (e.g., horse and ATV trails through streams) are occurring and will continue to occur. Available habitat could be supplemented if harvests increase spring/seep water yields, new springs/seeps surface, or if soil moisture levels are maintained. Decreasing soil moisture through timber harvest, slash/fuels disposal projects, and the disposal of existing down woody material (fuel treatments) is expected to continue to reduce adult foraging habitat and adversely affect dispersal. Wildfires have removed canopy which can unfortunately increase ground temperatures, and may limit distribution of this species the Forest. At sites where there are introduced predatory fish, leopard frog productivity has been adversely affected (Smith and Keinath 2007). Incremental impacts to habitat quantity are expected to be minimal because direct and indirect impacts are expected to be minimal.</td></tr>
<tr><td></td><td colspan="2">Summary</td></tr>
<tr><td></td><td colspan="2">The alternatives <u>‘may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing’.</u>

The proposed action would meet Forest Plan standards and guidelines. The proposed action would meet the intent of Objectives 213 and 221, and continue to provide habitat for the northern leopard frog. Therefore, this species is likely to persist on the Forest.</td></tr>
<tr><td></td><td>Alternative 1
No Action</td><td>Alternative 2
Proposed Action</td></tr>
<tr><td rowspan="6">Black Hills redbelly snake
(Storeria occipitomaculata pahasapae)</td><td colspan="2">Direct and Indirect Effects</td></tr>
<tr><td>Reductions in canopy density may cause surface temperature and soil moisture (drying) changes that would not favor this species</td><td>Potential direct impacts. Potential habitat disturbance or loss may occur from road reconstruction. Reductions in canopy density may cause surface temperature and soil moisture (drying) changes that would not favor this species. Herbicide treatment of noxious weeds may potentially affect water quality and plant species diversity. The proposed action should enhance habitat for this species by providing protection to riparian areas.</td></tr>
<tr><td colspan="2">Cumulative Effects</td></tr>
<tr><td colspan="2">May be directly impacted by livestock grazing and recreationists in suitable habitat. Timber harvesting, fuel treatments, and thinning where this species is present (den sites) may adversely alter site conditions (e.g. warming, drying, soil compaction, and den disturbance). Recreation is expected to continue and would negatively impact this species. Livestock overgrazing in riparian areas degrades potential suitable habitats through trampling, sedimentation, loss of vegetation, and effects to water quality, chemistry, and temperature. Additional levels of these impacts to riparian areas are not expected from the proposed action. The proposed action is expected to offset some of the adverse effects of past and present fire suppression by reducing the potential risk of fire and insects.</td></tr>
<tr><td colspan="2">Summary</td></tr>
<tr><td colspan="2">The proposed action <u>‘may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal</u></td></tr>
</table>

	listing'. The No Action alternative would have **"No Impact"**. The proposed action would meet the intent of Objectives 213 and 221, and continue to provide habitat for the redbelly snake.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Mountain sucker (*Catostomus platyrhynchus*) **NOTE: also a Forest MIS**	*Direct and Indirect Effects*	
	No direct or indirect effects	Slight potential for direct effects. Indirect effects to the mountain sucker resulting from changes to aquatic/riparian habitat are anticipated to be negligible. Mechanical vegetation treatment adjacent French Creek is proposed on only 36 acres. The proposed road crossing on French Creek would result in some streambank disturbance and sediment input/mobilization. Potential adverse indirect effects would largely be avoided by installing a temporary bridge rather than culverts and fill, to minimize sediment input into French Creek. Adverse effects are further reduced because of the small area of disturbance, approximately 30 feet of stream length, resulting from the crossing.
	Cumulative Effects	
	No cumulative effects	The proposed action is likely to have a discountable cumulative effect. Inwater construction activities at the road-stream crossing on French Creek may have a minor incremental impact regarding sediment input. This negative impact would be additive to other sediment input resulting from ongoing road use/maintenance and livestock grazing on public and private land adjacent to French Creek. Overall, assigned fisheries beneficial uses are likely to be maintained. Non-native fish populations will persist that may negatively impact the mountain sucker. Stream fragmentation remains largely unchanged due to Stockade Dam and perched culverts on lower French Creek.
	Summary	
	The alternatives **'may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing'**. Mountain sucker viability is not at risk due to the minor amount of aquatic habitat affected and the low magnitude of potential direct or indirect adverse effects. Project is consistent with Objective 221.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**

Cooper's mountain snail (*Oreohelix strigosa cooperi*)	*Direct and Indirect Effects*	
	Beetle caused mortality is expected to diminish dense conifer stand conditions that would protect these snails from environmental conditions and desiccation. Increased potential for stand-replacing wildfires, which could eliminate localized colonies and reduce suitable habitat both short-term and long-term	Potential for direct effects. Retains more dense canopy than No Action. Colonies would likely expand where suitable habitat is present. Sanitation of beetle infested trees within Frest sites may cause short-term impacts, but would retain more suitable habitat in the long-term.
	Cumulative Effects	
	Drought can have negative impacts on this species by reducing moist site requirements necessary to sustain colony number. The loss of overstory due to MPB mortality and the high probability of large-scale wildfire could reduce moist site conditions depending on size of openings and severity/intensity of fire. High intensity fire may destroy colonies and their habitat, isolate colonies, and reduce decay material necessary for their life cycle, which may last long-term. The proposed action is expected to reduce the potential for MPB and large wildfires which is expected to incrementally offset some of the effects of past fire suppression. Forest management activities, including livestock grazing, fuel treatments, recreation, and prescribed burning, in Vestal and in adjacent areas can increase isolation and increase xeric conditions that would limit snail colony expansion or extirpate localized colonies. Effects discussed above will incrementally increase impacts when added to the impacts of these past and present activities. Roads improved or constructed for the proposed action are expected to incrementally add to these impacts while the treatments are underway, but these additional impacts are expected to cease following project completion as temporary roads are closed.	
	Summary	
	The alternatives **'may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing'**. The proposed action would meet Forest Plan standards and guidelines and contribute toward meeting Objective 221. Therefore, this species is likely to persist on the Forest.	
	Alternative 1 No Action	**Alternative 2 Proposed Action**
Regal fritillary butterfly (*Speyeria idalia*)	*Direct and Indirect Effects*	
	No direct affect to this species or its habitat. MPB infestation will continue to reduce canopies, possibly creating additional habitat for the butterfly. High fire hazard would remain and be a threat to habitat.	Potential direct effects. Treatments to maintain grassland habitat may improve nectar/host plant species. Indirect effects to butterfly habitat may occur from prescribed fire, noxious weed treatment, placement of landings, road placement and crossings, especially if located along the margins of streams. These effects would likely result in loss of host and nectar species short-term. The 'proposed action' has a higher potential for the spread of invasive

		species that may affect this butterfly's habitat long-term. However, design criteria is included to protect riparian habitats, provide down woody material, and restore disturbed areas with native species. Therefore, treatment effects are expected to be minimal to riparian diversity and nectar/host plant species.
	Cumulative Effects	
	Fire suppression and increase in conifer cover in grasslands and riparian areas may increase over time, negatively affecting this species. Additionally, risk of large-scale wildfire or prescribed burning may negatively affect regal fritillary habitat short-term. The 'proposed action' is expected to offset some of the effects of past fire suppression by reducing pine encroachment into meadows and by reducing the risk of large-scale wildfires. Livestock grazing in prairies, upland meadows, hardwoods, and riparian zones may negatively affect this species. Prescribed burning in these areas could further reduce grasses, adding to these effects. Chemical use to control noxious weeds would decrease vegetation diversity in treated sites. Vegetation treatments may lead to more invasive weed infestations, which would lead to additional effects from chemical control. Fragmentation of habitat due to roads and trails may increase disturbance. Roads used under the proposed action may add to those disturbances temporarily, but the effects are expected to cease following project completion. A portion of the meadows and grasslands occur on private land. Heavy livestock use, recreation, and development on private land could negatively affect butterfly habitat. Under the 'proposed action', treatments that reduce pine encroachment into meadows may offset some of the loss of habitat occurring on private lands.	
	Summary	
	The proposed action **'may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing'**. The No Action alternative would have **"No Impact"**. The proposed action contributes to conservation of butterfly habitat, Forest plan Objective 221. The proposed alternatives would meet Forest Plan standards and guidelines. Therefore, this species is likely to persist on the Forest.	

Migratory Birds

Golden Eagle (Migratory Bird)

Contiguously forested habitats, which currently make up a large portion of the Vestal project area, are not preferred by golden eagles, but they may be included in a home range if suitable nesting or foraging habitat is intermixed. The Vestal project area contains limited areas, although present, e.g., Buckhorn Mountain, of rim-rock outcrops and substantial cliffs or rock faces that provide typical nesting substrates. Eagles could forage in the forest meadows, or in nearby grasslands and large burned forest areas.

Pine encroachment, commercial and non-commercial thinning, and prescribed burning treatments proposed for the Vestal project may have a positive effect on foraging habitat because it may open up the project area. Additionally, MPB activity is expected to kill large amounts of pine, opening up the area, potentially providing more foraging or nesting opportunities.

Fire and Fuels

Affected Environment

The ponderosa pine cover type dominates the landscape and as a result of fire exclusion, ponderosa pine has encroached on the non-forested communities, contributing to the reduction in size of the hardwood cover type, creating dense, closed canopy ponderosa pine stands. Surface fuels include duff, small woody debris, dead down logs and long needle litter. Isolated areas of storm damage, and slash from past management activities exist within the project area.

In light of the recent and projected insect activity within the project area, changes in fuels profiles are expected. Insect damage will alter several stand characteristics including canopy fuels, down woody fuels, duff, ladder fuels, herbaceous fuels, and microclimate, in turn altering the fire hazard and potential fire behavior.

The project area is located entirely in Custer County, South Dakota, with the City of Custer being the center for the project area. According to the 2010 census, the City of Custer has a population of just over 2,000. In recent years, several large fires have affected Custer County and private property and developed lands adjacent to national forest having burned over 100,000 acres in Custer County since 1997. The Vestal project area has not been impacted by large fire, but the area remains continually vulnerable.

The City of Custer has been identified as an At-Risk Community (ARC) as defined from the Federal Register (66FR 43384, 7/15/2001). Fire to the ARC and the Wildland Urban Interface are a greater concern for an area such as Custer with a high portion of private lands and large portion of that private being forested.

Community Wildfire Protection Plan (CWPP)

A Community Wildfire Protection Plan (CWPP) is a fire mitigation plan for at-risk communities. The plan identifies and prioritizes areas for hazardous fuel reduction; recommends the types and methods of treatment on Federal and non-Federal land; includes actions that will protect 1 or more *at-risk communities* and essential infrastructure, and includes recommendations to reduce structural ignitability of public and private property throughout the *at-risk community*.

The Custer County CWPP identified the City of Custer ARC as an urban interface environment with a high density of structures and infrastructure. In many areas the structures lack defensible fire protection space. No formally identified Municipal Watersheds are located in the project area; however the community of Custer obtains its water from within the project area. This water source is at high risk of fire impacts. Also there is a high potential for economic loss, and likelihood for loss of housing and businesses in the event of a wildfire. The Custer County CWPP identifies a three mile radius from the city limits of the City of Custer as a Community at Risk boundary.

Condition Class and Fire Regime

Historically, fires were more frequent and less severe. Fire suppression activities have trended the forest outside historic ranges. Currently, there are three general types of fire regimes in the Black Hills; Frequent low-severity, Infrequent high severity, and Mixed severity (USDA Forest Service, 2005). Fire regimes characterize the role fire plays in an ecosystem. The Fire Regime Condition Class rating can be used to describe the degree of departure from the historic fire regime (Hann et al., 2003).

The coarse scale national data characterizes the Black Hills as primarily fire regime Condition Class 3, which denotes a high degree of departure from the historic fire regime. There is a high relative risk of significantly altering or losing key components of the ponderosa pine forest system. (FEIS) These conditions significantly increase the probability of a surface fire transitioning to a crown fire with increased burn severity and tree mortality. Evidence of past fires shows the potential for large, high intensity surface fires, and, given the right conditions, stand-replacing fires. Recent examples of past large fires include the Jasper, Elk Mountain II, Battle Creek, Rico and Alabaugh.

Fire Risk

Risks are defined as those uses or human activities which have the potential to result in a wildfire ignition. Fire history occurrence of both large and point fires were analyzed using the project perimeter. The fire history data includes fires occurring from 1950 to present. Of the fires identified, 128 are known lightning-caused, 18 equipment-caused, 15 campfire-caused, 3 smoking-caused, 38 debris burning-caused, 3 railroad-caused, 5 arson-caused, 14 children-caused and 67 miscellaneous. Both fire history occurrence data as well as large fire history, those fires exceeding 20 acres, in and around the project area are depicted. In addition, the percent of the project area impacted was analyzed. (Figure 2, Table 41)

Table 41. Fire history occurrence and the size of the fires from 1950 to present

Fire Size Class	Fire Size (acres)	Number of Fires
A	0 – ¼	232
B	¼ to 9	50
C	10-99	3
D-G	100+	0

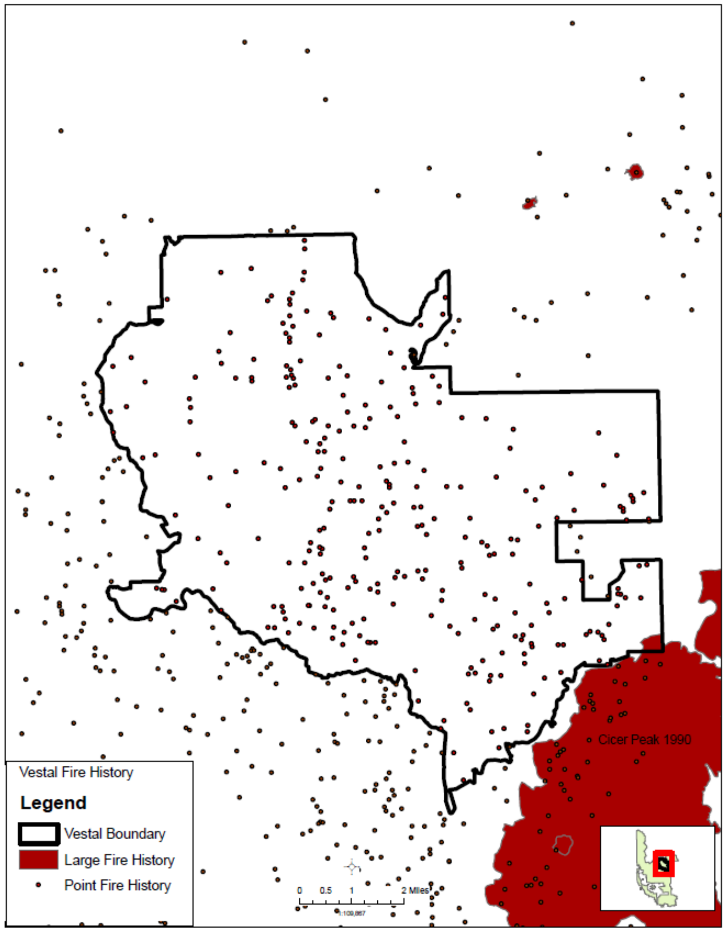

Figure 2. Fire history in and around the project area and the point fire history within the project boundary.

The 14,518 acre Cicero Peak fire burned approximately 72 acres within the project area (<1% of total fire).

The number of fires on the entire Black Hills National Forest system lands has remained fairly constant at 65-130 starts per year. The number of fires that have escaped initial attack has also remained constant. However, these escaped fires have become larger and are more difficult to control with an average large fire size increasing from under 1000 acres per fire in the early 1900's to over 8000 acres in recent years, having burned over 250,000 acres since 1980.

Values at Risk

Values are defined in the Forest Plan EIS (Appendix E-80) as any or all natural resource improvements, or other values that may be jeopardized if a fire occurs. There is one At-Risk Community (ARC), the City of Custer, located within the Vestal project and three ARC located within six miles of the project boundary. To assess the level of wildfire risk for each community buffer zones were created at distances of one half, one, two, and three miles around each community. (Figure 3) Based on the Custer and Pennington County data , it was determined there were approximately 3,194 structures within the project area, and an additional 1,439 more within a three mile radius of the project area.

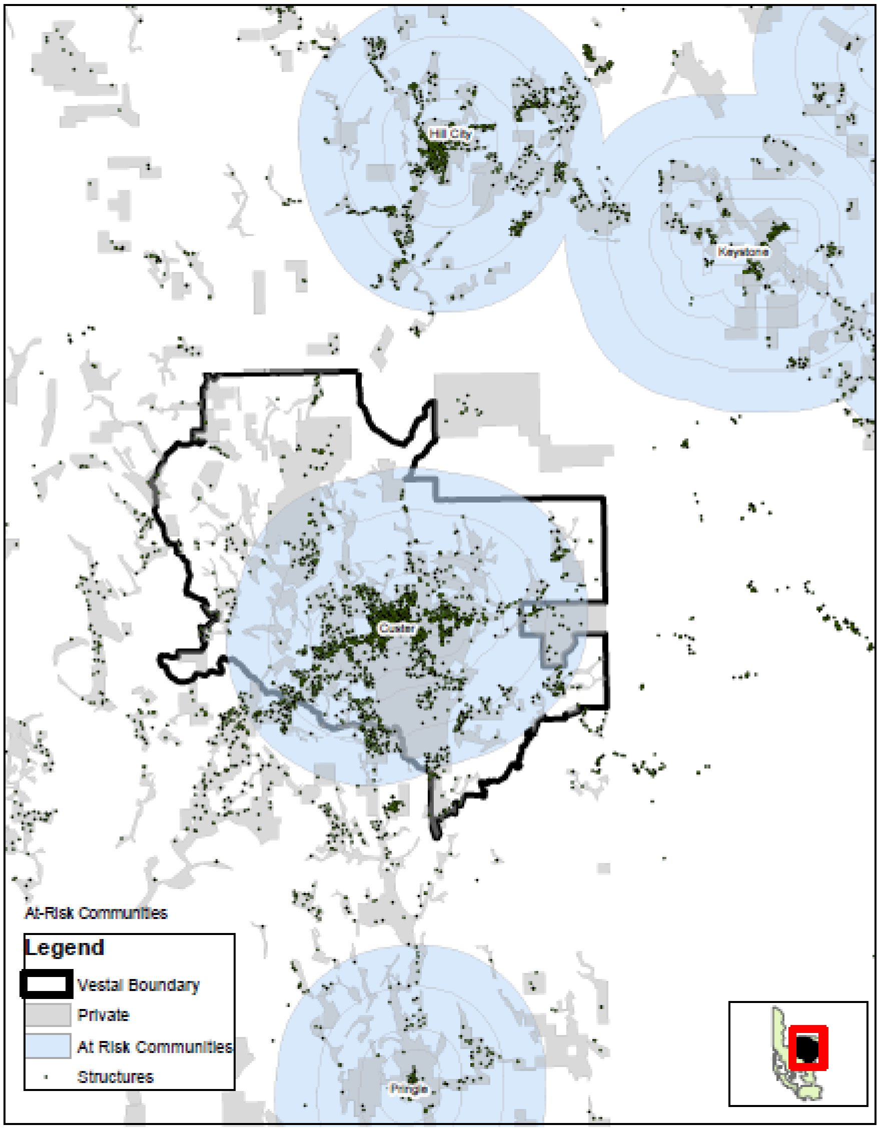

Figure 3. At-Risk Communities adjacent to and structures located within the project area.

Many of these structures are homes; others represent businesses, government buildings or other community services. Additional values at risk include commercial timber stands, power lines, range improvements, such as fences and spring developments, investments in timber stand improvement and reforestation, wildlife habitat, including snags, forage, riparian areas, security cover, and mid to late seral ponderosa pine stands, sensitive plants and animals, recreation sites, as well as water, air and visual quality.

Fire Hazard

Fire hazard is defined as a fuel complex that determines the ease of ignition and the resistance to control. Hazard is an expression of what kind of fire may potentially occur and how it affects human values. The fire hazard rating increases as the amount and continuity of surface and canopy fuels increases. As the amount of fuel on a given landscape increases and fuel profiles become more horizontally and vertically continuous, the intensity of a wildfire in that landscape is expected to increase. Areas with high fire hazard rating have the potential to exhibit more extreme fire behavior with more severe effects than those with a low hazard rating.

Fire Hazard Rating is best accomplished by reviewing known data regarding the arrangement of the vegetation, or structural stage. The structural stage gives an indication of the current fire hazard and is a stand level rating of crown fire susceptibility. Table 42 and Figure 4 provide a summary of current fire hazard rating in the project area. The entire project area is analyzed as WUI due to the amount of the project area encompassed by the three mile WUI radius identified within the Custer County CWPP as well as the extensive private property located outside that three mile designation.

Table 42*. Existing Fire Hazard

Approximate Total Acres*	Fire Hazard	Approximate Percentage of Project Area
1,777	Low	7
2,309	Moderate	9
11,125	High	43
10,437	Very High	41

*Total includes only vegetated acres. Rocks or water are not included.

A high to very high fire hazard rating currently exists in approximately 84% of the project area, based on existing structural stage. It is suspected that much of the non-Forest Service land also follows this trend of high to very high fire hazard rating, however to what extent is unknown.

The high to very high fire hazard rating is determined on the availability of fuels to sustain a fire. The high fire hazard that exists in the Vestal project area is a result of the disruption of the historic fire regime, creating a landscape dominated by large contiguous stands of dense ponderosa pine with a high loading of surface and ladder fuels. In addition, recent pockets of tree mortality caused by MPB will increase fuel concentrations on the ground resulting in an overall increase of fire hazard.

In an area such as Vestal, where high risk coincides with high hazard, the probability of fire with undesirable consequences is more likely. Such a fire could be very detrimental to many of the values existing in and around this project area.

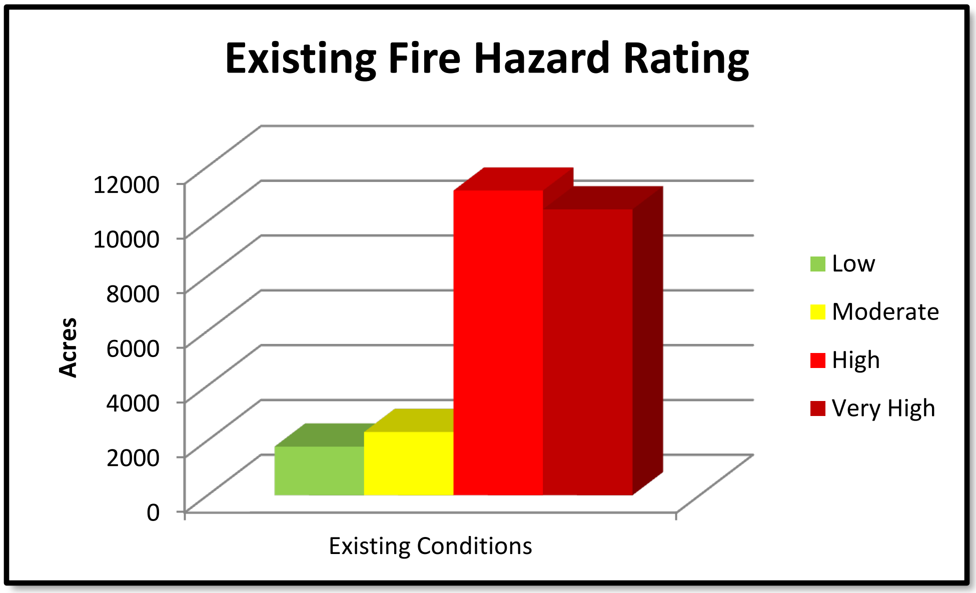

Figure 4: Existing Condition Fire Hazard Rating

Air Quality

Air quality within the Black Hills National Forest is addressed in the Final Environmental Impact Statement for the 1997 Revised Forest Plan. Overall, air quality within the Black Hills National Forest is very good. Air quality is better than national ambient air quality standards (NAAQS) for all pollutants.

There are two recognized Class 1 Airsheds in the Black Hills area, Wind Cave and Badlands National Parks. Wind Cave is located adjacent to the Black Hills National Forest to the southeast, and Badlands is located approximately 75 miles east of the Forest.

A solid working relationship exists between the Black Hills National Forest and the South Dakota Department of Environment and Natural Resources. There have been few if any problems identified and communicated to the Black Hills National Forest regarding negative impacts to air quality relating to prescribed fire activity on the Black Hills National Forest in the last 10 years. The only case of known impacts was a short term event that lasted less than two hours.

The Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS), in compliance with the Clean Air Act. EPA established primary standards to protect public health; and secondary standards to protect public welfare.

EPA established NAAQS primary and secondary standards for six principal pollutants. Of these "criteria" pollutants, one, particulate matter less than 2.5 microns in size ($PM_{2.5}$) is a primary component of smoke emissions from wildland fires including prescribed fires. The primary standard for $PM_{2.5}$ is 15.0 micrograms/cubic meter of air ($\mu g/m^3$). This means that the 3-year average of the weighted annual mean concentration measured at established monitoring stations must not exceed this level. EPA established the secondary standard as equal to the primary standard.

Data from four monitoring stations in the South Dakota portion of the Black Hills are reported for $PM_{2.5}$ on EPA's Airtrends website (http://www.epa.gov/airtrends/). One of these sites meets minimum trends completeness criteria. This site is located in Jackson County, near Badlands National Monument, some 90 miles east of the town of Custer. The other three sites record data but do not meet the minimum trends completeness criteria.

Between 2000 and 2009, monitoring stations in Custer, Jackson and Meade Counties in South Dakota showed $PM_{2.5}$ concentrations at or slightly above 5 $\mu g/m^3$, based on seasonally-weighted annual averages. Measurements in 2001 and 2003 at the Rapid City monitoring station showed levels of about 8 $\mu g/m^3$. No other measurements were recorded for that site, and no measurements after 2009 were recorded for any of the four sites. These measurements are well below the national average for $PM_{2.5}$ concentrations, and are also well below the primary and secondary standards for this criteria pollutant.

Air pollution in the form of PM_{10}, particulate matter smaller than 10 microns diameter, was at one time an issue in the Rapid City area. The 1996 Forest Plan EIS notes that the Rapid City area had been classified as an area not attaining the NAAQS for PM_{10} particulates. In September 2005, the State of South Dakota, Department of Environment and Natural Resources, petitioned the U.S. Environmental Protection Agency (EPA) requesting that the Rapid City area be re-designated from unclassifiable to attainment status for the PM_{10} standard. EPA published a proposed rule in the Federal Register on December 9, 2005, soliciting public comment on the proposal (70FR73183). On March 6, 2006, the EPA published a final rule approving the request from the State of South Dakota (71FR11162). The approval was based on the State's demonstration that the Rapid City area was in attainment of the PM_{10} national standard, and commitment to continuation of fugitive dust controls. The Rapid City area was officially re-designated from unclassified to attainment status for PM_{10} effective April 5, 2006.

The Vestal project area is in the vicinity of two Class 1 Airsheds; Badlands National Park and Wind Cave National Park and several communities at risk (Figure 6). The project area is designated as a Class II area allowing higher concentrations of pollutants than the Class I Airsheds. Smoke generated by wildfire is usually greater and cannot be mitigated; however, smoke generated under controlled conditions can be mitigated using the following means:

- Limit treatment area size
- Specify wind directions and speed
- Specify minimum mixing heights
- Stagger ignitions

These mitigation techniques in addition to other control methods for smoke management minimize the impacts of smoke to visibility and human health.

Environmental Consequences

Alternative 1

The no action alternative assumes that no change in management would occur within the project area. Management actions currently being practiced, including suppression would continue to be practiced. The only other changes that would occur on the landscape would be those that occur as a result of natural occurrences, wildfire suppression or those resulting from other project decisions.

Direct and Indirect Effects

The current mountain pine beetle outbreak is expected to run its course with much of the area expected to be heavily impacted by 2018. Changes to fire hazard within the project area are expected resulting in substantial areas of dead trees. Trees that die as a result of MPB infestation may break or fall within 1 to 3 years.

No improvement in condition class is expected to occur with this Alternative. The project area would continue to possess a high risk of losing key ecosystem components, resulting in increased fire size, intensity and severity. The MPB disturbance is not a fire disturbance therefore would not improve the existing fuel conditions. The arrangement of the fuels would change under post MPB conditions but no treatment of that vegetation would occur. This trend will continue until a fire disturbance.

The actions associated with this alternative are not substantial enough to significantly alter human activities or usage in the area therefore fire risk is not expected to change because the probability of an ignition occurring is not expected to change.

According to Langowski (2006), research has shown that post-epidemic stands had increased rates of surface fire spread, fireline intensity and total heat release. They also had increased chances for crown fire initiation but decreased chances for active crown fire spread. Chances for crown fire initiation were also greater due to larger amounts of dead aerial fuels in the overstory. Observations and theoretical consideration indicate that both fire severity and probability of crown fire may increase following outbreaks due to increased fuel loading and changed fuel characteristics.

Crown fire hazard in MPB affected stands can be best described as bi-modal. Crown fire hazard is higher than in non-MPB affected stands during the 2-3 years post-epidemic while most of the dead needles are retained on the killed trees and again following snag fall and stand-re-initiation when surface fire spread and intensity would be higher than in non-MPB affected stands due to increased surface fuel loads.

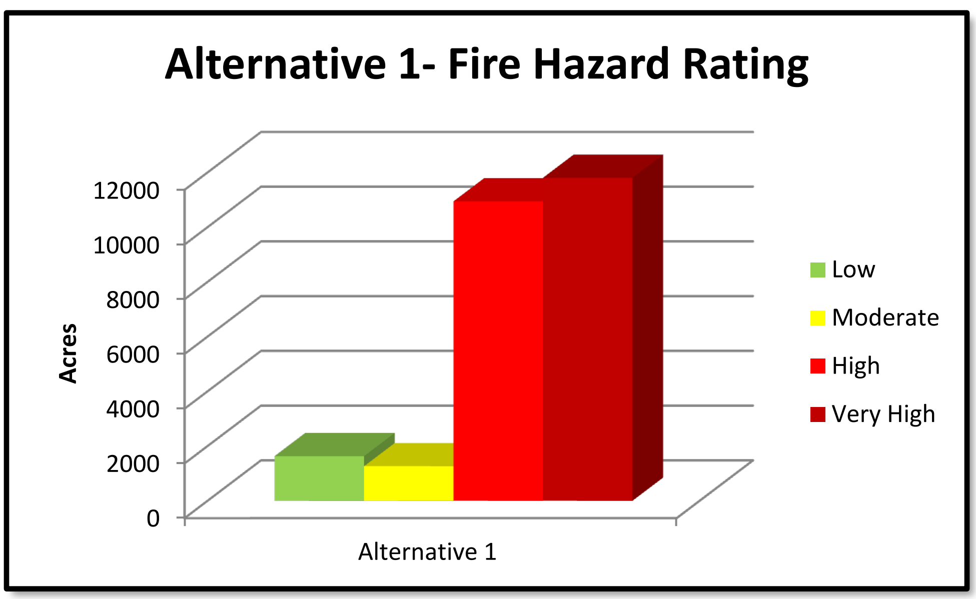

Figure 5. Alternative 1 Fire Hazard Rating (2018)

Table 43 Fire Hazard Rating for Existing Conditions and No Action at Year 2018

Fire Hazard Rating	Existing Conditions		Alternative 1	
	Acres	%	Acres	%
Low	1,777	7	1,632	6
Moderate	2,309	9	1,264	5
High	11,125	43	10,946	43
Very High	10,437	41	11,806	46

Qualitatively, in the absence of treatments or the use of prescribed fire, the fire hazard is expected to worsen across the project area. The only action that could improve the fire hazard, in this alternative, is a wildfire and the longevity and improvement of that wildfire would be directly associated to the fire intensity.

Fire behavior in both the moderate and high severity areas would result in an increase in resistance to control and a greater likelihood of wildfire escape leading to an increased risk of loss of natural forest resources as well as private property, and decreased firefighter and public safety. The high intensity would also cause consumption of the remaining duff layer and soil heating as well as other resource damage. Without treatment, the fire hazard would continue to move toward very high. The greatest potential for wildland fire growth and severity exists with this alternative.

Air Quality

Although air quality would not be directly impacted under the no action alternative, there would not be any control over the timing or amount of emissions released into adjacent airsheds in the event of a wildfire. A large wildfire has the potential to make a much greater impact on adjacent communities and Type 1 airsheds, possibly exceeding National Air Quality Standards. The EPA addresses smoke from wildland fire under their natural events policy at http://www.epa.gov/ttn/caaa/t1/memoranda/nepol.pdf. (Phase II Amendment USDA Forest Service, 2005)

Very few of the natural fuel breaks and past harvest units within the analysis area are large enough to moderate a rapidly spreading high intensity fire. (USDA, Forest Service 2008) Therefore, it is likely that a large scale stand replacement fire would eventually occur within the analysis area. Due to the projected high level of surface fuel loading (40-60 tons/acre) these fires could be quite severe resulting in undesirable effects. Under the no action alternative, the Vestal Project would not contribute to the need to protect local communities and watersheds from large-scale, high intensity wildfire.

Alternative 2

Alternative 2 focuses on the management of vegetation to maintain and improve forest health and reduce the risk of large-scale, high intensity wildfire.

Direct and Indirect Effects

Alternative 2 would decrease the potential for large scale, high intensity fires, allowing for characteristic low to mixed severity fires to occur. This Alternative also would have a significant effect on fire behavior. The chances for successful initial attack under this alternative are much greater than No Action and the risk to residential areas, the general public, and firefighters is also greatly reduced. In addition, an improvement of FRCC can be expected as conditions move towards a more natural condition.

The actions associated with this alternative are not substantial enough to significantly alter human activities or usage in the area therefore fire risk is not expected to change because the probability of an ignition occurring is not expected to change.

Fire hazard would be greatly reduced in this Alternative (see Figure 6 and Table 44). The mechanical treatments and prescribed burning would decrease ladder fuels, reduce the surface fuel loading, and break up the continuity of the fuels. Prescribed burning would also enhance the mosaic of burned and unburned fuels which resulted from past wildfires. The result of these treatments would be a decrease in flamelength, intensity, duration, spotting, probability of ignition, and crownfire potential. This would create more strategic and tactical firefighting opportunities resulting in greater success during initial attack due to the fact that fireline construction rates would be enhanced, line placement opportunities would increase, and resistance to control would decrease. The reduction in fire behavior would create a safer environment for firefighters as well as the public. The break up in fuel continuity would also lead to more opportunities for locating safety zones. The risk of mountain pine beetle outbreaks and the resulting accumulation to surface fuels would also be reduced by thinning. For a comparison by alternative please refer to Figure 7, on the next page.

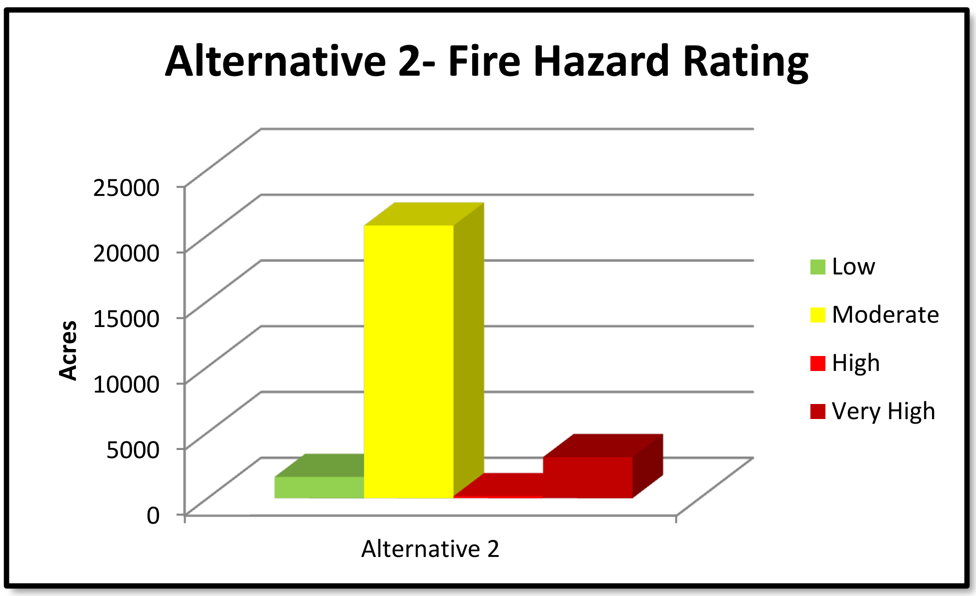

Figure 6. Alternative 2 Fire Hazard Rating

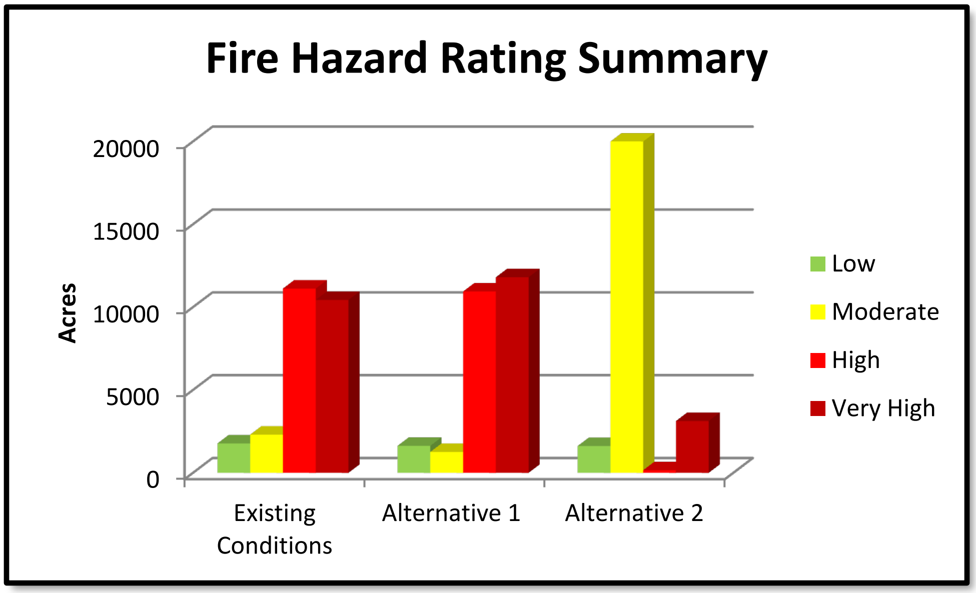

Figure 7 Fire Hazard Rating by Alternative

Table 45. Fire Hazard Rating by Alternative

Fire Hazard Rating	Existing Conditions		Alternative 1		Alternative 2	
	Acres	%	Acres	%	Acres	%
Low	1,777	7	1,632	6	1,622	6
Moderate	2,309	9	1,264	5	20,737	82
High	11,125	43	10,946	43	160	1
Very High	10,437	41	11,806	46	3,129	12

This alternative would contribute to meeting Forest Plan Goal 10 of establishing and maintaining a mosaic of vegetative conditions to reduce occurrences of large-scale, high intensity fire, insect, and disease events, and facilitate insect and disease management and firefighting capabilities. A substantial improvement in fire hazard would occur (see Figure 7 and Table 45). This change contributes to meeting Forest Plan Objective 10-01 to manage for 50% - 70% Moderate to low fire hazard in the wildland urban interface. In addition, Objective 10-04 would be met by treating fuels commensurate with risks, hazard, and land and resource values as identified earlier and supported in the Custer County CWPP.

Air Quality

During prescribed burn activities, the main pollutants that would be emitted include: $PM_{2.5}$, PM_{10}, carbon monoxide and volatile organic compounds. PM_{10} emissions may also be present resulting from logging operations, log hauling and road construction/reconstruction or rehabilitation activities.

Smoke generated from prescribed fires may affect visibility and air quality, and may be noticed by nearby residents, recreational users, adjacent communities and perhaps in sensitive areas such as the Class 1 Airsheds in Wind Cave or Badlands National Parks depending on transport wind direction and mixing heights. Of the six criteria air pollutants identified by the EPA, particulate matter with diameters less than 2.5 microns

($PM_{2.5}$) is the pollutant of greatest concern from prescribed fire activities. Most of the mass of wildfire smoke (80-90%) falls into the $PM_{2.5}$ classification. A 1997 amendment to the Clean Air Act established a national goal of prevention of any future and remedying of any existing impairment of visibility in mandatory Class 1 federal areas where impairments result from human caused pollution.

Prescribed fire operations would result in short-term emissions to the atmosphere. Dust may also be generated through timber harvest activities including log hauling and road construction or reconstruction, adding fine particulate emissions locally. Due to the generally lower intensity of prescribed fire activities, fuel consumption is expected to be lower and overall emissions would be lower than those expected from a high intensity wildfire.

Any prescribed burning is subject to prescriptive elements as defined in an approved Prescribed Fire Plan. These prescriptive elements may include mixing height, transport windspeed and direction as well as the adjective smoke dispersal forecast. Monitoring of potential smoke impacts occurs at different levels during a prescribed burn and may include on-site air monitoring stations, ocular estimation of visual smoke impacts or referencing of air monitoring sites at Wind Cave or Badlands National Parks or the monitoring site in Rapid City, SD. Secondly, the prescribed burn planning process itself incorporates the Interagency Prescribed Fire Planning and Implementation Procedures Guide (July 2008) and undergoes technical review prior to Line Officer review and approval. Potential short-term effects will be minimized by project design criteria and by following applicable smoke permit conditions identified in the appropriate State Implementation plans. Public notification procedures prior to initiating a prescribed fire project will be specified in the approved burn plan.

Pile and broadcast burning would release carbon dioxide and other compounds into the atmosphere. Carbon dioxide release may contribute to climate change. However, the potential impact at the project level scale would be negligible.

Cumulative Effects

The cumulative effects in the Vestal project were analyzed using those activities occurring within the project boundary. Those effects were analyzed from 2007 thru 2018, which captures those treatments which have improved fire hazard in the past and allows for mountain pine beetle (MPB) activity, mechanical and prescribed fire activities to be complete. The cumulative effects would occur on all types of ownerships that fall within the designated area.

In the Vestal project area, past, present and reasonably foreseeable future actions as well as the spread of the MPB contribute to changes in fuel conditions. Past management activities may have created situations that could have increased as well as decreased the risk of large scale, high intensity wildfires. For example, wildfire suppression leads to a buildup in down woody material, increased stocking, and increased ladder fuels, which all increase fire hazard. These activities have also contributed to an increase in wildland fire behavior, tree densities, the presence of ladder fuels, and dense crown closures, again all contributing to higher fire hazard. In addition, these dense stands have also contributed to the growth of MPB. If fires had been allowed to burn instead of pursuing an aggressive fire suppression program over the last 75-100 years, a significant increase in the amount of acreage in stands would have burned at a more frequent interval and a lower intensity. However, today's conditions favor wildfires of increased fire intensity at longer fire return intervals.

Management activities which have reduced fire hazard in the project area include the Quincy Bug and Atlantic Bug sales. Reductions in fire hazard occurred on all of the sites treated in these activities.

Vegetation treatments identified on non-Forest Service lands within the cumulative effects area would enhance the cumulative value of both FRCC and fire hazard. In areas not being treated, the potential for sustained crown-fires, as well as fireline intensity would increase. With this type of fire behavior, forest suppression objectives would not be met.

Fire occurring several miles outside of the project area may affect Vestal project area under the right conditions. On the Black Hills National Forest, fires in adjacent areas have previously had the ability to make large runs of up to 12 miles. Although this event is rare and requires extreme conditions, a large scale high intensity fire is more probable if no treatment is implemented. A fire start in Vestal (under the right conditions) would not only threaten or damage/destroy improvements within the City of Custer, but also has the potential to burn into or affect surrounding communities such as Keystone, Hill City, and Hayward within one burning period (12 hours). A large scale, intensity wildfire brings with it numerous risks and effects. Homes in the path of a wildfire are perhaps the most immediately recognized value at risk, however, severe wildfires put the numerous other important values at risk including: critical infrastructure, critical fish and wildlife habitat, firefighter and public health and safety, soil productivity, clean air, and functional fire-adapted ecosystems (Graham et al., 2004). Some of these values are also threatened by the secondary effects of wildfire, such as landslides, soil erosion, and the spread of exotic species (Graham et al., 2004).

The proposed action alternative is expected to have positive long term cumulative effects. The proposed treatment combined with foreseeable future projects, including anticipated fuel reductions on non-Forest Service lands, would decrease the potential for large-scale, high intensity wildfire as well as decrease fuel loading moving the project area to a more desirable condition. The proposed treatments would reduce stand density and canopy closure bringing the forest back to a more historical type condition. These projects combined with the treatments proposed in Vestal would decrease the hazardous fuels much more efficiently for longer periods of time.

Air Quality

The smoke and other emissions that may be generated by activities planned under the selected alternative may contribute to local and regional pollutant loading. The cumulative effect of prescribed fire activities or other planned land management activities would be short-lived and once smoke and/or dust has dissipated, the impact is over and will have no further overlap in time or space with other pollutants that are generated by non-Forest Service activities. As a result, planned land management activities (including prescribed fire) are not expected to have long term or significant impacts to National Ambient Air Quality Standards throughout all alternatives and should not contribute to significant future impairments of visibility in Class 1 Airsheds.

Approved prescribed burn plans use design criteria approved in NEPA project decisions. These design criteria have proven effective over the last ten years in maintaining smoke emissions at acceptable levels, as demonstrated by State monitoring which has shown only one temporary violation of $PM_{2.5}$ standards at the monitoring site in Rapid City that may have resulted from prescribed fire activity on the Black Hills National Forest. The Forest Service believes these design criteria have been shown to be effective and the same criteria can be expected to be effective under the selected alternative for this project.

Botany, Rangeland, and Noxious Weeds

Affected Environment

Botany

A comprehensive botanical survey was completed in 2006 exclusively for the Vestal project area to collect information related to plant communities, identify rare plant species habitat, and locate rare species. The term “rare” will be used to describe species uncommon in the Black Hills, the State of South Dakota, or the Rocky Mountain Region. These species include plant species listed on the Regional Forester’s sensitive list (see Vestal Botany Biological Assessment and Evaluation), Black Hills National Forest Species of Local Concern (SOLC), species having insufficient information to make listing determinations, as well as species tracked by the South Dakota Natural Heritage Program. Subsequent surveys were completed in 2010 and 2011 as a result of long-term rangeland monitoring for the livestock grazing program and general plant surveys of the area. Surveys will be ongoing in the project area.

Rare plant species habitats include; riparian areas, moist spruce forests, hardwood forests, granite outcrops, grasslands and meadows, open areas. The project area includes all of these types of habitats.

South Dakota State Listed Plant Species and Species of Insufficient Information: Forest Service Manual 2670.32 directs us to “Assist states in achieving their goals for conservation of endemic species”. These species are tracked by the South Dakota Natural Heritage Program and have been identified as rare or lack sufficient information in the State of South Dakota. The following tracked species are known to occur in the project area as a result of plant surveys.

Table 46. Known State Listed and Species of Insufficient Information

Scientific Name	Common Name	Target Type
Adoxa moschatellina	musk-root	State-Listed
Botrychium michiganense	Michigan moonwort	BKF Tracked
Botrychium pallidum	pale moonwort	State-Listed
Botrychium simplex	least grapefern	State-Listed
Carex canescens	silvery sedge	State-Listed
Carex intumescens	swollen sedge	State-Listed
Hierochloe odorata	sweetgrass	BKF Tracked
Muhlenbergia glomerata	bristly muhly	State-Listed
Scirpus cyperinus	woolgrass	BKF Tracked

Scientific Name	Common Name	Target Type
Symphyotrichum boreale	northern bog aster	BKF Tracked

Species of Local Concern (SOLC)

There are no known occurrences of SOLC within the project area; however, suitable habitat is present in the project area for 4 species. Suitable habitat for species not known to occur within the project area was based upon general habitat characteristics, proximity to known populations, and professional judgment. The project area contains a significant amount of habitat that was altered during post-settlement times (e.g. mining, hay fields, homesteads, etc.). Species of Local Concern plants which may have habitat in the project area include:

- leathery grapefern (*Botrychium multifidum)*
- southwestern showy sedge (*Carex bella*)
- alpine mountainsorrel (*Oxyria digyna)*
- arrowleaf sweet coltsfoot (*Petasites frigidus var. sagittatus)*

Region 2 (R2) Sensitive Species

A pre-field review was conducted of available information to assemble occurrence records, describe habitat needs and ecological requirements, and determine whether field reconnaissance is needed to complete the analysis. Sources of information included botanical surveys, Forest Service records and files, local professional judgment, and published research. *Viola selkirkii* is the only known Region 2 Sensitive Plant Species that occurs within the project area. Suitable habitat is however present in the area for two other species. Suitable habitat for species not known to occur within the project area was based upon general habitat characteristics, proximity to known populations, and professional judgment.

R2 Sensitive Species known to occur in the project area:

- great-spurred violet (*Viola selkirkii)*

R2 Sensitive Species with habitat in the project area:

- yellow lady's slipper (*Cypripedium parviflorum)*
- large round-leaf orchid *(Platanthera orbiculata)*

Range

There are currently a total of 13 grazing permits, (2 private land permits, and 11 term permits) within the analysis area. Cattle are present in the following allotments from June 1st – October 10th. There are numerous structural range improvements on federal land within the analysis area, including allotment boundary fences, unit division fences and water developments.

Ponderosa pine encroachment in grassland/meadow areas is problematic in the area. As well, numerous areas that had been probable open pine savanna sites now have mostly closed canopies leading to reduced forage production.

Noxious Weeds

There are approximately 1,000 acres of identified noxious weed infestation in the project area. Nearly half of this acreage includes Canada thistle, although sixteen different weeds species have been identified.

Previous noxious weed treatments in the Vestal project area includes 111 acres adjacent landowners program funded by Custer County RAC, approximately 45 acres of treatment of known leafy spurge, dalmatian toadflax, spotted knapweed, and yellow toadflax locations. Releases of biological controls to target Canada thistle, common mullein and leafy spurge have occurred within and adjacent to the project's boundary. The majority of the perimeter of the Vestal project has been treated in the past 5 years in association with previous timber sales.

Environmental Consequences

Alternative 1

There would be no direct effects to any known or unknown rare plants, noxious weeds or range resource since no activities would occur.

Botany

Hardwood stands provide suitable habitat for; southwestern showy sedge, arrowleaf sweet coltsfoot, sweetgrass, least grapefern, musk-root, pale moonwort, bristly muhly, and Michigan moonwort. Hardwood stands are expected to temporarily benefit from the projected mountain pine beetle-caused mortality as competition for sunlight and nutrients is reduced. However, continued encroachment of the smaller diameter ponderosa pine within the hardwood stands would occur. These trees would mature and eventually shade out the hardwoods. In addition, increased fire hazard poses a risk for a high intensity fire with the potential of being stand-replacing in the hardwood communities, which may have a detrimental impact on rare plants and their preferred habitat.

White spruce stands typically contain suitable habitat for: southwestern showy sedge, alpine mountainsorrel, arrowleaf sweet coltsfoot, leathery grapefern, least grapefern, pale moonwort, musk-root, pale moonwort, bristly muhly, and Michigan moonwort.

The potential for high intensity fire will increase with mountain pine beetle-caused mortality in the surrounding ponderosa pine. These high intensity fires have the potential of being stand-replacing in the white spruce communities, which may have a detrimental impact on plants and their preferred habitat.

Riparian areas, grasslands and meadows provide habitat for; alpine mountainsorrel, arrowleaf sweet coltsfoot, leathery grapefern, least grapefern, pale moonwort, musk-root, pale moonwort, bristly muhly, silvery sedge, swollen sedge, sweetgrass, bristly muhly, woolgrass, northern bog aster, and Michigan moonwort. With the projected mountain pine beetle caused-mortality, these areas are expected to temporarily benefit with the removal of the overstory. However, the loss of shade-providing large trees may alter the micro-climate of some areas and result in loss of plant habitat. The increased potential for large-scale fire in the area presents a risk to riparian habitats, as well as grasslands and meadows. Under such conditions, the moist forested sites and riparian areas that do not generally burn could ignite and burn at unusually high temperatures. This could result in a loss or degradation of plant habitat. This type of fire oftentimes has effects such as deep soil heating and intensities that could also negatively affect suitable habitat.

Another effect of this alternative could be the eventual decrease of graminoid dominated communities in the area as forested stands become denser and ponderosa pine continues to encroach upon meadow areas. Pine encroachment into these habitats would continue and may result in a loss of habitat for these species.

The effects to Region 2 Sensitive Species are discussed in detail in the Vestal Biological Assessment/Biological Evaluation. In summary, all alternatives have a determination of "**May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend for federal listing.**" for the three species which occur or may occur in the Vestal project area.

Range

This alternative would eventually; 1) decrease grassland communities/ forage production, 2) limit grazing access, and 3) increase livestock management costs. As forested ponderosa pine stands become denser and continue to encroach upon grassland and meadow areas, the amount of available sunlight that will reach the forest floor will decrease, thus decreasing grassland communities and the amount of available forage. In addition, as these stands become denser and dead mountain pine beetle infested trees fall to the forest floor, access through these stands will decrease, which will also decrease the amount of available forage. Decreasing the amount of available forage for livestock and wildlife, may result in an increased level of use in those areas that remain accessible. In addition, an increase in the amount of dead and down trees on fences will result in increased fence maintenance costs, increased herding/gathering costs and disrupt the planned grazing schedule which could negatively impact the forage resource. With all of the above, this will make it more difficult to meet the Forest Plan Guideline 2505 with the current grazing permits.

Noxious Weeds

Noxious weed populations would be limited to current infestations unless disturbance occurs from natural events, or large-scale fire.

Noxious weed infestations are known to increase with large fire events. The lack of treatment of hazardous fuels would lead to the potential increase of a large-scale high intensity wildfire, thus increasing the potential for a large-scale outbreak of noxious weeds. Mature stands of timber are common in the project area and comprise large contiguous areas of forest that are similar in structure. This provides the potential for wildfire and beetle infestation, both of which could play a role in the spread of noxious weeds. An increase in dead and down trees resulting from beetle kill could increase the potential for wildfires to spread and burn with increased intensity. This would lead to large areas of bare ground on which weeds could become established and compete with more desirable species. As trees mature and canopy cover and needle cast increases, existing grass/forb communities may decrease in health and vigor as light needed for photosynthesis is reduced. This hampers the ability of these communities to recover from intense fires. When the canopy cover is opened up due to wildfire or beetle kill, grass/forb communities may not be able to out compete noxious weeds in areas where infestations already exist. As a result, these infestations are likely to increase.

Alternative 2

Botany

Rare plant species with suitable habitat occur in similar habitats throughout the project area. These habitats are generally areas that receive additional moisture (riparian areas, drip lines around rock outcrops, etc.), aspen and/or paper birch stands, or have suitable habitat in cool air spruce drainages. The exception to this would be some *Botrychium* species that often have a variety of preferred habitat (open meadows, old roadbeds/trails, skid trails, etc.) that typically have had some level of disturbance. All species will be analyzed by habitat type in the effects analysis below.

Impacts to the rare plant species may be direct impacts (i.e. trampling, mechanical damage, etc.), or the impacts may be more indirect such as a change in the microclimate from treatments, which may result in a loss of habitat. It is unlikely there would be direct effects from mechanical treatments to habitat located in granite outcrops (inaccessible by equipment and will unlikely burn), spruce forests (protected by design criteria), or riparian areas (protected by design criteria and unlikely to burn intensively).

Hardwood (aspen, paper birch) stands are expected to benefit from the proposed treatments in this alternative. There are 557 acres of proposed hardwood treatments (Hardwood Conversion, Hardwood Release) and likely many acres of hardwood inclusions within ponderosa pine stands. Treatment of hardwood stands would remove and/or kill conifer species that have degraded these stands. This would have a long-term positive impact on this habitat type. However, short-term negative effects are expected from the proposed treatments. Theses impacts include a possible temporary loss of habitat from the disturbances associated with the treatments. Negative impacts may include increased noxious weed infestations, soil disturbance, trampling of known and/or unknown plants, or any other changes in the microclimate.

If hardwood stands are treated with prescribe fire this will likely have positive impacts by increasing vegetation diversity, recycling nutrients, and reducing the likelihood of a high-intensity wildfire. With prescribed fire treatments, the risk of damage to rare plants is typically minimal as hardwood stands, burned under prescription, generally do not burn intensively. Most rare plants are normally dormant during times of prescribed fire implementation. Rare plant species that have suitable habitat in hardwood stands include, but are not limited to: southwestern showy sedge, arrowleaf sweet coltsfoot, sweetgrass, least grapefern, musk-root, pale moonwort, bristly muhly, and Michigan moonwort.

White spruce would have effects to this habitat type from the proposed activities. This alternative proposes to reduce the likelihood and the intensity of a large-scale fire that would negatively impact this habitat. Rare plant species that have suitable habitat in spruce stands include, but are not limited to: southwestern showy sedge, alpine mountainsorrel, arrowleaf sweet coltsfoot, leathery grapefern, least grapefern, pale moonwort, musk-root, pale moonwort, bristly muhly, and Michigan moonwort.

Riparian areas, grasslands and meadows would benefit more than in Alternative 1. This alternative would remove all conifers from existing meadows and grasslands. With the projected mountain pine beetle caused-mortality and the proposed treatments, these areas are expected to benefit with the removal of the ponderosa pine that is encroaching into this habitat. Conifer encroachment into these areas alters the habitat and long-term reduces the quality for rare plant species that are dependent upon this type of habitat.

However, the loss of shade-providing large trees may alter the micro-climate of some areas and result in loss of plant habitat. Riparian areas would receive protection with application of the watershed design criteria “All applicable Best Management Practices (BMPs) and R2 Watershed Conservation Practices (WCPs) will be implemented” Overall riparian vegetation is expected to benefit from the removal of ponderosa pine on adjacent sites as more moisture becomes available in treated areas. Most potential for direct effects from the implementation of this alternative in riparian areas would come from prescribed fire. Rare species that have suitable habitat in riparian, meadow and grasslands include, but are not limited to: alpine mountainsorrel, arrowleaf sweet coltsfoot, leathery grapefern, least grapefern, pale moonwort, musk-root, pale moonwort, bristly muhly, silvery sedge, swollen sedge, sweetgrass, bristly muhly, woolgrass, northern bog aster, and Michigan moonwort.

Although specific data is lacking on the Black Hills National Forest, the earlier successional conditions that occur with opening the overstory canopy could produce conditions that would be beneficial to site colonization by wind-dispersed, spore-producing *Botrychium* species if the associated mycorrhizal species and other microsite conditions are present (Farrar 2004).

Prescribed burning within the project area would help prevent a high intensity wildfire that may occur due to the large amount of mountain pine beetle-caused mortality. While effects of prescribed burning are not well known for most rare plants (USDA Forest Service 2005) it is presumed that a large-scale wildfire would be more detrimental to individuals and their habitat than would fire burned under specific prescription. There is always a possibility of noxious weed infestation when an area burns, but again, effects are considered to be lessened when an area is burned under prescription rather than wildfire. There are design criteria in place that would require the involvement of the district botanist when developing burn plans so that the habitat requirements of rare plants in the area would be considered.

Indirect effects from any of the proposed treatments would be the increased potential for noxious weed infestations in disturbed areas. This can be detrimental to rare plant species, as noxious weeds and invasive species have the ability to out-compete desired native and rare plant species. The herbicides used in noxious weed control can also be detrimental to rare species if the individuals are inadvertently exposed to the herbicides. While unknown individuals may exist on these sites and may be damaged during operations, the overall effect should be neutral to beneficial.

The effects to Region 2 Sensitive Species are discussed in detail in the Vestal Biological Assessment/Biological Evaluation. In summary, all alternatives have a determination of “**May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend for federal listing.”** for the three species which occur or may occur in the Vestal project area.

Range

Ponderosa pine encroachment in grassland/meadow areas is problematic in the area. As well, numerous areas that had been probable open pine savanna sites now have mostly closed canopies leading to reduced forage production. This alternative would increase the overall amount of forage available by decreasing ponderosa pine density in the grasslands/meadows, uplands, and aspen stands. Decreasing pine density may also open areas up that were previously inaccessible to livestock. The treatments may allow for more even distribution of livestock throughout the pastures and reduce utilization in more critical areas such as meadows and grasslands. Design criteria are in place to protect rangeland improvements. However, conflict with permitted uses may occur if water system components are damaged, fences are left down or gates are left open.

Noxious Weeds

Noxious weed infestations are expected to increase under this alternative. Commercial and non-commercial timber harvest activities and prescribed fire often provide mechanisms for the introduction, establishment, and spread of noxious weeds. Anywhere there has been some form of soil disturbance, the potential for the establishment of noxious weeds exists. The potential for noxious weed establishment is even greater in disturbed areas adjacent to existing weed populations. The movement of equipment in and out of these areas also facilitates weed establishment. Roads and skid trails create a network of corridors through which seed dispersal can occur.

Cumulative Effects

The cumulative impact area for this analysis is the identified project area. Activities beyond the project area have a diminished effect on rangeland and botany resources as well as the noxious weeds within the project area. Impacts and effects to vegetation resources are similar to botany, rangelands, and noxious weeds. Therefore, any cumulative effects are alike for all three resources and will be jointly analyzed. The timing limit for the cumulative effects analysis is estimated at 20 years, ten years prior to present and ten years in to the future, which allows for an adequate length of time to record vegetative changes.

Past, present and reasonably foreseeable activities within the Vestal project area include timber harvest, timber thinning, limited mining, wildfire, prescribed burning, grazing, road construction and maintenance, noxious weed control, wildlife habitat improvement projects, and dispersed recreational use on both the public land and private land in the area. A list documenting known past and planned future activities for this area is included in the project record.

Any past, present or foreseeable future activity that causes soil disturbance has the potential to introduce and increase the rate of spread of noxious weeds and other exotic plants. This can be detrimental to rangeland resources and rare plant species, as invasive species have the ability to out-compete desired native plants. The herbicides used in noxious weed control can also be detrimental to rare plant species if the individuals are inadvertently exposed to the herbicides and have low tolerance levels to the specific herbicide.

The grazing in the Vestal project area would continue as identified in the Allotment Management Plans for the grazing allotments within the project area. Under the action alternative, creation of transitory range would have a positive cumulative effect on those allotments by reducing the time livestock spend in riparian areas. Broadcast burning proposed under the action alternative would work against the cumulative effect of fire suppression by killing small trees and setting back succession, though it is expected to have limited effects on overstory canopy. All of the effects to rangeland resources presented here would be limited in intensity and duration. Any negative impacts would be minimal and are directly related to livestock management in the short term as they are impacted by treatment activities.

All of the above uses are limited in intensity and duration and therefore when combined with the alternatives analyzed, including the no action alternative, do not result in adverse cumulative impacts to the rare plant species or their habitat, the range resource or noxious weeds.

Minerals and Geologic Resources

Affected Environment

The potential for development of mineral commodities within the project area is moderate to high. Specifically, potential exists for development of salable mica and feldspar resources from numerous schist units and pegmatites, and for locatable gold in placer deposits. Carbonates are not widespread in the project area; consequently, cave or karst resources have not been identified. Invertebrate and vertebrate fossils are unlikely to be present within project area.

Environmental Consequences

Direct, Indirect, and Cumulative Effects for All Alternatives

Existing transportation conditions within the project area are adequate to facilitate activities related to exploration and development for either salable or locatable minerals.

The Vestal project would not cause direct, indirect or cumulative effects to mineral resources under any alternative.

Lands and Special Uses

Affected Environment

There are 17,693 acres (41%) of private land within the Vestal project area. The private in-holdings are located within the city limits of Custer City, a significant amount of large residential subdivisions outside of the city limits, as well as larger parcels of raw, un-subdivided private land. Access to private land is provided through system and/or non-system, U-unauthorized forest roads and private "drives". The road system is more than adequate for providing access to private land. In some locations there are an excess of roads that pose management concerns as it relates to the implementation of travel management policies. The excess of roads are contributing to unauthorized access or special uses of National Forest System (NFS) land that are not authorized under permit. There are numerous utility corridors within the project area both overhead and buried providing customers with electrical, telephone and fiber optic services.

There are 9 special use permits, 47 issued easements, and 16 acquired right-of-ways (ROW) within the Vestal project area.

Special Use Permits: The special use authorizations within the project area would need to be protected. Broken Arrow Campground operates a seasonally open campground and is the holder of a Horse Trail Special Use Permit. The permitted area includes the use of system, non-system and developed trails on National Forest System land. Additionally, there are buried or overhead utility lines and corridors, buried water or sewage transmission lines or permitted signs on NFS land.

Easements: The amount of private in-holdings within the Vestal Project area has required the need for access on both system and non-system roads. Many residents who use NFS roads to access private land would be impacted by vegetation management activities including, but not limited to, an increase in the use of the road by timber harvesting equipment, log trucks and other administrative traffic. Roads that are under easement or special use authorization would need to be maintained to standard to mitigate the increased use and traffic.

Private Parcel Access/Right-Of-Way (ROW) Acquisitions: The acquired ROWs vary in length from 0.1 to 0.9 miles. Several rights-of-way needs have been identified for the Vestal Project, but are not critical for implementation to occur. Acquiring these right-of-ways would be pursued as funding and time allows.

Environmental Consequences

Alternative 1

This alternative would not have short-term effects on the lands resource, but there is potential for long-term effects. Due to the increase in mountain pine beetle (MPB) infested trees on both public and private land, tree mortality within this planning area is imminent. Untreated NFS lands have an increased threat of wildfires due to higher stocking densities. This could pose a risk of fire spread to private property. The No Action Alternative would also eliminate the ability to reduce potential MPB spread onto private land and subsequent tree mortality by not thinning dense timber stands on NFS lands. Overhead utility lines may have an increased risk of damage due to widespread tree mortality. Any land use proposals would continue to be considered through the Lands and Special Uses programs. Uses such as Small Tracts Act applications, special use permit applications, other utility requests, easement applications and opportunities to acquire right-of-ways would continue within the project area.

Alternative 2

This alternative may have long-term effects on the lands resource. The significant amount of special uses and right-of-ways within the project area may conflict with access to private land, but can be mitigated for the action alternative, provided roads are kept open for access to the public. Short-term effects of proposed activities would include dust and noise from increased traffic during harvest operations. Increased log hauling traffic could impact roads that the public utilizes to access their private property. Smoke from prescribed burning and slash pile disposal operations may impact some adjacent landowners. Reduction in stand density could reduce fire intensities, should a fire start on forest and endanger private property. Social impacts include private landowners' receptivity to more aggressive silvicultural prescriptions, deadfall mechanical fuel treatments and their relationship to land values. No critical needs have been identified for acquiring right-of-ways for implementation of the action alternative.

Cumulative Effects

The Vestal project area boundary, land exchanges within the last 15 years and special uses within the last 20 years were used to evaluate cumulative effects. Activities proposed under the action alternative would have little effect on both the current lands and special uses and on any foreseeable future lands and/or special uses proposals.

Heritage Resources

Affected Environment

Prehistoric Context

The Black Hills are part of the greater culture area of the Northwestern Plains with human occupation of dating to 11,000 B.P. (Frison 1991:7,13). Over this vast period of human occupation, the ecology, subsistence patterns, technology, and the cultures of Black Hills inhabitants have witnessed notable changes (Frison 1991:24). These changes are grouped into phases of occupation, which are held in the archaeological record. The Black Hills National Forest Cultural Resources Overview identifies cultural sites that represent all of these prehistoric phases of occupation in the Black Hills (Rom, et.al. eds 1996). Identifiable tribal groups living within the Black Hills area during the Protohistoric period include the Kiowa, Crow, Arapaho, Cheyenne, and Sioux.

Many Native Americans consider the entire Black Hills sacred land. Their belief system links specific locations in and around the Black Hills to star constellations (Rom, et.al. eds. 1996). These spiritually significant locations include but are not limited to: Devil's Tower, Old Baldy Mountain, Hot Springs, Buffalo Gap, Reynolds Prairie, the Spearfish Formation "race track" that surrounds the Black Hills, and Harney Peak (Goodman 1992). Ceremonies are performed at these sacred locations during specific periods on the celestial calendar or weather events (Goodman 1992: 12).

Historic Context

Although influenced by Euro-American culture through the introduction of horses, guns, and disease as early as the 17th century, sporadic use of the Black Hills by Euro-Americans largely began in the early 1800's and consisted mainly of fur trappers and traders (Sundstrom 1989). The western half of South Dakota, including the Black Hills, portions of southern North Dakota, and nearly the entire area of the Powder River Basin in Wyoming and Montana was recognized as unceded Indian Territory by the 1868 treaty between the United States and the Sioux and Arapaho. More intense Euro-American occupation in the Black Hills began shortly after gold was discovered in the Black Hills in 1874. It was this discovery that brought a full scale influx of Euro-American prospectors and miners to the Black Hills.

Historic settlement in the Black Hills by Euro-Americans is generally auxiliary to this history of the mining industry. Homestead patents are common from the late 1800's through the 1920's. Industries such as the ranching and logging industry became common in the early 1900's. However, much of the land was not patented and remains public land. During the Depression/New Deal Period (1920-1941), public works projects became common across the Black Hills landscape. The Civilian Conservation Corp (CCC) and the Works Progress Administration (WPA) organized groups of men in camps to construct fire lookouts, roads, trails, dams, and wells throughout the area.

Field Surveys and Eligible Sites

Sections of the Level III cultural resource inventory were first contracted to Niwot Archaeological Consultants in 2008. *A Level III Heritage Resource Inventory:Vestal Analysis Area, Calamity Unit* by Brad Noisat (BKF # R2008020300101) resulted in the survey of 6,332 acres. The contract inventory consisted of new survey and the evaluation of newly discovered sites. No monitoring or evaluation of existing cultural resources was performed under the contract.

The Forest Service conducted an in-house cultural resource survey of the remaining 5,788 acres distributed across the 26,223 acre Heritage Area of Potential Effect (APE). The Heritage APE is considered here as all National Forest System Lands within the Vestal Spring analysis area, and expanded to include some portions of Pennington County which originally considered for NEPA analysis, and a 100 meter buffer around the analysis area to encompass roads bordering or leading up to the project area and potential areas of federal undertaking in support of the NEPA action, such as landing areas for logging and staging areas for prescribed burns. Newly recorded and previously recorded unevaluated sites were evaluated for eligibility to the National Register of Historic Places. All eligible sites were monitored and evaluated for effects from all project alternatives.

There are 19 known cultural resources determined eligible for listing on the National Register of Historic Places (NRHP) within the Vestal analysis area. Additionally, 6 sites within the Vestal area remain unevaluated for listing, despite further attempts to evaluate their significance, and will be protected as potentially eligible for listing on the NRHP. Most of these sites are considered historic and range in age from 70-140 years before present. They include mines, homesteads, dams, and dumps. The historic sites are the remnants of the rich logging, mining, and settlement history of the local area. A number of historic sites are the remnants of the Civilian Conservation Corps of the Great Depression and New Deal time periods. The prehistoric sites that are present within the analysis area are typically rock shelters and encampments of varied and often undetermined age.

Environmental Consequences

Alternative 1

If there is no federal action, then there is no undertaking, as defined in 36 CFR Part 800.16(y), for Section 106 of the National Historic Preservation Act (16 U.S.C. 470f). However, **no action** may result in the destruction of cultural resources due to the increased fuel loading and tree mortality --both of which increase the potential for fire and subsequent ground disturbance and erosion. Many of the eligible sites in the Vestal project area are eligible for listing on the NRHP due to the presence of intact subsurface cultural deposits or standing architectural features. As such, any processes that disturb the soil/sediment matrices of an archaeological site (including erosion) or increase the intensity and probability of catastrophic wildfire, adversely impact the site's eligibility. Both of these potentials exist within the Vestal project area and are perceived as an ongoing threat to cultural resources.

Alternative 2

The Forest Service developed site specific recommendations for all eligible cultural resources to avoid adverse effects from this alternative. These recommendations were submitted within the Section 106 report for the Vestal project. The South Dakota SHPO concurs with these determinations. Furthermore, SHPO concurs with a finding of ***No Adverse Effect***, provided that these cultural resources are avoided by all ground disturbing activities during project implementation. If during the course of any ground disturbance related to this project, any bones, artifacts, foundations, or other indications of past human occupation of the area are uncovered, all operations will cease within a 100-meter radius of the site location and a district archaeologist notified immediately. The SHPO and regional Tribal Historic Preservation Offices (THPOs) will be notified of the discovery and provided an opportunity to comment. Any cultural resources located during project implementation will be protected based on the recommendations of the district archaeologist and the SHPO.

Adherence to the design criteria would result in no direct or indirect effects to cultural resources from Alternative 2.

Cumulative Effects

The nature of the cultural resources and the foreseeable actions in the project area dictate that the cumulative effects area should match the physical site boundaries. Therefore, the cumulative effects area is defined as the known archaeological sites in the identified burn, thinning units, and access roads to and from the project area. The timing limit for the cumulative effects analysis is 20 years; ten years prior to present and ten years in the future.

No adverse effects are expected to occur as a result of any alternative provided that the design criteria are followed and the site specific recommendations are implemented. Because there will be no direct or indirect effect to cultural resources, there will be no cumulative effects associated with the Vestal project.

Scenery

Affected Environment

Existing Scenic Integrity represents the current status of a landscape. It is determined on the basis of visual changes that detract from the scenic quality of the area. Direct human alterations may be included if they have become accepted over time as positive landscape character values. Existing scenic integrity is the current visual state, which is measured in degrees of deviation from the natural appearance of the landscape character type. These ratings give an indication of the present level of visual quality and visual evidence of management activities. The frame of reference for measuring achievement of scenic integrity levels is the valued attributes of the existing landscape character unit being viewed. In natural or natural appearing character, this is limited to natural or natural appearing vegetative patterns, features of water and rock, and landforms.

Apparent human alterations in the form of recreation facilities (such as Bismarck Lake Campground & Bob Marshall Camp), open roads that (such as the Peter Norbeck Scenic Byway, Mickelson Trail, US, State, & County Highways) provide access for commerce, to homes & recreation facilities, have generally been accepted over time as part of the positive cultural landscape character attributes. Within the planning area, forested areas are predominantly populated by Ponderosa Pine communities, Aspen and other hardwoods, and Spruce communities generally limited to streams and wet areas. Water features are limited to narrow, quiet, low-flow intermittent streams and Bismarck Lake.

Mountain Pine Beetle activity has rapidly expanded in the Black Hills National Forest and is now at epidemic levels within the Vestal project area. Generally, the MPB killed trees were mostly evident from county and Forest roads. Within the past few years this activity has become more evident from Federal, State, County highways, recreation areas, Mickelson Trail, communities and private lands surrounding them. Large groups of trees attacked by the MPB are highly evident in this portion of the planning area.

The northern portion of the planning area has a combination of steep slopes, rocky terrain, and dense conifer stands, as well as gently rolling forest areas. The vegetation in the area has been managed for wildlife, grazing, and timber, depending upon the location.

Scenic Integrity Objectives (SIO)

Scenic Integrity Objectives (SIOs) are management objectives for forest scenic resources. A High SIO means that human activities are not visually evident and that activities should repeat attributes of form, line color or texture found in the existing landscape. A Moderate SIO is where activities remain visually subordinate to the landscape character. The Low SIO applies to landscape which appear moderately altered. Within the Vestal project area, the following percentages of area apply 24% High SIO, 49% Moderate SIO, and 27% Low SIO.

Mountain pine beetle caused mortality continues to alter views of the landscape within the project area. Management activities which have occurred in the project area generally meet the assigned SIOs.

Environmental Consequences

Alternative 1

No direct effects to visual quality would occur. Existing conditions and natural processes of trees growing and regenerating would continue. The mountain pine beetle outbreak is predicted to impact the entire planning area by 2018. The vegetation pattern on the landscape would change from densely closed with few openings, to an open landscape with possibly a few clumps and scattered trees.

Within 10 years the dead trees would snap off, or fall, creating openings in the forest. In the foreground and middleground, the color and texture of the down trees would dominate the landscape. In the background, the forms of these open areas would be dominant in the landscape. The remaining trees will likely provide the seed source for new trees. Seedlings will sprout over time. Long term as the new forest grows up through the down trees, and the down trees decay, the new growth will help these areas to blend into the landscape.

A high to very high fire hazard would occur throughout the project area. Wildfires would likely have the ability to rapidly spread during hot and dry conditions. When fires have a long residence time in one area, the concentrated heat can break down the structure of the soil. This damaged structure allows the soil to be easily eroded, inhibiting future plant growth. Areas of eroded soil and lack of plant life can be evident in the landscape, and can be detrimental to the scenic integrity of an area.

Alternative 2

Under this alternative, trees of all sizes would be removed. The resulting appearance of vegetation treatments would change little for the first 10 years after the treatments are completed. Any treatments would result in fewer trees across the landscape – but the risk of MPB infestation and fire to the remaining trees would be reduced.

The visual effects of the MPB activity is quite evident just north of the planning area and in isolated pockets throughout the planning area - due to the visibility of the red needles. Steep slopes, and other areas that are not able to be treated, would display the full range of effects and mortality from the MPB. Eventually these areas would be less evident as the needles fall. As the trees decay and fall, openings would be created. These openings would change the character from a uniform appearing landscape 'carpeted' with pine trees to a complex matrix of openings, decaying dead trees, residual pine trees, and expanding areas of hardwood trees.

The variety of treatments should produce a natural appearing forest – but one that has fewer trees – as if fire had continued to play its natural role all along. Due to the insect activity and fuel treatments adjacent to private land, the current view of the forest from these locations would likely change from their current condition. Views of these treatments will be limited from Sensitivity Level 1 or 2 roads outside the planning area, due to the topography surrounding the planning area.

Alternative 2 would modify the vegetation across the landscape. Management activities would be more evident. The variety of treatments would create a variety of vegetation patterns, colors, and improve opportunities to view hardwoods and wildlife. Restoration treatments to increase hardwoods and meadows may take time to appear natural – but long term they would improve the visual diversity in the landscape. Under burning, piling & burning, would reduce fuel levels to natural levels – a positive ecological and scenic characteristic of frequent fires in a pine ecosystem. Treatments would meet a Moderate to High Scenic Integrity one year after being completed.

Cumulative Effects

The spatial boundary for analyzing cumulative effects is primarily that of the planning area. This identified area is the landscape that is evident in the foreground and middle ground from the main travel routes, with particular attention to recreation facilities, recreation trails, and the community of Custer (due to viewer's stationary position or slower pace while moving through the landscape).

The time boundary for this analysis extends from 1980 (when the start of recent vegetation management activities took place) to 2050 [completion of management activities (2018), followed by 5 years for pine seedlings to become established, and approx. 25 years for trees to grow up and visually 'fill' open areas]. This time period includes known management activities, and activities that are planned but have yet to be accomplished.

Fire suppression over the past century has played a role in the increased density of the vegetation on the forest. Likewise, much of the Forest was pre-commercially thinned by the Civilian Conservation Corp in the 1930's and 1940s, however we do not know if that effort included any or all of this planning area. The construction of the Needles Highway (SD 89) in 1919 and the Iron Mountain Road (US 16A) in 1933 focused the public's attention on this portion of the Black Hills, around the community of Custer, further establishing the area as a recreation destination, for its man-made and natural scenery.

Larger wildfires have not occurred within the planning area, but are readily apparent in the surrounding area.

From 2000 to 2011, commercial vegetation treatments have been conducted on a limited basis (as noted in the Existing Condition section). Other than the Atlantic Bug project, all treatments have met their assigned SIO. The Atlantic Bug project was projected to meet a Low or Very Low SIO due to the high level of MPB activity and tree mortality already in the units before any treatment activities occurred. Due to the adjacent tree seed source around these areas, trees should become established, and visually have an impact in approximately 15-25 years. Then a more natural appearance may be evident.

Transportation

Affected Environment

The existing transportation system in the Vestal project area was inventoried in 2007 and 2008 and reviewed in 2010. During the 2010 review additional road condition surveys were conducted to capture any change in road conditions. The majority of the roads are being maintained to the appropriate design standard according to maintenance level. Global positioning systems, aerial photos, and the forest road data base were used during the inventory process to correct any inconsistencies in the existing GIS and tabular data.

To summarize, the transportation system within the Vestal project area is comprised of approximately 192 miles of existing roads. The breakdown of the existing transportation system is listed below in Table 47.

Table 47: Existing Transportation System in the Vestal Area

Road System Classification	Length in Miles	Road Density (Miles/Square Mile)
County Roads	28	0.4
National Forest System Roads	125	1.8
Unauthorized Roads*	39*	0.6*
Total	***192***	***2.8***

*All unauthorized roads were administratively closed with the May 07, 2010 Record of Decision for the Forest Travel Management project.

There are no motorized trails within the Vestal project area.

Roads within the project area which are open to the public were designated by the May 07, 2010 Record of Decision and later depicted on the December 1, 2010 Motor Vehicle Use Map (MVUM).

The travel management designation of the National Forest System Roads within the project area and road density (miles of road per square mile) is depicted in Table 48 below.

Table 48. Travel Management Designation Miles and Density within the Vestal Area

Travel Management Designation	Length in Miles	Road Density (Miles/Square Mile)
Roads Closed to All, Yearlong	48	0.7
Roads Open to Highway Legal Vehicles Only, Seasonal (May 15 to Dec 15)	35	0.5
Roads Open to Highway Legal Vehicles Only, Yearlong	42	0.6
Total	***125***	***1.8***

Environmental Consequences

Alternative 1

Under Alternative 1 there would be no effects from a proposed action. There would be no change in the transportation system due to a proposed action. Scheduled annual and grid maintenance would continue as it has in the past. Road densities would remain the same under this alternative.

Alternative 2

This alternative proposes to utilize the existing transportation system to accomplish project activities; no new system roads would be constructed. There would be some adjustments to the existing system in that approximately 0.6 miles of non-system road would be converted to National Forest System Road (NFSR) and approximately 2 miles of open system road would be closed (see Map 8 in Appendix A). The converted system road segment was identified as needed for current and future resource management access. The proposed road closures (approximately 2 miles total) are in three separate segments and would protect wildlife values and prevent resource damage.

An estimated 34 miles of road would be reconstructed which may include, but is not limited to, structural improvements, typically rolling dips or culverts, surface reconditioning or realignment. An additional 91 miles of road would require maintenance to complete proposed activities.

Existing unauthorized roads that are used as temporary roads with the project would be closed after use as part of the timber operations. Remaining unauthorized roads not used for the proposed activities are already administratively closed and may be physically closed in the future when funds become available.

Temporary roads may also be used to access portions of proposed treatments units. The intent after use for all temporary road construction is that they shall be closed or decommissioned during post resource management activities. Temporary roads utilize existing unauthorized roads or are constructed in locations approved by the Forest Service.

The average road density for the Black Hills National Forest is 4.4 miles per square mile as shown in the Forest Plan (Phase II Amendment). The minor changes to the transportation system proposed in Alternative 2 do not result in an overall change to road density. A simple comparison of road densities for the Vestal project area is listed below in Table 49.

Table 49 Road Mileage and Density by Alternative

	Existing Conditions		Alternative 2	
	Miles	Miles/Mile^2	Miles	Miles/Mile^2
Open Roads	42	0.6	41	0.6
Seasonal Roads	35	0.5	35	0.5
Closed Roads	48	0.7	50	0.7
Total	***125***	***1.8***	***126***	***1.8***

Cumulative Effects

Alternative 1 – No Action

Alternative 1 would have no direct or indirect effects; therefore no cumulative effects would occur.

Alternative 2

This alternative would not increase open road density for the project area. Therefore, no negative cumulative effects to open road density would occur.

These activities along with the Vestal project have the potential for the following cumulative effects on the transportation system.

Annual maintenance on Maintenance Level 3 and 4 roads would have a positive effect on the transportation system. These routes would only require minimal maintenance to support timber harvest activities barring no significant or catastrophic weather events occur.

Road maintenance, reconstruction, and construction within the Vestal project, combined with annual and grid maintenance activities, would have cumulative effects on ground disturbance, vegetation loss, dust/noise increases and sediment movement for short durations and in scattered areas within the analysis area.

Recreation

Affected Environment

The Vestal project area provides for substantial developed and dispersed recreational opportunities. The city of Custer is located at the center of the project area. Many businesses support and benefit from the recreational opportunities that this area provides. Some of the non-Forest Service recreation sites located within the project boundary include Crazy Horse Memorial and the Mickelson Trail, as well as numerous private campgrounds, gift shops, restaurants, hotels and other tourist based businesses.

Recreation Opportunity Spectrum (ROS)

Three of the four Management Areas (MA) in the project area, MA 5.1, MA 5.4 and MA 8.2 have a ROS of ‘roaded-natural’. This accounts for approximately 83% of the total project area. The remaining management area, MA 4.1, has a ROS of ‘roaded natural, non-motorized’.

Developed Recreation

Forest Service developed recreation sites in the project boundary include the Forest Supervisor's Office Visitor Center, Bismarck Lake Recreation Area and organizational Camp Bob Marshall. Several main highways for visitor access travel through the project area, including State Highways 16, 385, Peter Norbeck National Scenic Byway (Byway), Highways 16A, 89 and 87.

Attractions located adjacent to or short drives from the project include Jewel Cave National Monument, Wind Cave National Park, Mt. Rushmore National Monument and Custer State Park. Numerous annual recreation events affiliated with other agencies and the State of South Dakota Mickelson Trail which occur in or near the project area include Sturgis Rally, Anna-Leigh Run, Mickelson Trail Trek, Lean Horse Ultra-Marathon, Buffalo Round-Up, Custer Gold Discovery Days, Crazy Horse Volksmarch and Crazy Horse Marathon/Half-Marathon. Most of these activities occur in the primary summer season and early fall.

Dispersed Recreation

There are also ample opportunities for dispersed recreation use of public lands year round in the project area to include driving for pleasure, hunting, wildlife viewing, rock climbing, bicycle riding, hiking and horseback riding. These activities are part of the "lifestyle" for local residents who reside either adjacent to or within a very short distance from Forest Service Lands. Year round recreation activity occurs in an interrelated mix of public Federal, State, County, City and private lands in the Vestal project area. This is important for the local economy as well as the quality of life for residents.

The most popular areas for dispersed recreation are Calamity Peak, Buckhorn Range, Custer Peak, Poverty Gulch and Meeker Ranch, home of an historic ranch farmstead. The Paha-Sapa Trail was decommissioned in the late 1980's but has continued to be used by private citizens. The Buckhorn Range, both east and west sides, in the project area is a spectacular large granite ridge accessible for dispersed recreation activity from the City of Custer limits and/or Highways 87 and 16/385. Custer Peak is located near Stockade Lake with several adjacent commercial campgrounds east of the Custer. Patrons of these campgrounds frequent Custer Peak mainly for hiking or horseback riding on old FS roads. Dispersed recreation use in these areas is highest during the primary recreation season from May to September annually. There is moderate use during the fall and low use during the winter months. Group use in the project area by hikers, horse riders and mountain bikers, particularly on the old Paha-Sapa trail, occurs on an infrequent basis during the summer months.

There are no motorized or non-motorized Forest System trails within the project area.

Recreation Special Uses

Three Outfitter & Guide and one Organizational Camp (Camp Bob Marshall) Special Use Permits are issued in the project area. Please refer to Map 10 in Appendix A for specific locations. There are authorized roads and trails under recreation outfitter & guide special use permits issued to Rockin R Rides for conducting horse rides, National Outdoor Leadership School for teaching rock climbing/environmental education and to Outlaw Ranch for hiking, horse ride and hiking activities in the project area (see Permit Map 10 in Appendix A).

Motorized Recreation

The majority of system roads in the project area are open to public licensed vehicles. Open public travel roads are reflected on the Black Hills National Forest Motor Vehicle Use Map (MVUM) which is available free to the public and also available on the Forest website. The project area does not allow for off-road motorized use. The use of Forest system roads which are open for public travel in the project area by ATV, UTV and trail motorcycles is common year round except in an unusually heavy snowfall winter. Unauthorized off highway use of the project area is a concern and a challenge to manage since the implementation of the 2010 Black Hills National Forest Travel Management Decision.

Environmental Consequences

Alternative 1

This alternative would have a negative effect on the recreation resource if the on-going MPB epidemic in project area continues, as expected. The resulting increased mortality of dense stands of timber due to MPB infestation would cause considerable degradation of the visual aesthetics over a broad landscape versus a healthy green forest.

Developed Recreation

This change in aesthetics could result in the project area being a less desirable place for the public to recreate and could decrease socio-economic benefits of a tourist based economy in the surrounding communities. There would also be high fire hazard within the project area due to heavy fuel loading from mountain pine beetle caused mortality. Large scale, high intensity wildfires reduce recreation use of an area and could also threaten/destroy recreation facilities in the project area such as Camp Bob Marshall and Bismarck Lake.

The predicted extent of dead trees killed by MPB would have a negative impact on developed and dispersed recreation. The dead trees would become public hazards and MPB killed trees generally fall or break within 3-5 years. In addition, there would be increased maintenance needed within developed sites and impacts to permitted Outfitter and Guide authorized trails. The expense of dealing with beetle affected trees in recreation sites would increase as the epidemic increases and affects more trees in these sites. This may result in a temporary closure of recreation sites to the public if tree mortality from MPB attack exceeds recreation resource budgets to remove these hazards for public safety.

Dispersed Recreation

Mountain pine beetle killed pine trees are a falling tree hazard to dispersed recreation users who frequent the area. Dispersed recreation areas are not monitored and cleared of hazardous trees such as is done in developed recreation sites. Dispersed recreation users such as horse riders, hikers, bicyclists, rock climbers, hunters, etc, can expect more dead and dying trees as more pine trees become infested with MPB.

Recreation Special Uses

Recreation special use permit areas would be maintained by the permit holders to ensure that they are cleared of hazardous MPB infested trees and safe for the public. Therefore, there would likely be increased maintenance costs for permit holders to continue to use these permitted areas and trails.

Alternative 2

The proposed activities in this alternative would reduce MPB risk and therefore, would consequently reduce the potential for MPB caused mortality. It is anticipated that the proposed thinning and sanitation treatments would result in a healthier forest of green trees that would provide a more appealing area in which to recreate versus one with large swaths of dead trees. A forest with an under story largely absent of dead and down fuels and slash would provide a more open, park-like setting desired by recreationists.

The use of prescribed fire and pile burning would create periods of smoke and haze causing temporary negative affects to recreation opportunities over a broad area. These prescribed burning periods occur during the non-primary recreation tourism season, mostly late fall and early spring to a lesser extent. Therefore the effects to recreation are considered short-term and minimal.

Sale activities would create short term periods of noise, dust, increased traffic and disturbance to the landscape, negatively impacting recreation social opportunities for solitude and rejuvenation in the natural environment. These impacts would be localized and relatively short-term. Vegetation management activities would be obvious during and following implementation. These effects on the public are largely short term provided the follow up fuels reduction phase of the project occurs relatively soon (2-3 years) after harvest.

No harvest activities would occur in developed recreation sites themselves during the primary recreation tourism season.

Recreation special use permits (SUPs) would experience the impacts discussed above. Design criteria is included to avoid harvest activity during the primary use season within SUP permitted areas, where possible. In addition, coordination would be required between permittees and Forest Service to avoid potential conflicts. Any necessary adjustments to permitted areas would ideally occur prior to the date that Annual Operating Plans are discussed and finalized between the Forest Service and permitted Outfitters and Guides.

Authorized outfitter trails/areas will be protected improvements in timber sale contracts and prescribed burning plans. Examples of protected improvements include trail tread, water bars, stock bypass gates and trail tread gravel.

Travel Management

Use of open public system roads for recreation during this project will be temporarily affected during periods of logging traffic and maintenance. Examples include road closure for grading and/or hauling of forest products. Road maintenance would occur during and after sale activities on affected roads enhancing their condition for post-sale recreation travel.

Mickelson Trail

The State of South Dakota Mickelson Trail and Mickelson Connector Trail between Custer and Custer State Park would be affected by the use of sections of these trails for harvesting timber in the Vestal project. Negative effects to these trails would be minimized through the use of specific design criteria (see Appendix B).

Cumulative Effects

The cumulative effects boundary used was the project area. Time boundary for cumulative effects is from present to five years in the future. These boundaries were selected because the effects would be most evident to the project area and within five years of beginning the project.

The cumulative effect of forest disturbance caused by a no action alternative during an on-going mountain pine beetle infestation or the action alternative of harvest and post harvest vegetative treatments could cause a shift of recreation activity from an area of disturbance to one of no or lesser disturbance. Recreation use would return to all areas and probably increase over time as the level of disturbance tapers off in successive years.

The cumulative impact of no action in an on-going mountain pine beetle infestation would result in more trees dying in larger groups over more area of the Vestal project. Thinning stands of trees in the action alternative results in more trees scattered over more area throughout the landscape when compared to the no action alternative. This would result in a more open recreation forested setting under the no action alternative and vice versa for the action alternative.

Soils and Hydrology

This section discusses the affected environment and environmental consequences of the no action and proposed action alternatives for soils and hydrologic resources. It summarizes the Vestal Soil and Watershed specialist report, located in the project file.

Field Surveys

The field survey for the Vestal project was completed over several years, beginning in 2007. The goal of the fieldwork is to classify streams, identify watershed problem areas and asses the condition of the soils. Stream classification consists of identifying whether a stream is perennial, intermittent or ephemeral. Watershed problems need to be identified so the appropriate correction measures are prescribed. The soil information is needed to assess the condition of the soils from past activities and is needed for the cumulative effects analysis. Most of the blue line streams, as display on seven and half minute USGS (United States Geologic Survey) Quads, were visited in the field. Areas visited for the soils assessment were distributed throughout the project area and across different soil map units. The results of the field work identified stream type, watershed problem areas and soils condition.

Affected Environment - Soils

There are 22 different soil map units within the Vestal project area. Eight (8) of the soil map units comprise less than 1% of the project area combined; BrB, HgB, HgD, HoD, MhA, Pt, VpC and W. These 8 are not discussed further. Five (5) soil map units, BtE, BuE, BvC, RkG and RlG, comprise 85% of the project area and the other 9 soil map units occupy approximately 15%. Soil map units within the project area and their characteristics are listed in Table 50.

Table 50. Soils in the Vestal Project Area

Map Unit Symbol	Map Unit Name	Percent of Project
BsB	Bullflat-Cordeston silt loams, 2 to 9 percent slopes	1%
BtE	Buska-Mocmont-Rock Outcrop, 10-40 percent slope	19%
BuE	Buska-Rock Outcrop, 10-40 percent slope	31%
BvC	Buska-Virkula, 2-15 percent slope	21%
CvB	Cordeston, 2-10 percent slope	1%
CwB	Cordeston-Marshbrook, 0-6 percent slope	2%
HeE	Heely, 9-30 percent slope	1%
HfC	Heely-Cordeston, 6-15 percent slope	1%
MsC	Mocmont, 2-12 percent slope	1%
MtE	Mocmont-Rock Outcrop, 10-40 percent slope	3%
PaE	Pactola-Virkula-Rock Outcrop, 10-40 percent slope	3%
RgG	Rock Outcrop-Buska, 40-80 percent slope	2%
RkG	Rock Outcrop-Mocmont, 40-80 percent slope	9%
RlG	Rock Outcrop-Pactola, 40-80 percent slope	5%

Soil Health Assessment

Current conditions of the soils were observed when five (5) soil map units were visited in the field. They were units with symbols BtE, BuE, BvC, CwB and HfC. These units represent 74% of the VPA. The goal was to find previously disturbed areas to see if there are any residual effects from past activities. Eleven (11) sites were observed. At nine (9) sites the old Soil Health Monitoring/Assessment Protocol was used and the findings were that all sites that were visited had Properly Functioning Soil Health Ratings. The other two (2) sites used the new Soil Monitoring Protocol and there was not any detrimentally disturbed soil found anywhere along the transect. All areas had excellent ground cover, infiltration was excellent and no erosion was occurring.

Soil Erosion

Erosion hazard is an indication of the risk of soil loss associated with disturbance. Soil map units with the symbols RgG, RkG and RlG have a severe EHR (Erosion Hazard Rating). These units occur on steep slopes of 40-80 percent and occupy approximately 16% of the project area. The EHR is severe because of the steep slopes. The majority (57%) of soils have a moderate EHR. Approximately 27% of soils have a slight EHR.

Soil Compaction

All soils are subject to compaction when conditions are right, but some can be more prone to compaction than others. Activities with heavy equipment on soils can change the characteristics of the soils, resulting in compaction and causing more runoff or resulting in poor plant growth.

Organic Matter and Nutrients

Forest Plan standard 1102 sets requirements for soils with topsoil less than 1 inch, organic matter less that 2 percent, or rooting depth less than 15 inches. In the Vestal project area, none of the soil map units contain topsoil organic matter of less than 2 percent or have rooting depths of less than 15 inches.

There are eight (8) soil map units have a large portion of the unit with topsoil thinner than one (1) inch. They are BtE, BuE, BvC, MsC, MtE, RgG, RkG and RlG and comprise 91% of the Vestal project area.

Environmental Consequences - Soils

Soil Erosion – Direct and Indirect Effects

"Severe erosion can impair long-term soil productivity if soils are heavily disturbed on shallow or highly erodible soils. Evidence of severe erosion is rills or pedestals," (USDA Forest Service, 1996).

Alternative 1

There would be no direct or indirect effects to soil productivity from soil erosion with this alternative because no new activities are planned.

Alternative 2

Commercial vegetative treatments have the potential to impact soil productivity by causing soil erosion. Noncommercial vegetation treatments, dead fall treatment and fuel break construction are not expected to have any impacts to soil productivity from soil erosion because the organic layer would still be present on the soil surface, protecting the soil from erosion. Prescribed fire is not expected to have any impacts to soil productivity from soil erosion because the organic layer is not expected to be burned off, thereby leaving some organics on the soil surface protecting the soil from erosion. Vegetation treatments on soils with a VSEHR and steep slopes have the most potential to cause soil erosion.

Approximately 2,164 acres or 9% of the treated acres are located on soils with a severe erosion hazard rating with slopes greater than 20% and less than 40%. One thousand one hundred ninety-six (1,196) additional acres or 5% of the treated acres are proposed for treatment on slopes greater than 40%. Minimal soil erosion may occur from the commercial activities but implementing the Forest Plan standards and guidelines, including WCPs and BMPs, and the design criteria "On soils with severe erosion hazard rating and slopes between 20 and 40%, machinery operations must be restricted to dry or frozen soil conditions" and "On soils with severe erosion hazard rating and slopes steeper than 40%, ground skidding must be avoided" there would be very little soil erosion occurring, and only for short distances. The potential for erosion related to roads would be minimized with proper erosion control structures at proper spacing for the grade of the road. These would be built in the road and be maintained throughout the operation and also upon putting the roads to bed.

Direct or indirect effects to soil productivity from soil erosion are not expected because very little erosion is expected to occur from this alternative with the implementation of the Forest Plan standards and guidelines, including WCPs and BMPs, and the design criteria.

Soil Compaction – Direct and Indirect Effects

"Soil compaction is caused by excess weight of vehicles and animals. It impairs infiltration, root growth, and soil biota," (USDA Forest Service, 1996).

Alternative 1

There would be no direct or indirect effects to soil productivity from soil compaction with this alternative because no new activities are planned.

Alternative 2

All soils are subject to compaction under the right conditions. Activities with heavy equipment on soils can change the characteristics of the soils, resulting in compaction and causing more runoff or resulting in poor plant growth. This alternative can have short-term impacts but the impacts are not expected to persist. Minimal soil compaction can occur from the commercial activities. BMP monitoring of timber units since 2005 (USDA Forest Service, 2008, 2009 & 2010) have shown some impacts occur but all units met Forest Plan Standards. If compaction does occur it would be reduced over time meaning no long-term effects. Forest Plan Monitoring on one site has shown "there is evidence that conditions were such that within one geographic area, on at least one soil type, and to the depth sampled, that the mean soil bulk density decreased from levels above the threshold classified as "detrimental compaction" to levels below the threshold within the time period of one year" (USDA Forest Service, 2009).

No indirect effect on soil productivity from soil compaction with this alternative is expected. Short-term direct effects can occur but are not expected to persist.

Nutrient Removal – Direct and Indirect Effects

"Soil fertility depends on organic matter and nutrients. Soil productivity can be degraded if humus and topsoil, or even excess leaves and limbs, are taken off site," (USDA Forest Service, 1996).

Alternative 1

There would be no direct or indirect effects to soil productivity from nutrient removal with this alternative because no new activities are planned.

Alternative 2

This alternative includes commercial and non-commercial vegetation management, dead fall treatment, fuel break construction and prescribed fire. Non-commercial vegetation management, dead fall treatment, fuel break construction and prescribe fire do not affect soil productivity from nutrient removal because organic material is not physically removed from the site. Lopping, chipping, crushing, or mastication leaves all material on site. Burning will change the form or composition of the nutrients but most will be still available on site.

Commercial vegetation management generally removes whole trees from the site in order to reduce the fuels in the stand. This could pose a concern on some soils, however with the mountain pine beetle activity in the Vestal project area, there would be sufficient material left on site to meet Standard 1102, including Guideline 1102a, and soil productivity would not be affected

No direct or indirect effects on soil productivity related to soil nutrients are expected to occur with this alternative.

No indirect effect on soil productivity from soil compaction with this alternative is expected. Short-term direct effects can occur but are not expected to persist.

Soil Heating – Direct and Indirect Effects

“Soil heating is caused by severe fires that occur when humus and large fuels are dry and large fuels are consumed near the ground. Soil heating sterilizes the soil, alters soil physics, consumes organic matter, and removes much of the site’s nutrients,” (USDA Forest Service, 1996). Impacts to soil productivity from soil heating usually occurs as a result of a wildfire but can occur in small areas with prescribe fire.

Alternative 1

There would be no direct or indirect effect to soil productivity from soil heating with this alternative because no new activities are proposed within the project area.

Alternative 2

Effects from soil heating can occur from burning of slash piles and prescribed fire.

Burning slash piles would cause detrimentally impacted soils from soil heating in small isolated locations throughout the project area. Any runoff from these small areas of detrimental impact would be absorbed by adjacent area. Concerns regarding soil heating come from large contiguous areas, which would not occur as the result of this project.

Prescribed burning is proposed on approximately 1,761 acres. There is potential for soil heating to occur as a result. However, design criteria to “conduct prescribed fires to minimize the residence time on the soil while meeting the burn objectives, this is usually done when the soil and duff are moist” would minimize the potential effects to the soil from soil heating. No direct or indirect effects to soil productivity from soil heating are expected with this alternative.

Regeneration Hazard – Direct and Indirect Effects

Alternative 1

There would be no direct or indirect effects to soil productivity from regeneration hazard with this alternative because no new activities are planned.

Alternative 2

Ponderosa Pine tends to reproduce well in the Black Hills (Orr, 1975). Natural regeneration of Ponderosa Pine can be quite successful (Shepperd and Battaglia, 2002). This alternative would not have a direct or indirect effect on regeneration hazard because of the high reproduction rate even though some soils may be more conducive to seedling mortality and be problematic with rocks.

Cumulative Effects - Soils

The spatial boundaries of the cumulative effects analysis are the HUC 12 watershed boundaries that have at least 15% of their area within the project area. Watersheds with lesser amounts of the project area within them would have negligible cumulative effects from this project. Four (4) HUC 7 watersheds are used in this analysis. They are identified in Table 51.

The time frame for the cumulative effects discussion is from year 2002 through 2021, ten years before and ten years after. These dates include impacts from recent timber harvesting in the past and extend forward to include the estimated completion of activities proposed in this project.

Table 51. Watersheds Analyzed for Cumulative Effects

HUC 12 Number	Watershed Name	Watershed Acres	% of Watershed in the Project Area
101201090601	Ruby Creek-French Creek	29,291	64%
101201090602	Stockade Lakes-French Creek	19,926	74%
101201090603	Glen Erin Creek-French Creek	17,419	28%
101201090903	Newton Fork-Spring Creek	24,423	15%

The cumulative effects area for the soils resource is the proposed activity units in the project area. The effects of the alternatives on the soils resource would be contained within the units. The timeframes used to consider effects of past, present, and future activities are from 2000 to 2026. The past, present, and future activities considered in this analysis are presented in Appendix F.

Forest Plan standards and guidelines, as well as site specific design criteria would be implemented in the proposed action. When implemented as described, no adverse cumulative effects to soils are expected to occur. Past monitoring shows that when Forest Plan standards and guidelines are implemented on similar projects, this standard is met (USDA Forest Service, 2008). It is further expected that the compacted, eroded, or displaced condition would be less than 15%, as described in Standard 1103. The following discussion considers the cumulative effects of potential disturbances to long-term soil productivity in accordance with Forest Plan Standard 1101.

Organic Matter and Nutrients

There would be no adverse cumulative impacts to soil organic matter and nutrients from any alternative within the project area because sufficient residual material and trees would be left on site for nutrient recycling after project implementation. Forest Plan Standard 1102 would be met.

Soil Heating

Events that could cause negative effects of soil heating are wildfires and, to a lesser degree, prescribed burning. Prescribed burning within the project area would be implemented in a manner designed to reduce the potential for adverse soil heating impacts. Prescribed burning would have beneficial effects by reducing long-term fire hazard and the potential for large-scale, high intensity wildfire that could have soil heating effects. Therefore, no adverse cumulative effects would be expected under any alternative.

Soil Erosion

Past, currently ongoing, and reasonably foreseeable actions listed in Appendix F were considered along with proposed activities for cumulative effects to soil erosion and displacement. Any soil erosion that may occur related to implementation of the Vestal project is expected to be localized, minor in both severity and extent, and thus well below levels that would be considered detrimental. This expectation also applies to other forest management activities and uses. Design criteria and appropriate WCP/BMP measures apply to all forest management activities and uses. These measures are designed to control runoff and erosion for a 10 year storm event (USDA Forest Service, 2006b). Therefore the risk of cumulative detrimental soil erosion is mitigated for typical storm events observed in the Black Hills for all forest management activities.

Grazing management throughout the project area is not expected to cause extensive soil erosion. Dispersed recreation activities generally do not cause excessive soil erosion issues due to the lack of concentrated use. Concentrated recreation sites are purposely located in flatter terrain which minimizes the potential for soil erosion and employs management strategies to guide concentrated uses where measures are in place (i.e. WCPs/BMPs) to minimize soil erosion.

Any soil erosion as a result of the Vestal project would be expected to be minimal and would be within the limits of Forest Plan Standard 1103 for Alternative 2. There would be no cumulative effects to soil erosion resulting from the no action alternative.

Soil Compaction

Past, currently ongoing, and reasonably foreseeable actions in the Vestal project area were considered along with proposed activities for cumulative effects to soil compaction. Any soil compaction that may occur related to implementation of the Vestal project is expected to be localized and well below levels that would be considered detrimental. This expectation also applies to other forest management activities and uses. Design criteria and appropriate WCP/BMP measures apply to all forest management activities and uses. Therefore the risk of cumulative detrimental soil compaction is minimized.

Grazing management throughout the project area is not expected to cause detrimental levels of soil compaction due to where livestock naturally tend to roam and the presence of rock fragments in most of the soils within the project area. Dispersed recreation activities also do not tend to cause detrimental soil compaction due to the lack of concentrated use for this type of recreation.

Any soil compaction would be expected to be minimal and would be within the limits of Forest Plan Standard 1103 for Alternative 2. There would be no cumulative effects to soil compaction resulting from the no action alternative.

Affected Environment – Hydrology

Watersheds

Watershed boundaries and HUC codes were obtained from the National Hydrography Dataset developed and maintained by the USDA Service Center and USGS (USGS, 2008). The Vestal project boundary overlaps portions of seven HUC 12 (6th level) watersheds (see Table 52). Since the project area does not coincide exactly with watershed boundaries, the water resources analysis area differs from the project area boundary.

Table 52: HUC 12 Watershed within the Vestal Project Area

HUC 12 Number	Watershed Name	Watershed Acres	% of Watershed in the VPA
101201090201	Upper Beaver Creek	22,753	1%
101201090601	Ruby Creek-French Creek	29,291	64%
101201090602	Stockade Lakes-French Creek	19,926	74%
101201090603	Glen Erin Creek-French Creek	17,419	28%
101201090804	Upper Grace Coolidge Creek	19,639	2%
101201090901	Headwaters Spring Creek	23,108	4%
101201090903	Newton Fork-Spring Creek	24,423	15%

In 2011Watershed Condition Framework (WCF) (USDA Forest Service, 2011) was implemented by the Forest Service. It is a comprehensive approach for classifying watershed condition, proactively implementing integrated restoration in priority watersheds on national forests and grasslands, and tracking and monitoring outcome-based program accomplishments for performance accountability.

Watershed condition is the state of the physical and biological characteristics and processes within a watershed that affect the soil and hydrologic functions supporting aquatic ecosystems. There are four (4) watersheds that have a substantial portion of their area within the Vestal project area, Ruby Creek-French Creek, Stockade Lakes-French Creek, Glen Erin Creek-French Creek and Newton Fork-Spring Creek. All are rated Class 2 watersheds, "Functioning at Risk".

Floodplains

A floodplain is the flat area on either side of a stream or river that is susceptible to inundation by floodwaters. Floodplains slow flood velocities and decrease erosion because they are by nature wide and flat, thus allowing for shallower and slower water. Thus, floodplains provide for flood moderation, water quality protection, ground water recharge, and wildlife habitat, among other benefits. The Federal Emergency Management Agency (FEMA) has mapped 100-year floodplains across the nation (FEMA, 1998).

There are approximately 267 acres of mapped 100-year floodplains within the Vestal project area on National Forest. Mapped 100-year floodplains are located along the following streams and drainage ways: French Creek, Glen Erin Creek, Laughing Water Creek, Loues Creek, North Fork French Creek, Ruby Creek, Tenderfoot Creek and Willow Creek.

Wetlands and Riparian

Wetlands were mapped during a national effort and recorded in the National Wetland Inventory (NWI). There are approximately 67 acres of wetlands within the Vestal project area.

One of the mapped wetlands is Bismarck Lake, classified as Lacustrine Systems. The term Lacustrine is related to the word 'lakes' and thus a lacustrine wetland is, by definition lake-associated. The Lacustrine system includes wetlands and deepwater habitats that are greater than 20 acres and have less than 30 percent cover of persistent vegetation (Water Word Glossary, 2004).

The rest of the mapped wetlands are classified as Palustrine Systems. "Palustrine" comes from the Latin word "palus" or marsh. Wetlands within this category include inland marshes and swamps as well as bogs, fens, tundra and floodplains. Palustrine systems include any inland wetland, which lacks flowing water and contains ocean derived salts in concentrations of less than 0.05%.

Lakes

There is one lake within the Vestal project area, Bismarck Lake. It is 25 acres in size and is form by a dam constructed by the CCC (Civilian Conservation Corps) on an unnamed tributary to French Creek. The outflow from the Bismarck Lake flows for approximately 600 feet and then empties into Stockade Lake in Custer State Park.

Streams

There are an estimated 135 miles of streams within the Vestal project area. Sixty-seven percent (67%) or 91 miles are on private, leaving 44 miles on National Forest. Of the 44 miles of streams on National Forest, 33 % are perennial, 12% are intermittent and 55% are ephemeral (See Map 9 in Appendix A).

Streams on National Forest within the Vestal project area are identified on Map 9, Appendix A. Identification of whether each stream on National Forest is Ephemeral, Intermittent or Perennial was based on field survey and review of USGS Quad maps. Perennial and intermittent streams have a 100 foot WIZ along them and will be identified as a protected stream course. The WIZ distance is from the high water mark and is on each side of the stream for a total of at least 200 feet. Table 53 displays the streams by name.

Table 53. Stream Mileages Within the Vestal Project Area

Name	Perennial	Intermittent	Ephemeral	Private	Total
Bugtown Gulch	-----	-----	0.17	-----	0.17
Crow Creek	-----	-----	0.75	1.27	2.02
East Fork Ruby Creek	-----	-----	-----	2.45	2.45
French Creek	3.29	-----	-----	10.39	13.68
Glen Erin Creek	1.32	0.55	0.75	1.82	4.44
Graveyard Gulch	-----	-----	0.58	0.28	0.86
Laughing Water Creek	0.43	-----	0.13	6.15	6.71
Loues Creek	0.04	-----	-----	0.81	0.85
North Fork French Creek	-----	0.16	-----	1.24	1.40
Ruby Creek	0.41	1.24	0.41	4.65	6.71
Sidney Creek	-----	-----	-----	2.68	2.68
Tenderfoot Creek	-----	0.45	0.05	3.58	4.08
Tenderfoot Gulch	0.02	-----	0.03	1.63	1.68
Toe (Joe) Gulch	0.87	-----	0.33	0.08	1.28
Willow Creek	1.33	-----	0.22	4.84	6.39
Unnamed	6.75	2.63	20.87	48.91	79.16
Total Miles	***14.46***	***5.03***	***24.29***	***90.78***	***134.56***

Beneficial Uses

The SD (South Dakota) DENR (Department of Environment and Natural Resources) assigns water quality standards based on the beneficial uses of each water body. All streams and lakes in SD are assigned the beneficial uses of fish and wildlife propagation, recreation and stock watering. Streams are also assigned the beneficial use of irrigation. Within the Vestal project area the streams in Table have additional designated beneficial uses, as noted.

Table 54. Vestal Stream with Additional Beneficial Uses

Beneficial Uses			
	SD Beneficial Uses		
Water Body	**Coldwater Marginal Fish Life Propagation**	**Limited Contact Recreation**	**Immersion Recreation**
Bismark Lake Creek	X	X	
French Creek	X	X	
Glen Erin Dam Creek	X	X	
Laughing Water Creek	X	X	
Loues Creek	X	X	
Ruby Creek	X	X	
Willow Creek	X	X	
Bismarck Lake	X	X	X

(South Dakota Legislature, 2011)

Streamflow Regime

Streamflows throughout the Black Hills have been reduced over the last century. This has been a result of fire suppression. There has been an increase of woody biomass. Higher leaf areas from increased woody biomass will increase evapotranspiration and interception, resulting in lower streamflows and the drying of springs (USDA Forest Service, 2003b).

Peak flows data has been collected for a limited time on several streams in an around the Vestal project area. The streams include; French Creek, three (3) sites, two (2), six (6) and 19 years; Laughing Water Creek, six (6) years; and Ruby Creek, six (6) years. Peak flows on these creeks occurred from March to October with the most occurring in June (USDI USGS 2011a).

Stream Health

Perennial and intermittent streams within the project area were reviewed to determine Stream Health Rating (SHR). Many streams have the majority of their length on private lands. Those perennial and intermittent streams with very minor amounts on National Forest lands were not assigned a SHR. The remaining streams were assigned SHR as discussed below:

> French Creek – Is a major tributary to the Cheyenne River. The entire length is 86.2 miles. Sixteen percent (16%), or 13.7 miles, of this stream is in the Vestal project area. Of that portion, 76% is on private land and 24% is on National Forest. There are two distinct reaches, above Stockade Lake and below Stockade Lake. The reach above Stockade has many impacts with a significant amount of stream crossings, significant grazing on private land, and channelization in the City of Custer, to highlight some impacts. The reach below Stockade Lake had

significantly less impacts with a few road/stream crossings that could be improved. Most crossings are on county roads. The SHR for French Creek above Stockade Lake would be diminished and French Creek below Stockade Lake would be At-Risk.

Glen Erin Creek – Approximately 98% (4.5 miles), is within the Vestal project area. Only 0.1 miles is outside the project area. Forty percent (40%) is on private land. There are two distinct reaches on National Forest. One reach has had CCC activity on it, building dams and building restoration structures in the stream. Two of the dams are no longer functioning and one is holding water and creating a nice pond. The restoration work has created wonderful wetlands along the stretch that was restored. The SHR for this reach would be At-Risk. The other reach, or lower reach, has been acquired recently and the stream has not been grazed for a number of years. This reach has a SHR of Robust.

Ruby Creek – The entire length of this stream, 6.7 miles, is within the Vestal project area, however 69% of this stream is located on private land. Two (2) miles are on National Forest. Some of Ruby Creek that is on National Forest is on the French Creek Allotment. The stream health on this section of Ruby Creek was identified as At-Risk in the Hell Canyon 2010 Range Project and it would be the same today.

Toe (Joe) Gulch – Seventy-one percent (71%), 1.3 miles, of 1.8 miles total length of this stream is within the Vestal project area. Very little of this stream, six percent (6%) is on private land. This stream is within the French Creek Allotment. In the past the valley along the stream has been grazed and continues to be grazed today but under new management plans. The SHR for this stream is At-Risk.

Connected Disturbed Area (CDA)

CDAs are areas that are identified that contribute sediment to streams or wetlands causing degradation of physical function, degraded water quality and increased peak flows that may alter physical channel processes. When a disturbed area flows into a waterbody without sufficient delay from vegetated filter strips or sediment detention structures, it is connected to the waterbody. CDAs may include bare soil patterns, compacted soils, roads, severely burned areas or mine spoils.

Disturbed areas near ephemeral drainages are generally not CDAs. This is because there is vegetation in the drainages that will filter out any erosion generated. This erosion does not contribute to the degradation of the physical function of the stream or degrade water quality.

During field inventory, 10 CDAs were identified, all of which are road crossings. Four (4) were on Forest Service roads and six (6) were on County roads. The CDAs were distributed across three (3) HUC 12 watersheds.

Water Quality

The State of South Dakota maintains a list of waterbodies that do not meet water quality standards for their assigned beneficial uses. There is one (1) stream, within the Vestal project area, French Creek, that is currently on the SD 303(d) Waterbody List (SD DE NR 2010).

French Creek is on the list for not meeting the beneficial use of Coldwater Marginal Fish Life and Limited Contact Recreation. The parameter of concern is dissolved oxygen. The listed cause is natural sources and drought related impacts. The South Dakota Department of Environment and Natural Resources conducted a monitoring program from March through October of 2010 at several sites along this reach. No violations related to dissolved oxygen were observed or recorded during this sampling period. (Robert Smith, personal communication, March 1, 2011)

All other streams and waterbodies within the Vestal project area are meeting their assigned beneficial uses.

Environmental Consequences - Hydrology

The water resources analysis area encompasses the headwater portions of Redbird and Gillette Canyons, an area totaling approximately 50,820 acres (Appendix A, Map 6). The water resources analysis area includes land managed by both the Mystic and Hell Canyon Ranger Districts of the Black Hills National Forest, as well as private lands.

Potential impacts to water resources include impacts to aquatic ecosystems, special areas, and soil productivity (discussed earlier). Aquatic ecosystems include physical conditions (sediment, bed/bank stability and flow regimes), chemical conditions (temperature/oxygen and water purity) and biological conditions (aquatic life). The Alternatives may impact these conditions in the project area, as discussed below.

Past, currently ongoing, and reasonably foreseeable actions listed in Appendix F were considered along with proposed activities for cumulative effects to water resources.

Aquatic Ecosystems

Sediment – Direct and Indirect Effects

Alternative 1

This alternative would not have any new activities occur within the project so sediment levels would remain unchanged. There would be no direct or indirect effects to the aquatic resource due to sediment.

Alternative 2

Mechanical vegetation treatments are proposed on approximately 251 acres within the 100 foot WIZ (Water Influence Zone). Approximately half of these acres are within 50 feet of the water source. There would be no direct effects of sedimentation from commercial vegetation treatments.

Prescribed burning is proposed on approximately 121 acres within the WIZ. As with mechanical treatments, approximately half of these acres are within 50 feet of the water source. The potential to generate sediment from prescribed fire is low because soils within the WIZ and next to the streams are generally wetter. There would be no direct effects of sedimentation from prescribed fire.

Maintenance and temporary use of roads within the WIZ and at stream crossings have the potential to increase sediment because the road surface is disturbed during operations and material on the road can be easily mobilized during precipitation events. There are approximately 7 miles of existing roads within the WIZ in the Vestal project area. Slightly less than half are within 50 feet of the water source. No new roads would be constructed in the WIZ.

There are also approximately 40 existing stream crossings. It is expected that some sediment would be produced at these crossings. It is extremely difficult to quantify how much sediment would be produced, so the amount of activity within the WIZ is used as a comparison.

None of the crossings on reconstructed routes will be disturbed. There would potential be two (2) constructed crossing on perennial streams on a reconstructed road and a temporary road. The reconstructed crossing is on French Creek, NFSR 342.1E, and will be a temporary bridge. The temporary road crossing will be on Ruby Creek and will require a structure to span the stream such as a temporary bridge, cattle guard, temporary arch or similar structure. Both structure will be removed and rehabilitated upon completion of the project. A third culvert on a level 1 road, NFSR 297.1I, will be removed upon completion of its use.

Some sediment is expected to be introduced to the streams at these locations, but not in quantities that would affect the aquatic resource.

Alternative 2 may generate sediment from mechanical treatments, prescribed burning, the use of existing roads or stream crossings. However, with the implementation of Forest Plan Standards and Guidelines, WCPs, BMPs and design criteria, the potential to generate sediment from mechanical treatments or prescribed fire, is low. Some sediment is expected to be generated from use of existing roads and stream crossings, however the amount would be minimal, and in quantities that would not affect the aquatic resource.

As a benefit of the activities, three (3) CDAs on Forest roads would be corrected.

There would be a slight increase in potential for sedimentation from the action alternative in the short term (<5 years) due to activities related to road crossings usually at the crossings. In the long term (>5 years) sediment potential would be reduced by the action alternative as compared to existing conditions because of the repair or fixing of some of the CDAs.

Bed and Bank Stability – Direct and Indirect Effects

"Bed and bank stability can be damaged from trampling by animals or humans, vehicle impact, degraded bank vegetation, or excessive flow augmentations. Streams can be made wider and shallower, pools and overhanging banks can be destroyed, and much sediment can be added to streams," (USDA Forest Service, 1996).

Alternative 1

No direct or indirect effects to bed and bank stability would occur.

Alternative 2

This alternative would not have an impact on bed and bank stability within the VPA. Skid and forwarding trails have the potential to cross perennial and intermittent streams. When this occurs, design criteria for forwarding and skid trails will be implemented to protecting bank stability. By implementing the design criteria and this alternative would have no direct or indirect impacts.

Stream Flow Regime – Direct and Indirect Effects

"Flow regimes can be altered by major changes in cover type or ground cover, dense road networks, or water projects. Water temperature and chemistry, sediment transport, aquatic habitats, and aquatic life cycles can be degraded," (USDA Forest Service, 1996).

Alternative 1

There would be no direct effects to flow regime. Indirect effects include an increase in the amount of water available for streamflow and ground water recharge due to Mountain Pine Beetle caused tree mortality.

Alternative 2

Commercial and non-commercial timber activities which remove live biomass would positively affect flow regime. Prescribed burning could also result in a positive impact to flow regime due to resulting tree mortality. This would be minimal since mortality limits are included.

This alternative would have a positive effect on flow regime by the removal of live vegetation from the landscape and would result in improved flow regimes over Alternative 1 by reducing the live biomass across the landscape.

Temperature and Oxygen – Direct and Indirect Effects

"Summer water temperature is increased, and winter water temperature is decreased, by removing shade, reducing low flows, or damaging banks so streams are wider and shallower. Dissolved oxygen is usually reduced when summer water temperature is increased. Such impacts impair or destroy the suitability of water bodies for aquatic biota," (USDA Forest Service, 1996).

Alternative 1

No direct effects would occur. An indirect effect would occur if the live biomass decreases over time due to tree mortality from Mountain Pine Beetle. This could affect stream temperature/oxygen, by making more water available for streamflow because of reduced evapotranspiration. More water in the stream could mean stable water temperature and oxygen levels.

Alternative 2

This alternative would have a positive but minimal impact on stream temperature and oxygen because live biomass would be reduced, resulting in more water being available for streamflow. Increases in water amounts would help maintain stream temperatures.

This alternative is similar to the no action alternative with the expected indirect effect due to the Mountain Pine Beetle. Water temperature and oxygen levels are expected to be maintained because more water would be available for streamflow.

Water Purity – Direct and Indirect Effects

"Water purity can be degraded by placing concentrated pollutant sources near water bodies, applying harmful chemicals in or near water bodies, or intercepting hazardous rock strata by roads. Degrading water purity can impair or destroy use of the water by aquatic biota and humans," (USDA Forest Service, 1996).

Alternative 1

This alternative would not have any direct or indirect effects on water purity.

Alternative 2

None of the proposed activities involves placing concentrated pollutant sources near water bodies or applying harmful chemicals near water bodies. There would be no direct or indirect effect to water purity.

Aquatic Life – Direct and Indirect Effects

"Aquatic life can be degraded by migration barriers, changed flow regimes, riparian damage, or big sediment loads or chemical loads," (USDA Forest Service, 1996). Flow regimes, sediment, and purity are discussed previously. The items that will be discussed in this section will be migration barriers and riparian damage.

Alternative 1

No direct or indirect effects would occur to aquatic life from Alternative 1.

Alternative 2

This alternative would not increase or decrease any migration barriers because temporary bridges or other structures which allow unimpeded streamflow would be used at stream crossings. Riparian damage would be minimal. Implementing the Forest plan standards and guidelines, including WCPs and BMPs would minimize any impacts to the riparian vegetation. No direct or indirect effects would occur to aquatic life from migration barriers or riparian damage.

Riparian Ecosystems – Direct and Indirect Effects

"Riparian ecosystems provide shade, bank stability, fish cover, and woody debris to aquatic ecosystems. They also provide key wildlife habitat, migration corridors, sediment storage and release, and surface-ground water interactions. Composition and structure of riparian vegetation can be changed by actions that remove certain species age classes," (USDA Forest Service, 1996).

Alternative 1

This alternative would not have any new activities within the project area so there would be no direct or indirect effect on riparian ecosystems.

Alternative 2

There would not be any commercial activities or new system roads within any riparian areas. There is a proposed temporary road crossing of Ruby Creek. This crossing would require the road to temporarily span the stream. No other riparian impacts are expected. Therefore, minimal negative impacts may occur as a result of the proposed project. If prescribed fire were to occur in riparian areas, it would be a light burn because conditions in these areas are usually moist, resulting in no impacts. There would be minimal short-term negative direct effect on the riparian ecosystems.

Wetlands – Direct and Indirect Effects

"Wetlands control runoff and water quality, recharge ground water, and provide special habitats. Actions that may alter their ground cover, soil structure, water budgets, drainage patterns, and long-term plant composition can impair these values," (USDA Forest Service, 1996).

Alternative 1

This alternative would not have any new activities within the project area so there would be no direct or indirect effects on wetlands.

Alternative 2

No mechanical treatments or roads are proposed within wetlands. Prescribed fire in wetlands would be a light burn because conditions in these areas are inherently moist, resulting in no impacts. There would be no direct or indirect effects on wetlands.

Floodplains – Direct and Indirect Effects

"Floodplains are natural escape areas for floods that temper flood stages and velocities," (USDA Forest Service, 1996).

Alternative 1

This alternative would not have any new activities within the project area so there would be no direct or indirect effects on floodplains.

Alternative 2

Roads are the main concern within floodplains because road fills are usually placed in floodplains to facilitate road crossings of streams. This interrupts flood flows and can change the elevation of flood waters. Timber harvest activities do not affect floodplains because floodplains are not altered during the activity. Dead fall treatment, fuel break construction and prescribe fire does not alter floodplains. Since no new roads are proposed as part of this project, there would be no impacts to floodplains. There would be no direct or indirect effect on the floodplains.

Cumulative Effects - Hydrology

The spatial boundaries of the cumulative effects analysis for water resources are the HUC 12 watershed boundaries that have at least 15% of their area within the project area. Watersheds with lesser amounts of the project area within them would have negligible cumulative effects from this project. Four (4) HUC 7 watersheds are used in this analysis. They are identified in Table 55.

The time frame for the cumulative effects discussion is from year 2002 through 2021, ten years before and ten years after. These dates include impacts from recent timber harvesting in the past and extend forward to include the estimated completion of activities proposed in this project.

Table 55. Watersheds Analyzed for Cumulative Effects

HUC 12 Number	Watershed Name	Watershed Acres	% of Watershed in the Project Area
101201090601	Ruby Creek-French Creek	29,291	64%
101201090602	Stockade Lakes-French Creek	19,926	74%
101201090603	Glen Erin Creek-French Creek	17,419	28%

HUC 12 Number	Watershed Name	Watershed Acres	% of Watershed in the Project Area
101201090903	Newton Fork-Spring Creek	24,423	15%

Past, present and future land uses and events within these watersheds have been occurring since settlement of the Black Hills. Commercial treatments, precommercial thin, fuelbreaks, pine encroachment, wildfire, prescribe fire, grazing, weed spraying, mining, abandoned mines, mine reclamation, developed recreation, dispersed recreation, dam building (Bismarck and Stockade Lake), City of Custer, private land ownership, private land development and roads are some of the land uses and events that have occurred. All of these activities or events individually have an impact on the watersheds.

There would be no cumulative effects to bed and bank stability, water purity aquatic life, wetlands and floodplains. These watershed features would not have direct or indirect effects, as discussed above.

The Watershed Condition Class for each watershed would remain unchanged from Class 2 as a result of this project. None of the alternatives proposes enough activities to change the ratings.

Sediment

There would be a slight increase in potential for sedimentation from the action alternative in the short term (<5 years) due to activities related to road crossings usually at the crossings. In the long term (>5 years) sediment potential would be reduced by the action alternative as compared to existing conditions because of the repair or fixing of 3 known CDAs. As a benefit of the activities, three (3) CDAs on Forest roads would be corrected.

Any sediment as a result of the Vestal project would be expected to be minimal for Alternative 2. There would be no cumulative effect to aquatic ecosystem from sediment from the no action alternative.

Flow Regimes

Changes to flow regimes, increased water, would occur with either alternative due to predicted MPB mortality and in Alternative 2, proposed treatments. This would add to other increases in flow, such as MPB caused mortality adjacent to the analysis area and be a positive cumulative effect for both alternatives.

Riparian Ecosystems

Impacts to the riparian ecosystem as a result of the Vestal Project would occur. This would add to what has already occurred (roads, private land development, grazing) in the watershed creating a cumulative impact. Impacts to riparian ecosystems are expected to be minimal and temporary for Alternative 2. There would be no cumulative effects to riparian ecosystems resulting from the no action alternative.

Best Management Practices (BMP) Effectiveness

BMPs by definition are "Common-sense actions required, by law, to keep soil and other pollutants out of streams and lakes. BMPs are designed to protect water quality and to prevent new pollution" (IFPC 2003). BMPs are implemented to control or limit non-point source pollution.

"BMPs are developed by the State of SD…to ensure compliance with federal and state water-quality standards," (USDA Forest Service 2006a). They provide good guidance but are fairly general. WCPs are practices to protect soil, aquatic, and riparian systems. USDA Forest Service, Region 2, developed them. They are more specific with design criteria. "If used properly, they meet or exceed State BMPs," (USDA Forest Service, 2006b). BMPs and WCPs are incorporated into the Forest Plan standards and guidelines and provide more specific direction.

The question has been brought up, how do we know the BMPs are effective or work? The Black Hills National Forest completed a Forest Plan BMP Evaluation (USDA Forest Service, 2003a). Two studies done on the Black Hills National Forest by the Black Hills Forest Resource Association, 2001 and Wyoming Timber Industry Association, 2001, reviewed BMP effectiveness. The conclusion is "These results highlight the consistent application and effectiveness of BMPs in the Black Hills and other National Forests" (USDA Forest Service, 2003a). The evaluation goes on to review other studies or reports and comes to the conclusion that "These studies highlight the effectiveness of BMPs in forests throughout the United States" (USDA Forest Service, 2003a). This evaluation shows that BMPs are effective. Since this evaluation has been completed field audits were completed in 2004 and 2009 in SD (Black Hills Forest Resource Association, 2004, 2009). Results showed application of BMPs were 92% in 2004, 95% in 2009, compared to 82% in 2001 and effectiveness of the BMPs was 95% in 2004, 95% in 2009, compared to 84% in 2001. This additional information shows the continued application and effectiveness of BMPs in SD. "The audit results from 2001, 2004 and 2009 have established a positive trend of on the ground BMP improvement" (Black Hills Forest Resource Association, 2009).

Additional BMP/WCP monitoring was completed on the Hell Canyon Ranger District, for 2002 through 2010. A summary report and subsequent yearly reports show that the BMP/WCP are being implemented and are effective and states, "Logging practices on the Hell Canyon Ranger District have not had any negative impact on the watershed and streams and that they do comply with the requirements of the CWA" (USDA Forest Service, 2008, 2009 & 2010).

The Vestal project would have WCPs and BMPs prescribed and implemented. This would protect the water quality of the streams and creeks in the project area and the activities that are planned would meet the requirements of the CWA.

Short Term Uses and Long Term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA, Section 101).

Please refer to the Silviculture and Soils sections in Chapter 3 for discussions related to short-term uses and long-term productivity. The proposed actions in this project include design criteria (see Appendix B) to protect soil productivity. These short-term actions would generally not damage or diminish long-term resource productivity.

As provided for by the Forest Plan, minimum management requirements guide implementation of the action alternative. Adherence to these requirements ensures that long-term productivity of the land is not impaired by short-term uses. Monitoring specified in this EIS and the Forest Plan validates that the management requirements and mitigation are effective in protecting long-term productivity.

Unavoidable Adverse Effects

The following is a description of adverse effects that are unavoidable with implementation of the action alternative. For further discussion of the effects on the resources listed below, see Chapter 3 under the respective resource topics.

Forest Insect and Disease – will continue in the project area, at epidemic levels in some areas, and endemic levels in others.

Wildlife Habitat – for certain species may be adversely affected to varying levels with implementation of the action alternatives. The Wildlife section of this EIS discloses those effects.

Air Quality – may be adversely affected on a temporary/seasonal basis as a result of planned prescribed burning and dust from roads and activities.

Scenic Quality – may be affected adversely for some observers by the various levels of vegetation treatment and other actions planned.

Fire/Fuels Hazard – may be increased during the short-term in some areas as result of slash created from vegetation treatment. With disposal treatment this hazard will be reduced. There exists a higher long-term potential for large-scale wildfire under Alternative 1 versus Alternative 2.

Soils – can be eroded wherever vegetation and soils are disturbed. Compaction can occur where vehicles and equipment are used.

Heritage Resources – can be disturbed or destroyed where human or natural activities take place.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as a temporary loss of timber productivity in forested areas that are kept clear for use as a power line right-of-way or a road. For further discussion of the effects on resources, see the respective resource topics.

There are **no irreversible commitments** of resources with any of the alternatives analyzed.

There are **no irretrievable commitments** of resources under any alternative.

Environmental Justice

Executive Order 12898 directs Federal agencies to focus attention on human health and environmental conditions in minority communities and low-income communities. The purpose of the executive order is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.

In Phase II FEIS, Tables 3-59 and 3-60 highlight the demographic statistics for identifying potential communities of concern (USDA Forest Service 2005). None of the counties in the study area contain low-income or minority populations as defined by Executive Order 12898. No additional outreach or analysis has been performed, as there would be no disproportionate negative effects on such communities under any of the alternatives.

Additional evaluation of minority and low-income population data (USDA Forest Service 2009c) show no evidence to suggest that the proposed action would have a disproportionate adverse effect on low-income populations. Evaluations also show that minority populations for the county in the study area are unlikely to meet the Environmental Justice criterion for a minority population and would be unlikely to experience disproportionate adverse effects from implementation of any alternative.

Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with…other environmental review laws and executive orders."

The project does not involve impounding or diverting water, or adverse impacts to threatened or endangered species, therefore, formal consultation with the U.S. Fish and Wildlife Service under the Fish and Wildlife Coordination Act is not required.

No ground disturbing actions would occur in known elgible historical places. Section 106 of the National Historic Preservation Act has been conducted as required and the State Historic Preservation Officer has concurred with a finding of no impact to eligible historic or prehistoric sites.

The mission of the USDA Forest Service is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. The agency recognizes that climate change is an important emerging issue. To help guide agency actions in addressing this challenge, the Forest Service has developed the Strategic Framework for Responding to Climate Change (USDA Forest Service 2008c). One of the stated goals in this framework is to *Promote the management of forests and grasslands to reduce the buildup of greenhouse gasses, while sustaining the multiple benefits and services of these ecosystems*. This project contributes toward meeting the agency's goal of mitigating the buildup of greenhouse gasses by managing the forest landscape within the project area so that it is more resilient to deforestation or catastrophic loss. Thereby maintaining or increasing its ability to sequester carbon.

CHAPTER 4: CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

Interdisciplinary Team Members:

Lynn Kolund	District Ranger – Bachelor of Science, Forest Biology, Colorado State University, 1978. Thirty-one years of Forest Service experience in timber, silviculture, recreation, wilderness, fire and lands. Worked on seven districts and two Supervisor's offices on six National Forests in Wyoming, Colorado, Alaska and South Dakota.
Kelly Honors	District NEPA Coordinator – Bachelor of Science, Forestry, State University of New York, College of Environmental Science and Forestry, 1985. Twenty six years of Forest Service experience at the district level in timber and planning; twenty-three of those years on the Black Hills National Forest. Twenty-two years experience in writing NEPA documents.
Kurt Allen	Entomologist – USDA Forest Service, Forest Health Protection – Bachelor of Science, Biology, University of Northern Iowa, 1988. Master of Science, Forestry and Entomology, Iowa State University, 1992. Service Center leader and entomologist since 1995. Entomologist, Forest Health Protection for the Northeastern Area, Durham, NH, from 1992-1995. Currently conduct applied research and use developing technologies to find answer to forest management/forest insect issues. Supervise Forest Health Management staff.
Don Boone	Silviculturist – Bachelor of Science, Forest Science, University of Wisconsin-Madison, 1979. Twenty-eight years of Forest Service experience as a Forestry Technician, Pre-Sale Forester, and Silviculturist on the Routt and Black Hills National Forests. Six years experience with the South Dakota Division of Forestry and two years experience with Custer State Park, South Dakota.
Gwen Lipp	Fire/Fuels Planner – Bachelor of Science, Environmental Engineering, South Dakota School of Mines and Technology, 2004. Ten years of Forest Service experience at the district and national level in fire operations, fuels, timber, prescribed

	fire and planning. Current qualifications include: Incident Commander Type 4, Dozer Boss, Engine Boss, Prescribed Fire Effects Monitor, Prescribed Fire Ignition Specialist, Resource Unit Leader, Situation Unit Leader, Task Force Leader trainee, Burn Boss Type 2 trainee and Planning Section Chief trainee.
Jamie Wheeler	Wildlife Biologist – Bachelor of Science, Biology, St. Norbert College, DePere, WI, 1999. Master of Science, Wildlife and Fisheries Science, South Dakota State University, Brookings, SD, 2007. Worked from 2005-2007 at Wind Cave National Park as a wildlife SCEP (Student Career Experience Program) student. Three years of Forest Service experience at the district level as a wildlife biologist.
Steve Hirtzel	Fisheries Biologist – Bachelor of Science in Wildlife & Fisheries Science, South Dakota State University, Brookings, SD. Twenty-one years of experience in research, regulatory and management programs with various federal agencies, the past seven years on the Black Hills National Forest.
Les Gonyer	Hydrologist – Bachelor of Science, Forestry, minor in Hydrology, University of Minnesota, 1977. Thirty-five years of Forest Service experience at the District and Forest levels in Utah, New Mexico, Oregon, Idaho, Wyoming, California, and South Dakota in watershed, timber, special uses, minerals, fire, engineering, and environmental analysis. Red-carded firefighter, FFT2. BAER (Burned Area Emergency Response) Team Leader and RAT (Rapid Assessment Team) team experience.
Lucas Bindel	Rangeland Management Specialist – Bachelor of Science – Rangeland Ecology and Watershed Management; Minor-Reclamation and Restoration Ecology. University of Wyoming, 2009. Two years experience as Rangeland Management Specialist for Forest Service.
Matthew Scott	Botanist – Bachelor of Science – Rangeland Ecology and Watershed Management; Minor, Reclamation and Restoration Ecology; Extensive coursework in soils and botanical sciences, 2006. Three years experience fuels, wildland and prescribed fire management. Four years experience as a Natural Resource Specialist for Laramie Rivers Conservation District focused in rangeland management, vegetation monitoring, and wildlife habitat management. Qualified for OPM 430 Series (Botanist) in 2010. Six months experience as Botanist on the Black Hills National Forest.

Michael Engelhart	Archaeologist – Archaeologist- Bachelor of Arts in Anthropology from North Dakota State University, 2007. Diploma with Honors, Korean, Defense Language Institute, 2000. Graduate credits in Anthropology from the University of Wyoming, 2007-Present. Three years' experience as an Archaeological Technician for the Black Hills National Forest, 2007-2009. Two years experience as an Archaeologist at the district level for the Black Hills National Forest, 2009-Present.
Donald Weiand	Civil Engineering Technician – Bachelor of Science in Industrial Technology from Black Hills State University, 1996. Associate of Science in Drafting from Black Hills State University, 1994. Fourteen years of Forest Service experience at the district and Forest level in transportation planning, road design, contract preparation & administration, and environmental analysis. Certified in roads, administration of timber sales, and public works under the Forest Service National Construction Certification Program. Eighteen years as an Army Engineer with experience in route reconnaissance and roads planning and road construction operations.
Corbin Herman	Civil Engineering Technician - Two years of Forest Service experience at the District and Forest level in transportation planning, road design, contract preparation and administration, and environmental analysis. Certified in Roads & Aggregate Base and Surfacing, Inspector of Timber Sales and Public Works under the Forest Service National Construction Certification Program. Fire Fighting - Qualified as a Firefighter Type 2 and Helicopter Crewmember Trainee. Construction Foreman/Supervisor - Two years as Custer County Highway Superintendent, two years as Custer City Director of Streets, Parks, & Public Buildings, six years as heavy Equipment Operator for Custer County Highway Department.
Gail Mayer	Civil Engineering Technician – Bachelor of Arts in Outdoor Recreation from Chadron State College, Chadron, NE, 1992. Eight years of experience with the National Forest Service in surveying, GPS, road design, and package layout. Two years experience with Federal Highway Administration in road construction inspection and materials testing. One year experience with the Wyoming Department of Transportation in surveying and materials testing.
Dave Pickford	Recreation – Bachelor of Arts in Outdoor Recreation from Eastern Washington University, 1984. Eighteen years of Forest Service experience as the District level in timber,

	firefighting, trails, recreation and wilderness on the Ottawa and Black Hills National Forests. USFS, NPS and USFWS field experience in Washington, Idaho, Wyoming, Colorado, UP Michigan as well as NH State Parks. Former USAF Survival Specialist and USAF (civilian) Outdoor Adventure Program Staff.
Meagan Buehler	Lands Specialists – Bachelor of Science, Forestry, minor in Wildlife & Fisheries Biology, University of Massachusetts-Amherst, 1997. Eleven years experience with the Forest Service at the district level for the Black Hills National Forest currently as District Lands Specialist. One season experience with the BLM in Oregon as a forester-stand exams and timber sale preparation.
Gary Haag	Geologist/Minerals Specialist: Bachelor of Arts, Geology, Rutgers University, 1979 & Master of Science, Geology, Rutgers University, 1982. New Jersey Department of Environmental Protection 1884-1989, ground water discharge permit program. South Dakota Department of Environment and Natural Resources 1989-2010, ground water discharge permit program. February 2010 to present on BHNF-Hell Canyon Ranger District as a geologist working on locatable and mineral material projects and mineral potential reports for mineral withdrawals and timber sales.
Patrick Morton	Geologist/Minerals SCEP – Bachelor of Science, Geology, Towson University, 2003 & Master of Science, Geology, South Dakota School of Mines and Technology, 2011. June 2010 to Present on BHNF as a SCEP geologist/geologist working on locatable and mineral material projects and mineral potential reports for mineral withdrawals and timber sales.
Stephen Keegan	Forest Landscape Architect - Bachelor of Science, Landscape Architecture & Environmental Studies, State University of New York (SUNY) - College of Environmental Science and Forestry, 1980; Bachelor of Science, Syracuse University 1980; Associates of Arts, Humanities, SUNY - Onondaga Community College, 1978. Twenty-eight years of Forest Service experience at the Forest and Zone level on the Helena, Clearwater, Malheur & Black Hills National Forests. Of which twenty-one years have been as a Landscape Architect conducting Scenic Resource Assessments for: vegetation and fuels management, watershed analysis, utility & facility construction, wild & scenic rivers, scenic byways, and burned area emergency rehabilitation.

Margaret Farrell	GIS/Database Management Specialist – Bachelor of Science, Geology, University of Wyoming, 1985. Eighteen years of Forest Service experience in database management, including fourteen years experience in ESRI GIS products.

Federal, State, and Local Agencies:

City of Custer
    Mayor Gary Lipp
Custer Rotary
Custer Chamber of Commerce
    Dave Ressler
Hill City Chamber of Commerce
Keystone Chamber of Commerce
Custer County Commissioners
Custer County Conservation District
Custer County Emergency Management
    Mike Carter
Custer State Park
    Gary Brundige
South Dakota Division of Forestry
    Dave Hettick
    Jim Strain
South Dakota Division of Wildland Fire Suppression
    Andy Tate
South Dakota State Department of Game, Fish, and Parks
    Shelly Deisch
    Shannon Percy
South Dakota Department of Transportation
    Craig McIntyre
The Honorable John Thune, United States Senate
The Honorable Tim Johnson, United States Senate
The Honorable Kristi Noem, House of Representatives
The Honorable Dennis Daugaard, South Dakota Governor's Office
Mount Rushmore National Monument
    Bruce Weisman
U.S. Environmental Protection Agency
    Larry Svoboda

Tribes:

Cheyenne River Sioux Tribe
Cheyenne-Arapaho Tribes of Oklahoma
Crow Creek Sioux Tribe
Eastern Shoshone Tribe
Flandreau Santee Sioux Tribe
Kiowa Ethnographic Endeavor for Preservation
Lower Brule Sioux Tribe
Mandan, Hidatsa and Arikara Nation
Northern Arapaho Tribe
Northern Cheyenne Tribe
Oglala Sioux Tribe
Rosebud Sioux Tribe
Santee Sioux Nation
Sicangu Lakota Treaty Council Office
Sisseton-Wahpeton Sioux Tribe
Spirit Lake Sioux Tribe
Standing Rock Sioux Tribe
Yankton Sioux Tribe

Organizations, Groups, and Businesses:

Azela Holding Co.
Biodiversity Conservation Alliance
    John Persell
Black Hills Electric Cooperative
Black Hills Forest Resource Association
    Tom Troxel
    Carson Engleskirger
Black Hills Power and Light
Bland Road Association
    Georgia Holmes
Broken Arrow Campground
Brown/Conn/Lane Subdivision
    Homeowners Association
Buttercup Holding Co.
Carnation Holding Co.
Custer's Camp Properties
    Raymond & Elaine Zobel
Custer Volunteer Fire Department
    Chief Joel Behlings
Crazy Horse Memorial
    Ruth Ziolkowski
Emerald and Ruby Road District
    Verl Scheibe
Friends of the Norbeck
    Brian Brademeyer
Golden West Communications
Lilac Holding Co.
Lutherans Outdoors
    Molly Sasser-Goehner
Marigold Holding Co.
Mineral Tech Corporation
Native Ecosystems Council
    Sara Jane Johnson
National Outdoor Leadership School
    Andy Blair
Outlaw Ranch
Pacer Corporation
Prairie Hills Audubon Society
    Nancy Hilding
Rosemary Holding Co.
Rushmore Forest Products
    Dan Buehler
Save Our Black Hills Coalition
    Darcie Henegar
Sierra Club – Black Hills Group
    Jim Margadant
Spearfish Forest Products
    Paul Pierson
Western 4H Camp Association
    Leo Orme
Wildflower Holding Co.

Others:

Baker, Virgil
Ballard, Russ & Ellen
Blumenthal, Kinta
Bowman, Virgil & Kathryn
Brunner, James
Busskohl, Bill
Cambier, Larry & Nancy
Conn, Herb & Jan
Crayden, Terry
Dean, James
Dean, Jeremy
Dillon, Patrick
Doughty, Kent & Rita
Eich, Roger & Marletta
Ellerton, Terry & Vera
Fagnan, Brian
Fagnan, Mary & Robert
Filley, Archie
Fiveash, Monica
Gerstner, Karen
Gilg, Tim
Goodwin, Andy
Gordon, Richard
c/o Cherly Warren
Gladys Raver Family Partnership
c/o Lawana Gramm
Griffin, Steve & Nancy
Grimes, Jim & Ingrid
Gutzmer, Wallace
Hamm, Melissa & Mike
Hansen, Gary
Howard, Jim
Killman, Melvin
Knuckles, Dennis & Penny
Larson, Robert
Laverick, Jim & Carol
Lewison, Matthew & Ellen
Loomis, Tom
Manlove, Steven
Maude, Martin & Jinx
Mortenson, Jeffery
Mumm, Clifford
Noonan, Matthew
O'Brien, Dan
Paulsen, Gladwin & Juanice
Paulsen, Mitchell
Reindl, Kevin & Denise
Roinstad, Lori
Sander, Timothy
Stumpf, Richard
Uhlmann, Van
Van Asperen, Curtis
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Vanderploeg, Marty
Velder, Daniel, Gary & Linda
Wahle, Catherine
Wearne, Brent
White, Brent & Karen
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CHAPTER 5: LITERATURE CITED and GLOSSARY

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Glossary

Activity Fuels
Fuels resulting from or altered by mechanical treatments, such as tiimber harvest or thinning, as opposed to naturally created fuels.

Age Class
Groups of trees approximately the same age.

Allotment
A designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range allotment management plan. It is the basic land unit used to facilitate management of the range resource on National Forest lands.

Area of Potential Effects
The geographic area or areas within which an undertaking may cause changes in the character or use of historic properties, if any such properties exist.

Arterial Road
Provides service to large land areas and usually connects with public highways or other Forest arterial roads to form an integrated network of primary travel routes. The location and standard are often determined by a demand for maximum mobility and travel efficiency rather than specific resource management service. It is usually developed and operated for long-term land and resource management purposes and constant service.

At-Risk-Community (ARC)

An area (A) that is comprised of —(i) an interface community as defined in the notice entitled "Wildland Urban Interface Communities Within the Vicinity of Federal Lands That Are At High Risk From Wildfire" issued by the Secretary of Agriculture and the Secretary of the Interior in accordance with Title IV of the Department of the Interior and Related Agencies Appropriations Act, 2001 (114 Stat. 1009) (updated 66 Fed. Reg. 43384, August 17, 2001); or (ii) a group of homes and other structures with basic infrastructure and services (such as utilities and collectively maintained transportation routes) within or adjacent to Federal land; (B) in which conditions are conducive to a large-scale wildland fire disturbance event; and (C) for which a significant threat to human life or property exists as a result of a wildland fire disturbance event."

Available Fuel

The total mass of ground, surface and canopy fuel per unit area consumed by a fire, including fuels consumed in postfrontal combustion of duff, organic soils, and large woody fuels.

Basal Area

The cross-sectional area of a stand of trees measured at 4 feet 6 inches from the ground. The area is expressed in square feet per acre.

Best Management Practices (BMPs)

Are methods, measures, or practices selected by an agency to meet its nonpoint source control needs. BMPs include but are not limited to structural and nonstructural controls, and operation and maintenance procedures. BMPs can be applied before, during and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CRF 130.2(m)). An agreement between the USFS and the State of South Dakota stipulates that USFS Region 2 Watershed Conservation Practices (WCPs) will be used above and beyond South Dakota BMPs to comply with state and federal water quality regulations related to the Clean Water Act.

Big Game

Certain wildlife that may be hunted for sport under state laws and regulations. In the Black Hills, these animals include deer, elk, turkey, mountain goats, and bighorn sheep.

Biological Evaluations

As defined by FSM 2670.5, a biological evaluation is a documented Forest Service review of Forest Service programs or activities in sufficient detail to determine how an action or proposed action may affect any threatened, endangered, proposed, or sensitive species.

BMPs

(See "Best Management Practices.")

Board Foot

Timber measurement equaling the amount of wood contained in a board one-inch thick, 12-inches long, and 12-inches wide.

Broadcast Burning

A management ignited fire, allowed to burn under specific conditions (prescriptions) and within established boundaries to achieve some land-management objective.

Browse
Twigs, leaves and young shoots of trees and shrubs on which animals feed.

Canopy
The cover by vegetation and/or branches. Often but not always restricted to the tree layer or greater than six feet tall.

Canopy Closure/Cover
The percentage of the ground and/or sky covered by vegetation and/or branches. These are perceived from a human point of view perpendicular to flat ground.

Canopy Fuels
The live and dead foliage, live and dead branches, and lichen of trees and tall shrubs that lie above the surface fuels. (See also Available Canopy Fuel)

Clearcut
The harvesting (removal) in one cut of all trees in an area. The area harvested may be a patch (zero-to-ten acres), stand (not more than 40 acrea), or strip.

Coarse Woody Debris (CWD)
Woody material greater than 3 inches in diameter, that is derived from tree limbs, boles, and roots (excluding stumps) in various stages of decay.

Collector Road
Serves smaller land areas than a Forest arterial road and is usually connected to a Forest arterial or public highway. Collects traffic from Forest local roads and/or terminal facilities. The location and standard are influenced by both long-term multi-resource service needs, as well as travel efficiency. May be operated for either constant or intermittent service depending on land use and resource management objectives for the area served by the facility.

CMAI
(See "Culmination Mean Annual Increment.")

Compaction
The packing together of soil particles by forces exerted at the soil surface, resulting in increased soil density.

Conifer
A group of cone-bearing trees, mostly evergreen, such as the pine and spruce.

Council on Environmental Quality (CEQ)
An advisory council to the President established by the National Environmental Policy Act (NEPA) of 1969.

Cover Type
The vegetative species that dominates a site. Cover types are named for one plant species or non-vegetated condition presently (not potentially) dominant, using canopy or foliage cover as the measure of dominance.

Crown
The upper part of a tree or other woody plant carrying the main branch system and foliage and surmounting at the crown base a more or less clean stem.

Crown Fire
Any fire that burns in canopy fuels.

Crown Fire Hazard
A physical situation (fuels, weather, and topography) with potential for causing harm or damage as a result of crown fire.

Cubic Foot
A unit of measure usually referring to wood volume (1 foot wide by 1 foot long by 1 foot thick).

Culmination Mean Annual Increment (CMAI)
The point at which a tree or stand achieves its greatest average growth, based on expected growth, according to the management systems and utilization standards assumed in the Forest Plan.

Cultural Resources
(See "Heritage Resources.")

Cumulative Effects
Collective results of past, present, and reasonably foreseeable future actions, regardless of which agency or person undertakes the actions.

DBH
(See "Diameter at Breast Height.")

Dead Fuels
Fuels with no living tissue within which moisture content is governed almost entirely by solar radiation.

Decision Documents
Documents that provide the criteria and information used in the formulation and evaluation of alternatives and the preferred alternative.

Design Criteria
Management measures included in the design of a project to avoid or minimize potential resource impacts.

Diameter at Breast Height (DBH)
The diameter of a standing tree at a point 4 feet, 6 inches from ground level.

Ecosystem
A community of living plants and animals interacting with each other and with their physical environment. A geographic area where it is meaningful to address the interrelationships with human social systems, sources of energy, and the ecological processes that shape change over time.

Eligible (Heritage Resources)
Indicates a specific heritage resource qualifies for or is already listed in the National Register of Historic Places.

Endangered Species

Any species of animal or plant in danger of extinction throughout all or a significant portion of its range and so designated by the Secretary of Interior in accordance with the 1973 Endangered Species Act.

Ephemeral Streams

A stream or portion of a stream that has flowing water only in direct response to precipitation in the immediate locality (watershed or catchment basin), and only flows during and for a short duration after the precipitation event. Runoff from rainfall or snowmelt is the primary source of water for stream flow. Groundwater is not a source of water for the stream and thus the stream bed is at all times above the water table.

Erosion

The wearing away of the land surface by running water, wind, ice, gravity, or other geological activities.

Erosion Hazard Rating

The probability of soil loss from off-road and off-trail disturbance activities that remove most or all of the protective ground cover and expose the soil surface. Erosion hazard ratings are developed by the Natural Resource Conservation Service (NRCS) based on forest soil properties.

Fire Hazard

A fuel complex, defined by volume, type, condition, arrangement and location, that determines the ease of ignition and the resistance to control.

Fire Incidence

The average number of fires in a specified area during a specified time period.

Fire Occurrence

Number of fires per unit time in a specified area (synonym for fire frequency).

Fire Regime Condition Class (FRCC)

A tool developed to evaluate current against natural landscape characteristics with respect to vegetation-fuel composition and structure, fire frequency, fire severity, and other disturbances. **Fire Regime Condition Class** characterizes the degree of departure from natural fire, vegetation, and fuel regimes.

- **Fire Regime Condition Class I -** Fire regimes are within natural range, and risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within historical range.
- **Fire Regime Condition Class II -** Fire regimes have been moderately altered from their natural range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from natural frequencies by one or more return intervals. Vegetation attributes have been moderately altered.
- **Fire Regime Condition Class III -** Fire regimes have been significantly altered from their natural range. The risk of losing key ecosystem components is high. Fire frequencies have departed from natural frequencies by several return intervals. Vegetation attributes have been significantly altered.

Fire Risk

The chance of a fire starting, as affected by the nature and incidence of causative agents, including lightning, people, and industry. Three risk scales are used: high, moderate, and low. High-risk areas include locations where lightning, people, or industry have commonly caused fire in the past; moderate-risk areas include locations where lightning, people, or industry have periodically caused fire in the past; and low-risk areas include locations where lightning, people, or industry have infrequently caused fire in the past.

Fire Suppression

All the work and activities connected with fire-extinguishing operations beginning with discovery and continuing until the fire is completely extinguished.

Fire Suppression Objective

To suppress wildfires at minimum costs consistent with land and resource management objectives and fire-management direction as determined by National Fire Management Analysis System (NFMAS). This includes all work and activities associated with fire-extinguishing operations beginning with discovery and continuing until the fire is completely extinguished.

Fireline Intensity

The rate of heat energy released per unit time per unit length of a fire front. Numerically, it is the product of the heat combustion, quality of fuel consumed per unit area in the fire front, and the rate of spread of a fire as measured in BTUs per second per foot of the fire front.

Floodplain

The lowland and relatively flat areas adjacent to streams and standing bodies of water and coastal waters, including debris cones and flood-prone areas of offshore islands. 100-year floodplains include, at a minimum, the area subject to a 1% chance of flooding in any given year.

Forage

Vegetation used for food by wildlife, particularly ungulate wildlife and domestic livestock.

Forbs

Any herbaceous plant other than those in the grass, sedge, and rush families. For example, any non-grass-like plant that has little or no woody material.

Forest System Roads

Roads that are part of the Forest Development Transportation System that includes all existing and planned roads as well as other special and terminal facilities designated as part of the Forest Development Transportation System.

Fuel Breaks

Generally wide strips of land 100-300 feet in width on which native vegetation has been modified so that fires burning into them can be more readily controlled. Some fuel breaks contain fire lines such as roads or hand lines that can be widened.

Fuel Complex

The combination of ground, surface, and canopy fuel strata.

Fuel Loading
The volume of the available or burnable fuels in a specified area, usually expressed in tons per acre.

Fuel Model
A set of surface fuel bed characteristics (load and surface-area-to-volume-ratio by size class, heat content, and depth) organized for input to a fire model. Standard fuel models (Anderson 1982) have been stylized to represent specific fuel conditions.

Fuel Treatment
Any manipulation or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control, including lopping, chipping, crushing, piling, and burning (synonym for fuel modification).

Fuels
The organic materials that will support the start and spread of a fire: duff, litter, grass, weeds, forbs, brush, trees, and dead woody materials.

Goal
Broad, general statement that encompasses the desired future conditions that the U.S. Forest Service seeks to attain.

Grass/Forb, Grass/Forb Stage (Structural Stage 1)
(See Structural Stages - Structural Stage 1)

Guideline
Preferred or advisable courses of action; deviations from guidelines are permissible, but the responsible official must document the reasons for the deviation.

Hardwood
Pertains to broadleaf trees.

Herbicide
A chemical substance used for killing or suppressing plants.

Heritage Resources
The physical remains (including but not limited to artifacts, structures, landscape modifications, rock art, trails, or roads) and conceptual content or context (as a setting for legendary, historic, or prehistoric events, such as a sacred area for native peoples) of an area.

Ignition (Fire Management)
The initiation of combustion.

Infrastructure
The facilities, utilities, and transportation systems needed to meet public and administrative needs.

Insect Epidemic

High population levels of insect pests that cause substantial injury to plant or animal hosts. Used synonymously with "Outbreak".

Intensity (Fire Management)

How hot a fire is. Specifically, a measure (in BTUs per foot per second) of the energy released per unit of time in an area of actively burning fire. The amount of heat released per foot of fire front per second.

Interdisciplinary Team (IDT)

A group of individuals with different specialized training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one discipline is sufficiently broad to adequately solve the problem. Through interaction, participants bring different points of view and a broader range of expertise to bear on the problem.

Intermittent Stream

A stream or portion of a stream that flows, in its natural condition, only during certain times of the year when ground water provides water for streamflow. During dry periods intermittent streams may not have flowing water. Runoff from rainfall or snowmelt is a supplemental source of flow.

Landscape Character

Particular attributes, qualities, and traits of a landscape that give it an image and make it identifiable or unique. Valued landscape character creates a "sense of place" and describes the image of an area. The landscape character provides a reference for defining the inherent scenic attractiveness classes.

Late Succession

Ecosystems distinguished by old trees and related structural features (Mehl, 1992). This term encompasses the later stages of stand development that typically differ from earlier stages in structure, composition, function, and other attributes.

There are two types of late-successional ponderosa pine defined for the Black Hills. The first type, open-canopy late-successional ponderosa pine, occurs where periodic, low-intensity fires have been part of the ecosystem. These late-successional stands would consist of clumps or groups of trees with grasses in the openings between the clumps. They would contain large old trees with open branches, irregular, and flattened crowns. The clumps or groups of trees would contain little down dead material and few small trees. The second type, closed-canopy late-successional ponderosa pine occurs where periodic, low intensity high-frequency fires have not been a significant part of the ecosystem. These stands would contain large old trees with open branches and irregular crowns. The stands would have multiple canopy layers made up of various-aged trees. They would be well stocked with trees and contain standing dead and down trees.

Lopping and Scattering

Lopping logging debris and spreading it more or less evenly on the ground.

Management Indicators Species (MIS)

Plant or animal species selected in a planning process that are used to monitor the effects of planned management activities on populations of wildlife and fish, including those that are socially or economically important.

Meadow

An area of perennial, herbaceous vegetation, usually grass or grass-like. A natural opening in a forest, generally at higher elevations, that produces exceptional levels of herbaceous plants.

Mechanical (treatment, activity)

Vegetation management activities which are implemented with the use of mechanized equipment (i.e. chainsaws, etc.).

Monitoring

The sample collection and analysis of information regarding Forest Plan and project level management practices to determine how well objectives have been met as well as the effects of those management activities on the land and environment.

Multi-storied Stands (Vegetation)

Plant communities having two or more recognizable canopy layers or height levels.

National Environmental Policy Act of 1969 (NEPA)

An act declaring a national policy to encourage productive harmony between people and their environment; to promote efforts that will prevent or eliminate damage to the environment and the biosphere and simulate the health and welfare of people; to enrich the understanding of the ecological systems and natural resources important to the nation; and to establish a Council on Environmental Quality.

National Fire Management Analysis System (NFMAS)

A broad umbrella process to help fire managers identify the most efficient fire program meeting the direction in the Forest Plan. This includes information for the planning record on program composition, annual programmed costs, emergency firefighting costs, expected resource impacts, and net value change.

National Forest Management Act (NFMA)

A law passed in 1976 amending the Forest and Rangeland Renewable Resources Planning Act that requires the preparation of Regional and Forest Plans and the preparation of regulations to guide that development.

National Register of Historic Places (NRHP)

A list of heritage resources that have local, state, or national significance. The list is maintained by the Secretary of the Interior.

Natural Regeneration

The renewal of a tree crop by natural means without seeding or planting done by people. The new crop is grown from self-sown seed or by vegetative means, such as root suckers.

Non-motorized Activities

Activities that do not incorporate the use of a motor, engine, or other non-living power source. Non-motorized activities exclude such machines as aircraft, hovercraft, motorboats, automobiles, motor bikes, snowmobiles, bulldozers, chainsaws, rock drills, and generators.

Noxious Weeds

Those plant species designated as weeds by federal or state laws. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage; poisonous; toxic; parasitic; a carrier or host for serious insects or diseases; and generally non-native.

Objective

Concise statement of desired measurable results intended to promote achievement of specific goals. Attainment of objectives is limited by the application of standards and guidelines.

Outbreak

See insect epidemic.

Overstory

The portion of vegetation in a forest forming the uppermost foliage layer.

Perennial Stream

A stream or portion of a stream that has flowing water year-round, during a typical year. Groundwater is the primary source sustaining base stream flow, with rainfall or snowmelt providing supplemental stream flow. The water table is located above the stream bed for most of the year.

Piling and Burning

Piling slash resulting from logging and subsequently burning individual piles.

Plant Communities

Assemblage of plant species living in an area. It is an organized unit to the extent that it has characteristics in addition to the individuals and populations and functions as a unit.

Products Other than Logs (POL)

Products such as posts, poles, and fiber from trees or parts of trees less than sawlog size. POL usually includes trees greater than 5 inches diameter breast height (DBH) (4.5 feet from ground level) and less than 7.9 inches diameter breast (DBH), with tops of trees greater than 4 inches to less than 6 inches in diameter.

Prescribed Burning/Fire

Controlled application of fire to wildland fuels in either their natural or modified state under specified environmental conditions that allows the fire to be confined to a predetermined area and at the same time produce the fireline intensity and rate of spread required to attain planned resource management objectives (synonym for controlled burning).

Prescription (Fire Management)

A written statement defining objectives to be attained, as well as temperature; humidity; wind direction and wind speed; fuel-moisture content; and soil moisture, under which the fire will be allowed to burn, generally expressed as acceptable ranges of the various indices, and the limit of the geographic area to be covered.

Ranger District

Administrative subdivisions of the Forest supervised by a District Ranger who reports to the Forest Supervisor.

Raptor Nests
Any nest of eagles, hawks, falcons, or owls.

Regeneration (Silviculture)
The renewal of vegetation whether by natural or artificial means. Also, the new growth itself.

Responsible Official
The Forest Service employee who has the delegated authority to make a specific decision.

Riparian Area
(See "Riparian Ecosystem.”)

Riparian Communities
Repeating, classified, defined, and recognizable assemblages of plantor-animal communities associated with riparian areas.

Riparian Ecosystem
The moist transition zone between the aquatic ecosystem and the relatively drier, more upland, terrestrial ecosystem(s). This transition zone can extend both laterally and longitudinally away from aquatic ecosystems, sometimes into headwater swales that have no defined stream channel. The riparian ecosystem is the area whose soil is relatively more moist than the adjacent upland and whose vegetation growth reflects the greater accumulation of available water.

Roads
A general term denoting a way with at least two-wheel tracks for purposes of travel by vehicles greater than 50 inches in width.

Sawtimber
Trees suitable in size and quality for producing logs that can be processed into lumber. For planning purposes, trees with an 8-inch diameter or more are classified as sawtimber.

Scarify
To abrade, scratch, or modify the surface of the ground to expose mineral soil (as in site preparation) or to break up compacted soil layers (as during road decommissioning or landing rehabilitation).

Scenery
The composition of basic terrain, geologic features, water features, vegetative patterns, and landrise effects that typify a land unit and influence the visual appeal the unit may have for visitors.

Scenic Class
Scenic classes measure the relative importance or value of discrete landscape areas having similar characteristics of scenic attractiveness and landscape visibility. Scenic classes are used during forest planning to compare the value of scenery with the value of other resources, such as timber, wildlife, late succession,

or minerals. The higher the scenic class, the more important it is to maintain the highest scenic value. Scenic classes are determined and mapped by combining the three classes of scenic attractiveness with the distance zones and concern levels of landscape visibility. A numerical value of 1 to 7 is assigned to Forest lands. Generally, scenic classes 1-2 have high public value; classes 3-5 have moderate value; and classes 6 and 7 have low value.

Scenic Integrity (Existing or Objective)
State of naturalness or conversely the state of disturbance created by human activities or alteration. Integrity is stated in degrees of deviation from the existing landscape character in a national forest. It is the measure of the degree to which a landscape is visually perceived to be complete. The highest scenic integrity ratings are given to those landscapes that have little or no deviation from the character valued by constituents for its aesthetic appeal. Scenic integrity is used to describe an existing situation, standard for management, or desired future conditions.

Very High: A scenic integrity level that generally provides for ecological change only.

High: A scenic integrity level meaning human activities are not visually evident. In high scenic integrity areas, activities may only repeat attributes of form, line, color, and texture found in the existing landscape character.

Moderate: A scenic integrity level that refers to landscapes where the valued landscape character "appears slightly altered.” Noticeable deviations must remain visually subordinate to the landscape character being viewed.

Low: A scenic integrity referring to the landscapes where the valued landscape character "appears moderately altered." Deviations begin to dominate the valued , being viewed, but they borrow valued attributes such as size, shape, effect, and pattern of natural opening, vegetative type changes, or architectural styles within or outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed but compatible or complimentary to the character within.

Very Low: A scenic integrity level that refers to landscapes where the valued landscape character "appears heavily altered.” Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles within or outside the landscape being viewed. However, deviations must be shaped and blended with the natural terrain so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition.

Unacceptable Low: A scenic integrity level that refers to landscapes where the valued landscape character being viewed appears extremely altered. Deviations are extremely dominant and borrow little if any line, form, color, texture, pattern, or scale from the landscape character. Landscapes at this level of integrity need rehabilitation. This level should only be used to inventory existing integrity. It must not be used as a management objective.

Sediment

Displaced soil material suspended in water or that has been deposited in streams and lakes.

Sensitive Species

Those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density; or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Severely Burned Soil

A condition in which most woody debris and the entire forest floor is consumed down to bare mineral soil. Soil may have turned red due to extreme heat. Also, fine roots and organic matter are charred in the upper one-half inch of mineral soil.

SHPO

(See "State Historic Preservation Officer.”)

Silvicultural System

A management process that tends, harvests, and replaces forests, resulting in a forest of distinctive form with a desired condition.

Silviculture

Generally, the science and art of tree management, based on the study of the life history and general characteristics of forest trees and stands, with particular reference to local factors; more particularly, the theory and practice of controlling the establishment, composition, constitution, and growth of forests for desired conditions.

Site

An area considered in terms of its physical and/or biological environment; for example, a riparian zone, a homogenous stand of vegetation, or a campground.

Skid Trail

Any way, more or less prepared, over which logs are dragged. Any road or trail leading from stump to landing.

Skidding

Moving logs from the stump to a collecting point.

Slash

The residue left on the ground after harvesting, sanitation operations, windstorm, or fire. It includes such material as unutilized logs, uprooted stumps, broken or uprooted stems, tops, branches, and leaves.

Snag

Standing dead tree or standing portion from which at least the leaves and smaller branches have fallen; often called a stub if it is less than 20 feet tall.

Soil Productivity

The inherent capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities. Soil productivity may be expressed in terms of volume or weight/unit area/year, percent plant cover, or other measures of biomass accumulation.

Standard

Mandatory courses of action; any deviation from standards requires amendment of the LRMP.

Stand

A community, particulary of trees, possessing sufficient uniformity as regards to vegetation type, age class, risk class, vigor, size class, and stocking class that distinguishes it from adjacent communities and thus forms a management or silvicultural unity. Within a stand, a dominant or primary species and age class is identifiable, but there may be inclusions or clusters of different species or ages. R2 RIS stands are typically greater than 10 acres. IRI stands are typically greater than 5 acres.

Stand-replacing Fire

A fire that kills all or most living overstory trees in a forest and initiates secondary succession or regrowth.

State Historic Preservation Officer (SHPO)

A person appointed by a state's governor to administer the State Historic Preservation Program.

Stream Health

The condition of a stream relative to robust health for that stream type and landscape, considering indicators such as channel pattern; slope; particle size; pool frequency and depth; bank vegetation; and woody debris that reflect the stability and habitat quality of the stream.

Stream Level

A classification of the relative position of streams in a channel network. First-level streams drain into the ocean. Second-level streams are tributaries to the first-level streams. For example, the Mississippi is a first-level stream; the Missouri is a second-level stream.

Structural Stages (Vegetation)

Any of several developmental stages of tree stands described in terms of tree size and the extent of canopy closure they create. They include:

- **Structural Stage 1 (Grass/Forb)**: An early forest successional stage during which grasses and forbs are the dominant vegetation. This stage is dominated by grasses and forbs lasting until tree seedlings become established.
- **Structural Stage 2 (Shrubs/Seedlings):** Developmental stage dominated by tree seedlings (less than one inch dbh) and shrub species. This stage consists of shrubs and seedlings. This stage remains until seedlings reach 1 inch diameter at breast height (DBH).
- **Structural Stage 3 (Sapling/Pole):** Developmental stage dominated by young trees 1 to 9 inches dbh, 10 to 50 feet tall, and usually less than 50 years old.

This stage is subdivided into three canopy closure classes: SS3A Sapling/Pole stage with less than 40% canopy cover

- SS3B Sapling/Pole stage with 40-70% canopy cover
- SS3C Sapling/Pole stage greater than 70% canopy cover

- **Structural Stage 4 (Mature):** Consists of trees larger and older than structural stage 3. This stage contains trees which are at least 9" DBH.
  - SS4A Mature stage with less than 40% canopy cover
  - SS4B Mature stage with 40-70% canopy cover
  - SS4C Mature stage greater than 70% canopy cover
- **Structural Stage 5 (Late Succession):** This stage is characterized by very large trees (16+ inches DBH). Trees are at least 160 years in age. Late succession ponderosa pine may occur in dense stands but may also grow in the open or in "park-like" stands.

Successional Stages (Seral Stages)

The relatively transitory communities that replace one another during development toward a potential natural community.

Temporary Roads

A road developed and operated for a limited period of time that will cease to exist as a transportation facility after the purpose for which it was constructed is completed and the occupied land is reclaimed and managed for natural resource purposes.

Thinning

The practice of removing some of the trees in a stand to meet desired conditions. Two types of thinning may be done:

Pre-commercial, Non-commercial: Removing trees that are too small to make a merchantable product.

Commercial: Removing trees that have reached sufficient size to be manufactured into a product and to improve tree spacing and promote more rapid growth.

Threatened Species

Any species likely to become endangered within the foreseeable future throughout all or a significant portion of its range and that has been designated in the Federal Register by the Secretary of Interior as such.

Trail

A general term denoting a way usually less than 50 inches wide for purposes of travel by foot, stock, or trail vehicle.

Transportation System

All roads needed to manage and administer Forest resources. A road network.

Travel Corridor

A strip of land that includes up to a maximum of 1,000 feet for major roads (500 feet either side of the road's centerline) or 500 feet for major trails (250 feet either side of the trail's centerline); travel corridors form a passageway that allows travelers to experience and interact with the quality and character of the landscape.

Travel Management

Travel management is the movement of people and products to and through national forests and grasslands. It connects many different varieties of users and multiple uses on National Forest System (NFS) lands.

Understory

The lowest layer of vegetation in a forest or shrub community composed of grass, forbs, shrubs, and trees less than 10 feet tall. Vegetation growing under the tree canopy.

Values, Values at Risk (Fire Management)

Any or all natural resources, improvements, or other values that may be jeopardized if a fire occurs.

Water Influence Zone (WIZ)

The land next to water bodies where vegetation plays a major role in sustaining long-term integrity of aquatic systems. It includes the geomorphic floodplain (valley bottom), riparian ecosystem, and inner gorge. Its minimum horizontal width (from top of each bank) is 100 feet or the mean height of mature dominant late-seral vegetation, whichever is most.

Watershed

The area of land bounded by a divide that drains water, sediment, and dissolved materials to a common outlet at some point along a stream channel or to a lake, reservoir, or other body of water. Also called a drainage basin or catchment.

Watershed Conservation Practices (WCPs)

Are stewardship actions based upon scientific principles and legal requirements to protect soil, aquatic and riparian resources. Each watershed conservation practice consists of a management measure, a set of design criteria used to achieve the management measure, and guidance for monitoring and restoration.

Watershed Level

The number assigned to an entire drainage basin contributing to the stream segment of a given level and bearing an identical designation; for example, a first-level watershed contains all the drainage area of a first-level stream (See "Stream Level.")

Waters of the United States

"include essentially all surface waters such as navigable waters and their tributaries, all interstate waters and their tributaries, all wetlands adjacent to these waters, and all impoundments of these waters". "Waters of the United States include perennial and intermittent streams, lakes, wetlands, and their tributaries." Refer to 40 CFR 230.3 for the full definition.

Wetlands

As defined jointly by the Corps of Engineers (33 CFR 328.3) and Environmental Protection Agency (40 CFR 230.3), wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands are a subset of the "Waters of the United States" subject to regulation under Section 404 of the Clean Water Act.

Wildfire

Any wildland fire not designated and managed as a prescribed fire within an approved prescription. All wildfires will be given an appropriate suppression action.

Appendix A:
MAPS

Map 1 – Vicinity Map

Map 2 – Vestal Management Areas

Map 3 – Existing Pine Habitat Structural Stages and Other Cover Types

**There is no Map 4

Map 5 – Alt. 2 Pine Habitat Structural Stages and Other Cover Types

Map 6 – Alt. 2 Vegetation Treatments – Tile Key

- Tile 1
- Tile 2
- Tile 3
- Tile 4
- Tile 5
- Tile 6

Map 7 – Alt. 2 Fuels Treatments – Tile Key

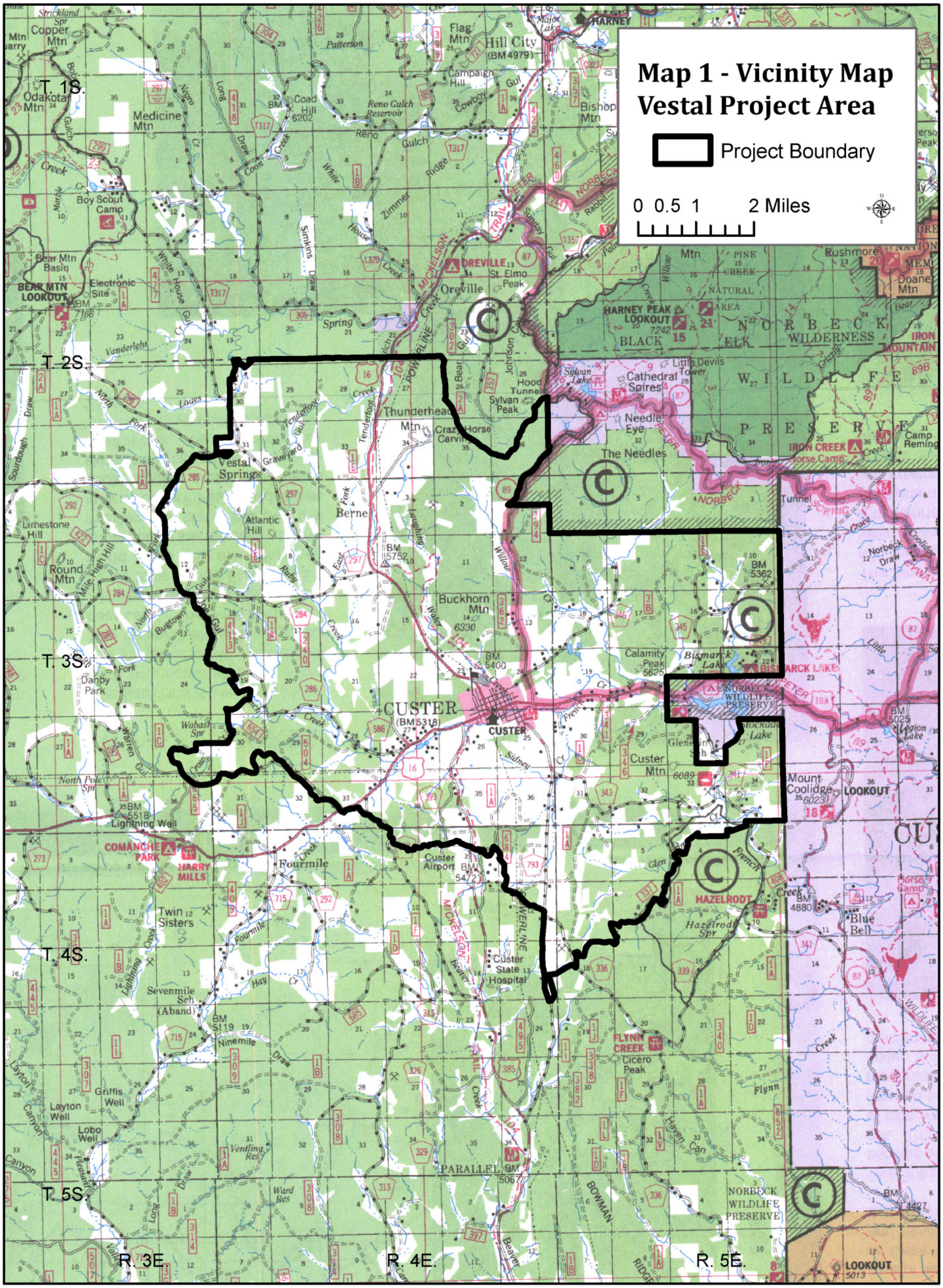
- Tile 1
- Tile 2
- Tile 3
- Tile 4
- Tile 5
- Tile 6

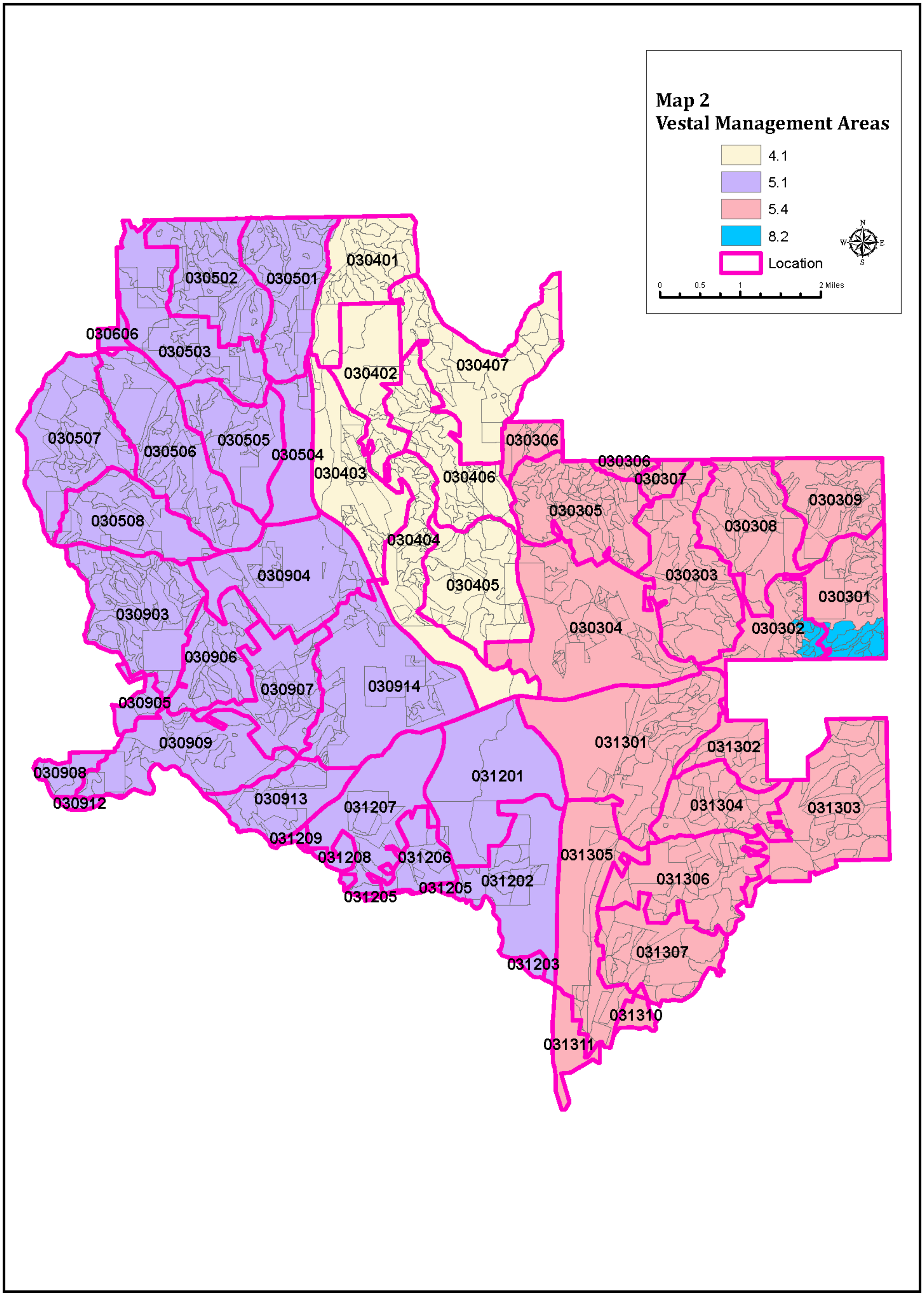
Map 8 – Roads

Map 9 – Streams

Map 10A – Permits

Map 10B – Permits


Map 1 - Vicinity Map
Vestal Project Area
Project Boundary
0 0.5 1 2 Miles
T. 1S.
T. 2S.
T. 3S.
T. 4S.
T. 5S.
R. 3E.
R. 4E.
R. 5E.
CUSTER
Vestal Springs
Berne
Thunderhead Mtn
Buckhorn Mtn
Custer Mtn
Fourmile
Custer Airport
Custer State Hospital
Oreville
Hill City
NORBECK WILDERNESS
NORBECK WILDLIFE PRESERVE
HAZELRODT
FLYNN CREEK
PARALLEL


Map 2
Vestal Management Areas
4.1
5.1
5.4
8.2
Location
0
0.5
1
2 Miles
030401
030501
030502
030606
030503
030402
030407
030507
030506
030505
030504
030403
030406
030306
030306
030307
030309
030305
030308
030508
030404
030904
030405
030303
030301
030903
030304
030302
030906
030907
030914
030905
030909
031301
031302
031201
030908
030912
030913
031207
031304
031303
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031203
031310
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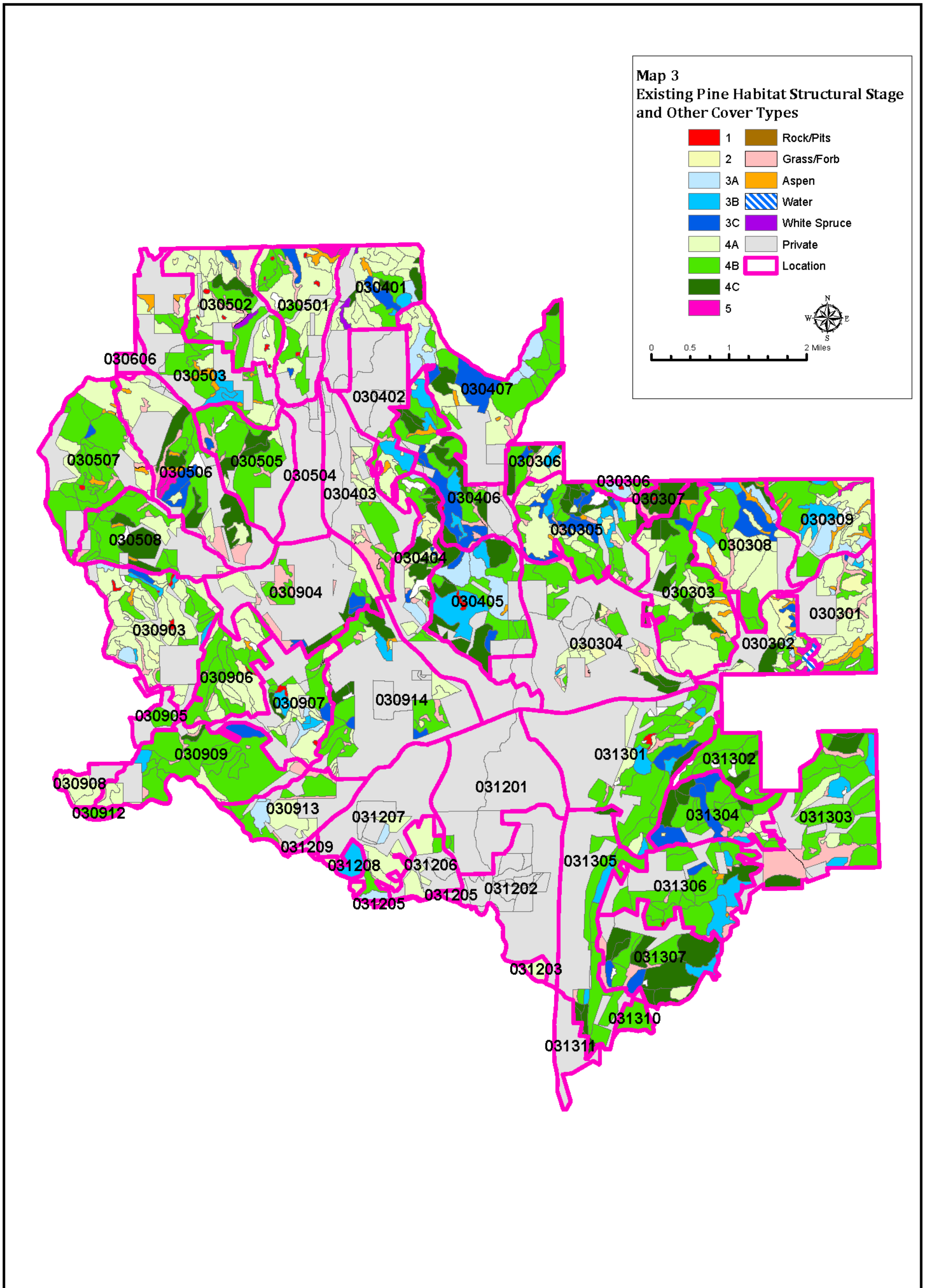

Map 3
Existing Pine Habitat Structural Stage and Other Cover Types
1
2
3A
3B
3C
4A
4B
4C
5
Rock/Pits
Grass/Forb
Aspen
Water
White Spruce
Private
Location
0 0.5 1 2 Miles
030401
030501
030502
030606
030503
030402
030407
030507
030506
030505
030504
030403
030306
030306
030307
030406
030305
030309
030308
030508
030404
030904
030405
030303
030301
030903
030304
030302
030906
030907
030914
030905
031301
031302
030909
031201
030908
030912
030913
031207
031304
031303
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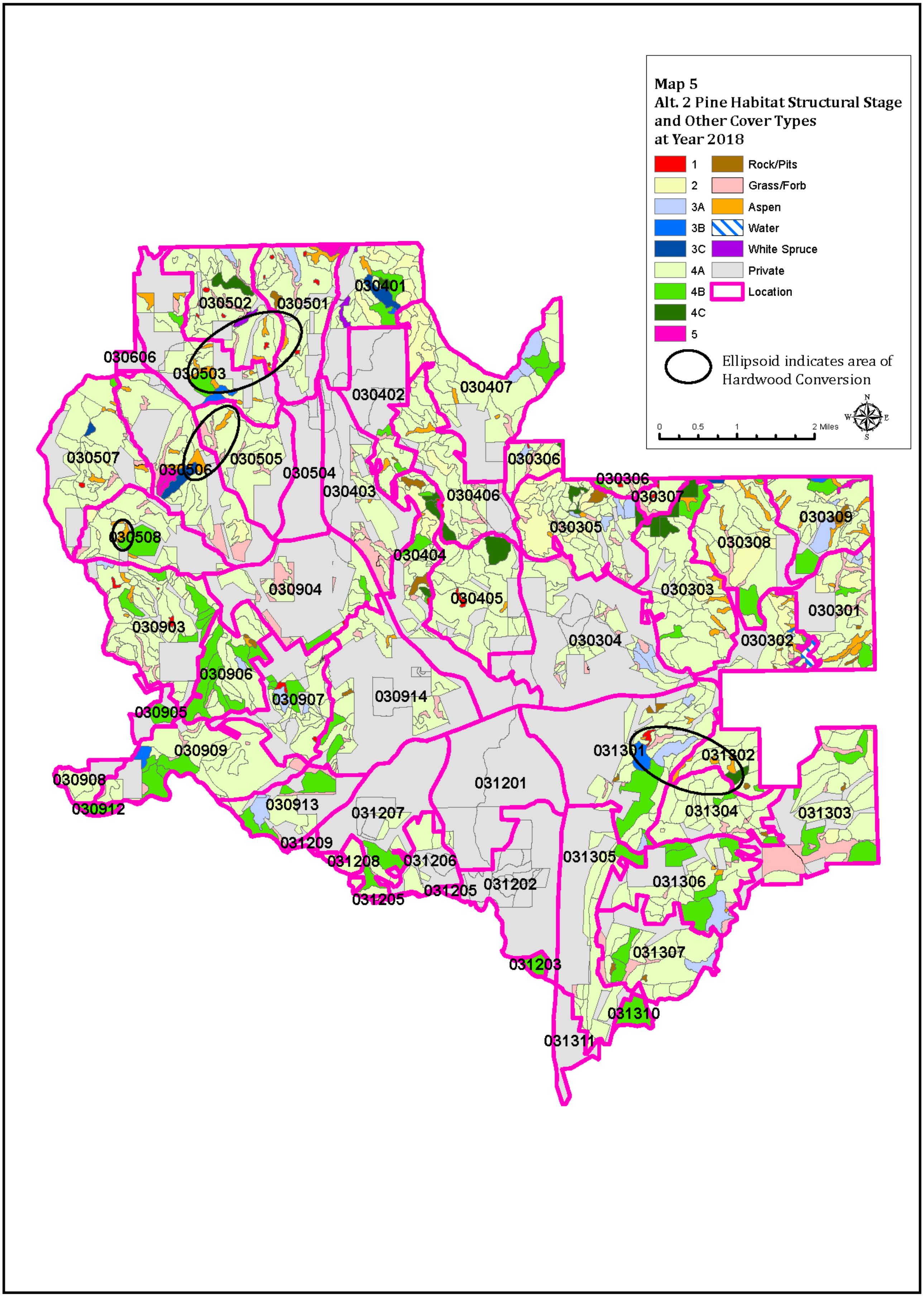
031203
031310
031311


Map 5
Alt. 2 Pine Habitat Structural Stage
and Other Cover Types
at Year 2018
1
2
3A
3B
3C
4A
4B
4C
5
Rock/Pits
Grass/Forb
Aspen
Water
White Spruce
Private
Location
Ellipsoid indicates area of Hardwood Conversion
0
0.5
1
2 Miles
N
W
E
S
030502
030501
030401
030606
030503
030402
030407
030507
030506
030505
030504
030403
030306
030406
030307
030309
030508
030305
030308
030404
030904
030405
030303
030301
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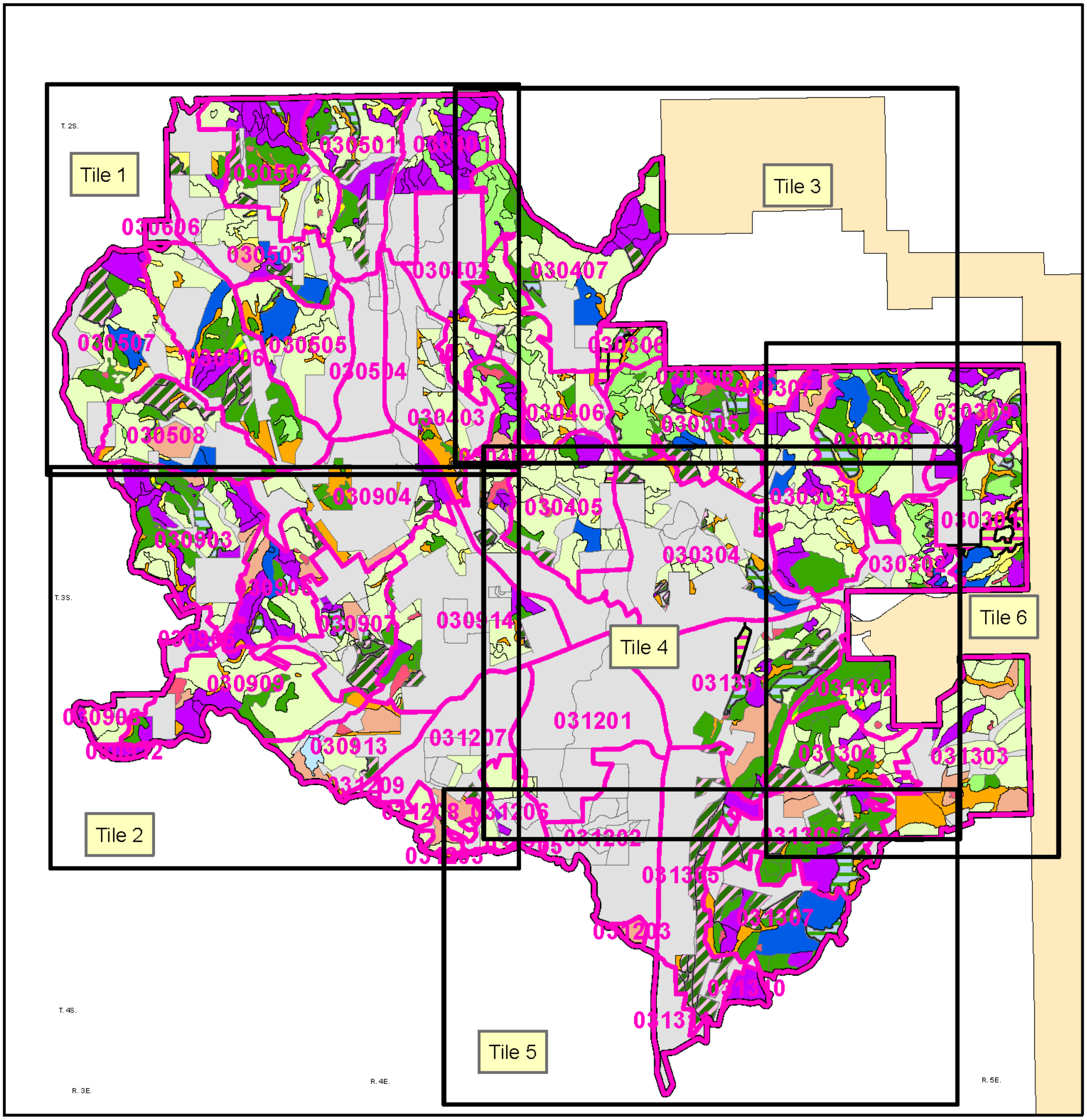
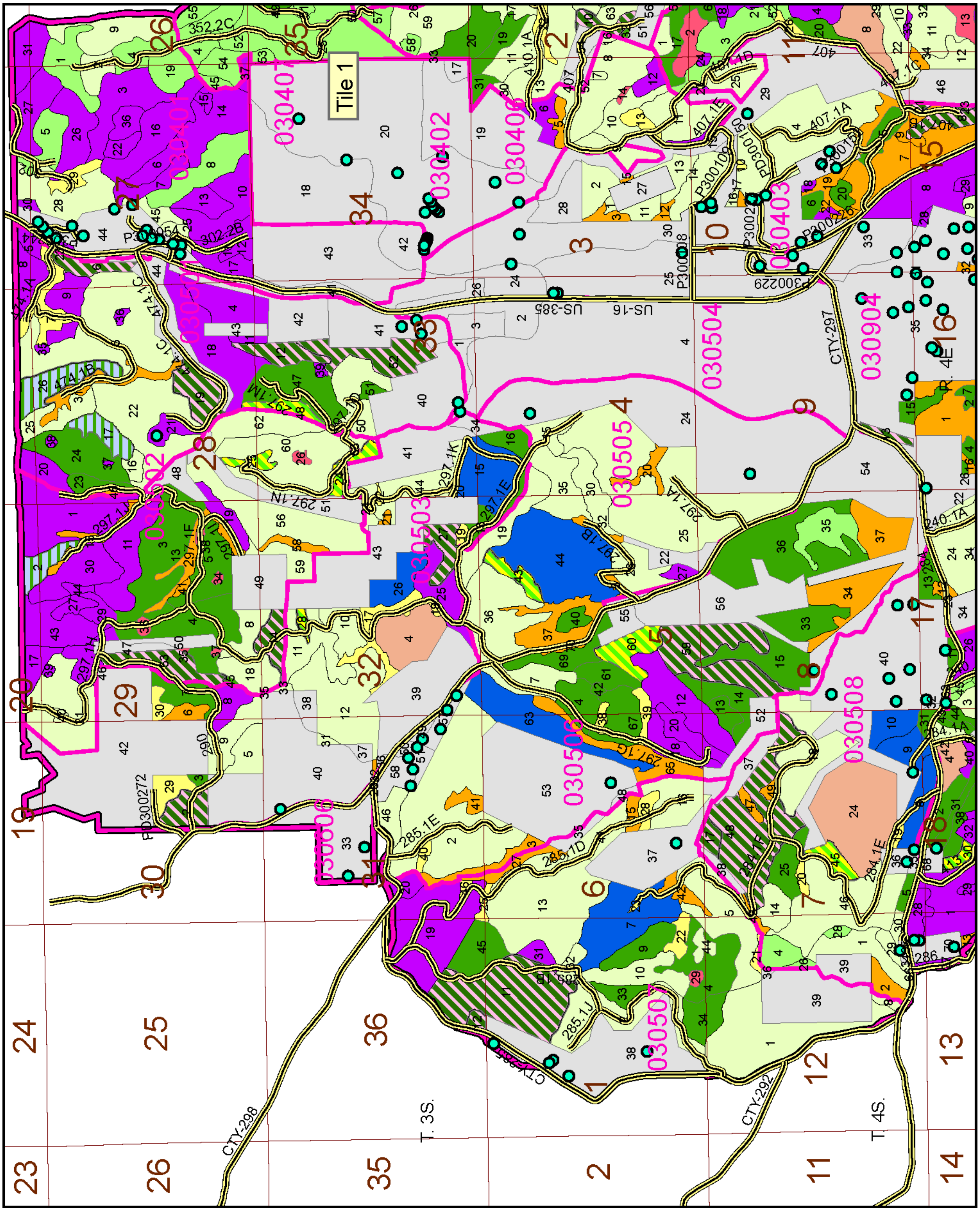


Map 6
Alt. 2 Vegetation Treatments

Defer	Free Selection	Sanitation	Pine Encroachment
Private	Group Shelterwood	Variable Density Thinning	PreCommercial Thin
Commercial Thin	Shelterwood Seedcut	Hardwood Conversion	Products Other than Logs (POL)
Commercial Thin 50 BA	Overstory Removal	Hardwood Release	Location
Structure	Custer State Park		Boundary

Tile Key 1:100,000
Tile Page 1: 37,000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US-385
US-16
CTY-297
CTY-298
CTY-292
T. 3S.
T. 4S.
R. 4E
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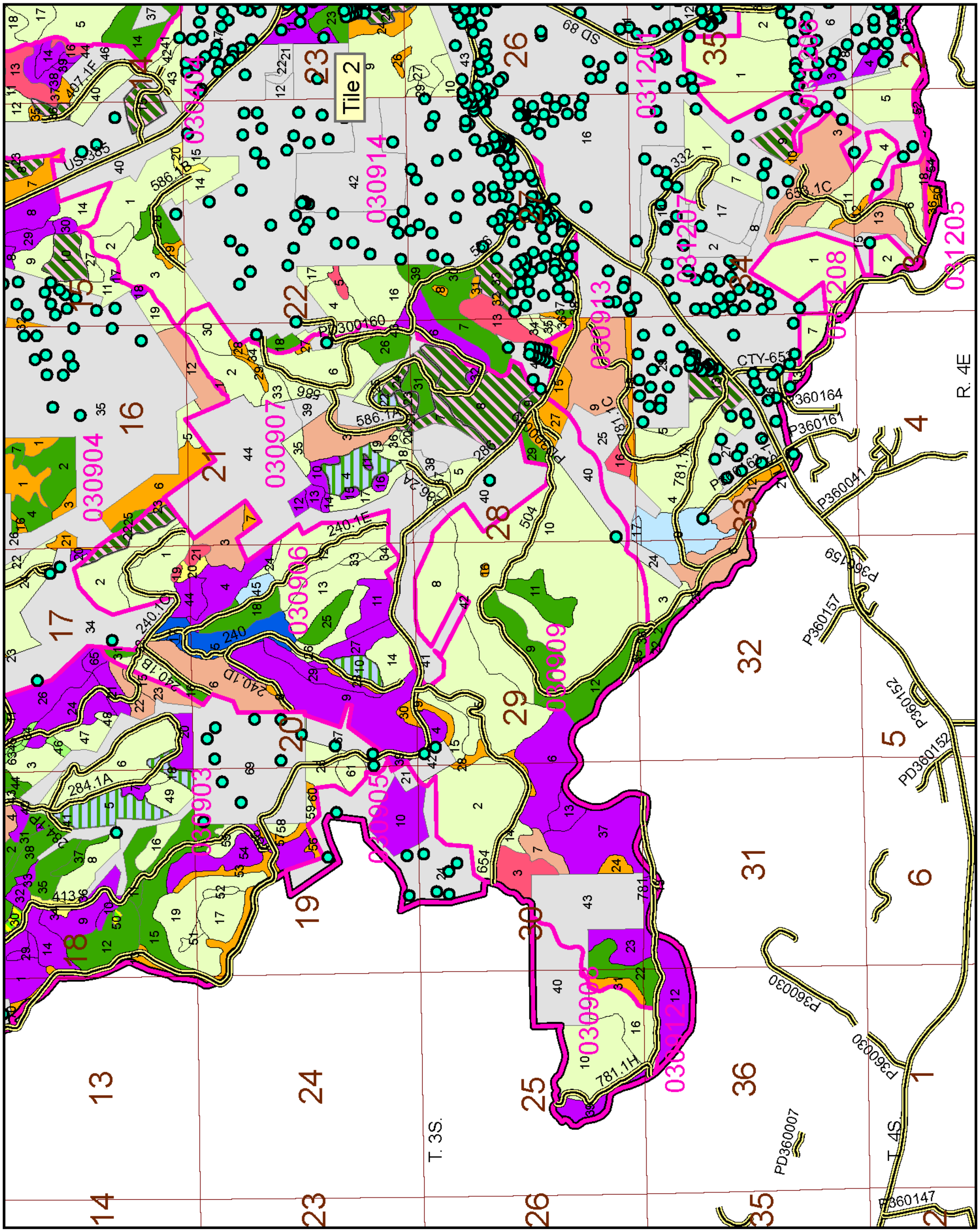
030403
030404
030406
030407
030502
030503
030504
030505
030506
030507
030508
030904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T. 4S.
R. 4E
US 385
SD 89
CTY-653
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030907
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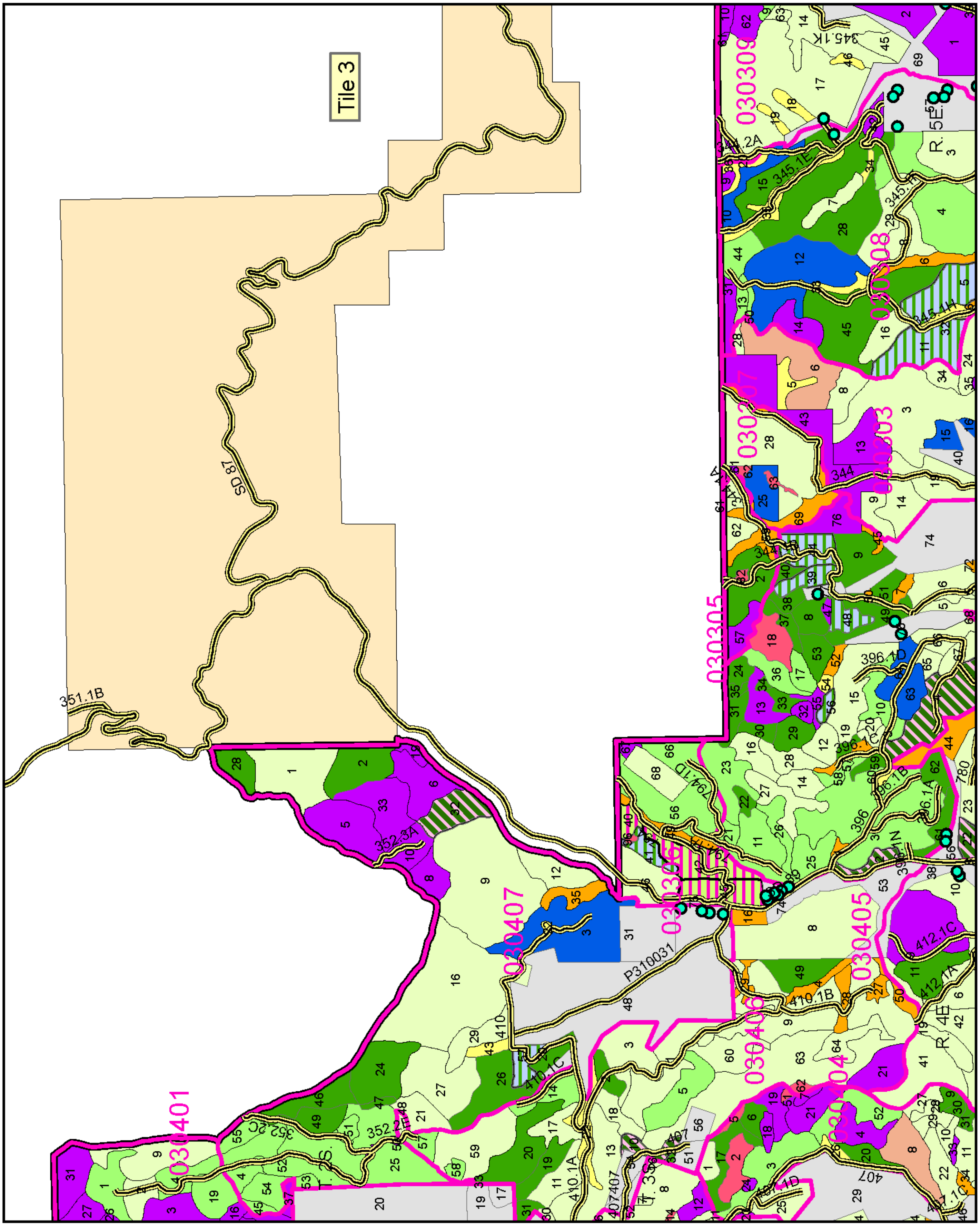
031207
031205
031208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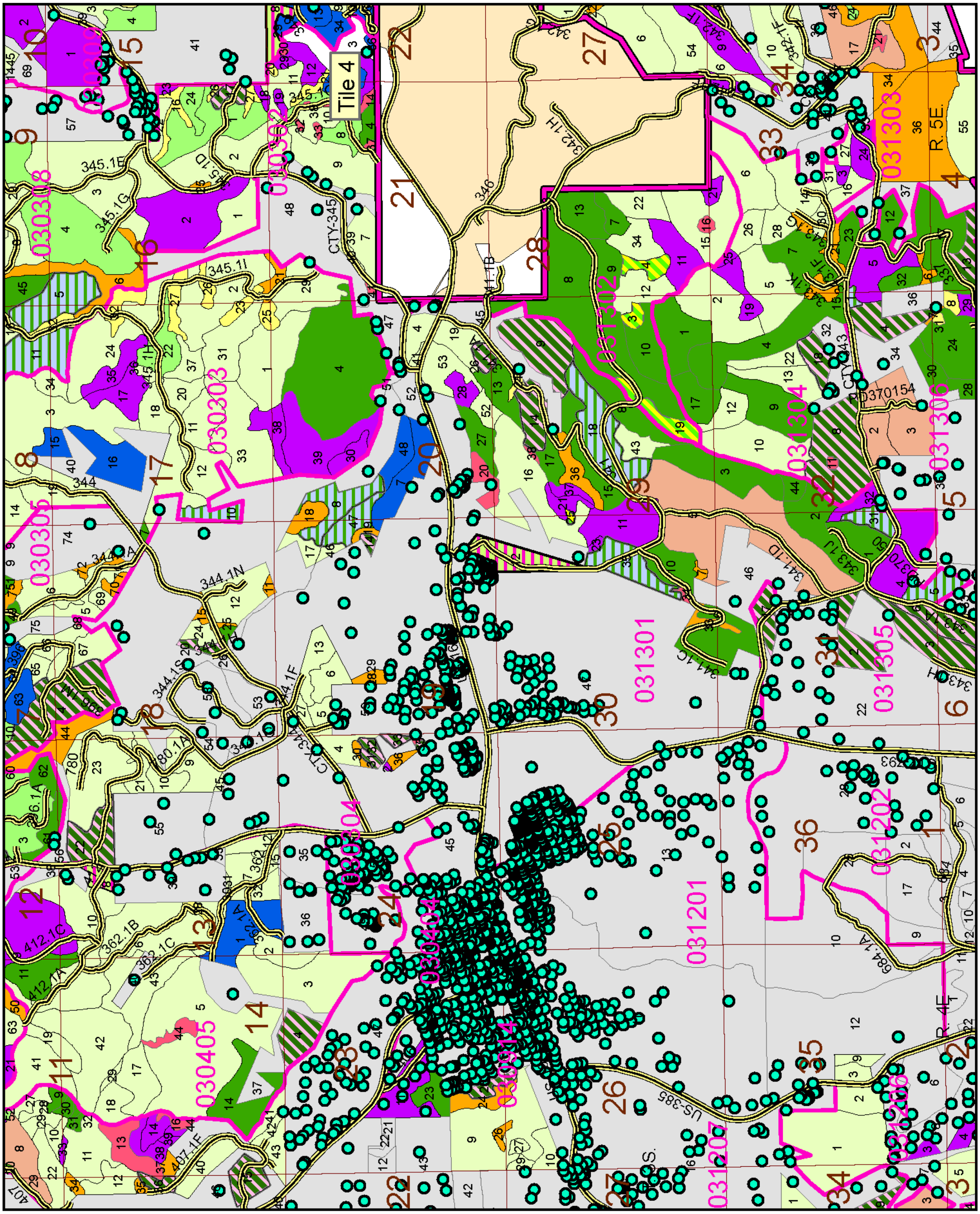
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US-385
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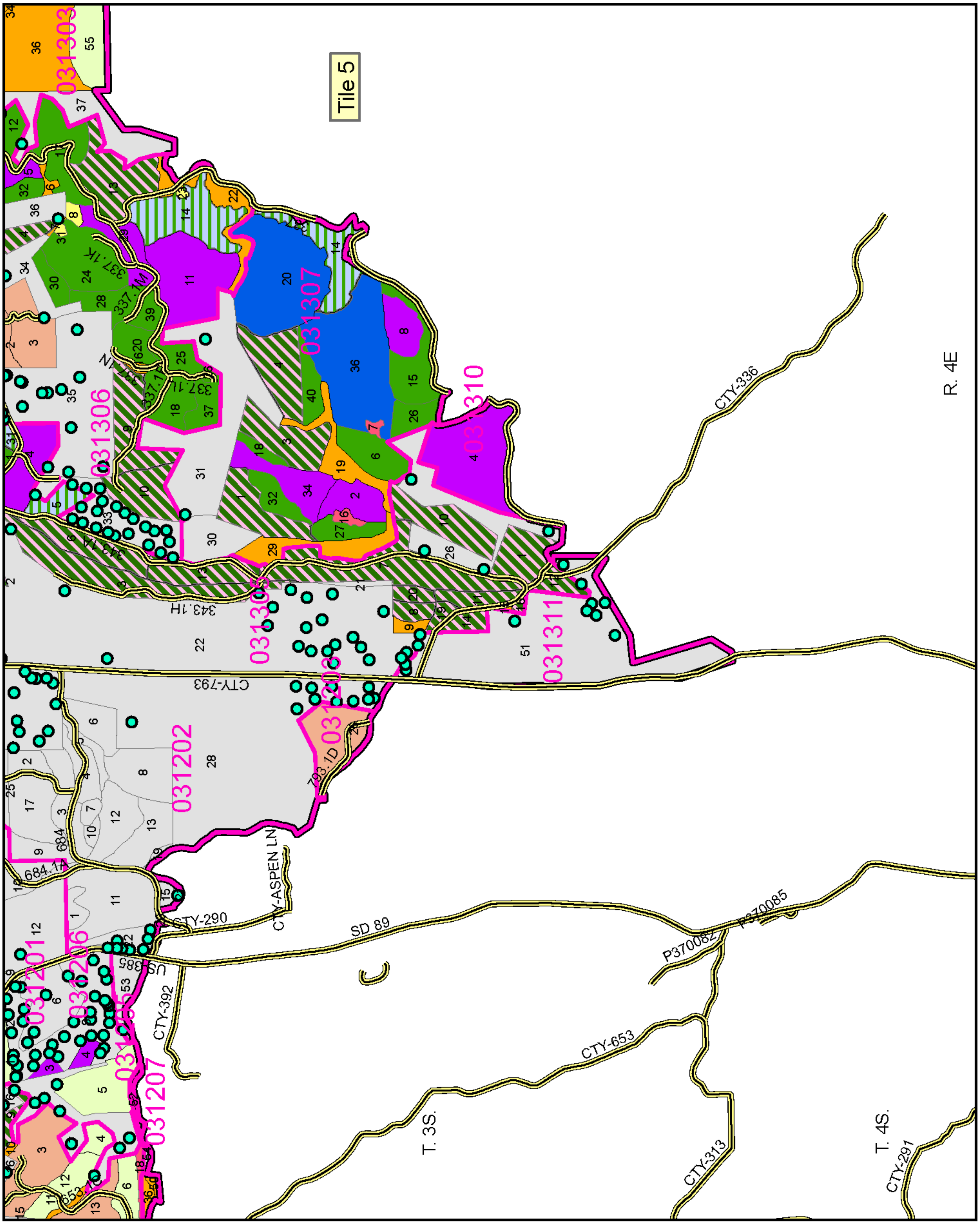
R. 4E.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CTY-336
CTY-793
CTY-290
CTY-ASPEN LN
SD 89
P370085
P370082
CTY-653
CTY-313
CTY-291
CTY-392
US 385
343.1H
793.1D
031303
031307
031306
031310
031305
031311
031202
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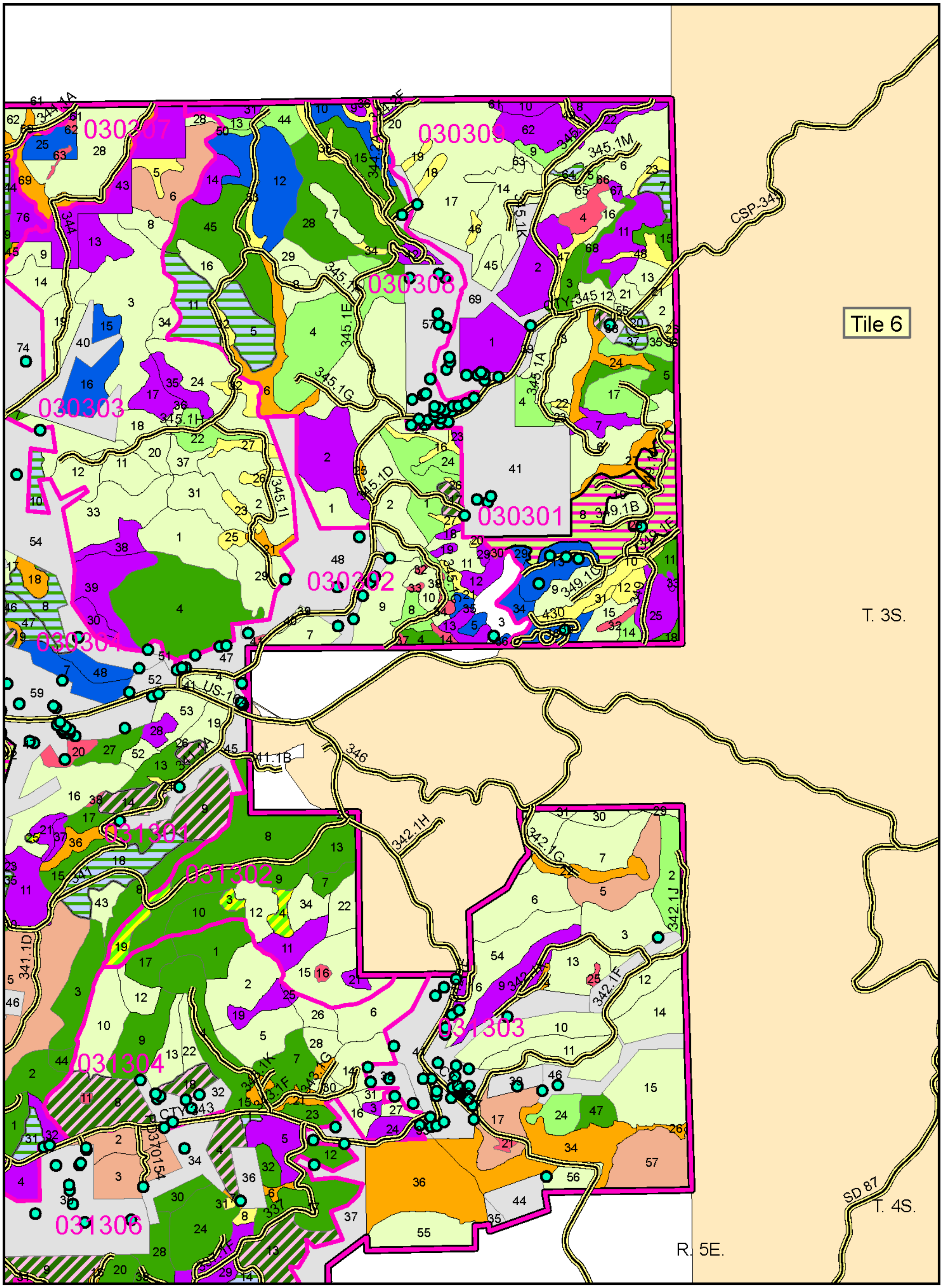
031207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030308
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030301
030302
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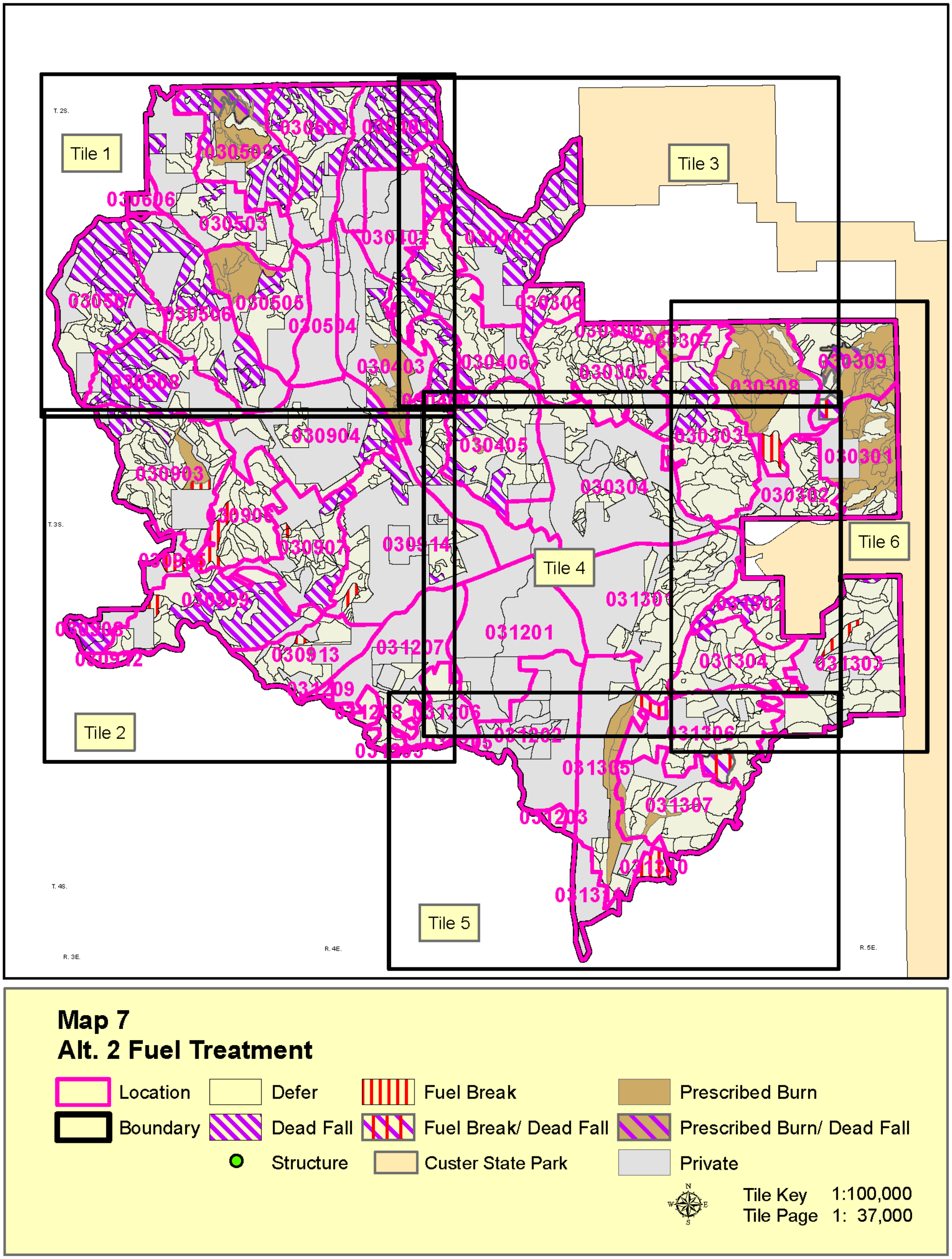
T. 4S.
R. 5E.
US-16
CSP-345
CTY-345
CTY-343
SD 87
346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Tile 3
Tile 4
Tile 5
Tile 6
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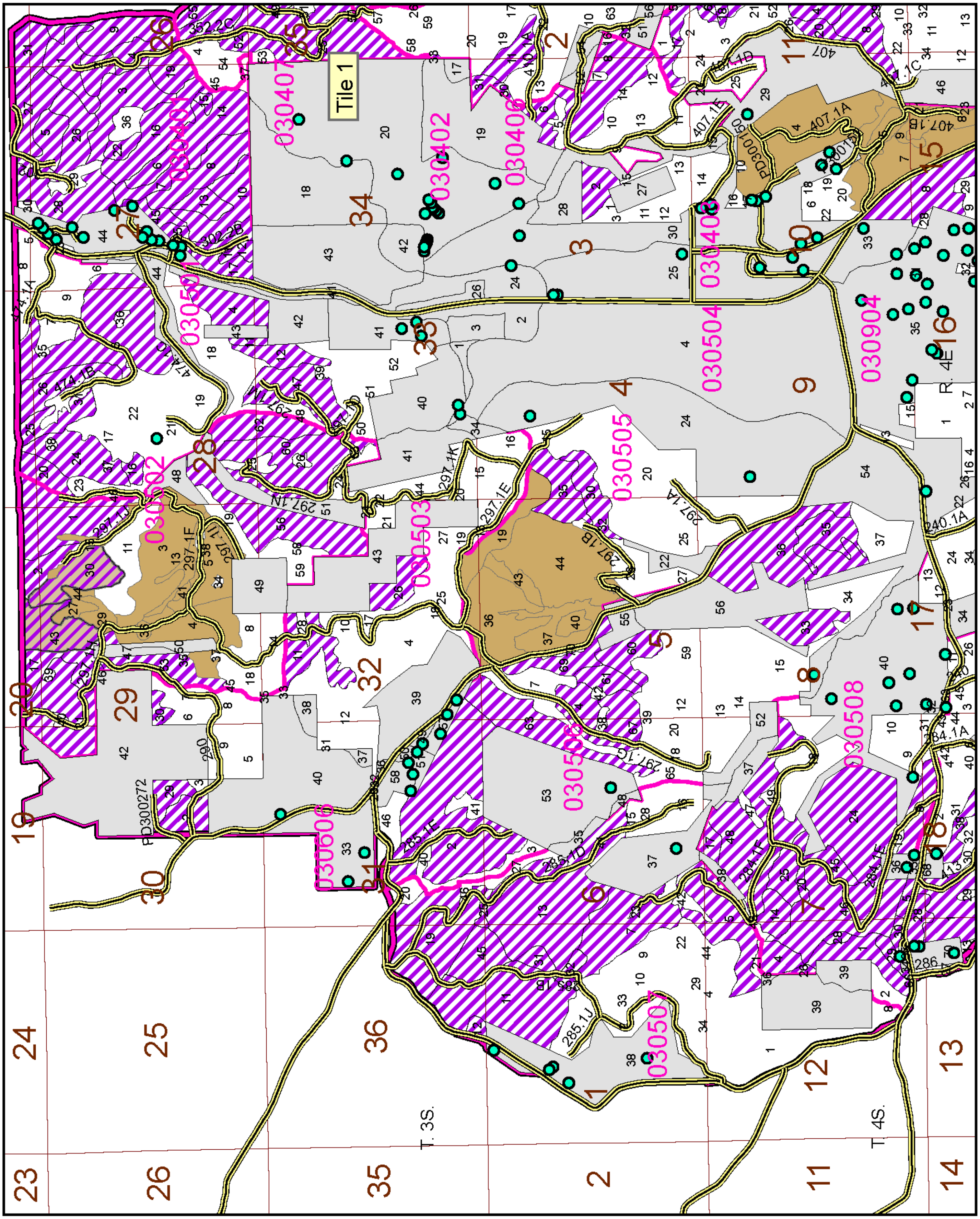
031302
030909
031201
031207
031304
031303
030913
031306
031202
031305
031307
031203
031310
T. 2S.
T. 3S.
T. 4S.
R. 3E.
R. 4E.
R. 5E.
Map 7
Alt. 2 Fuel Treatment
Location
Boundary
Defer
Dead Fall
Structure
Fuel Break
Fuel Break/ Dead Fall
Custer State Park
Prescribed Burn
Prescribed Burn/ Dead Fall
Private
N
S
E
W
Tile Key 1:100,000
Tile Page 1: 37,000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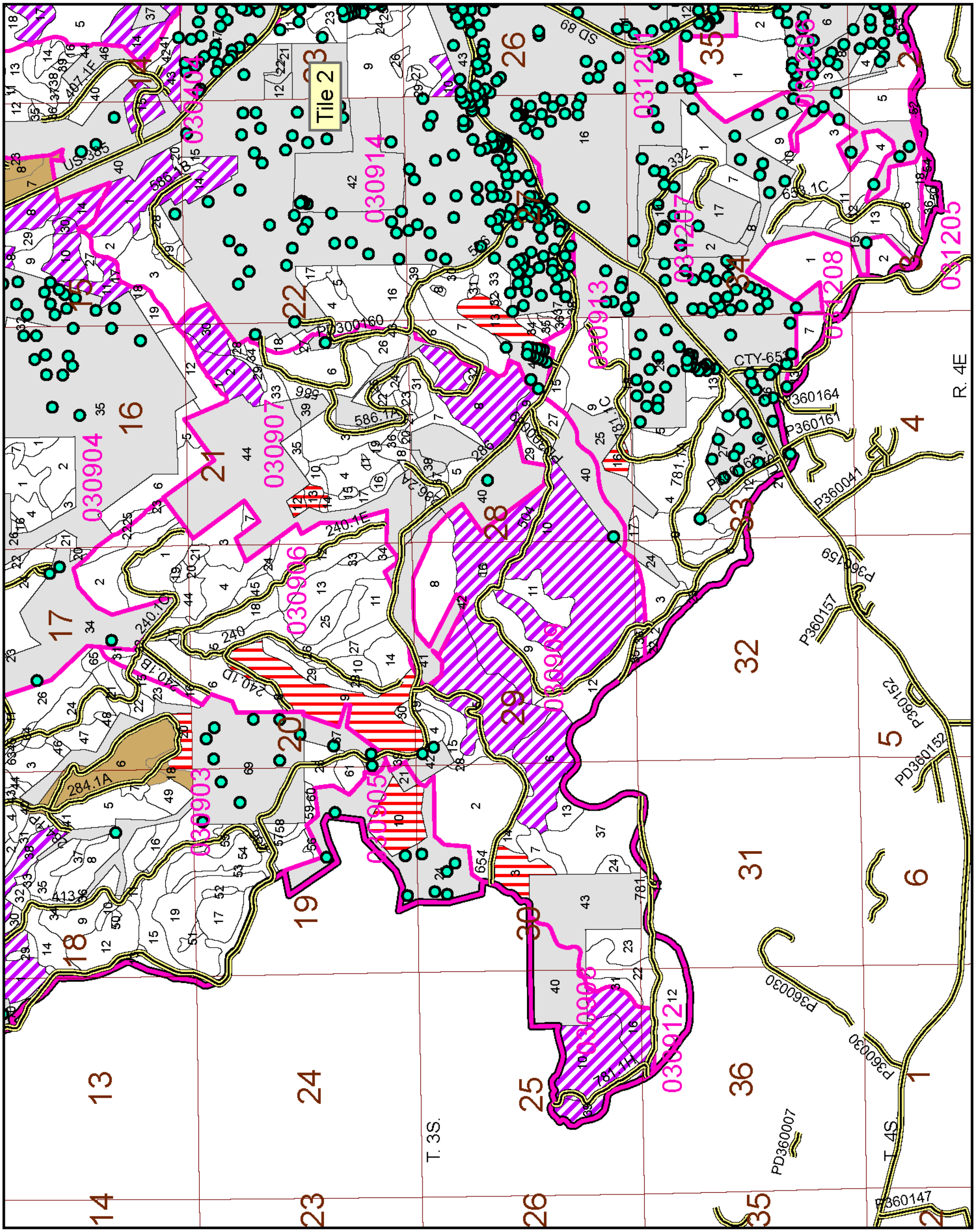
R. 4E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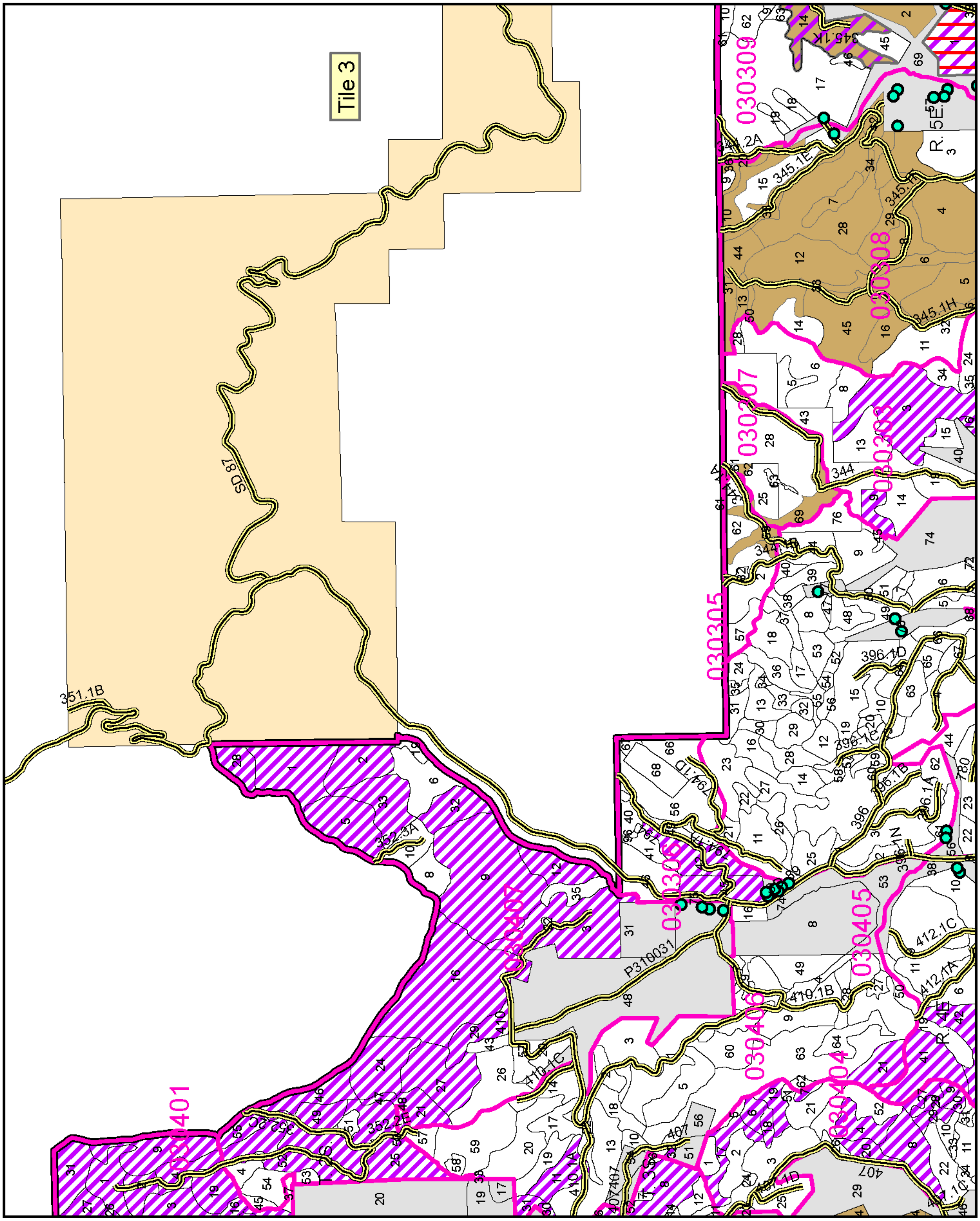
T. 4S.
R. 4E
US 385
SD 89
CTY-653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030305
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P310031
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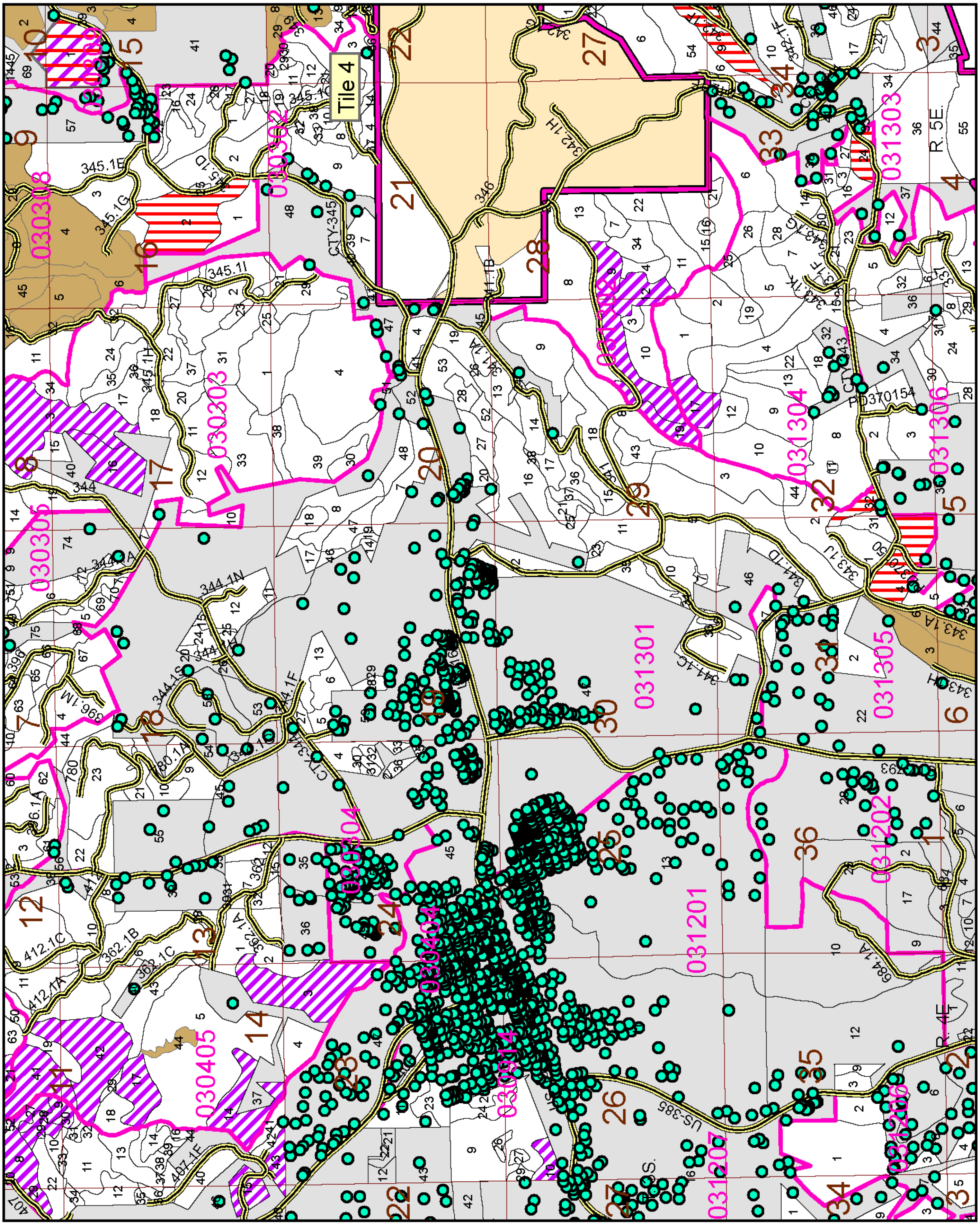
412.1C
412.1A
410.1B
345.1H
345.1E
344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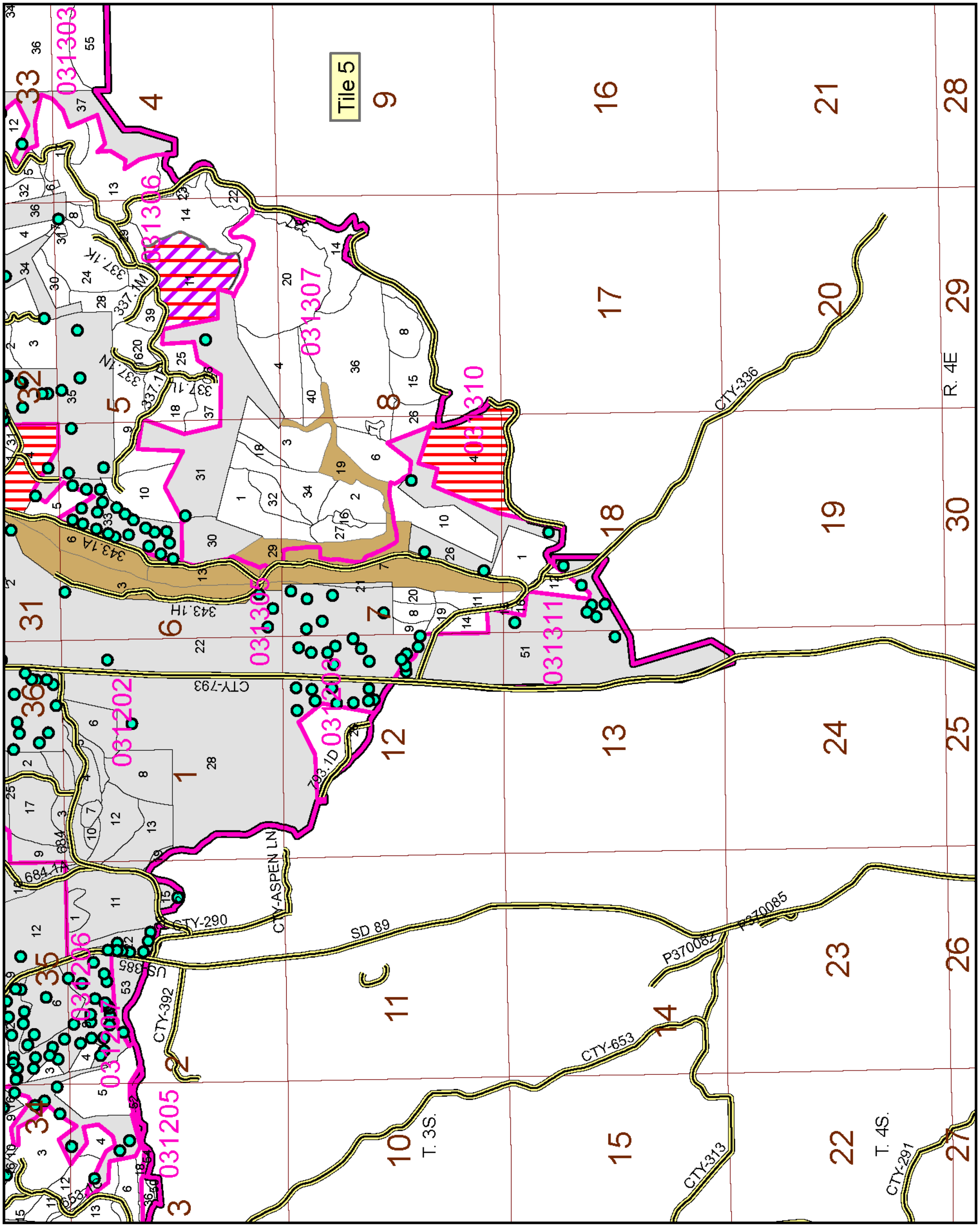
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031202
031206
031207
031205
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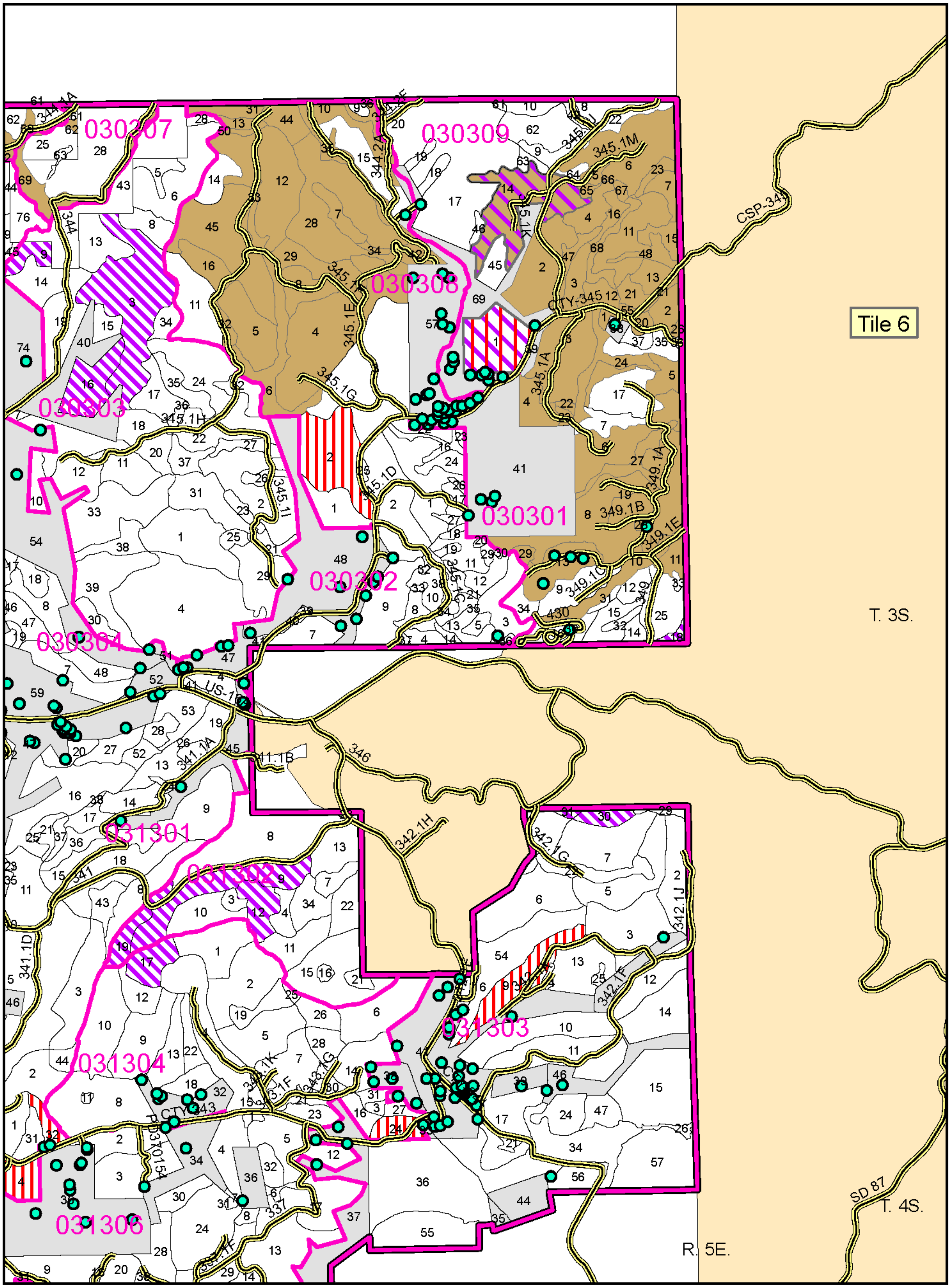
CTY-793
CTY-ASPEN LN
CTY-290
SD 89
US 385
CTY-392
CTY-653
CTY-313
CTY-291
P370082
P370085
R. 4E
T. 3S.
T. 4S.


Tile 6
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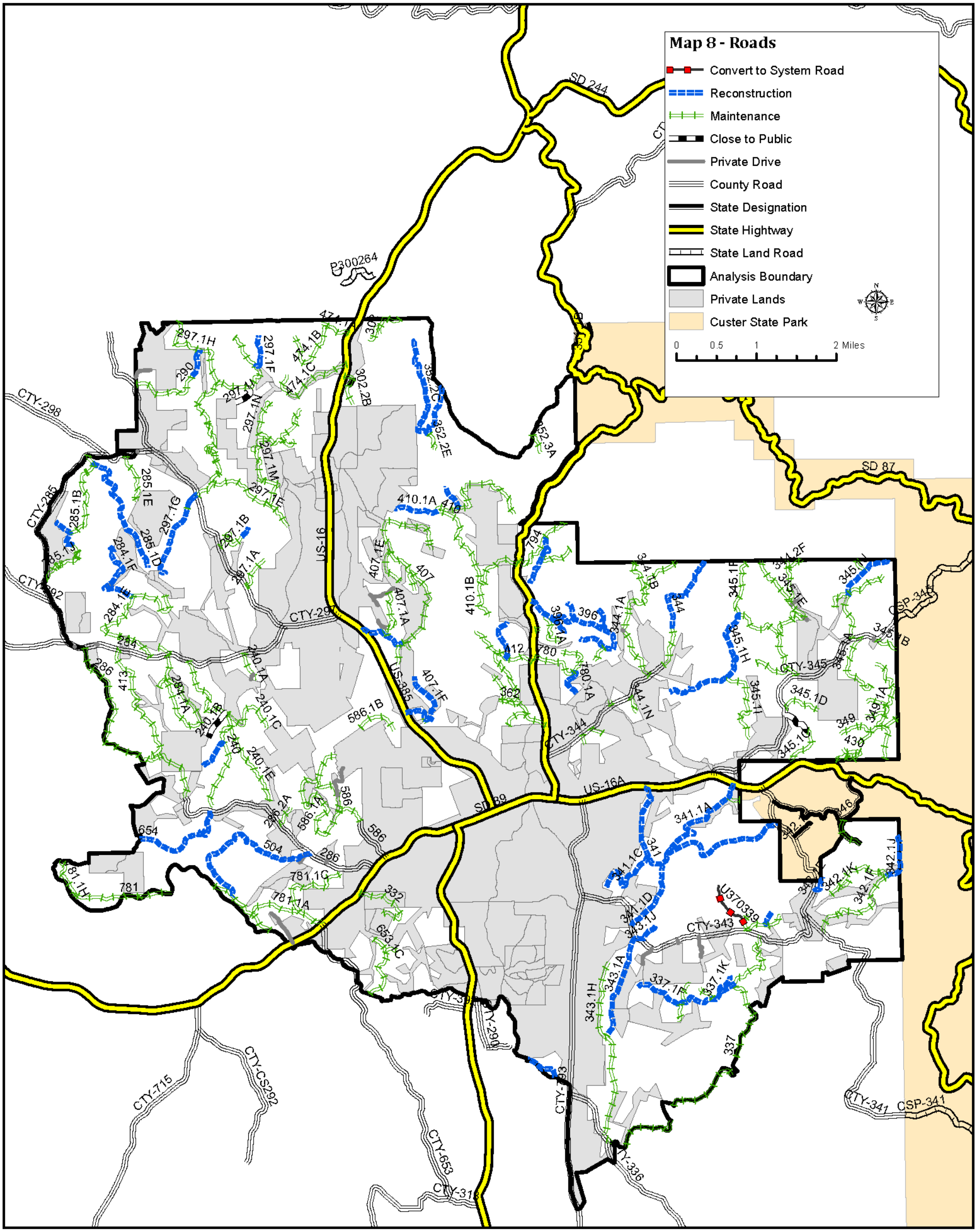
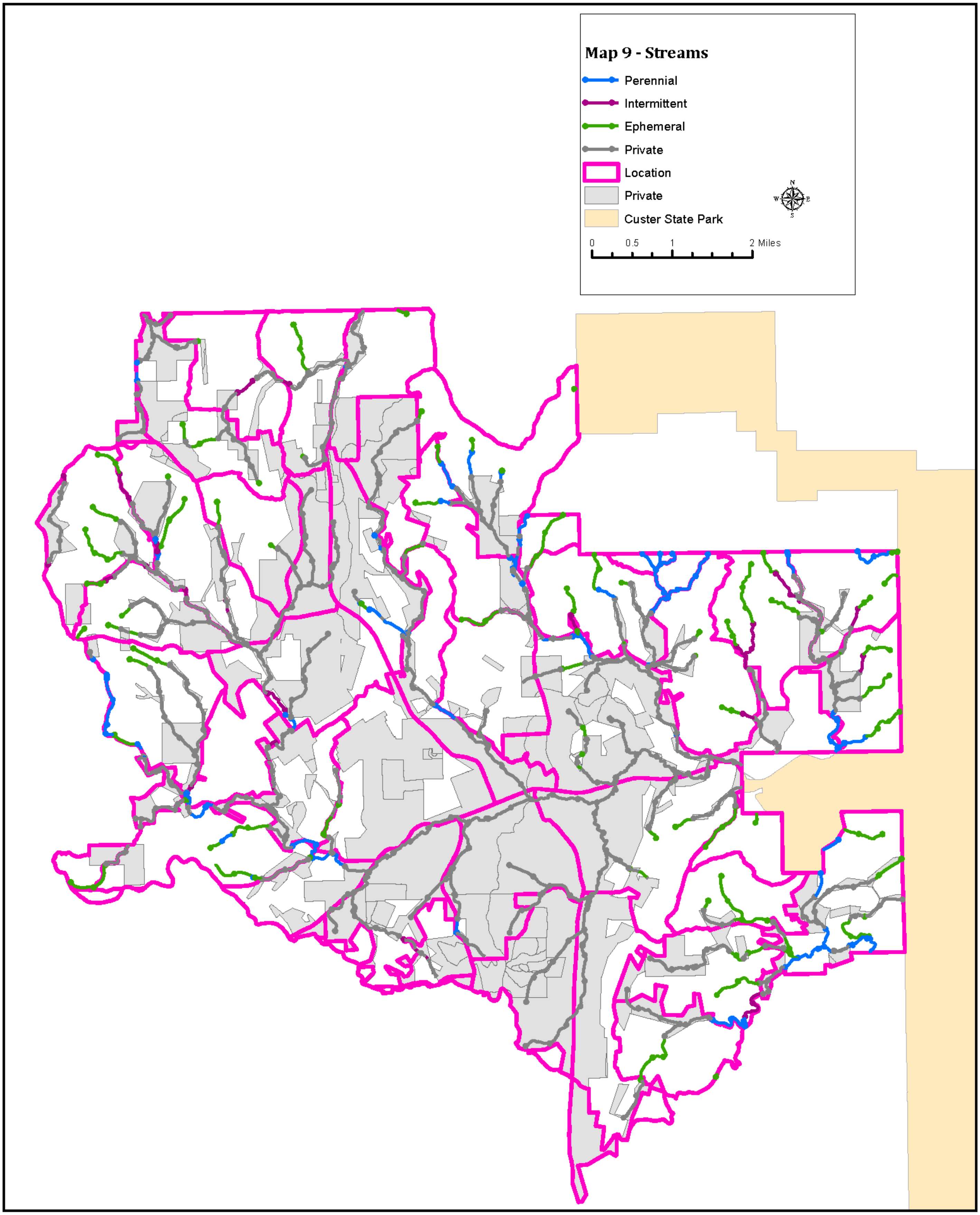
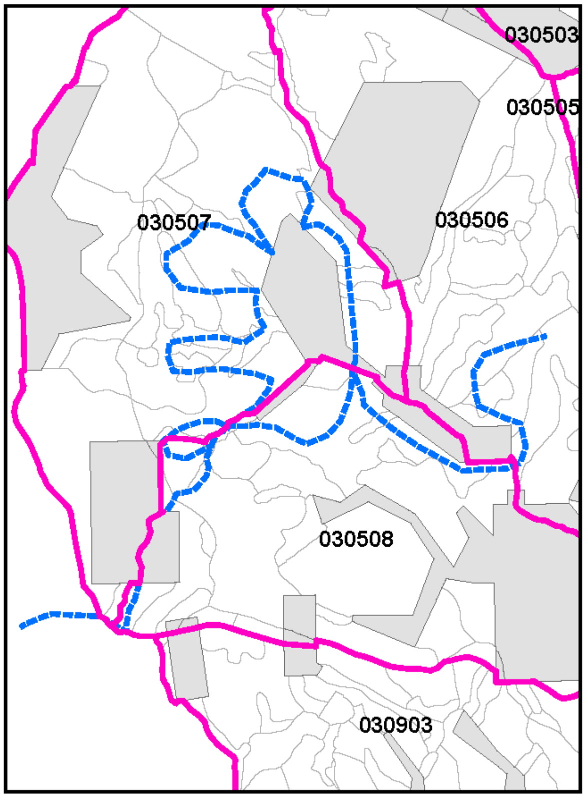
030308
030303
030301
030302
030304
031301
031302
031303
031304
031306
CSP-344
CTY-345
US-16
CTY-343
345.1M
345.1G
345.1E
345.1D
345.1I
345.1A
345.1H
349.1A
349.1B
349.1E
349.1C
341.1A
341.1B
341.1D
342.1H
342.1G
342.1J
342.1F
346
SD 87
T. 3S.
T. 4S.
R. 5E.

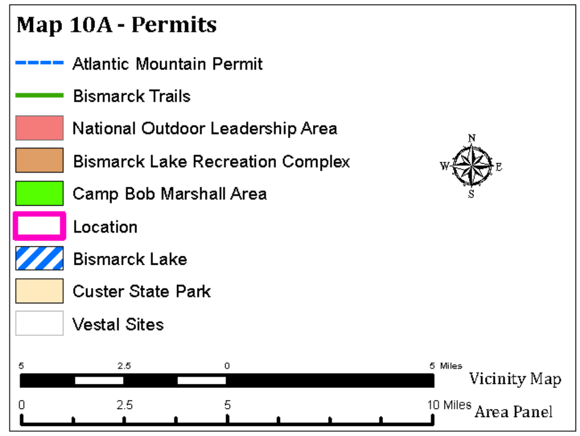

Map 8 - Roads
Convert to System Road
Reconstruction
Maintenance
Close to Public
Private Drive
County Road
State Designation
State Hightway
State Land Road
Analysis Boundary
Private Lands
Custer State Park
0 0.5 1 2 Miles
SD 244
SD 87
US-16
US-16A
US-385
SD 89
CTY-298
CTY-285
CTY-344
CTY-345
CTY-343
CTY-715
CTY-CS292
CTY-653
CTY-341
CSP-341
P300264
U370339

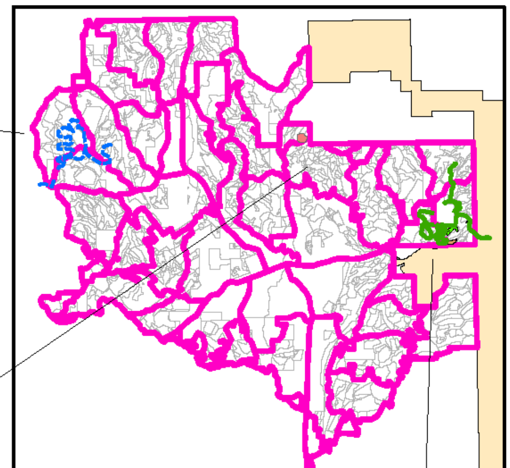


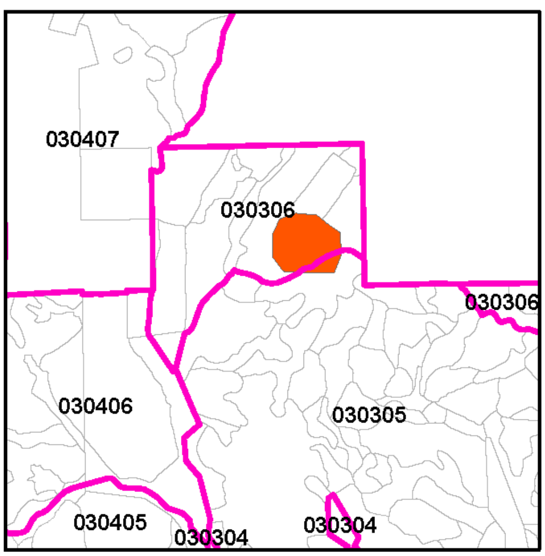
Map 9 - Streams
Perennial
Intermittent
Ephemeral
Private
Location
Private
Custer State Park
0
0.5
1
2 Miles
N
W
E
S



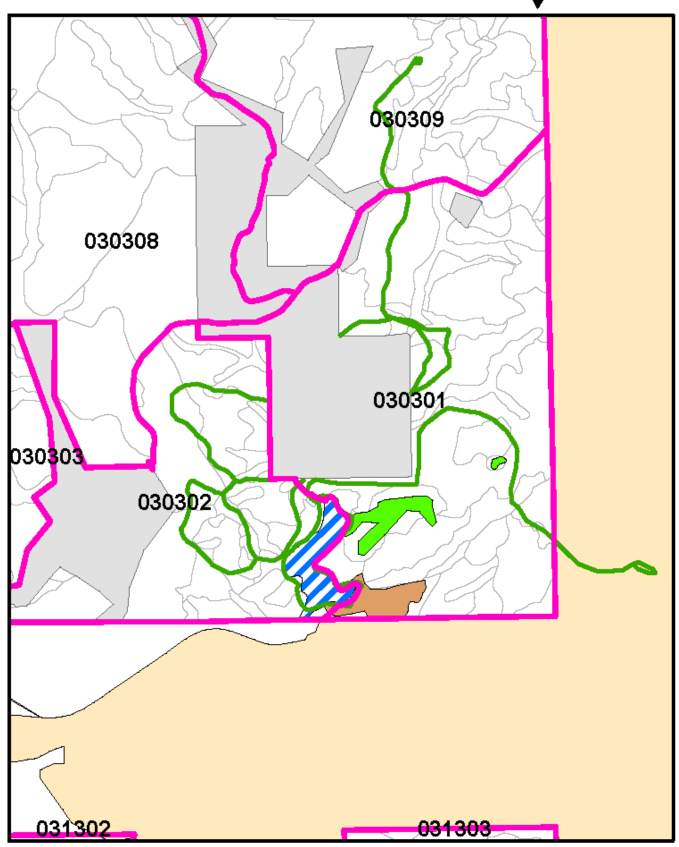
Atlantic Mountain Ranch Permitted OutfitterTrails



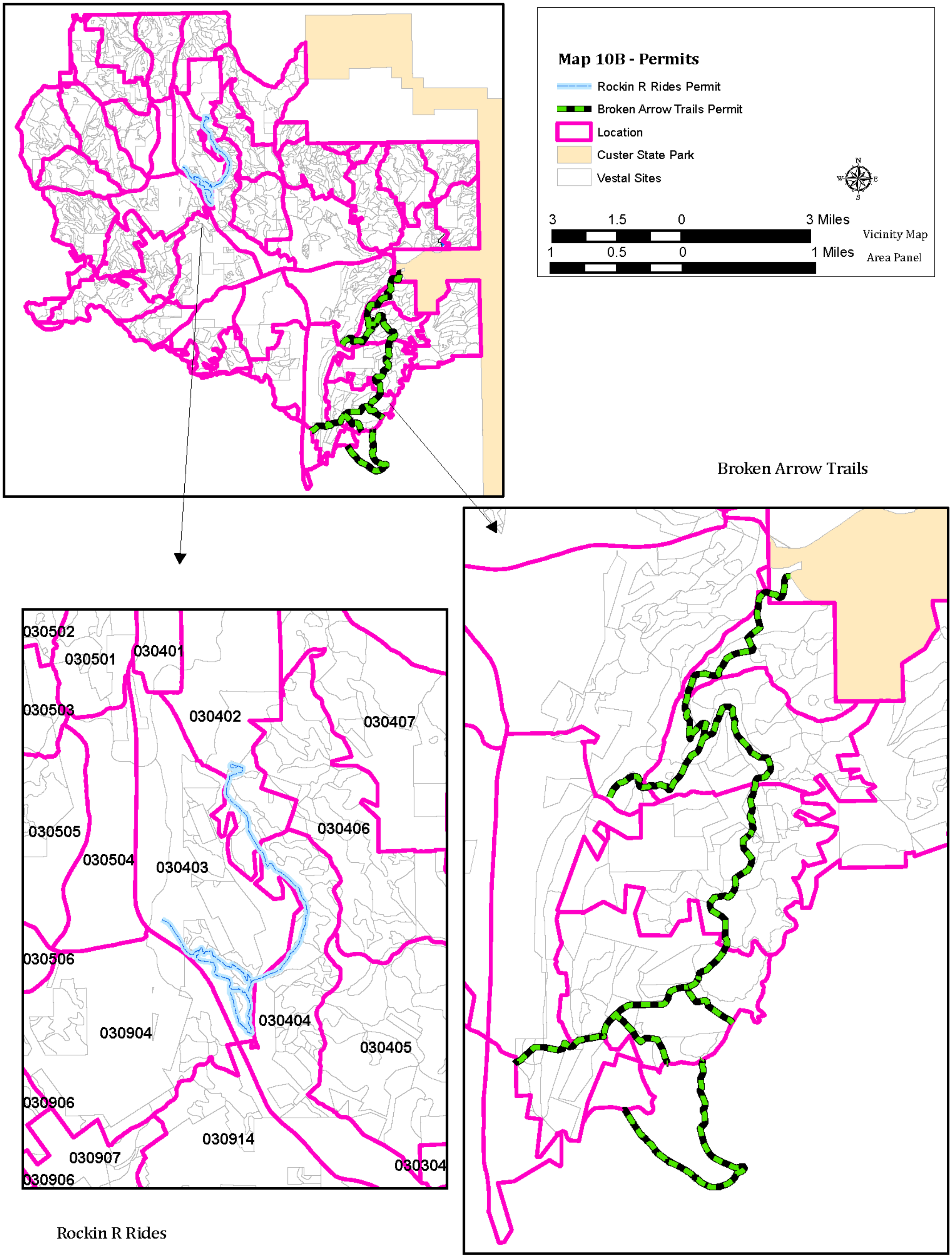




National Outdoor Leadership School



Camp Bob Marshall Area,
Bismarck Lake Recreational Area,
and Outlaw Ranch Outfitter Trails


Map 10B - Permits
Rockin R Rides Permit
Broken Arrow Trails Permit
Location
Custer State Park
Vestal Sites
N
W
E
S
3 1.5 0 3 Miles
Vicinity Map
1 0.5 0 1 Miles
Area Panel
Broken Arrow Trails
030502
030501
030401
030503
030402
030407
030406
030505
030504
030403
030506
030404
030904
030405
030906
030914
030907
030304
030906
Rockin R Rides

Appendix B:
DESIGN CRITERIA

Introduction

The following design criteria are listed by resource area and do not suggest any particular order of priority. All activities proposed in this project would require implementation of these design criteria.

Heritage

- All eligible and unevaluated sites would be avoided during project activities. There are 22 known cultural resources either determined eligible for listing on the National Register of Historic Places or unevaluated.
- If during the course of any ground disturbance related to this project, any bones, artifacts, foundations, or other indications of past human occupation of the area are uncovered, all operations will cease within a 100-meter radius of the site location and a District Archaeologist notified immediately. The SHPO and regional THPOs will be notified of the discovery and provided an opportunity to comment. Any cultural resources located during project implementation will be protected based on the recommendations of the District Archaeologist and the SHPO.
- Vegetation Treatments: the following design criteria must be implemented to protect the known sites in the project area from adverse effects of mechanical treatments.
    - All cultural resources that have the potential to be affected by project activities will be flagged or otherwise posted for avoidance.
    - No burn piles will be placed within the boundaries of eligible or unevaluated sites.
    - All vehicles, timber harvesting equipment, or other machinery must not be stored or parked within the boundaries of the above eligible or unevaluated sites. Vehicles would be confined to existing and marked Forest Service roads if and when traversing through cultural resources, unless travel through site boundaries is specifically not allowed as stated in the site specific recommendations.
    - No road maintenance, blading or modification of roads through eligible and unevaluated sites will be conducted without the specified clearance and on-site presence of a district archaeologist.
- Prescribed Fire Treatments: the following design criteria, developed through scientific studies of fire effects on cultural resources must be implemented to protect the known sites in the project area from the adverse effects of prescribed fire (USDA, 2003).
    - All cultural resources that have the potential to be affected by project activities will be flagged or otherwise posted. In some cases, burning through sites may be allowed, but specified features must be avoided by ground disturbing effects (e.g. road cuts, dozer lines, handlines, staging areas, and mop-up).

- Wetline through cultural resources instead of using ground disturbing handlines.
- Fire retardant possesses a risk of damaging archaeological sites and is not allowed within site boundaries.
- Fire is allowed within the site boundaries of cultural resources provided that the following on-site fire behavior criteria are met: There are 7 known sites that will burn under 400°C < 1 hour without any preparation and **may be** burned through. There are 17 cultural resource sites that contain material which is easily destroyed by fire or would burn greater than 400° > 1 hour, and where preparation is not feasible due to the amount of fuel loading. These **15 sites cannot be burned through** and must be avoided during implementation of all prescribed burning. Consult with heritage resource specialist prior to any burning.

Fire/Fuels

❖ All prescribed burn treatments would meet with the provisions of the Clean Air Act. District personnel would monitor burn conditions, and the SASEM (Smoke Model) or equivalent program would be used to assure provisions are met. The impacts of burning on metropolitan areas such as Rapid City would be assessed at the time of burning.

Smoke impacts would be minimized utilizing the following design criteria and are incorporated into the burn plan as appropriate:

- Limit treatment area size.
- Specify wind directions and speed.
- Specify minimum mixing heights to ensure dispersal of emissions.
- Stagger ignitions.

❖ Re-vegetation of prescribed burned areas would be promoted by:

- Following broadcast burning, seed to initiate re-vegetation if ground cover is 60 percent or less and slopes are 30 percent or more.
- If piled and burned fuel creates ash piles deeper than three inches, scatter the ash, scarify and mix it with mineral soil, or bury it. **Guideline 4106**

❖ Prescribed burn plans would identify acceptable levels of tree mortality for seedlings/saplings, poles and sawtimber; burning prescriptions will be estimated to meet these levels. **Guideline 4108**

❖ Prescribed burning shall be delayed until the MPB epidemic has passed through the proposed burn areas.

❖ Activity fuels would be treated along forest collector roads and forest development trails to meet the adopted Scenic Integrity Objectives (SIO). Along arterial roads, remove 70-90 percent of activity fuels up to 300 feet from roads edge. Debris piles would be burned as soon as practical after remaining on-site for at least 2 years. Where mechanical treatment and prescribed burning is proposed within the same site, mechanical treatments would be completed prior to burning.

- Prescribed burning would be conducted in the fall in sites 30503-4, 5, 7, 8, 9, 21 and 23 which are those used by Rockin-R-Rides for their one hour ride.
- Prescribed burning within site 030309-13, allow only 5% mortality in regeneration to provide for big game screening cover.
- Where Variable Density Thinning (VDT) or Free Selection (FS) is proposed adjacent to private lands, the target basal area within 300 feet of the private land boundary will be $50ft^2$ / acre.
- Prescribed burning would be done following mechanical treatments in forested stands.
- Reduce or otherwise treat all fuels adjacent to non-forest lands so the potential fireline intensity does not exceed 200 BTUs/second/foot on 90 percent of the days when fires occur, or break up continuous fuel concentrations exceeding the above intensity into units 30-40 acres maximum size, surrounded by fuel breaks.

Slash Treatments

- Slash piles that are scheduled for burning should be located outside of meadows that contribute to Waters of the United States. Use a buffer distance designed to keep sediment, ash and debris out of channels. **Guideline 4111**
- Whole Tree yarding is required:
  - Where Rx burning is planned in timber stands (not meadows)
  - Adjacent to private lands
- Whole Tree yarding is prohibited:
  - Meadows proposed for Rx burning.
  - Within Variable Density Thinning areas not adjacent to private land
- Lop and scatter slash in sites or portions of sites identified in the Wildlife section of this Appendix, see Table B-1.

Botany/Rangeland/Weeds

- Follow all Forest Plan Objectives, Standards, and Guidelines relating to rangeland resources, flora species, weed control, and re-vegetation.
- Monitoring and surveying for SOLC and state listed plant species would be ongoing. Management of any new occurrences of SOLC would be considered if either alternative is chosen.
- Where ground-disturbing activities occur in areas infested with weeds, weeds would be treated prior to project implementation, where feasible, to reduce future spread and establishment of noxious weeds.
- Contracts and permits issued as part of this project would include measures to limit spread of noxious weeds. Where proposed activities would occur in areas

infested with noxious weeds and considered to be at high risk for spread, off-road equipment associated with the activity will be cleaned before leaving the area to prevent spread of weeds to adjacent NFS and private lands. Known areas meeting these criteria will be identified by District staff before commencement of any timber sale contract associated with this project. Known weed infestations will be displayed on the timber sale map.

- Review of the area for noxious weed infestations would continue during management activities. If new noxious weed infestations that could be spread by management activities are found during implementation, actions to minimize spread would be taken.
- Disturbed soil would be re-vegetated in a manner that optimizes plant establishment for that specific site. Re-vegetation may include topsoil replacement, planting, seeding, fertilization, liming, and placement of weed-free mulch as necessary. Re-vegetation would be initiated as soon as possible, generally not to exceed 6 months, after termination of ground-disturbing activities. All disturbed soils would be re-vegetated with native species when available, using seed mixtures free of noxious weeds. On areas needing the immediate establishment of vegetation, non-native, non-aggressive annual, non-aggressive perennials, or sterile perennials, may be used until native perennials become established. These species can be used to prevent the spread of noxious weeds and prevent erosion. Only weed-free mulch would be used.
- Known noxious weed infestations would be treated with herbicides and/or biological controls after treatments to reduce infestations and allow native vegetation to compete with non-natives. Areas would be retreated as necessary.
- When possible, avoid disturbances to grassland and meadows with activities such as large slash piling, skidding, and temporary road construction. If unavoidable, utilize portions of the site that are dominated by non-native plant species. Consult with the district botanist or rangeland specialist for proper placement of slash piles and roads.
- Restore or rebuild all fences damaged during project activities.
- When temporary roads and skid trails are to be constructed, locate beside existing fences, if possible. Such clearing will help with the maintenance of those improvements.
- All livestock gates would remain shut from June 1st – October 10th.
- Consult with the district botanist during prescribed burn planning in any sensitive species habitat.
- Defer prescribed burned areas from livestock grazing for a portion or all of the following growing season to ensure re-growth of forage species. **Guideline 4107**
- Deck piles and landings should be no closer than 200’ from any spring with exclosure fences.

- There is a potential for conflict during timber harvest and treatment activities when livestock are present. Please ensure all fences are up and gates remain closed while livestock are in the area.
- Current noxious weed infestations within the project area should be monitored for impacts from proposed activities as well as effectiveness of control measures. Inventory of the project area for additional infestations should be done during and following implementation of proposed activities.

Recreation

- Logging slash would be mechanically chipped/shredded or removed from Camp Bob Marshall and Bismarck Lake recreation site, prior to May 15th annually to provide a recreation site ready for opening to the public. Chips may remain on site provided they are not in the campsite improvements, such as parking areas, campfire rings, picnic tables, tent pads, buildings, etc. Chips would be raked – spread no more than a few inches deep (no large piles).
- Timber harvest, post sale, and prescribed fire operations should not occur within Camp Bob Marshall and Bismarck Lake Recreation Area during the primary use season from May 15th to September 15th annually. Enough time would be allowed to close out all work and accept logging units in developed recreation sites so they may be safely opened to the public by May 15th annually.
- Logging activity would occur in recreation sites during periods of dry or frozen ground to limit rutting.
- Timber harvest, post sale, and prescribed fire operations would be avoided, where possible, in the following sites which are under recreation special use permits, for the stated dates of use. These special use permits have annual operation plans, which include specific dates which are known by March 15th annually. Coordination between the special use permit holders and district recreation specialist and the sale administrator would be required before the beginning of harvest activities to avoid conflicts (See permit maps in Appendix A).
    - National Outdoor Leadership School (NOLS) – operates from April-September, 3-4 sessions, approximately 10 days each session. Involves protecting one campsite/parking areas and one rock climbing rock site.
    - Rockin-R-Rides – trail rides operate annually from May 15-October 7. Involves protecting approximately seven miles of horseback riding trails.
    - Lutherans Outdoors/Atlantic Mountain Ranch – primary operating season is May-September, with sporadic operation from October-December. Involves protecting approximately three miles of horseback riding/hiking trails.
- Designated and permitted horseback riding trails, as part of the Broken Arrow Horse Trail Special Use Permit, will be protected (See permit maps in Appendix A). There would be no restrictions to harvesting, skidding and hauling operations, but roads would be kept open and any lop and scattered slash would need to be removed from designated trails. If trees designated for removal have

trail markers on them, the permit administrator and permittee should be notified to replace these. If trail closures are necessary within the permitted area to facilitate harvesting activities, the permit administrator and permittees must be notified.

- ❖ Do not place slash piles or logging decks on trails used under recreation special use permits for Rockin-R-Rides, NOLS, Lutherans Outdoors/Atlantic Mountain Ranch and Broken Arrow permitted trails. Trails would be protected as improvements and repaired as needed prior to the start of annual permitted use period. Examples of repairs include replacing log and gravel trail water bars and rock steps that were designed and constructed specifically for protecting resources. Protection measures include:
    - o Logging, post sale and prescribed fire operations would not use narrow horse trails that have constructed improvements, such as log/gravel/rock water bars as temporary roads, improved fire control lines, skid trails or landing zones.
    - o Skidders would cross specialized horse trails at 90 degrees at areas with minimal cross slope. Forwarder skidders are preferred for crossing these trails to limit damage and the need for repairs to the trail tread.
    - o Slash would be removed from horse trail tread prior to use of these trails by permitted outfitters.
    - o Broken tops, hung up trees, over outfitter trails will be removed prior to use by the public.
- ❖ Signs should be used along roads where harvesting activity is occurring to warn the public of possible hazards.
- ❖ Coordinate with the State of SD on use of the Mickelson Trail and the paved Mickelson Trail Connector from Custer to Custer State Park for harvest activities.
    - o Safety requirements would include signage to warn trail users of project activity and a flagger would be at both ends of the working area on the trail if there is potential of trees falling on the trail.
    - o Only wheeled vehicles will be used on the trail.
    - o Any logs that need to be moved across or along the trail would be lifted and carried.
    - o The trail would be returned to its existing condition after implementation. All materials used to fix the trail would be approved by the State Trails Manager.
    - o The project coordinator would notify the State Trails Office at the beginning and the end of the project to allow the Trails Office to post notifications to the public of project work along the trail.
    - o There would be an onsite meeting with the State Trails Manager before conclusion of the project to address any problems related to the trail.

❖ **Lands**

- Work with the district Lands Specialist when overhead utility lines are in areas of MBP infested trees to coordinate with utility companies to assess and remove the infested or at risk trees.
- Identify to the public, by the placement of signs or other formats, when log trucks and increased traffic is within or directly affecting a residential community.

Scenery

- All treatments should transition ('feather') the vegetation edge from the dense canopy (in the adjacent non-treated areas, including private land) into the unit. Avoid creating geometric shapes when implementing proposed activities, when possible.
- When thinning dense stands, avoid creating a residual forested stand with evenly spaced trees if possible.
- Fuel treatments along private land boundaries would transition into the surrounding forest. These areas are essential shaded fuel breaks. Avoid creating 'corridors' of cleared understory areas by laying out the outer (forest side) of the unit in a curvilinear layout.
- All temporary roads, skid trails, burn piles and log deck areas should be returned to a natural appearance by eliminating the cut/fill slope to match the adjacent contours. Re-seed and place natural levels of down debris across these routes. This is particularly important within the Peter Norbeck Scenic Byway corridor, around developed recreation areas, non-motorized recreation areas and trails.
- Slash needs to be treated in accordance with Forest Plan **Guideline 5606**.
- Design criteria specific to the following public access routes: Peter Norbeck Scenic Byway (US Hwy 16, 16A, 16/385, SD Hwy 89, access to Bismarck Lake Campground and other recreation facilities).
    - Where possible along the roads, remaining vegetation should be in a variety of sizes and spacing to maintain a more natural appearance. This technique has been very effective in maintaining a natural appearance.
    - Clean up log decks within 300 feet of travel corridors by returning to original contours, scarify to eliminate compaction (as necessary), and plant with native grass seed.
    - Locate log landings outside the immediate foreground (200') of the highways when possible. Limit equipment use within this distance zone as possible.
    - Remove un-merchantable material piles ('cull decks' & piles of tops/limbs) in the immediate foreground (300') of the highways.
    - Slash should be cleaned up to natural levels within 300 feet of these highways, in accordance with Forest Plan Guideline 4112b (ie - This can be accomplished by piling & burning, or chipping and removing chips.), and Forest Plan Guideline 5606.

- Highlight large diameter ponderosa pine when possible, by removing small trees around them that block the view of them, could act as ladder fuels in a fire, and out compete with them for nutrients.

Transportation

- After project implementation any temporary roads would be closed and rehabilitated. Public signage such as a carsonite post with sticker could be placed at the temporary road entrance to designate the road appropriately for public travel management purposes.
- Physical closures, such as slash, stumps, rocks and re-vegetation could be used to eliminate use. Earthen barriers may be used when there is not adequate material available for slash, stumps or rock closures. This may be done after harvest activities, to allow use of a road by the purchaser, or as funds become available. Closure gates may be utilized where administrative access might be needed.
- Existing gates and related signs would be protected during sale activities.

Wildlife

Sensitive Species

- A R2 sensitive species or species of local concern located after contract or permit issuance will be appropriately managed by active coordination between permittee, contractor or purchaser, Forest Service line officer, project administrator, and biologist and/or botanist. Solutions need to be based on the circumstances of each new discovery and must consider the species need, contractual obligations and costs, and mitigation measures available at the time of discovery. **Standard 3115**

Northern Leopard Frog/Black Hills Red-bellied Snake

- Riparian areas or wetlands where populations of sensitive species are located are to be avoided during ground disturbing activities. Use one or more of the following (or other mitigation measures) tied to the site-specific conditions for disturbances adjacent to known occurrences:

  a. Avoid removing riparian or wetland vegetation; filling or dredging the riparian area or wetland; diverting stream flow from the current channel.

  b. Prevent storm runoff from washing silt into the stream or wetland.

  c. Reseed and/or replant cut and fill slopes with native seed and/or native plants promptly to control erosion and for prevention of noxious-weed infestations. Use appropriate measures to control erosion on disturbed areas that are steep, are highly erosive, and/or adjacent to the riparian area.

  d. Timing, placement, and installation of temporary stream diversions shall allow passage of aquatic life and protect sensitive and species of local concern.
  Standard 3106

- Avoid creating barriers (e.g., new open roads) between red-bellied snake hibernacula and wetlands. **Standard 3116**

- Retain a more dense canopy (>60 BA) and lop and scatter slash within or adjacent to the following sites (Table B-1). The denser canopy would allow for more moisture on the ground in the site as well as provide some hiding cover for big game. These sites may be used as upland habitat for sensitive northern leopard frogs.

  Table B-1. The following sites should have slash lopped and scattered within 200’ of the site edge in the direction of the nearby pond/spring; if proposed for prescribed burning, do not burn down woody material, juniper and regeneration within 200’ of the site edge:

Location-Site(s)	Description
030508-43, 48 and 030507-5	Church Camp (site 43)- Lop and scatter 200’ from pond on west side of 030508-48 and east side of 030507-5 to protect upland habitat for sensitive frogs.
030905-10	Crow Creek Pond—Lop and scatter 200’ from the pond (southeast corner).
030906-12, 24	Ruby Spring (site 24)—lop and scatter 200’ in the northeast corner of site 12, which is adjacent to site 24. Additionally, keep ¼ acre in northeast corner more dense (>60 BA).
030906-13	French Creek Fen (Site 13)—Lop and scatter 200’ on west side of site 13, just east of fen. Additionally, retain more dense canopy (>60BA) to provide shade and cover for wildlife.
031207-12, 13	12, 13 (“Spar” Spring/CCC development) – site 12 is proposed for pine encroachment and is to the east of the spring and site 13 is proposed for free selection. It is recommended that sites are lop and scattered up to 200’ around the spring area. It is also recommended that no trees are cut within 200’ of the site.
031306-14, 22	Lake of the Pines – lop and scatter within the southeastern portion of site 14 (adjacent to pond) and in site 22.

- Deck piles and landings should be no closer than 200’ from any spring with exclosure fences. Heavy equipment would not be allowed to operate within wet areas to prevent noxious weed growth near existing springs.

- Consult with a District Biologist prior to any work in a riparian area containing northern leopard frogs. If during any activities in the project area red-bellied snakes are observed or potential hibernacula are found, contact a District Biologist. If a hibernacula/breeding site is found a buffer may be established around the riparian area and the hibernacula.

Northern Goshawk

- From April 1 through August 15, minimize additional human caused noise and disruption beyond that occurring at the time of nest initiation (e.g. road traffic, timber harvest, construction activities) within one-half mile of all active goshawk nests up until the nest has failed or fledglings have dispersed. **Standard 3111**

- When removing trees in suitable goshawk nesting habitat, except when done for the express purpose of enhancing goshawk habitat; Identify 180 acre nest areas around historically active nests. Vegetation management activities within nest areas shall be limited to those that maintain or enhance the stand's value for goshawk. **Standard 3108**

Snails

- Manage known sensitive species and species of local concern snail colonies to:
  a. Retain overstory sufficient to maintain moisture regimes, ground level temperatures and humidity.
  b. Retain ground litter, especially deciduous litter.
  c. Avoid burning, heavy grazing, off-highway vehicles (OHVs), heavy equipment and other activities that may compact soils or alter vegetation composition and ground cover.
  d. If prescribed burning is unavoidable, burn when snails are hibernating, usually below 50 degrees Fahrenheit, and use fast-moving fires to minimize effects to snails.
  e. Control invasive weeds, but use herbicides when snails are not on the surface, and treat individual plants rather than broadcast application. **Standard 3103**
- There is one SOLC snail site located along Upper French Creek Road (030906-9). Work should be done when the ground is frozen to prevent soil compaction and disturbance. Slash needs to be moved off this site for future disposal (i.e., burning or chipping). **Standard 3103**

Butterflies

- Consider habitat needs (survey as appropriate) of regal fritillary and Atlantis fritillary butterflies prior to prescribed burning on prairies or meadows. This is especially important for prescribed burns scheduled from September through April. Design the project to conserve important habitat components of known sightings. **Guideline 3105**
- Defer prescribed burn units from livestock grazing for a portion or all of the following growing season to ensure regrowth of forage species, butterfly host and nectar species, and soil stabilization. **Guideline 4107**

Marten

- In areas identified as important connectivity corridors for marten, maintain canopy closure of at least 50 percent. **Standard 3215**

Bats/Caves

- Avoid ground disturbance within 100 feet of an opening of a natural cave (**Standard 1401a**).

- Where caves or abandoned mines serve as nurseries or hibernacula for bats, vegetative changes within 500 feet of the opening are allowed only if needed to maintain bat habitat or if topography or other features protect the openings from disturbance. (**Standard 3207**). Slash shall not be piled at the entrance of caves or mines.
- Hibernating bats occur in site 030502-53 and would require/include a 500 ft buffer. In this site, no treatment within 100' of adit opening (**Standard 1401a**). However, in the 100-500' boundary, sanitation ONLY may occur. Contact the district wildlife biologist for details on buffer location and size.
- Protect caves or mines identified as bat nurseries or hibernacula, and their microclimates when designing management activities (e.g. timber harvest, road construction, recreation facilities, trail construction). Protect known bat day and night roosts (**Standard 3102).**
- Any caves or mines discovered during sale layout, sale operations, or post sale activities will be reported to the District Wildlife Biologist, District Geologist and District Archaeologist for evaluation. If determined that the site may be suitable bat maternity or hibernation habitat, buffers would be maintained to protect the microclimate of the site. **Standard 3207**

Turkey

- Provide at least 2 to 6 turkey-roost sites per section, consisting of mature trees with an average diameter at breast height (dbh) of 10 to 14 inches, widely spaced horizontal branches, and basal areas at least 90 square feet per acre. Sites should be at least one-fourth acre in size and not isolated from adjacent forested stands. Emphasis should be on the upper third of east-facing slopes if available. **Guideline 3205**

Raptors

- Protect known raptor nests. Consider potential effects of disturbance, nesting phenology, human activities existing at onset of nest initiation, species, topography, other R2 sensitive species and plant species of local concern, forest cover, nest protection standards and recommendations used by state or federal agencies, and other appropriate factors when designing protection. **Standard 3204**

  In sites with active raptor nests, vegetation treatments (including sanitation and fuels thinning) may occur only from Aug. 15-March 31, unless otherwise approved by a wildlife biologist. Minimize disturbance within ½ mile of active nests.

Small Mammal Habitat

- In vegetation treatment units, leave 1 pile of woody material per 2 acres to create near-ground structure for small mammal species, except within 300 feet of buildings. **Standard 3117**

Big Game – Screening Cover

- ❖ Provide big game screening along at least 20 percent of the edges of arterial and collector roads. Consider vegetation, slopes, landform, etc. in evaluating available screening**. Guideline 3203**
- ❖ Keep 200' buffer of regen along FSR 344 (Willow Creek) and in location 030309-13 (along FSR 345.1) to maintain at least 20% screening cover after vegetation treatments.

Snags/Down Woody Material

- ❖ Retain all snags greater than 20-inch dbh unless a safety hazard. If snag densities within a project area are below Objective 211, retain all snags unless they are a safety hazard. If large snags (>14" dbh) are not available, retain snags in the largest size class available. **Standard 2301a**
- ❖ Retain at least six hardwood snags per acre in hardwood stands. Retain all snags in hardwood stands with snag density of less than six per acre. **Standard 2301b**
- ❖ Cutting of standing dead trees for fuelwood is prohibited, except in designated areas. **Standard 2304**
- ❖ All soft snags should be retained unless they are a safety hazard. **Standard 2305**
- ❖ Activity debris would remain on site in all stands except those specified as "Whole Tree Yarding Required" under the alternative descriptions. **Guideline 2307**
- ❖ During vegetation management activities on ponderosa pine forested sites, retain an average of at least 50 linear feet per acre of coarse woody debris with a minimum diameter of 10 inches. On white spruce forested sites retain an average of at least 100 linear feet per acre of coarse woody debris with a minimum diameter of 10 inches. **Standard 2308**

Hardwoods

- ❖ Conserve live aspen with cavities. **Standard 3124**
- ❖ Conserve live aspen with signs of cavity nesting, where this will not conflict with clone regeneration. **Guideline 2204**
- ❖ Do not locate landings or slash piles in hardwood stands or inclusions unless no alternative sites are available.
- ❖ During prescribed burning, fire should not be intentionally lit through an aspen stand or aspen clone during lighting operations. Lighting would be stopped approximately one aspen tree length (minimum 35") from the aspen stand or clone, although fire may creep through the aspen on its own. Monitoring of aspen should occur during implementation and if the observed fire behavior is more intense than expected, lighting operations would be adjusted and/or wetline around aspen stands would occur to ensure protection of aspen stands.
- ❖ Hinge all non-commercial conifers around and within hardwood release treatments, including inclusions, and directionally fall non-commercial conifers into the inclusion or around the perimeter to create a barrier. If non-commercial

sized conifers are not available to create a barrier, mature aspen may be hinged around the perimeter in the same manner. Leave all slash as is to hinder browsing.

Riparian Habitats

- Avoid disturbance (e.g. road building, trail building, skid trails), non-commercial and commercial harvest adjacent to and within riparian communities (**Standards 1304** and **1306**, and **Guideline 3212**). Buffer distance from riparian habitats will vary on a site-specific basis, and would be determined based on topography, vegetation community, etc.

  Treatments along riparian areas or within wet meadows would be limited to frozen ground conditions. This applies within sites 30308-33 and 030406-28. The spring or wet area should be avoided, and activity should be restricted to frozen ground.
- Prohibit motorized vehicles from entering streams except at specified points. **Guidelines 9107 and 9108**
- Use biological control methods whenever practical, and whenever protecting other resources is desired, such as water quality. **Guideline 4302**
- Maintain slash and large woody debris within riparian communities (**Guideline 3212**). Boundaries of riparian habitats would vary on a site-specific basis, and would be determined based on topography, vegetation community, etc. Large woody debris and slash should not block stream flow or spring flows in these areas.
- Protect riparian exclosure fence around Tenderfoot Creek along FSR 297.1I during operations.

Wildlife Guzzlers

- Leave all trees within guzzler fence exclosures (including trees used as fence posts) to keep shade and cover for wildlife. Locations and sites are the following:

030406-22	030405-19	030308-16
030907-2	030506-20	030505-35
030914-7	030906-24	

Squirrel Caches

- Retain all trees within squirrel caches unless otherwise directed by a Wildlife Biologist.

Slash Piles

- Locate slash piles that are scheduled for burning out of grasslands, meadows, and riparian areas to protect from invasion of non-native species and loss of habitat for butterfly species. In addition, do not place slash piles on top of squirrel caches.
- If mammal tracks (i.e., mountain lion, bobcat, coyote, fox, or marten) are seen around landing piles or slash piles indicating potential use as cover or dens, these

piles will not be burned. A wildlife biologist must be contacted and will assess if and when these piles may be burned or dismantled.

Wildlife Closures/ Gates

- Retain all commercial and non-commercial trees for 1 chain length (66 ft) around all gates (seasonal and year-long) to aid in preventing unauthorized public access by their placement with surrounding vegetation. These gates and adjacent trees should both be protected features and retained as part of the road closure feature. The following table (Table B-2) lists the seasonal gates only and their locations.

Table B-2. Seasonal gates and locations.

Gate Number	Designation	Location	Site	Road
A7	Seasonal	030903	1	413
A8	Seasonal	030508	8	284.1D
A12	Seasonal	030505	36	297.1E
A13	Seasonal	030506	7	297.1G
A17	Seasonal	030909	27	504 (east end)
A28	Seasonal	030909	15	654
A29	Seasonal	030903	45	240
A33	Seasonal	030909	12	504 (west end)
A34	Seasonal	030913	6	781.1A
B17	Seasonal	030301	3	345.1A
B35	Seasonal	030301	8	349.1A

Silviculture

- Activity fuel should be removed, lopped, scattered or piled for later burning. Slash piles, other than those left for wildlife habitat (**Standard 3117**), should be burned within one year, if possible. This will reduce the risk of Ips beetle caused mortality.
- Sites 030305-07, 50, 70, 71, and 72 are meadow sites with pine encroachment. Pine encroachment treatment would remove all pine trees, but spruce would be left within these sites.
- In site 30508-11, retain trees in the largest diameter class.
- In Overstory Removal treatments retain an average of one large tree per acre.
- The most current Black Hills NF "Visual Marking Guides" would be followed for tree marking within distance of arterial and collector roads and private land with dwellings.
- The practices outlined in "Best Management Practices for the control of Non-Point Pollution from Silvicultural and Related Road Activities" would be followed.
- Sanitation, or removal of conifer trees identified as insect infested, is included for all National Forest land within the project area.

- Whole tree harvest commercial-sized conifers from aspen stands in such a manner to insure limited damage to remaining aspen. Whole tree harvest would eliminate shading of the ground by logging slash. If conifer slash is to be piled and burned, place piles at least one (aspen) tree height away from the edge of the aspen to avoid damage to the roots from the intense heat (Sheppard, 10-2004). Conifers less than 9-inches dbh shall be removed post harvest or hinged to provide protection to aspen suckers.
- Where aspen (individual trees or clones) occurs within conifer stands with proposed treatments, remove all pine within 33 feet surrounding the perimeter. This will encourage expansion of these hardwoods.

Soils and Hydrology

- Include all USFS Region 2 Watershed Conservation Practices (WCPs), Forest Plan standards and guidelines, South Dakota Best Management Practices (BMPs), and industry standard methods for protecting geologic, soil and water resources.

Protected Stream Courses:

- Protected stream courses within the project area include all or portions of the following streams.

Table B-3. Vestal protected stream courses on National Forest

Stream Name	Stream Class	Miles
French Creek	Perennial	3.29
Glen Erin Creek	Perennial	1.87
Laughing Water Creek	Perennial	0.43
Loues Creek	Perennial	0.04
North Fork French Creek	Intermittent	0.16
Ruby Creek	Perennial	1.65
Tenderfoot Creek	Intermittent	0.45
Tenderfoot Gulch	Perennial	0.02
Toe (Joe) Gulch	Perennial	0.87
Willow Creek	Perennial	1.33

- Protected stream courses will have a buffer and are generally called a WIZ (200 ft. total width, 100 feet each side of the stream). Activities can occur in the WIZ but care will need to be taken to minimize impacts in the WIZ. Design criteria include; limit the amount of skid trails in the WIZ and skid trails would be designated in the WIZ.

Table B-4. Vestal WIZ Sites – Alternative 2

Location	Site	Site Acres	Wiz Acres	Prescription	% of Site
030301	3	57.3	1.0	GSH	2
030301	8	116.0	2.2	SWSC	2
030301	10	27.8	12.0	HR	43
030301	16	21.5	1.1	VDT	5
030301	24	22.1	7.0	PE	32
030301	30	0.8	0.2	HR	22
030301	31	3.2	2.4	HR	75
030302	36	1.9	0.6	VDT	33
030303	9	12.9	0.9	GSH	7
030303	25	5.8	2.9	HR	49
030303	32	12.5	2.2	HR	17
030303	43	76.2	12.5	SANI	16
030304	22	28.7	1.0	CT50	3
030304	23	68.0	1.8	GSH	3
030305	4	69.2	1.1	CT50	2
030305	31	10.8	0.7	CT	7
030305	33	6.4	2.7	CT	41
030305	34	1.9	0.8	CT	45
030305	35	3.5	0.7	CT	20
030305	54	3.0	0.9	HR	31
030305	55	5.4	3.0	SANI	56
030305	66	15.9	1.0	GSH	6
030305	76	19.7	6.9	SANI	35
030306	46	33.6	6.3	GSH	19
030306	59	16.4	11.8	PE	72
030306	61	7.5	0.6	GSH	7
030307	25	18.4	1.8	VDT	10
030307	61	2.4	0.5	SANI	20
030307	62	1.7	0.3	DEFER	17
030307	69	30.7	15.9	PE	52

Table B-4. Vestal WIZ Sites – Alternative 2

Location	Site	Site Acres	Wiz Acres	Prescription	% of Site
030308	6	38.8	22.7	PE	59
030308	10	21.6	3.7	VDT	17
030308	28	103.9	3.8	CT	4
030308	32	7.8	2.7	HR	34
030308	35	20.7	12.4	HR	60
030308	36	8.0	3.2	HR	40
030309	2	52.8	2.0	SANI	4
030309	3	17.3	1.1	CT	6
030309	8	14.3	2.7	SANI	19
030309	17	163.0	2.9	GSH	2
030309	20	2.5	0.3	SANI	10
030309	22	14.4	7.3	SANI	51
030309	47	9.1	6.3	HR	69
030309	49	5.5	4.5	HR	82
030403	5	13.6	2.0	CT	14
030403	9	20.3	5.8	PE	29
030403	13	12.9	2.0	GSH	16
030403	20	6.8	0.6	CT	8
030403	22	2.5	0.4	SANI	15
030404	40	26.4	2.0	GSH	8
030404	41	7.8	3.6	GSH	47
030405	14	37.7	4.0	CT	10
030406	8	97.0	5.1	GSH	5
030406	14	20.6	3.2	OR	16
030406	22	17.5	3.4	HR	20
030406	59	45.8	2.2	GSH	5
030407	3	79.2	2.3	VDT	3
030407	16	142.2	2.5	GSH	2
030407	20	14.5	0.5	CT	3
030407	26	37.8	4.0	CT	11

Table B-4. Vestal WIZ Sites – Alternative 2

Location	Site	Site Acres	Wiz Acres	Prescription	% of Site
030407	29	22.0	4.8	GSH	22
030407	43	6.6	2.0	HR	30
030501	19	25.5	4.0	CT50	16
030502	13	18.0	4.0	PE	22
030502	19	14.1	2.3	SANI	16
030503	2	22.1	2.5	CT50	11
030506	63	56.3	1.1	VDT	2
030507	12	5.6	2.3	CT50	42
030508	48	97.0	2.3	CT50	2
030906	9	102.4	5.3	SANI	5
030906	12	68.6	2.1	GSH	3
030907	9	5.3	4.2	CT50	79
030909	2	93.1	1.6	GSH	2
030909	9	36.1	1.5	CT	4
030909	10	318.8	4.2	GSH	1
030909	15	14.1	4.4	GSH	31
030909	29	8.7	4.3	CT	49
030909	39	4.0	1.9	SANI	47
030913	9	66.2	4.8	FS	7
031201	3	9.3	4.0	GSH	43
031206	5	46.3	2.4	GSH	5
031207	3	68.5	2.3	FS	3
031301	53	23.1	0.5	GSH	2
031303	6	56.2	4.7	GSH	8
031303	16	8.2	3.4	SANI	42
031303	17	44.7	2.3	FS	5
031303	54	57.1	3.5	GSH	6
031303	56	19.0	1.7	GSH	9
031306	14	63.5	3.0	POL	5
031307	20	112.5	1.4	VDT	1

Table B-4. Vestal WIZ Sites – Alternative 2

Location	Site	Site Acres	Wiz Acres	Prescription	% of Site
030301	3	57.3	1.0	GSH	2
030301	8	116.0	2.2	SWSC	2
030301	10	27.8	12.0	HR	43
030301	16	21.5	1.1	VDT	5
030301	24	22.1	7.0	PE	32
030301	30	0.8	0.2	HR	22
030301	31	3.2	2.4	HR	75
030302	36	1.9	0.6	VDT	33
030303	9	12.9	0.9	GSH	7
030303	25	5.8	2.9	HR	49

Landings within the WIZ

- 0-50 feet – No landings are permitted this close to the stream.
- 50 -100 feet – Landing within this distance are discouraged. Only place a landing within this distance when there are no other options available. Erosion control measures such as compost socks, straw wattles, etc. may be needed if landing are in this zone. Consult with Hydrologist.

Forwarding and Skid Trails within the WIZ

- Operate within the WIZ when conditions are dry or frozen. If conditions are wet, trees will need to be end lined out of the WIZ.
- 0 to 50 feet – No equipment within 50 feet of the stream except at designated crossings.
- Limit the amount of forwarding and skid trails in the WIZ.
- Forwarding and skid trails will be designated in the WIZ.
- Avoid crossing perennial and intermittent streams to the extent practical and avoid creating low water crossings or 'fords' of streams.
- Forwarding and skidding through water will be avoided. Perennial and Intermittent stream crossings will have a temporary structure installed to keep equipment and logs out of water and protect the stream bank.
- Rehabilitate forwarding and skid trail crossings of perennial and intermittent streams to original contour, seed and install erosion control matting for a distance of at least 25 feet from the stream on any disturbed areas.

- All forwarding and skid trails will have drainage control structures installed on them when they are rehabilitated upon completion of work, discharging into a vegetative filter. Spacing will use the following as guidelines:

Table B-5. Spacing for water bars

Road or Trail Grade (%)	Spacing Between Water Bars (Feet)
2	250
5	135
10	80
15	60
20	45

Roads within the WIZ

- If FSR 342.1E is needed for this project, the crossing of French Creek would be done with a temporary bridge.
- Temporary roads crossing perennial or intermittent stream. Any temporary roads crossing perennial or intermittent streams will require a structure to span the stream such as a temporary bridge, cattle guard, temporary arch or similar structure to avoid damage of the stream and stream bank.
- Roads crossing streams with new construction or reconstruction, at the stream crossing, will use erosion control devices to minimize to amount of sediment from entering the stream. Such device could include compost socks, sediment stop, wattles, etc.
- Road clearing limits and widths in the WIZ will be limited to the minimum width.
- Road drainage features on roads would be spaced as outlined in Table B-6.

Table B-6. Spacing for water bars

Road or Trail Grade (%)	Spacing Between Water Bars (Feet)
2	250
5	135
10	80
15	60
20	45

- Seed all roads in the WIZ, temporary and system, upon their closure.
- Upon rehabilitation of stream crossings, seed and erosion control fabric will be installed for a distance of at least 25 feet from the stream on any disturbed areas.

Soils:

- Manage land treatments to limit the sum of severely burned and detrimentally compacted, eroded, and displaced land to no more than 15% of any land unit. (Forest Plan Standard 1103.)

- All forwarding and skid trails would have drainage control structures installed on them when they are rehabilitated upon completion of work. Drainage control structures could include slash. Spacing would use the following as guidelines:

Table B-7. Spacing for water bars

Road or Trail Grade (%)	Spacing Between Water Bars (Feet)
2	250
5	135
10	80
15	60
20	45

- On soils with very severe EHR and slopes steeper than 40%, ground skidding must be avoided.
- On soils with very severe EHR and slopes between 20 and 40%, machinery operations must be restricted to dry or frozen soil conditions.
- On soils with topsoil thinner than one (1) inch, consider need for retention of coarse woody debris slash in each activity area to balance soil quality requirements and fuel loading concerns. Exceptions may occur when high fire hazard overrides the need to leave slash onsite.
- Conduct prescribed fires to minimize the residence time on the soil while meeting the burn objectives. This is usually done when the soil and duff are moist.
- All off-road, ground-based equipment operations should be minimized as possible, and should take place during dry or frozen conditions to limit soil compaction, rutting and soil erosion. The 'Dry or Frozen Design Criteria' is to protect soils with a VSEHR on slopes 20 to 40%. Machinery operations are only permitted when there are dry or frozen conditions. These are areas with slopes 20% to 40% with VSEHR. Machinery operations must be restricted to dry or frozen soil conditions.

Table B-8. Dry or Frozen Design Criteria – Alternative 2

Location	Site	Site Acres	Dry/Frozen Acres	% of Site
030303	1	55.0	33.1	60
030303	3	109.0	27.1	25
030303	4	133.0	40.8	31
030303	13	26.1	5.3	20
030303	17	20.7	10.3	50
030303	20	14.4	3.0	21
030303	24	61.5	13.8	22
030303	25	5.8	4.4	75
030303	31	33.8	3.6	11
030303	33	58.4	9.5	16
030303	34	9.9	6.3	63
030303	37	12.3	3.1	25
030303	38	16.7	7.0	42

Location	Site	Site Acres	Dry/Frozen Acres	% of Site
030303	39	47.5	21.3	45
030304	48	15.6	7.0	45
030305	13	15.7	6.3	40
030305	17	9.4	1.1	12
030305	24	8.7	1.2	13
030305	29	14.2	4.4	31
030305	32	4.8	2.1	45
030305	33	6.4	1.3	20
030305	36	14.8	1.9	13
030305	37	9.0	2.3	25
030305	38	7.3	1.2	17
030305	53	13.8	13.8	100
030306	40	9.1	1.3	15

Location	Site	Site Acres	Dry/Frozen Acres	% of Site
030306	56	54.3	5.6	10
030306	57	14.3	2.0	14
030306	61	7.5	3.5	47
030306	66	22.9	11.4	50
030306	67	3.7	2.7	73
030306	68	20.6	3.3	16
030308	11	41.3	8.1	20
030308	14	16.4	10.7	65
030309	4	16.6	2.5	15
030309	11	40.2	15.5	38
030309	14	72.9	8.9	12
030309	15	11.7	11.7	100
030309	16	9.0	5.8	65
030309	17	163.0	27.9	17
030309	22	14.4	8.7	60
030309	49	5.5	2.2	39
030309	61	1.5	0.7	49
030309	62	32.5	27.8	86
030401	1	28.4	4.3	15
030401	3	41.5	12.9	31
030401	5	24.5	6.8	28
030401	7	15.4	5.1	33
030401	9	41.5	18.0	43
030401	10	38.5	34.0	88
030401	12	6.0	6.0	100
030401	14	41.3	4.2	10
030401	15	3.4	2.0	58
030401	22	7.8	1.5	19
030401	23	5.5	5.5	100
030401	31	27.8	6.2	22
030401	37	4.0	1.6	41
030401	45	8.8	8.8	100
030402	10	21.1	14.8	70
030402	12	9.5	4.1	43
030402	15	6.6	6.2	94
030402	16	1.7	1.7	100
030404	1	7.9	3.0	38
030404	6	8.1	1.8	21
030404	7	3.1	2.5	80
030404	11	31.5	7.8	25
030404	17	18.7	5.6	30
030404	19	12.5	2.8	22
030404	21	19.0	13.6	71
030404	24	1.7	0.3	17
030404	28	3.4	0.7	19
030404	31	2.4	1.5	60
030404	38	10.0	4.0	40

Location	Site	Site Acres	Dry/Frozen Acres	% of Site
030404	44	1.8	1.4	79
030404	52	27.4	11.7	43
030405	2	16.0	2.7	17
030405	3	70.7	15.6	22
030405	5	156.3	40.7	26
030405	14	37.7	28.1	75
030405	17	26.0	21.6	83
030405	18	15.3	3.8	25
030405	19	20.7	6.5	32
030405	29	2.7	2.7	100
030405	41	43.7	6.4	15
030406	10	10.1	2.2	22
030406	11	22.4	8.3	37
030406	13	49.9	8.3	17
030406	19	15.9	1.6	10
030406	20	36.6	26.7	73
030406	31	7.0	3.9	56
030406	48	2.9	2.9	100
030406	57	9.6	2.5	26
030406	59	45.8	18.7	41
030406	63	144.7	14.0	10
030407	1	56.1	6.3	11
030407	2	33.3	7.6	23
030407	5	43.7	10.6	24
030407	6	31.7	4.5	14
030407	9	129.3	20.4	16
030407	10	19.6	6.4	33
030407	16	142.2	18.4	13
030407	21	18.5	7.9	43
030407	24	39.9	38.5	97
030407	27	47.2	4.6	10
030407	28	19.0	19.0	100
030407	32	26.1	6.2	24
030407	33	36.3	36.3	100
030407	46	26.6	4.3	16
030407	49	17.2	10.5	61
030407	53	4.4	1.5	35
030407	54	15.9	4.3	27
030407	55	12.3	2.7	22
030501	3	120.6	31.7	26
030501	5	7.6	4.7	61
030501	6	14.7	7.4	50
030501	8	20.6	8.0	39
030501	9	23.0	4.4	19

Location	Site	Site Acres	Dry/Frozen Acres	% of Site
030501	12	18.2	15.8	87
030501	18	57.1	7.4	13
030501	19	25.5	2.9	11
030501	20	17.3	3.9	22
030501	22	77.7	35.7	46
030501	23	9.7	3.4	35
030501	24	41.5	18.9	45
030501	25	21.4	4.4	20
030501	26	32.3	15.6	48
030501	51	3.9	1.4	37
030501	52	37.9	19.3	51
030502	1	70.8	24.9	35
030502	2	17.1	7.1	42
030502	60	79.0	8.5	11
030502	62	33.4	3.3	10
030505	19	34.2	12.4	36
030505	30	24.1	20.4	85
030505	35	33.5	3.9	12
030502	1	70.8	24.9	35
030506	4	21.8	2.2	10
030506	12	45.0	5.9	13
030506	13	9.6	1.5	16
030506	14	23.1	23.1	100
030506	15	38.3	18.4	48
030506	18	19.6	3.4	17
030506	20	18.6	8.6	46
030506	39	7.0	1.6	22
030506	59	70.5	7.5	11
030506	60	24.2	8.3	34
030506	67	27.4	16.1	59
030507	9	22.0	6.2	28
030507	22	8.8	2.3	26
030904	29	10.9	1.9	17
030904	30	4.5	0.8	17
030914	2	11.8	9.9	85
030914	10	10.6	3.1	29
030914	28	15.2	3.4	22
031301	5	158.2	29.9	19
031301	14	20.7	2.2	11
031301	16	66.8	19.8	30
031301	37	5.8	4.1	71
031301	43	13.4	4.7	35
031302	3	5.2	5.2	100

Location	Site	Site Acres	Dry/Frozen Acres	% of Site
031302	4	10.5	10.5	100
031302	7	10.5	1.3	13
031302	10	26.1	2.7	10
031302	12	22.2	9.2	42
031302	13	28.7	9.8	34
031302	15	56.5	15.5	27
031302	19	18.6	4.8	26
031302	21	5.6	5.6	100
031302	22	21.3	21.3	100
031303	3	51.7	21.7	42
031303	5	42.5	28.1	66
031303	6	56.2	8.3	15
031303	7	51.4	36.6	71
031303	16	8.2	8.2	100
031303	30	12.3	1.5	12
031303	54	57.1	39.8	70
031303	57	61.6	25.2	41
031304	1	35.9	15.2	42
031304	2	48.4	7.2	15
031304	5	40.2	9.2	23
031304	1	35.9	15.2	42
031304	2	48.4	7.2	15
031304	5	40.2	9.2	23
031304	6	45.0	4.6	10
031304	10	49.9	32.4	65
031304	13	23.4	7.9	34
031304	17	21.6	21.6	100
031304	19	14.3	2.3	16
031304	22	12.6	12.6	100
031304	25	2.4	1.3	54
031304	28	13.3	4.6	35
031305	3	80.8	32.4	40
031305	7	94.7	22.8	24
031305	13	34.5	6.7	20
031306	3	42.7	8.3	19
031307	36	124.6	42.3	34

❖ Avoid ground-based harvest and skidding equipment operations on sustained slopes steeper than 40%. The ‘No Activity Design Criteria’ is to protect soils with a VSEHR on slopes greater than 40%. No machinery operations activities will be allowed on slopes greater than 40%. These are areas with slopes greater than 40% with VSEHR. Machinery operations are not permitted on these areas.

Table B-9. No Activity Design Criteria – Alternative 2

Location	Site	Site Acres	No Activity Acres	% of Site
030303	1	55.0	20.4	37
030303	3	109.0	15.6	14
030303	4	133.0	18.2	14
030303	17	20.7	2.2	11
030303	31	33.8	3.6	11
030303	37	12.3	4.5	36
030303	38	16.7	7.1	43
030303	39	47.5	13.1	28
030305	13	15.7	6.3	40
030305	17	9.4	1.5	16
030305	29	14.2	9.3	65
030305	35	3.5	0.6	18
030305	36	14.8	8.8	59
030305	37	9.0	1.6	17
030305	53	13.8	1.3	10
030306	56	54.3	6.2	11
030306	57	14.3	5.3	37
030306	67	3.7	0.9	24
030308	16	18.4	4.3	23
030309	8	14.3	1.9	13
030309	61	1.5	0.5	30
030401	3	41.5	5.3	13
030401	9	41.5	10.7	26
030401	10	38.5	6.1	16
030401	14	41.3	13.4	33
030401	15	3.4	3.4	100
030401	16	45.7	19.0	42
030401	22	7.8	5.2	67
030401	23	5.5	1.1	19
030401	36	11.4	6.8	60
030401	37	4.0	3.9	98
030401	45	8.8	1.7	20
030402	10	21.1	12.4	59
030402	12	9.5	2.9	30
030404	3	39.8	11.3	28
030404	4	18.6	3.3	18
030404	6	8.1	0.9	11
030404	7	29.7	5.5	18
030404	10	6.2	0.9	14
030404	11	31.5	11.0	35
030404	14	8.5	0.8	10
030404	17	18.7	3.8	20
030404	18	5.4	1.3	25
030404	21	19.0	5.5	29
030404	38	10.0	8.9	89
030405	5	156.3	45.7	29
030405	17	26.0	5.7	22
030405	29	2.7	2.7	100
030405	41	43.7	5.5	13
030406	10	10.1	3.8	38
030406	11	22.4	7.8	35
030406	19	15.9	2.0	13
030406	20	36.6	27.0	74
030406	31	7.0	0.9	13
030406	63	144.7	33.3	23
030407	2	33.3	29.5	89
030407	6	31.7	7.3	23
030407	9	129.3	125.3	97
030407	10	19.6	8.8	45
030407	16	142.2	20.8	15
030407	19	5.5	1.3	24
030407	24	39.9	19.3	48
030407	27	47.2	13.2	28
030407	28	19.0	14.7	77
030407	32	26.1	6.5	25
030407	33	36.3	9.8	27
030407	49	17.2	7.4	43
030407	55	12.3	2.0	16
030501	5	7.6	1.7	22
030501	8	20.6	2.8	14
030501	9	23.0	5.3	23
030501	12	18.2	9.1	50
030501	19	25.5	3.2	13
030501	23	9.7	1.5	16
030501	24	41.5	9.0	22
030501	26	32.3	14.1	44
030501	52	37.9	15.5	41
030502	1	70.8	9.0	13
030502	2	17.1	1.9	11
030506	13	9.6	2.6	28
030506	14	23.1	3.3	14
030506	15	38.3	4.9	13
030506	59	70.5	9.8	14
030506	67	27.4	5.5	20

Location	Site	Site Acres	No Activity Acres	% of Site
030904	29	10.9	1.4	13
030904	30	4.5	1.4	32
030914	2	11.8	3.3	28
031301	3	44.6	7.1	16
031301	44	7.5	3.2	42
031302	3	5.2	5.2	100
031302	7	10.5	2.7	25
031302	11	24.6	7.8	32
031302	12	22.2	10.5	47
031302	15	56.5	21.0	37
031302	19	18.6	6.2	33
031302	21	5.6	1.3	24
031302	22	21.3	2.8	13
031303	6	56.2	15.0	27
031303	7	51.4	22.0	43
031303	54	57.1	21.4	38
031303	57	61.6	7.4	12

Location	Site	Site Acres	No Activity Acres	% of Site
031304	1	35.9	35.9	100
031304	2	48.4	6.1	13
031304	5	40.2	20.0	50
031304	6	45.0	12.6	28
031304	10	49.9	31.2	63
031304	17	21.6	9.3	43
031304	19	14.3	5.2	36
031304	26	13.9	13.9	100
031304	28	13.3	1.5	12
031305	6	41.6	4.0	10
031307	8	23.8	8.9	37

Fisheries

- Avoid the reconstruction of FSR 342.1E and the inwater activity associated with the road-stream crossing on French Creek downstream of Stockade Lake. If FSR 342.1E must be reconstructed, then use a temporary bridge to avoid placing additional fill in French Creek. Inwater activity on French Creek downstream of Stockade Lake should be avoided during June through mid-July and October 1st through April 15th to keep heavy equipment out of lower French Creek during the mountain sucker and brook/brown trout spawning, incubation and emergence period, respectively, to be consistent with WCPH Management Measure 3; design criteria c.
- Leave the perched culvert on FSR 344 as-is on East Meeker Creek (Meeker Ranch) as an instream barrier to keep non-native brook stickleback (*Culaea inconstans*) from migrating further upstream.

Appendix C:
MONITORING PLAN

Monitoring Plan for the Vestal Project

Introduction

The Forest Plan identifies specific items to be monitored, and the Monitoring Implementation Guide (USDA Forest Service, 2005) describes monitoring protocols that have been established for numerous resources, as directed by the Forest Plan. The Monitoring Implementation Guide identifies frequency and methods of data collection, unit of measure, sampling design, expected precision and reliability, reporting frequency, data storage location, and costs for each monitoring item identified by the Forest Plan. This guide is subject to periodic adjustments. For additional information, refer to the Forest Plan (Chapter 4), and the Monitoring Implementation Guide.

The ID Team for the Vestal project compiled additional monitoring objectives/items, which are summarized below. These items provide emphasis regarding particular resource monitoring needs in the project area. Monitoring would be prioritized by the responsible line officer if funding is unavailable to implement all items listed or referenced in this Monitoring Plan.

Soils and Hydrology

To ensure that soil and water resources are not impaired due to project activities, Best Management Practices (BMPs) are applied. BMP monitoring occurs during and after management activities. BMP implementation monitoring would occur during management activities, primarily through contract administration or oversight of Forest Service crew work.

Project specific design criteria for soil and water protection will be incorporated into any contracts or internal work orders used to implement the proposed activities. The effectiveness and implementation of these design criteria would be monitored as stated above for BMPs and during the annual Implementation and Effectiveness field review. Additional monitoring may occur based on needs as identified by the project hydrology and soils specialist.

Fuels

All fuels treatments would be recorded in the FACTS database. Prescribed fire surveys would be conducted following prescribed burning to ensure resource objectives are being met.

Monitoring of smoke conditions during burning operations would be done to comply with the provisions of the Clean Air Act. District personnel will utilize the SASEM (Smoke Model), or an equivalent program to assure provisions are being met. The impacts on metropolitan areas such as Rapid City would be assessed at the time of burning.

Noxious Weeds

Areas of weed infestation would be monitored and the effectiveness of the weed treatments measured. Areas should be re-treated as necessary.

Wildlife

The Hell Canyon District biologist would monitor known goshawk nests every summer for activity and breeding success. The biologist would coordinate with implementation crews to ensure the timing restrictions are followed in active territories. Occurrences and sighting of wildlife species would be documented during field visits and monitoring trips.

Heritage

Post project site monitoring is a useful method for determining the effectiveness of avoidance measures. Twenty percent (20% rounded up to the nearest whole number) of eligible and unevaluated cultural resources in the vicinity of treatment areas will be revisited and monitored for effects from the Vestal Project following implementation. The selection of sites to be monitored is at the discretion of the District Archaeologist, and results will be sent to SHPO in the form of a site monitoring report.

Botany

Monitoring and plant surveys for R2 Sensitive Species will be ongoing. Management of any new occurrences as well as the existing known occurrence will need to be considered as treatment plans are developed for the area.

Appendix D: TREATMENTS BY SITE

Alternative 2 Treatments by Site

Cover Type Abbreviations:

GRA Grasslands

NFL Non-Vegetated Sites (rock, gravel pits, etc.)

TAA Aspen

TPP Ponderosa Pine

TWS Spruce

WAT Water

Alternative 2 Prescription Abbreviations:

CT Commercial Thinning

CT50 Commercial Thinning to a BA of 50 ft^2/acre

DEFER Deferred from treatment

FS Free Selection

GSH Group Shelterwood

HC Hardwood Conversion

HR Hardwood Release

OR Overstory Removal

PCT Precommercial Thinning

PE Pine Encroachment

POL Products Other than Logs Thinning

SANI Sanitation

SWSC Shelterwood Seedcut

VDT Variable Density Thinning

Alternative 2 Fire & Fuels Abbreviations:

DF Dead Fall

FB Fuelbreak

RX Prescribed Burning

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30301	1	4	5.4	TPP	3C	CT50	RX
30301	2	14	5.4	TPP	4A	GSH	RX
30301	3	57	5.4	TPP	4A	GSH	RX
30301	4	19	5.4	TPP	4A	OR	RX
30301	5	23	5.4	TPP	4B	CT	RX
30301	6	50	5.4	TPP	4A	GSH	RX
30301	7	15	5.4	TPP	4B	SANI	
30301	8	116	5.4	TPP	4A	SWSC	RX
30301	9	26	8.2	TPP	4A	GSH	
30301	10	28	8.2	TAA	3A	HR	RX
30301	11	11	8.2	TPP	4A	CT	RX
30301	12	10	8.2	TAA	2	HR	
30301	13	34	8.2	TPP	4A	VDT	RX

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30301 14	7	8.2	TPP	4B	OR	
30301 15	18	8.2	TPP	4B	GSH	
30301 16	21	8.2	TPP	4B	VDT	
30301 17	33	5.4	TPP	2	OR	
30301 18	5	8.2	TPP	3B	CT	DF
30301 19	15	5.4	TPP	4A	GSH	RX
30301 20	6	5.4	TPP	3A	POL	RX
30301 21	4	5.4	TAA	3A	HR	RX
30301 22	2	5.4	TAA	3B	HR	RX
30301 23	3	5.4	TPP	3A	GSH	RX
30301 24	22	5.4	GRA		PE	RX
30301 25	33	8.2	TPP	4B	SANI	
30301 26	2	5.4	TAA	4A	HR	RX
30301 27	19	5.4	GRA		PE	RX
30301 28	2	5.4	NFL		DEFER	RX
30301 29	4	8.2	TPP	4A	VDT	RX
30301 30	1	8.2	TAA	1	HR	
30301 31	3	8.2	TAA	2	HR	
30301 32	4	8.2	NFL		DEFER	
30301 33	2	8.2	TPP	4A	SANI	
30301 34	10	8.2	TPP	4A	VDT	
30301 35	16	5.4	TPP	4A	OR	
30301 36	1	5.4	TPP	4A	OR	
30301 37	6	5.4	TPP	3B	POL	
30302 1	47	5.4	TPP	2	OR	
30302 2	63	5.4	TPP	4A	GSH	
30302 3	29	8.2	WAT		DEFER	
30302 4	9	5.4	TPP	4B	CT	
30302 5	5	8.2	TPP	4A	VDT	
30302 7	23	5.4	TPP	4A	GSH	
30302 8	13	5.4	TPP	4A	OR	
30302 9	46	5.4	TPP	4C	GSH	
30302 10	15	5.4	TPP	4B	GSH	
30302 11	16	8.2	TPP	4A	GSH	
30302 12	12	8.2	TPP	5	SANI	
30302 13	13	8.2	TPP	5	SANI	
30302 14	3	5.4	GRA		DEFER	
30302 16	9	5.4	TAA	4B	HR	
30302 17	7	5.4	TPP	3C	CT50	
30302 18	3	5.4	TPP	3B	SANI	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30302	19	3	5.4	TPP	3A	SANI	
30302	20	1	8.2	TAA	3A	HR	
30302	21	5	5.4	TAA	3B	HR	
30302	22	8	5.4	TPP	2	GSH	
30302	23	2	5.4	TPP	3A	SANI	
30302	24	10	5.4	TPP	3C	OR	
30302	25	2	5.4	GRA		PE	
30302	26	2	5.4	TAA	4A	HR	
30302	27	4	5.4	TAA	2	HR	
30302	29	3	8.2	TPP	4B	SANI	
30302	30	1	8.2	GRA		DEFER	
30302	31	1	5.4	NFL		DEFER	
30302	32	1	5.4	NFL		DEFER	
30302	33	1	5.4	NFL		DEFER	
30302	34	4	5.4	GRA		DEFER	
30302	35	4	8.2	TPP	4B	VDT	
30302	36	2	8.2	TPP	4A	VDT	
30302	37	2	5.4	NFL		DEFER	
30302	38	8	5.4	TPP	3A	OR	
30302	39	2	5.4	TPP	4C	GSH	
30302	40	2	5.4	TPP	4A	GSH	
30302	41	1	5.4	GRA		DEFER	
30303	1	55	5.4	TPP	4A	GSH	
30303	2	62	5.4	TPP	4A	GSH	
30303	3	109	5.4	TPP	4B	GSH	DF
30303	4	133	5.4	TPP	4A	CT	
30303	5	10	5.4	TAA	1	HR	
30303	6	51	5.4	TPP	4B	FS	
30303	7	3	5.4	TPP	4B	CT	
30303	8	16	5.4	TPP	3C	GSH	
30303	9	13	5.4	TPP	4A	GSH	DF
30303	10	12	5.4	TPP	4C	POL	
30303	11	53	5.4	TPP	4A	GSH	
30303	12	26	5.4	TPP	4B	GSH	
30303	13	26	5.4	TPP	4C	SANI	
30303	14	23	5.4	TPP	4A	GSH	
30303	15	10	5.4	TPP	4B	VDT	
30303	16	34	5.4	TPP	4C	VDT	DF
30303	17	21	5.4	TPP	4A	SANI	
30303	18	18	5.4	TPP	4B	GSH	

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30303 19	40	5.4	TPP	4A	GSH	
30303 20	14	5.4	TPP	4C	GSH	
30303 21	8	5.4	GRA		PE	
30303 22	24	5.4	TPP	4A	OR	
30303 23	7	5.4	TAA	1	HR	
30303 24	62	5.4	TPP	4B	GSH	
30303 25	6	5.4	TAA	3A	HR	
30303 26	7	5.4	TAA	1	HR	
30303 27	11	5.4	TAA	1	HR	
30303 28	4	5.4	TPP	4B	GSH	
30303 29	37	5.4	TPP	4B	GSH	
30303 30	11	5.4	TPP	4A	SANI	
30303 31	34	5.4	TPP	4C	GSH	
30303 32	12	5.4	TAA	1	HR	
30303 33	58	5.4	TPP	4B	GSH	
30303 34	10	5.4	TPP	4C	GSH	
30303 35	17	5.4	TPP	4A	SANI	
30303 36	4	5.4	TPP	4A	GSH	
30303 37	12	5.4	TPP	4B	GSH	
30303 38	17	5.4	TPP	4B	SANI	
30303 39	48	5.4	TPP	4A	SANI	
30303 43	76	5.4	TPP	4C	SANI	
30304 2	1	5.4	TPP	4A	SANI	
30304 4	18	5.4	TPP	4A	GSH	
30304 5	7	5.4	TPP	4A	GSH	
30304 6	15	5.4	TPP	4A	GSH	
30304 7	30	5.4	TPP	4C	VDT	
30304 8	27	5.4	TPP	2	POL	
30304 9	27	5.4	TPP	4B	GSH	
30304 10	17	5.4	TPP	4B	GSH	
30304 11	2	5.4	GRA		PE	
30304 12	33	5.4	TPP	4B	GSH	
30304 13	18	5.4	TPP	2	GSH	
30304 14	3	5.4	TPP	4C	CT50	
30304 15	6	5.4	GRA		PE	
30304 17	9	5.4	TPP	4A	GSH	
30304 18	10	5.4	GRA		PE	
30304 19	3	5.4	GRA		PE	
30304 20	6	5.4	TPP	4C	CT50	
30304 21	11	5.4	TPP	4A	GSH	

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30304 22	29	5.4	TPP	4B	CT50	
30304 23	68	5.4	TPP	4B	GSH	
30304 24	8	5.4	TPP	2	GSH	
30304 25	2	5.4	TPP	4B	CT	
30304 26	2	5.4	GRA		PE	
30304 27	7	5.4	TPP	4A	GSH	
30304 28	5	5.4	GRA		PE	
30304 29	1	5.4	GRA		PE	
30304 30	3	5.4	GRA		PE	
30304 31	3	5.4	TPP	3B	CT50	
30304 32	4	5.4	TPP	4A	CT50	
30304 33	3	5.4	TPP	4B	CT50	
30304 34	1	5.4	GRA		DEFER	
30304 35	1	5.4	TPP	4A	CT50	
30304 36	4	5.4	GRA		PE	
30304 44	26	5.4	GRA		PE	
30304 45	2	5.4	TPP	4B	GSH	
30304 46	4	5.4	TPP	4A	GSH	
30304 47	18	5.4	TPP	2	POL	
30304 48	16	5.4	TPP	4C	VDT	
30305 1	4	5.4	GRA		PE	
30305 2	11	5.4	TPP	4B	CT50	
30305 3	127	5.4	TPP	4A	OR	
30305 4	69	5.4	TPP	4B	CT50	
30305 5	22	5.4	TPP	4B	GSH	
30305 6	27	5.4	TPP	4B	GSH	
30305 7	5	5.4	GRA		PE	
30305 8	13	5.4	TPP	3B	CT	
30305 9	30	5.4	TPP	4B	CT	
30305 10	23	5.4	TPP	4A	OR	
30305 11	37	5.4	TPP	4A	OR	
30305 12	13	5.4	TPP	4B	GSH	
30305 13	16	5.4	TPP	4C	SANI	
30305 14	12	5.4	TPP	3B	GSH	
30305 15	42	5.4	TPP	3C	GSH	
30305 16	15	5.4	TPP	4B	GSH	
30305 17	9	5.4	TPP	4C	OR	
30305 18	20	5.4	NFL		DEFER	
30305 19	3	5.4	TPP	3C	CT	
30305 20	4	5.4	TPP	3C	GSH	

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30305 21	7	5.4	TPP	4B	OR	
30305 22	5	5.4	TPP	2	CT	
30305 23	31	5.4	TPP	4A	OR	
30305 24	9	5.4	TPP	4B	CT	
30305 25	20	5.4	TPP	4B	OR	
30305 26	12	5.4	TPP	2	OR	
30305 27	22	5.4	TPP	3C	GSH	
30305 28	15	5.4	TPP	4B	GSH	
30305 29	14	5.4	TPP	4C	CT	
30305 30	7	5.4	TPP	4C	CT	
30305 31	11	5.4	TPP	4C	CT	
30305 32	5	5.4	TPP	4A	SANI	
30305 33	6	5.4	TPP	3C	CT	
30305 34	2	5.4	TPP	3C	CT	
30305 35	4	5.4	TPP	4C	CT	
30305 36	15	5.4	TPP	3C	OR	
30305 37	9	5.4	TPP	4C	CT	
30305 38	7	5.4	TPP	3C	CT	
30305 39	13	5.4	TPP	3B	POL	
30305 40	6	5.4	TPP	4B	CT	
30305 44	23	5.4	TPP	2	POL	
30305 45	3	5.4	GRA		PE	
30305 47	2	5.4	TPP	4A	SANI	
30305 48	12	5.4	TPP	2	POL	
30305 49	22	5.4	TPP	3B	CT	
30305 50	1	5.4	GRA		PE	
30305 51	9	5.4	TPP	2	CT	
30305 52	5	5.4	GRA		PE	
30305 53	14	5.4	TPP	4A	CT	
30305 54	3	5.4	TAA	1	HR	
30305 55	5	5.4	TPP	4C	SANI	
30305 56	4	5.4	TPP	3C	POL	
30305 57	6	5.4	GRA		PE	
30305 58	6	5.4	TPP	3C	OR	
30305 59	7	5.4	TPP	4A	CT	
30305 60	3	5.4	TAA	4A	HR	
30305 61	14	5.4	TPP	3C	CT	
30305 62	12	5.4	TPP	3C	CT	
30305 63	17	5.4	TPP	4A	VDT	
30305 64	15	5.4	TPP	4B	VDT	

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30305 65	8	5.4	TPP	4A	GSH	
30305 66	16	5.4	TPP	4B	GSH	
30305 67	24	5.4	TPP	4B	GSH	
30305 68	1	5.4	GRA		DEFER	
30305 69	5	5.4	TPP	4A	GSH	
30305 70	5	5.4	GRA		PE	
30305 71	5	5.4	GRA		PE	
30305 72	2	5.4	GRA		PE	
30305 73	5	5.4	TPP	4A	GSH	
30305 76	20	5.4	TPP	4C	SANI	
30306 2	36	5.4	TPP	3A	CT	
30306 40	9	5.4	TPP	4C	SWSC	
30306 41	11	5.4	TPP	3C	POL	
30306 42	35	5.4	TPP	4B	SWSC	DF
30306 45	28	5.4	TPP	4C	SWSC	DF
30306 46	34	5.4	TPP	4B	GSH	
30306 49	13	5.4	GRA		PE	
30306 56	54	5.4	TPP	4A	OR	
30306 57	14	5.4	TPP	4B	SANI	
30306 59	16	5.4	GRA		PE	RX
30306 61	8	5.4	TPP	4B	GSH	
30306 62	10	5.4	TPP	4B	GSH	
30306 66	23	5.4	TPP	4A	OR	
30306 67	4	5.4	TPP	4C	SANI	
30306 68	21	5.4	TPP	3B	GSH	
30306 81	2	5.4	GRA		PE	RX
30306 82	2	5.4	TPP	1	DEFER	
30306 96	1	5.4	TPP	1	DEFER	
30307 25	18	5.4	TPP	4C	VDT	
30307 28	80	5.4	TPP	4C	GSH	
30307 61	2	5.4	TPP	4C	SANI	
30307 62	2	5.4	TPP	1	DEFER	RX
30307 63	3	5.4	TPP	1	DEFER	
30307 69	31	5.4	GRA		PE	RX
30308 1	24	5.4	TPP	4B	GSH	
30308 2	67	5.4	TPP	4B	SANI	FB
30308 3	109	5.4	TPP	4A	GSH	
30308 4	110	5.4	TPP	4A	OR	RX
30308 5	38	5.4	TPP	4A	POL	RX
30308 6	39	5.4	GRA		PE	RX

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30308	7	13	5.4	TPP	4A	GSH	RX
30308	8	21	5.4	TPP	4A	GSH	RX
30308	9	3	5.4	TPP	4B	SANI	
30308	10	22	5.4	TPP	4C	VDT	RX
30308	11	41	5.4	TPP	4A	POL	
30308	12	80	5.4	TPP	4B	VDT	RX
30308	13	5	5.4	TPP	3A	OR	RX
30308	14	16	5.4	TPP	4A	SANI	
30308	15	33	5.4	TPP	3A	CT	
30308	16	18	5.4	TPP	3B	GSH	RX
30308	28	104	5.4	TPP	3C	CT	RX
30308	29	30	5.4	TPP	4A	GSH	RX
30308	31	14	5.4	TPP	3C	SANI	RX
30308	32	8	5.4	TAA	2	HR	RX
30308	33	8	5.4	TAA	2	HR	RX
30308	34	3	5.4	TAA	3C	HR	RX
30308	35	21	5.4	TAA	2	HR	RX
30308	36	8	5.4	TAA	2	HR	RX
30308	42	10	5.4	TPP	4A	SANI	RX
30308	44	17	5.4	TPP	3B	OR	RX
30308	45	83	5.4	TPP	4B	CT	RX
30308	50	4	5.4	TPP	3A	OR	RX
30309	1	50	5.4	TPP	4B	SANI	FB/DF
30309	2	53	5.4	TPP	3A	SANI	RX
30309	3	17	5.4	TPP	4A	CT	RX
30309	4	17	5.4	NFL		DEFER	RX
30309	5	6	5.4	TPP	4A	OR	RX
30309	6	69	5.4	TPP	4A	GSH	RX
30309	7	12	5.4	TPP	4A	POL	RX
30309	8	14	5.4	TPP	4A	SANI	
30309	9	11	5.4	TPP	4A	OR	
30309	10	10	5.4	TPP	3B	SANI	
30309	11	40	5.4	TPP	4A	SANI	RX
30309	12	13	5.4	TPP	3A	GSH	RX
30309	13	13	5.4	TPP	3A	GSH	RX
30309	14	73	5.4	TPP	3B	GSH	RX/DF
30309	15	12	5.4	TPP	4B	CT	RX
30309	16	9	5.4	TPP	4A	GSH	RX
30309	17	163	5.4	TPP	4B	GSH	
30309	18	6	5.4	TAA	4A	HR	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30309	19	4	5.4	TAA	4C	HR	
30309	20	3	5.4	TPP	4A	SANI	
30309	21	9	5.4	TPP	4A	GSH	RX
30309	22	14	5.4	TPP	5	SANI	
30309	23	7	5.4	TAA	3A	HR	RX
30309	45	14	5.4	TPP	4A	GSH	
30309	46	3	5.4	TAA	4A	HR	
30309	47	9	5.4	TAA	2	HR	RX
30309	48	10	5.4	TAA	3A	HR	RX
30309	49	6	5.4	TAA	3B	HR	
30309	55	2	5.4	TPP	3A	GSH	RX
30309	61	1	5.4	TPP	4C	SANI	
30309	62	32	5.4	TPP	4B	SANI	
30309	63	6	5.4	TPP	4A	GSH	
30309	64	4	5.4	TPP	3A	POL	
30309	65	3	5.4	TPP	4A	GSH	RX
30309	66	1	5.4	NFL		DEFER	RX
30309	67	3	5.4	TPP	4A	SANI	RX
30309	68	11	5.4	TPP	4A	CT	RX
30401	1	28	4.1	TPP	4A	OR	DF
30401	2	14	4.1	TPP	4A	GSH	DF
30401	3	41	4.1	TPP	4B	SANI	DF
30401	4	20	4.1	TPP	3A	OR	DF
30401	5	24	4.1	TPP	4A	OR	DF
30401	6	14	4.1	TPP	4A	SANI	DF
30401	7	15	4.1	TPP	4A	SANI	DF
30401	8	38	4.1	TPP	4A	OR	DF
30401	9	42	4.1	TPP	4C	GSH	DF
30401	10	38	4.1	TPP	4A	SANI	DF
30401	11	12	4.1	TWS	4A	SANI	DF
30401	12	6	4.1	TPP	4A	SANI	DF
30401	13	14	4.1	TPP	4A	SANI	DF
30401	14	41	4.1	TPP	4B	SANI	DF
30401	15	3	4.1	TPP	3B	SANI	DF
30401	16	46	4.1	TPP	3C	SANI	DF
30401	17	14	4.1	TPP	4A	SANI	DF
30401	19	21	4.1	TPP	3B	OR	DF
30401	22	8	4.1	TPP	4A	SANI	DF
30401	23	6	5.1	TPP	4A	SANI	
30401	25	7	4.1	TWS	4C	GSH	DF

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30401 26	31	4.1	TPP	4A	SANI	DF
30401 27	31	4.1	TPP	4A	SANI	DF
30401 28	46	4.1	TPP	4A	GSH	DF
30401 29	11	4.1	TAA	2	HR	
30401 30	3	4.1	TWS	4B	SANI	
30401 31	28	4.1	TPP	4A	SANI	DF
30401 36	11	4.1	TPP	4C	SANI	
30401 37	4	4.1	TPP	4B	SANI	
30401 45	9	4.1	TPP	4C	GSH	DF
30402 5	8	4.1	GRA		PE	
30402 6	14	4.1	TPP	4B	SANI	DF
30402 7	2	4.1	TPP	4A	GSH	
30402 8	59	4.1	TPP	3B	GSH	DF
30402 9	19	4.1	TPP	4B	GSH	
30402 10	21	4.1	TPP	4A	GSH	
30402 11	37	4.1	TPP	4A	GSH	
30402 12	9	4.1	TPP	4B	SANI	
30402 13	8	4.1	TAA	3B	HR	
30402 14	1	4.1	NFL		DEFER	
30402 15	7	4.1	TPP	4B	SANI	
30402 16	2	4.1	TPP	3C	GSH	
30403 1	2	4.1	TPP	4A	GSH	
30403 2	18	4.1	TPP	4A	GSH	DF
30403 3	6	4.1	GRA		PE	
30403 4	112	4.1	TPP	4B	GSH	RX
30403 5	14	4.1	TPP	4B	CT	RX
30403 6	6	4.1	TPP	4A	CT	
30403 7	71	4.1	GRA		PE	RX
30403 8	18	4.1	TPP	4B	CT50	RX
30403 9	20	4.1	GRA		PE	RX
30403 10	1	4.1	TAA	1	HR	
30403 11	9	4.1	TPP	4A	GSH	
30403 12	3	4.1	GRA		PE	
30403 13	13	4.1	TPP	4A	GSH	
30403 14	25	4.1	TPP	4A	GSH	
30403 15	1	4.1	GRA		PE	
30403 16	2	4.1	TPP	4A	GSH	
30403 17	1	4.1	GRA		PE	
30403 18	2	4.1	TPP	4A	SANI	
30403 19	12	4.1	GRA		PE	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30403	20	7	4.1	TPP	4A	CT	
30403	21	2	4.1	TPP	4A	CT50	RX
30403	22	3	4.1	TPP	4A	SANI	
30403	23	1	4.1	TPP	4A	CT50	RX
30404	1	8	4.1	TPP	3A	GSH	
30404	2	16	4.1	NFL		DEFER	
30404	3	40	4.1	TPP	4B	OR	
30404	4	19	4.1	TPP	2	SANI	DF
30404	5	3	4.1	NFL		DEFER	
30404	6	8	4.1	TPP	4C	CT	DF
30404	7	3	4.1	TPP	4C	SANI	DF
30404	8	33	4.1	TPP	4C	FS	DF
30404	9	5	4.1	TPP	4C	CT	DF
30404	10	6	4.1	TPP	4C	GSH	
30404	11	31	4.1	TPP	4C	GSH	
30404	12	16	4.1	TPP	4A	GSH	
30404	13	21	4.1	NFL		DEFER	
30404	14	9	4.1	TPP	4C	SANI	
30404	15	17	4.1	TPP	4A	CT50	DF
30404	16	4	4.1	TPP	1	DEFER	
30404	17	19	4.1	TPP	4B	CT	DF
30404	18	5	4.1	TPP	4B	SANI	DF
30404	19	13	4.1	TPP	4C	SANI	DF
30404	20	12	4.1	TPP	3A	CT	DF
30404	21	19	4.1	TPP	4C	SANI	
30404	22	21	4.1	TPP	4A	GSH	
30404	23	1	4.1	TPP	4A	SANI	
30404	24	2	4.1	TPP	4A	SANI	
30404	25	24	4.1	TPP	4A	GSH	
30404	26	5	4.1	TAA	3A	HR	
30404	27	7	4.1	TPP	4A	GSH	DF
30404	28	3	4.1	TPP	3C	GSH	DF
30404	29	8	4.1	TPP	4A	GSH	DF
30404	30	4	4.1	TPP	4B	CT	DF
30404	31	2	4.1	TPP	4B	CT	
30404	32	2	4.1	TPP	4A	CT	
30404	33	2	4.1	TPP	4A	SANI	
30404	34	3	4.1	GRA		PE	
30404	35	2	4.1	GRA		PE	
30404	36	6	4.1	TPP	3C	CT50	

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30404 37	4	4.1	GRA		PE	
30404 38	10	4.1	TPP	4A	SANI	
30404 39	2	4.1	TPP	4A	SANI	
30404 40	26	4.1	TPP	3A	GSH	
30404 41	8	4.1	TPP	4A	GSH	
30404 42	5	4.1	TPP	4B	GSH	
30404 43	13	4.1	TPP	4B	GSH	DF
30404 44	2	4.1	TPP	4B	SANI	
30404 51	2	4.1	TPP	1	DEFER	
30404 52	27	4.1	TPP	4A	OR	
30405 1	40	4.1	TPP	4B	VDT	
30405 2	16	4.1	TPP	3C	GSH	
30405 3	71	4.1	TPP	4C	GSH	DF
30405 4	22	4.1	TPP	4C	CT50	
30405 5	156	4.1	TPP	3B	GSH	
30405 6	108	4.1	TPP	3A	GSH	
30405 7	17	4.1	TPP	4B	GSH	
30405 8	9	4.1	TPP	4B	SWSC	
30405 9	57	4.1	TPP	4C	SANI	
30405 10	49	4.1	TPP	4B	GSH	
30405 11	25	4.1	TPP	3B	CT	
30405 12	11	5.4	TPP	4B	GSH	
30405 14	38	4.1	TPP	4C	CT	DF
30405 15	3	4.1	TPP	4B	GSH	
30405 17	26	4.1	TPP	4C	GSH	DF
30405 18	15	4.1	TPP	4B	GSH	
30405 19	21	4.1	TPP	3C	GSH	
30405 28	4	4.1	TAA	3B	HR	
30405 29	3	4.1	TPP	4C	GSH	
30405 30	1	4.1	TPP	3A	GSH	
30405 31	1	4.1	TPP	3B	GSH	
30405 32	14	4.1	TPP	4B	GSH	
30405 41	44	4.1	TPP	4C	GSH	DF
30405 42	66	4.1	TPP	3A	GSH	DF
30405 43	43	4.1	TPP	4B	GSH	
30405 44	8	4.1	TPP	1	DEFER	RX
30406 1	59	4.1	TPP	4C	GSH	
30406 2	10	4.1	TPP	4C	CT	
30406 3	36	4.1	TPP	4B	GSH	
30406 4	9	4.1	GRA		PE	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30406	5	30	4.1	TPP	4B	OR	
30406	7	4	4.1	TPP	4A	GSH	
30406	8	97	4.1	TPP	4B	GSH	
30406	9	58	4.1	TPP	4B	GSH	
30406	10	10	4.1	TPP	3C	CT50	
30406	11	22	4.1	TPP	4C	GSH	DF
30406	13	50	4.1	TPP	4B	GSH	
30406	14	21	4.1	TPP	4B	OR	
30406	16	8	4.1	GRA		PE	
30406	17	15	4.1	TPP	3B	GSH	
30406	18	13	4.1	TPP	4A	GSH	
30406	19	16	4.1	TPP	4C	CT	
30406	20	37	4.1	TPP	4B	CT	
30406	21	23	4.1	TPP	4C	SANI	DF
30406	22	17	4.1	TAA	4B	HR	
30406	27	5	4.1	GRA		PE	
30406	28	10	4.1	GRA		PE	
30406	29	6	4.1	GRA		PE	
30406	30	3	4.1	TPP	4C	GSH	DF
30406	31	7	4.1	TPP	4C	CT	DF
30406	32	2	4.1	TPP	4B	CT	DF
30406	33	1	4.1	TPP	4C	CT	DF
30406	48	3	4.1	TPP	3C	GSH	DF
30406	49	22	4.1	TPP	4C	CT	
30406	50	8	4.1	GRA		PE	
30406	57	10	4.1	TPP	4A	OR	
30406	58	4	4.1	TPP	4A	OR	
30406	59	46	4.1	TPP	3B	GSH	
30406	60	25	4.1	TPP	3B	GSH	
30406	62	3	4.1	TPP	1	DEFER	
30406	63	145	4.1	TPP	3C	GSH	
30406	64	16	4.1	TPP	3B	GSH	
30407	1	56	4.1	TPP	4B	GSH	DF
30407	2	33	4.1	TPP	4B	CT	DF
30407	3	79	4.1	TPP	4A	VDT	DF
30407	4	9	4.1	TPP	4A	OR	
30407	5	44	4.1	TPP	3A	SANI	DF
30407	6	32	4.1	TPP	4B	SANI	
30407	8	17	4.1	TPP	3A	SANI	
30407	9	129	4.1	TPP	4B	GSH	DF

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30407 10	20	4.1	TPP	3A	SANI	
30407 12	26	4.1	TPP	4A	GSH	DF
30407 16	142	4.1	TPP	3C	GSH	DF
30407 19	6	4.1	TWS	4A	SANI	
30407 20	15	4.1	TPP	4B	CT	
30407 21	18	4.1	TPP	3C	GSH	DF
30407 22	2	4.1	TAA	3C	HR	
30407 24	40	4.1	TPP	4B	CT	DF
30407 25	88	4.1	TPP	3A	OR	DF
30407 26	38	4.1	TPP	4A	CT	
30407 27	47	4.1	TPP	4C	GSH	DF
30407 28	19	4.1	TPP	4C	CT	DF
30407 29	22	4.1	TPP	4A	GSH	DF
30407 32	26	4.1	TPP	4B	CT50	DF
30407 33	36	4.1	TPP	4B	SANI	DF
30407 35	13	4.1	GRA		PE	
30407 43	7	4.1	TAA	3B	HR	
30407 45	4	4.1	TPP	4A	OR	
30407 46	27	4.1	TPP	4A	CT	DF
30407 47	3	4.1	TPP	4A	CT	DF
30407 49	17	4.1	TPP	4B	CT	DF
30407 50	3	4.1	TPP	4A	SANI	
30407 51	6	4.1	TPP	4A	OR	
30407 52	42	4.1	TPP	4A	OR	DF
30407 53	4	4.1	TPP	4A	OR	
30407 54	16	4.1	TPP	4A	OR	
30407 55	12	4.1	TPP	4A	OR	DF
30407 57	12	4.1	TPP	4A	POL	
30501 3	121	5.1	TPP	4A	GSH	DF
30501 4	32	5.1	TPP	4A	SANI	DF
30501 5	8	5.1	TPP	5	SANI	
30501 6	15	5.1	TPP	4A	CT50	
30501 7	24	5.1	TAA	4A	HR	
30501 8	21	5.1	TPP	5	SANI	
30501 9	23	5.1	TPP	4A	SANI	
30501 11	4	5.1	TPP	4A	SANI	DF
30501 12	18	5.1	TPP	4A	CT50	DF
30501 16	6	5.1	TPP	4B	GSH	DF
30501 17	19	5.1	TPP	4B	POL	
30501 18	57	5.1	TPP	4A	SANI	

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30501 19	26	5.1	TPP	4B	CT50	
30501 20	17	5.1	TPP	4A	SANI	DF
30501 21	12	5.1	NFL		SANI	
30501 22	78	5.1	TPP	4A	GSH	
30501 23	10	5.1	TPP	4A	CT	
30501 24	42	5.1	TPP	4B	CT	DF
30501 25	21	5.1	TPP	4B	GSH	DF
30501 26	32	5.1	TPP	3C	POL	DF
30501 31	23	5.1	GRA		PE	
30501 35	1	5.1	TPP	1	SANI	
30501 36	2	5.1	TPP	1	SANI	
30501 37	1	5.1	TPP	1	SANI	
30501 38	1	5.1	TPP	1	SANI	
30501 39	2	5.1	TPP	1	SANI	
30501 46	5	5.1	GRA		PE	
30501 47	45	5.1	TPP	4B	CT	DF
30501 48	14	5.1	TPP	4B	HC	
30501 50	36	5.1	TPP	4A	GSH	
30501 51	4	5.1	TPP	3C	CT	
30501 52	38	5.1	TPP	4B	CT50	
30502 1	71	5.1	TPP	4A	SANI	DF
30502 2	17	5.1	TPP	3C	POL	DF
30502 3	68	5.1	TPP	4B	CT	RX
30502 4	56	5.1	TPP	4A	CT	RX
30502 5	36	5.1	TPP	4A	CT	RX
30502 8	18	5.1	TPP	4A	GSH	
30502 11	42	5.1	TPP	4C	SANI	
30502 13	18	5.1	GRA		PE	RX
30502 14	17	5.1	TPP	4B	CT50	
30502 15	12	5.1	GRA		PE	RX
30502 17	15	5.1	TPP	4A	SANI	DF
30502 18	23	5.1	TPP	4B	GSH	
30502 19	14	5.1	TWS	4C	SANI	
30502 21	65	5.1	TPP	4A	GSH	DF
30502 24	12	5.1	TPP	4C	HC	
30502 25	8	5.1	TPP	4B	HC	
30502 26	2	5.1	TPP	1	DEFER	
30502 27	8	5.1	TPP	4A	SANI	RX
30502 29	10	5.1	TPP	4A	SANI	RX
30502 30	36	5.1	TPP	4A	SANI	RX/DF

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30502	34	1	5.1	TPP	1	DEFER	
30502	35	1	5.1	TPP	1	DEFER	
30502	36	3	5.1	TPP	1	DEFER	RX
30502	37	1	5.1	TPP	1	DEFER	
30502	38	2	5.1	GRA		DEFER	
30502	39	2	5.1	TPP	3A	SANI	
30502	40	3	5.1	TPP	2	GSH	
30502	41	2	5.1	GRA		PE	RX
30502	43	37	5.1	TPP	4A	SANI	RX/DF
30502	44	4	5.1	TPP	4A	SANI	RX
30502	45	1	5.1	TPP	4B	CT	
30502	46	18	5.1	TPP	4A	SANI	DF
30502	53	30	5.1	TPP	4A	CT50	DF
30502	56	73	5.1	TPP	4B	GSH	DF
30502	58	7	5.1	GRA		PE	
30502	59	17	5.1	TPP	4B	GSH	
30502	60	79	5.1	TPP	4A	GSH	DF
30502	62	33	5.1	TPP	4B	GSH	DF
30502	63	1	5.1	TPP	1	DEFER	
30503	2	22	5.1	TPP	4A	CT50	DF
30503	3	2	5.1	TPP	4A	CT	
30503	4	42	5.1	TPP	4B	FS	
30503	5	18	5.1	TPP	4A	GSH	
30503	6	8	5.1	GRA		PE	
30503	7	20	5.1	TPP	4A	CT	
30503	8	16	5.1	TPP	4B	SANI	
30503	9	25	5.1	TPP	4B	GSH	
30503	10	21	5.1	TPP	4A	GSH	
30503	11	36	5.1	TPP	4B	GSH	DF
30503	12	73	5.1	TPP	4B	GSH	
30503	13	17	5.1	TPP	4B	CT	
30503	15	45	5.1	TPP	4A	VDT	
30503	16	13	5.1	TPP	4A	CT	
30503	17	23	5.1	TAA	2	HR	
30503	18	1	5.1	TAA	2	HR	
30503	19	3	5.1	TAA	1	HR	
30503	20	2	5.1	TAA	1	HR	
30503	21	2	5.1	GRA		PE	
30503	22	2	5.1	TAA	1	HR	
30503	24	9	5.1	TPP	4B	GSH	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30503	25	31	5.1	TPP	3B	SANI	
30503	26	23	5.1	TPP	3B	VDT	DF
30503	27	18	5.1	TPP	3B	CT50	
30503	28	3	5.1	TPP	4B	HC	
30503	29	16	5.1	TAA	2	HR	DF
30503	30	6	5.1	TAA	2	HR	DF
30503	31	2	5.1	TPP	4B	GSH	
30503	32	1	5.1	GRA		PE	
30503	33	2	5.1	TPP	4B	GSH	
30503	44	31	5.1	TPP	4B	GSH	
30505	5	4	5.1	GRA		PE	RX
30505	15	15	5.1	TPP	4A	GSH	
30505	19	34	5.1	TPP	4B	GSH	RX
30505	20	9	5.1	GRA		PE	
30505	25	197	5.1	TPP	4B	GSH	
30505	26	27	5.1	TPP	4C	GSH	
30505	27	6	5.1	TPP	4A	SANI	
30505	30	24	5.1	TPP	4C	GSH	DF
30505	32	5	5.1	GRA		PE	
30505	35	33	5.1	TPP	4C	GSH	DF
30505	36	67	5.1	TPP	4B	GSH	RX
30505	37	32	5.1	GRA		PE	RX
30505	40	8	5.1	TPP	3C	CT	RX
30505	43	12	5.1	TPP	4B	HC	RX
30505	44	100	5.1	TPP	4B	VDT	RX
30506	2	160	5.1	TPP	4A	GSH	DF
30506	3	15	5.1	GRA		PE	
30506	4	22	5.1	TPP	4B	CT	DF
30506	7	27	5.1	TPP	4B	GSH	
30506	12	45	5.1	TPP	3C	SANI	
30506	13	10	5.1	TPP	4A	CT	
30506	14	23	5.1	TPP	3C	CT	
30506	15	38	5.1	TPP	4C	CT	
30506	18	20	5.1	TPP	5	SANI	
30506	20	19	5.1	TPP	5	SANI	
30506	33	28	5.1	TPP	4A	CT	DF
30506	34	36	5.1	GRA		PE	
30506	35	27	5.1	TPP	4A	OR	DF
30506	36	92	5.1	TPP	4C	CT	DF
30506	37	30	5.1	GRA		PE	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30506	38	4	5.1	TAA	3B	HR	
30506	39	7	5.1	TAA	4A	HR	
30506	40	4	5.1	TAA	4A	HR	
30506	41	8	5.1	GRA		PE	
30506	42	2	5.1	TPP	4C	CT	
30506	46	16	5.1	TPP	4A	GSH	
30506	59	71	5.1	TPP	4B	CT50	
30506	60	24	5.1	TPP	3C	HC	DF
30506	61	16	5.1	TPP	4B	CT	DF
30506	63	56	5.1	TPP	4C	VDT	DF
30506	65	31	5.1	GRA		PE	
30506	67	27	5.1	TPP	4C	CT	DF
30506	69	25	5.1	TPP	4B	CT	DF
30506	70	5	5.1	GRA		PE	
30507	1	95	5.1	TPP	4B	GSH	
30507	2	59	5.1	TPP	4A	GSH	
30507	4	38	5.1	TPP	4B	CT	
30507	5	60	5.1	TPP	4B	GSH	DF
30507	7	64	5.1	TPP	4B	VDT	DF
30507	8	4	5.1	TPP	4A	GSH	
30507	9	22	5.1	TPP	4B	CT	
30507	10	30	5.1	TPP	4B	GSH	
30507	11	102	5.1	TPP	4B	CT50	DF
30507	12	6	5.1	TPP	4B	CT50	DF
30507	13	116	5.1	TPP	4B	GSH	DF
30507	15	6	5.1	GRA		PE	
30507	16	33	5.1	TPP	4A	GSH	
30507	19	90	5.1	TPP	4A	SANI	DF
30507	20	10	5.1	TPP	4B	SANI	
30507	21	3	5.1	TAA	1	HR	
30507	22	9	5.1	TAA	3A	HR	
30507	23	1	5.1	TAA	3B	HR	
30507	25	4	5.1	TAA	3A	HR	DF
30507	27	11	5.1	GRA		PE	
30507	28	7	5.1	TAA	3A	HR	
30507	29	3	5.1	TPP	1	DEFER	
30507	31	9	5.1	TPP	3C	SANI	DF
30507	32	8	5.1	TPP	4B	GSH	DF
30507	33	11	5.1	TPP	4B	CT	
30507	34	21	5.1	TPP	4B	CT	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30507	41	22	5.1	TPP	4A	GSH	DF
30507	42	9	5.1	GRA		PE	
30507	44	6	5.1	TPP	4B	GSH	
30507	45	29	5.1	TPP	4B	CT	DF
30507	46	2	5.1	TAA	2	HR	
30508	1	28	5.1	TPP	4B	GSH	DF
30508	2	12	5.1	GRA		PE	
30508	4	15	5.1	TPP	4B	OR	DF
30508	5	6	5.1	TPP	4B	CT	DF
30508	8	25	5.1	TPP	4C	VDT	DF
30508	9	18	5.1	TPP	4B	VDT	
30508	10	18	5.1	TPP	4B	VDT	
30508	11	5	5.1	TPP	4A	CT	
30508	12	3	5.1	GRA		PE	
30508	13	11	5.1	TPP	4A	CT	
30508	14	16	5.1	TPP	4B	GSH	DF
30508	17	8	5.1	TPP	4B	CT50	DF
30508	18	59	5.1	TPP	4A	GSH	
30508	19	3	5.1	TAA	4B	HR	
30508	20	4	5.1	TAA	3B	HR	DF
30508	24	95	5.1	TPP	4C	FS	DF
30508	25	21	5.1	TPP	4C	CT	DF
30508	26	3	5.1	TPP	4B	OR	DF
30508	28	3	5.1	TPP	4B	OR	DF
30508	29	7	5.1	TPP	4B	GSH	DF
30508	30	5	5.1	TPP	4B	GSH	DF
30508	31	5	5.1	TPP	4B	CT	
30508	43	4	5.1	GRA		PE	
30508	45	11	5.1	TPP	4B	HC	DF
30508	46	90	5.1	TPP	4B	GSH	DF
30508	47	4	5.1	GRA		PE	
30508	48	97	5.1	TPP	4B	CT50	DF
30508	49	4	5.1	GRA		PE	
30606	28	1	5.1	GRA		DEFER	
30903	1	52	5.1	TPP	4A	SANI	DF
30903	2	19	5.1	TPP	3C	CT	
30903	3	20	5.1	TPP	4A	GSH	
30903	4	16	5.1	TPP	4A	FS	
30903	5	36	5.1	TPP	4A	POL	
30903	6	71	5.1	TPP	4A	GSH	RX

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30903 7	5	5.1	TPP	1	SANI	
30903 8	23	5.1	TPP	4A	GSH	
30903 9	29	5.1	TPP	4B	SANI	
30903 10	5	5.1	TPP	4A	SANI	
30903 11	17	5.1	TPP	4A	CT	
30903 12	38	5.1	TPP	4A	CT	
30903 13	38	5.1	GRA		PE	
30903 14	21	5.1	TPP	4A	SANI	
30903 15	52	5.1	TPP	4A	CT	
30903 16	12	5.1	TPP	4A	GSH	
30903 17	23	5.1	TPP	3A	GSH	
30903 18	10	5.1	TPP	4A	POL	RX
30903 19	54	5.1	TPP	4A	GSH	
30903 20	15	5.1	TPP	4B	SANI	FB
30903 21	12	5.1	TPP	4B	SANI	
30903 22	13	5.1	TPP	4B	FS	
30903 23	14	5.1	TPP	3B	FS	
30903 24	33	5.1	TPP	4B	SANI	
30903 25	18	5.1	TPP	4A	GSH	
30903 26	37	5.1	TPP	4A	SANI	
30903 27	4	5.1	TPP	4A	SANI	
30903 28	13	5.1	TPP	3A	SANI	DF
30903 29	5	5.1	TPP	1	SANI	
30903 30	6	5.1	TPP	3A	HC	
30903 31	14	5.1	TPP	3B	CT	
30903 32	6	5.1	TPP	4A	SANI	
30903 33	3	5.1	TPP	4A	SANI	
30903 34	6	5.1	TAA	3A	HR	
30903 35	17	5.1	TPP	4A	CT	
30903 36	1	5.1	TAA	1	HR	
30903 37	8	5.1	TPP	4A	CT	
30903 38	22	5.1	TPP	4B	CT	DF
30903 39	1	5.1	TPP	1	SANI	
30903 40	5	5.1	TPP	4A	SANI	
30903 41	2	5.1	TPP	4A	CT	
30903 42	7	5.1	TPP	4B	GSH	
30903 43	4	5.1	TPP	1	CT	
30903 44	6	5.1	TPP	3B	CT	
30903 45	3	5.1	TPP	3A	OR	
30903 46	3	5.1	TPP	4A	OR	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30903	47	14	5.1	TPP	4B	GSH	
30903	48	3	5.1	TPP	4A	GSH	
30903	49	14	5.1	TPP	4A	GSH	
30903	50	1	5.1	TPP	4A	HC	
30903	51	3	5.1	TPP	4A	GSH	
30903	52	3	5.1	TPP	3B	GSH	
30903	53	13	5.1	GRA		PE	
30903	54	44	5.1	TPP	4A	SANI	
30903	55	9	5.1	TPP	2	GSH	
30903	56	3	5.1	GRA		PE	
30903	57	6	5.1	GRA		PE	
30903	58	4	5.1	TPP	4B	GSH	
30903	59	3	5.1	TPP	4A	GSH	
30903	60	3	5.1	GRA		PE	
30903	61	12	5.1	TPP	4A	GSH	
30903	63	3	5.1	TPP	4A	OR	
30903	64	2	5.1	TPP	4A	OR	
30903	65	5	5.1	TPP	4A	SANI	
30903	66	1	5.1	TPP	4A	SANI	
30904	1	48	5.1	GRA		PE	
30904	2	29	5.1	TPP	4B	CT	
30904	3	4	5.1	GRA		PE	
30904	4	12	5.1	TPP	4B	CT	
30904	5	10	5.1	TPP	3C	GSH	
30904	6	35	5.1	GRA		PE	
30904	7	4	5.1	TPP	4B	CT	
30904	8	71	5.1	TPP	4A	SANI	DF
30904	9	14	5.1	TPP	4B	GSH	
30904	10	20	5.1	TPP	3C	CT50	DF
30904	11	16	5.1	TPP	4C	GSH	DF
30904	12	27	5.1	TPP	4C	FS	
30904	13	6	5.1	TPP	4B	CT50	
30904	14	16	5.1	TPP	4C	GSH	DF
30904	15	10	5.1	TPP	4B	CT	
30904	16	2	5.1	GRA		PE	
30904	17	1	5.1	TPP	1	SANI	
30904	18	2	5.1	TPP	1	SANI	
30904	19	10	5.1	TPP	4B	GSH	
30904	20	2	5.1	TPP	4A	SANI	
30904	21	5	5.1	GRA		PE	

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30904 22	3	5.1	TPP	4A	GSH	
30904 23	3	5.1	GRA		PE	
30904 24	58	5.1	TPP	4A	GSH	
30904 25	4	5.1	TPP	4B	CT	
30904 26	1	5.1	TPP	4A	CT	
30904 27	8	5.1	TPP	3C	GSH	
30904 28	2	5.1	TPP	4A	SANI	
30904 29	11	5.1	TPP	4B	SANI	
30904 30	4	5.1	TPP	4B	SANI	DF
30904 31	1	5.1	GRA		PE	
30904 32	3	5.1	GRA		PE	
30905 10	39	5.1	TPP	4B	SANI	FB
30906 1	42	5.1	TPP	4A	GSH	
30906 2	42	5.1	TPP	4A	GSH	
30906 3	26	5.1	TPP	4B	FS	
30906 4	30	5.1	TPP	4B	SANI	
30906 5	43	5.1	TPP	4B	VDT	
30906 6	51	5.1	TPP	4B	FS	
30906 7	4	5.1	GRA		PE	
30906 8	3	5.1	GRA		PE	
30906 9	102	5.1	TPP	4B	SANI	FB
30906 10	12	5.1	TPP	4A	POL	
30906 11	21	5.1	TPP	4B	SANI	
30906 12	69	5.1	TPP	4A	GSH	
30906 13	41	5.1	TPP	4A	GSH	
30906 14	22	5.1	TPP	4A	GSH	
30906 15	13	5.1	TPP	4A	GSH	
30906 16	6	5.1	TPP	4A	CT	
30906 17	2	5.1	TPP	4A	VDT	
30906 18	23	5.1	TPP	4B	CT	
30906 19	2	5.1	NFL		DEFER	
30906 20	5	5.1	TAA	4B	HR	
30906 21	5	5.1	NFL		DEFER	
30906 22	17	5.1	TPP	4B	CT50	
30906 23	2	5.1	GRA		PE	
30906 24	3	5.1	TPP	1	GSH	
30906 25	15	5.1	TPP	4A	CT	
30906 26	18	5.1	TPP	4A	GSH	
30906 27	19	5.1	TPP	4B	SANI	
30906 28	5	5.1	GRA		PE	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30906	29	18	5.1	TPP	4B	SANI	
30906	30	5	5.1	GRA		PE	
30906	31	4	5.1	TPP	4B	CT	
30906	32	1	5.1	TPP	4B	CT	
30906	33	3	5.1	TPP	4A	GSH	
30906	34	4	5.1	TPP	4A	GSH	
30906	44	15	5.1	TPP	4A	SANI	
30906	45	9	5.1	TPP	2	PCT	
30907	1	1	5.1	NFL		DEFER	
30907	2	27	5.1	TPP	4B	GSH	DF
30907	3	35	5.1	TPP	4A	FS	
30907	4	26	5.1	TPP	3B	POL	
30907	5	12	5.1	TPP	4B	GSH	
30907	6	63	5.1	TPP	4B	GSH	
30907	7	20	5.1	TPP	3A	CT50	
30907	8	71	5.1	TPP	4A	CT50	DF
30907	9	5	5.1	TPP	4A	CT50	DF
30907	10	7	5.1	TPP	1	SANI	
30907	11	1	5.1	NFL		SANI	
30907	12	4	5.1	TPP	4B	SANI	FB
30907	13	5	5.1	TPP	4B	SANI	FB
30907	14	2	5.1	TPP	4B	SANI	FB
30907	15	2	5.1	TPP	4B	SANI	
30907	16	3	5.1	TPP	4A	SANI	
30907	17	12	5.1	TPP	4C	GSH	
30907	18	9	5.1	TPP	4A	GSH	
30907	19	1	5.1	TPP	4A	GSH	
30907	20	2	5.1	TPP	4B	GSH	
30907	21	5	5.1	TPP	4A	CT50	
30907	22	5	5.1	TPP	3A	POL	
30907	23	5	5.1	TPP	3B	CT50	
30907	24	6	5.1	TPP	4A	CT50	
30907	25	8	5.1	TPP	4A	GSH	
30907	26	16	5.1	TPP	3C	CT	
30907	27	2	5.1	GRA		PE	
30907	28	2	5.1	GRA		PE	
30907	29	3	5.1	GRA		PE	
30907	30	20	5.1	TPP	4A	GSH	DF
30907	31	13	5.1	TPP	3B	CT	
30907	32	3	5.1	TPP	1	SANI	

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30907 33	9	5.1	TPP	4B	GSH	
30907 34	1	5.1	GRA		PE	
30907 35	8	5.1	TPP	4B	GSH	
30907 36	3	5.1	TPP	4A	GSH	
30907 37	7	5.1	TPP	4A	GSH	
30908 10	64	5.1	TPP	4A	GSH	DF
30908 16	37	5.1	TPP	4A	GSH	DF
30908 39	22	5.1	TPP	4A	SANI	DF
30909 2	93	5.1	TPP	4B	GSH	
30909 3	25	5.1	TPP	3B	DEFER	FB
30909 4	8	5.1	TPP	4A	SANI	
30909 5	96	5.1	TPP	4B	GSH	DF
30909 6	59	5.1	TPP	4B	SANI	DF
30909 7	12	5.1	TPP	4B	FS	
30909 8	48	5.1	TPP	3C	GSH	
30909 9	36	5.1	TPP	4B	CT	
30909 10	319	5.1	TPP	4B	GSH	DF
30909 11	23	5.1	TPP	4B	CT	
30909 12	37	5.1	TPP	4A	CT	
30909 13	13	5.1	TPP	4B	SANI	
30909 14	9	5.1	TPP	4B	GSH	
30909 15	14	5.1	TPP	4C	GSH	
30909 16	1	5.1	GRA		PE	
30909 19	8	5.1	GRA		PE	
30909 22	27	5.1	TPP	4A	CT	
30909 23	28	5.1	TPP	4A	SANI	
30909 24	6	5.1	GRA		PE	
30909 27	20	5.1	GRA		PE	
30909 28	10	5.1	GRA		PE	
30909 29	9	5.1	TPP	4A	CT	
30909 31	9	5.1	GRA		PE	
30909 35	3	5.1	TPP	4A	CT	
30909 36	3	5.1	TPP	4A	CT	
30909 37	67	5.1	TPP	4B	SANI	
30909 39	4	5.1	TPP	4A	SANI	
30912 12	47	5.1	TPP	4B	SANI	
30912 13	1	5.1	GRA		DEFER	
30913 2	7	5.1	TPP	4B	CT	
30913 3	22	5.1	TPP	4B	GSH	
30913 4	95	5.1	TPP	4A	GSH	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30913	5	2	5.1	TPP	4A	GSH	
30913	6	51	5.1	TPP	4B	FS	
30913	8	42	5.1	TPP	3A	PCT	
30913	9	66	5.1	TPP	4B	FS	
30913	12	6	5.1	GRA		PE	
30913	13	20	5.1	TPP	4A	CT50	
30913	15	20	5.1	GRA		PE	
30913	16	9	5.1	TPP	4B	DEFER	FB
30913	17	3	5.1	TPP	3A	PCT	
30913	18	13	5.1	GRA		PE	
30913	21	3	5.1	GRA		PE	
30913	22	2	5.1	TPP	4B	CT	
30914	1	47	5.1	TPP	4C	GSH	DF
30914	2	12	5.1	TPP	4B	GSH	
30914	3	50	5.1	TPP	4B	GSH	
30914	4	27	5.1	TPP	4C	GSH	
30914	5	4	5.1	NFL		DEFER	
30914	6	30	5.1	TPP	4B	SANI	
30914	7	40	5.1	TPP	4B	CT	
30914	8	1	5.1	GRA		PE	
30914	9	74	5.1	TPP	4B	GSH	
30914	10	11	5.1	TPP	3C	GSH	DF
30914	11	36	5.1	TPP	4A	SANI	
30914	13	24	5.1	TPP	4B	DEFER	FB
30914	14	27	5.1	TPP	3B	GSH	DF
30914	15	3	5.1	TPP	4A	GSH	
30914	16	41	5.1	TPP	4B	GSH	
30914	17	7	5.1	TPP	4C	GSH	
30914	18	8	5.1	TPP	4A	CT	
30914	19	5	5.1	GRA		PE	
30914	20	5	5.1	TAA	2	HR	
30914	23	14	5.1	TPP	4A	CT	
30914	24	13	5.1	GRA		PE	
30914	25	8	5.1	TPP	4B	CT50	
30914	26	4	5.1	GRA		PE	
30914	27	3	5.1	TPP	2	GSH	
30914	28	15	5.1	TPP	4A	CT	
30914	29	4	5.1	TPP	4B	GSH	
30914	30	5	5.1	TPP	4A	CT	
30914	31	2	5.1	GRA		PE	

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
30914 32	1	5.1	GRA		PE	
30914 33	17	5.1	TPP	4B	CT50	
30914 34	4	5.1	TPP	4A	GSH	
30914 35	3	5.1	TPP	4A	GSH	
30914 36	3	5.1	TPP	4A	GSH	
30914 37	3	5.1	GRA		PE	
30914 38	2	5.1	TPP	4A	CT	
30914 39	8	5.1	TPP	3C	CT	
31201 3	9	5.1	TPP	4B	GSH	
31201 9	6	5.1	TPP	4B	GSH	
31203 26	49	5.1	TPP	4A	FS	
31205 36	6	5.1	GRA		PE	
31205 50	3	5.1	GRA		PE	
31206 1	89	5.1	TPP	4A	GSH	
31206 2	18	5.1	TPP	4B	GSH	
31206 3	5	5.1	TPP	4A	SANI	
31206 4	7	5.1	TPP	4A	SANI	
31206 5	46	5.1	TPP	4A	GSH	
31207 1	32	5.1	TPP	4A	GSH	
31207 3	68	5.1	TPP	4A	FS	
31207 4	10	5.1	TPP	4A	GSH	
31207 6	24	5.1	TPP	3A	GSH	
31207 7	14	5.1	TPP	3A	GSH	
31207 9	18	5.1	TPP	4A	CT50	
31207 10	2	5.1	GRA		PE	
31207 11	27	5.1	TPP	4A	GSH	
31207 12	3	5.1	GRA		PE	
31207 13	28	5.1	TPP	4B	FS	
31207 18	6	5.1	GRA		DEFER	
31208 1	74	5.1	TPP	3B	GSH	
31208 2	17	5.1	TPP	4A	GSH	
31208 7	16	5.1	TPP	4A	GSH	
31208 13	4	5.1	TPP	4A	GSH	
31301 1	22	5.4	TPP	4A	CT	
31301 2	42	5.4	TPP	4B	CT	
31301 3	45	5.4	TPP	4B	CT	
31301 4	15	5.4	TPP	4B	GSH	
31301 5	158	5.4	TPP	4B	FS	
31301 6	43	5.4	TPP	4B	CT	
31301 7	2	5.4	GRA		PE	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
31301	8	34	5.4	TPP	4C	CT	
31301	9	46	5.4	TPP	4B	CT50	
31301	10	24	5.4	TPP	4B	CT	
31301	11	39	5.4	TPP	3B	SANI	
31301	12	29	5.4	TPP	4A	SWSC	
31301	13	21	5.4	TPP	4B	CT	
31301	14	21	5.4	TPP	4B	CT50	
31301	15	28	5.4	TPP	4B	CT	
31301	16	67	5.4	TPP	4B	GSH	
31301	17	12	5.4	TPP	4B	CT	
31301	18	52	5.4	TPP	3C	POL	
31301	19	21	5.4	TPP	4B	GSH	
31301	20	11	5.4	NFL		DEFER	
31301	21	9	5.4	TPP	1	SANI	
31301	23	2	5.4	TPP	4A	SANI	
31301	24	4	5.4	TAA	3B	HR	
31301	25	1	5.4	TPP	4B	HC	
31301	26	8	5.4	TPP	3B	CT50	
31301	27	16	5.4	TPP	4B	CT	
31301	28	10	5.4	TPP	3A	SANI	
31301	31	12	5.4	TPP	3B	POL	
31301	32	11	5.4	TPP	4B	SANI	FB
31301	33	6	5.4	GRA		PE	
31301	34	3	5.4	NFL		DEFER	
31301	35	29	5.4	TPP	4A	POL	
31301	36	15	5.4	GRA		PE	
31301	37	6	5.4	TPP	4A	SANI	
31301	38	1	5.4	NFL		DEFER	
31301	41	3	5.4	TPP	4B	GSH	
31301	43	13	5.4	TPP	3B	GSH	
31301	44	8	5.4	TPP	4B	CT	
31301	52	8	5.4	TPP	4A	GSH	
31301	53	23	5.4	TPP	4B	GSH	
31302	3	5	5.4	TPP	2	HC	
31302	4	10	5.4	TPP	3A	HC	
31302	7	10	5.4	TPP	4C	CT	
31302	8	91	5.4	TPP	4B	CT	
31302	9	60	5.4	TPP	4B	CT	DF
31302	10	26	5.4	TPP	4B	CT	
31302	11	25	5.4	TPP	4C	SANI	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
31302	12	22	5.4	TPP	4B	GSH	DF
31302	13	29	5.4	TPP	4B	CT	
31302	15	57	5.4	TPP	4B	GSH	
31302	16	3	5.4	NFL		DEFER	
31302	19	19	5.4	TPP	4B	HC	DF
31302	21	6	5.4	TPP	4B	SANI	
31302	22	21	5.4	TPP	4B	GSH	
31302	34	19	5.4	TPP	4B	GSH	
31303	1	23	5.4	TPP	4B	GSH	
31303	2	37	5.4	TPP	3B	OR	
31303	3	52	5.4	TPP	4B	GSH	
31303	4	3	5.4	GRA		PE	
31303	5	42	5.4	TPP	4B	FS	
31303	6	56	5.4	TPP	4B	GSH	
31303	7	51	5.4	TPP	4C	GSH	
31303	9	44	5.4	TPP	4A	SANI	FB
31303	10	50	5.4	TPP	4B	GSH	
31303	11	58	5.4	TPP	4B	GSH	
31303	12	34	5.4	TPP	4B	GSH	
31303	13	36	5.4	TPP	3B	GSH	
31303	14	44	5.4	TPP	4B	GSH	
31303	15	72	5.4	TPP	4B	GSH	
31303	16	8	5.4	TPP	4B	SANI	
31303	17	45	5.4	TPP	4B	FS	
31303	21	3	5.4	GRA		DEFER	
31303	22	20	5.4	GRA		PE	
31303	24	20	5.4	TPP	4A	OR	
31303	25	3	5.4	NFL		DEFER	
31303	26	4	5.4	GRA		PE	
31303	29	6	5.4	TPP	4B	GSH	
31303	30	12	5.4	TPP	4C	GSH	DF
31303	31	3	5.4	TPP	4A	GSH	DF
31303	34	88	5.4	GRA		PE	
31303	36	108	5.4	GRA		PE	
31303	47	14	5.4	TPP	4B	CT	
31303	54	57	5.4	TPP	4B	GSH	
31303	55	47	5.4	TPP	4C	GSH	
31303	56	19	5.4	TPP	3B	GSH	
31303	57	62	5.4	TPP	4B	FS	
31304	1	36	5.4	TPP	3C	CT	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
31304	2	48	5.4	TPP	4B	GSH	
31304	3	3	5.4	NFL		SANI	
31304	4	62	5.4	TPP	3C	CT	
31304	5	40	5.4	TPP	4B	GSH	
31304	6	45	5.4	TPP	4B	GSH	
31304	7	34	5.4	TPP	4B	CT	
31304	8	67	5.4	TPP	3C	CT50	
31304	9	42	5.4	TPP	4B	CT	
31304	10	50	5.4	TPP	4C	GSH	
31304	11	1	5.4	TPP	2	DEFER	
31304	12	16	5.4	TPP	4C	GSH	
31304	13	23	5.4	TPP	4B	GSH	
31304	14	29	5.4	TPP	4A	GSH	
31304	15	7	5.4	GRA		PE	
31304	16	10	5.4	TPP	4B	GSH	
31304	17	22	5.4	TPP	4C	CT	DF
31304	18	15	5.4	TPP	4B	CT50	
31304	19	14	5.4	TPP	4B	SANI	
31304	20	2	5.4	GRA		PE	
31304	21	10	5.4	GRA		PE	
31304	22	13	5.4	TPP	4B	GSH	
31304	23	14	5.4	TPP	3B	CT	
31304	24	15	5.4	TPP	4B	SANI	FB
31304	25	2	5.4	TPP	4B	SANI	
31304	26	14	5.4	TPP	4C	GSH	
31304	27	6	5.4	TPP	4B	GSH	
31304	28	13	5.4	TPP	4B	GSH	
31304	29	2	5.4	GRA		PE	
31304	30	8	5.4	TPP	4A	GSH	
31304	31	6	5.4	TPP	4A	GSH	
31305	1	33	5.4	TPP	4B	CT50	
31305	2	28	5.4	TPP	4B	CT50	
31305	3	81	5.4	TPP	4B	CT50	RX
31305	4	46	5.4	TPP	4B	SANI	FB
31305	5	17	5.4	TPP	4B	POL	
31305	6	42	5.4	TPP	3B	CT50	RX
31305	7	95	5.4	TPP	4B	CT50	RX
31305	8	10	5.4	TPP	4B	CT50	
31305	9	6	5.4	GRA		PE	
31305	10	44	5.4	TPP	4B	CT50	

Location and Site	Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
31305 11	17	5.4	TPP	4C	CT50	
31305 12	15	5.4	TPP	4C	CT50	
31305 13	35	5.4	TPP	4B	CT50	RX
31305 14	12	5.4	TPP	4C	CT50	
31305 15	1	5.4	GRA		PE	
31305 16	3	5.4	TPP	4C	CT50	
31305 17	15	5.4	TPP	4C	CT50	
31305 19	7	5.4	TPP	4C	CT50	
31305 20	8	5.4	TPP	3B	CT50	
31306 1	3	5.4	TPP	3B	POL	
31306 2	27	5.4	TPP	4B	FS	
31306 3	43	5.4	TPP	4B	FS	
31306 4	25	5.4	TPP	4B	CT50	
31306 5	31	5.4	TPP	4B	SANI	
31306 6	4	5.4	GRA		PE	
31306 7	1	5.4	GRA		PE	
31306 8	4	5.4	TAA	3B	HR	
31306 9	48	5.4	TPP	4B	CT50	
31306 10	38	5.4	TPP	4B	CT50	
31306 11	78	5.4	TPP	4B	SANI	FB/DF
31306 12	18	5.4	TPP	4B	CT	
31306 13	59	5.4	TPP	3B	CT50	
31306 14	63	5.4	TPP	3B	POL	
31306 16	3	5.4	GRA		PE	
31306 17	49	5.4	TPP	4C	CT	
31306 18	23	5.4	TPP	4B	CT	
31306 20	30	5.4	TPP	4B	CT	
31306 22	34	5.4	GRA		PE	
31306 23	1	5.4	TAA	2	HR	
31306 24	55	5.4	TPP	4B	CT	
31306 25	19	5.4	TPP	4B	CT	
31306 26	3	5.4	TPP	1	CT	
31306 28	22	5.4	TPP	4B	CT	
31306 29	30	5.4	TPP	4B	SANI	
31306 30	13	5.4	TPP	3C	CT	
31306 31	2	5.4	TAA	3A	HR	
31306 32	10	5.4	TPP	3B	CT	
31306 37	19	5.4	TPP	4B	CT	
31306 39	14	5.4	TPP	4B	CT	
31307 1	42	5.4	TPP	4C	CT50	

Location and Site		Acres	Management Area	Cover Type	Existing Structural Stage	Alternative 2 Prescription	Alternative 2 Fire & Fuels
31307	2	26	5.4	TPP	4B	SANI	
31307	3	42	5.4	TPP	4C	CT50	
31307	4	47	5.4	TPP	4B	CT50	
31307	6	32	5.4	TPP	3C	CT	
31307	7	3	5.4	NFL		DEFER	
31307	8	24	5.4	TPP	4A	SANI	
31307	14	45	5.4	TPP	3B	POL	
31307	15	41	5.4	TPP	4C	CT	
31307	16	4	5.4	NFL		DEFER	
31307	18	7	5.4	TPP	4B	CT	
31307	19	30	5.4	GRA		PE	RX
31307	20	112	5.4	TPP	4C	VDT	
31307	26	18	5.4	TPP	4C	CT	
31307	27	16	5.4	TPP	3C	CT	
31307	29	36	5.4	GRA		PE	RX
31307	32	18	5.4	TPP	4C	CT	
31307	34	36	5.4	TPP	4B	SANI	
31307	36	125	5.4	TPP	4C	VDT	
31307	40	17	5.4	TPP	4B	CT	
31310	4	93	5.4	TPP	4B	SANI	FB

Appendix E:
FINDINGS: SILVICULTURE

Silvicultural Findings of Compliance with Laws, Regulations, and Policy
Vestal Project EIS

The following findings are made based on the environmental analysis and the silvicultural prescription:

Consistency with plans [16 U.S.C. 1604 (i)]:

1. Timber harvest would occur on lands suited for timber production or would occur in areas where timber harvest is permitted and is necessary to help achieve other resource management objectives.

All areas to be harvested are suitable and permissible for harvest.

2. Silvicultural treatments are consistent with the Forest Plan.

See page II-25 of the phase II Amendment of the Black Hills Forest Plan for acceptable Silvicultural Systems.

Timber Harvest [16 U.S.C. 1604 (g)(3)(E)]:

1. Soil, slope, or other watershed conditions will not be irreversibly damaged;

See Vestal Project Hydrology specialist report.

2. There is assurance that the lands can be adequately restocked within five years after final regeneration harvest.

Regeneration surveys would be accomplished on all shelterwood seed cuts (3rd and 5th years), overstory removals (1st year), and on all selection cuts (5th year) to assure the stands have regenerated properly. There would be no clearcutting in the Vestal project area.

3. Streams, streambanks, shorelines, lakes, wetlands, and other bodies of water are protected from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment where harvests are likely to seriously and adversely affect water conditions or fish habitat.

See Vestal Project Hydrology specialist report.

4. The harvesting system to be used was not selected primarily because it will give the greatest dollar return or the greatest unit output of timber.

Even-aged Regeneration Harvests [16 U.S.C. 1604 (g)(3)(F)]:

1. For clearcutting, if it is the optimum method.

Clearcutting would not be used in the Vestal project area.

2. Clearcuts, coppice cuts, seed tree, and shelterwood regeneration harvests are appropriate to meeting the objectives and requirements of the Forest Plan.

See page II-25 of the phase II Amendment of the Black Hills Forest Plan for acceptable Silvicultural Systems.

3. An interdisciplinary review was completed and the potential environmental, biological, aesthetic, engineering, and economic impacts were assessed and the cutting methods are consistent with the multiple use of the project area.

See Vestal Project EIS and specialist reports.

4. Cut blocks, patches, or strips are shaped and blended to the extent practicable with the natural terrain.
5. Even-aged regeneration harvests made in one operation meet the 40-acre maximum size limit requirement.

There are no harvests that need to meet this requirement.

6. Harvest will be consistent with the protection of soil, watershed, fish, wildlife, recreation, esthetic resources, cultural and historic resources, and the regeneration of timber resources.

Vestal Project Botany BE and specialist report
Vestal Project Wildlife BE and specialist report
Vestal Project Hydrology specialist report
Vestal Project Heritage specialist report

Culmination of Mean Annual Increment [16 U.S.C. 1604 (m)]:

Stands of trees harvested have generally reached the culmination of mean annual increment of growth (CMAI).

Page II-26 of the phase II Amendment of the Black Hills Forest Plan Guideline 2411. Regeneration harvests of even-aged timber stands should not be undertaken until the stands have generally reached (or surpassed 95% of the) culmination of the mean annual increment measured in cubic feet.

CMAI occurs when the periodic annual increment equals the mean annual increment (MAI). The BHNF considers any stand that has reached 120 years old as having reached CMAI. All stands receiving regeneration harvests meet this requirement.

Finding prepared and recommended by: ______________________ Date: ______________

Donald M. Boone Jr.
Certified Silviculturist

Findings accepted by: ______________________________ Date: ____________________
Lynn D. Kolund
District Ranger

Appendix F:

PAST, PRESENT, AND FUTURE ACTIVITIES

Past, Present, and Reasonably Foreseeable Future Activities

Past Actions

Years	Type of Activity	Acres	Project Name
1960-present	Livestock Grazing		Allotments: Cicero, French Creek, North Custer, South Custer, Tenderfoot
1980-1999	Timber Harvest	11,885	Buckhorn, Marble, Custer, Wabash, Ruby Creek, Thunderhead, Minnie, Sanator, Willow, Laughing, Atlantic, Bismark, Glen Erin Salvage
1982-1999	Wildlife Habitat Improvement – thin/ weed and release	863	Marble, Ruby Creek, Sourdough, Thunderhead, Needles 2, Laughing, Buckhorn, Limestone, Minnie
1985-1999	Pre-commercial Thinning	5,302	Buckhorn, Marble, Custer, Wabash, Ruby Creek, Minnie, Sanator, Willow, Laughing, Atlantic, Bismark
1986-1998	Site prep for Natural Regeneration	925	Marble, Ruby Creek, Laughing, Bismark, Buckhorn
1986-1999	Weed Spraying	3,100	Marble, Ruby Creek, Sourdough, Thunderhead, Needles 2, Laughing, Buckhorn, Limestone, Minnie
1988-1999	Wildlife Habitat Improvement - Forage	548	Custer, Willow, Bismarck, Laughing, Minnie, Elephant, Ruby Creek, Buckhorn, Sanator, Herbie,
1990	Wildfire	14,518	Cicero Peak
1990-2000	Burn and Rehab Piles	600	Willow, Minnie, Bismarck, Laughing, Custer, Ruby Creek, Wabash, Herbie Salvage, Glen Erin, Garsong
1990-2000	Jackpot Burning	80	Needles 2, Goat, Buckhorn, Ruby Creek
1990-2011	Fuels Reduction – chipping, crushing/compacting	214	Bismarck, Minnie
1990-2011	Fuel Break Construction	1,010	Ruby Creek, Minnie, Buckhorn, Laughing, Willow, Custer, Sanator, Painter, Silverstar
1991-1996	Plant Trees	40	Cicero Salvage, Outside Sale
1994-95	Fish Habitat Improvement	8	Sanator
1997-2002	Land Exchanges & Acquisitions	Acquired: 1,274 ac.; Conveyed: 1,337 ac.	Busskohl, Kreitz, Linde, Custer Area, Knuckles, Pacer 2
1999	Pine Encroachment control	160	Buckhorn
2000-2011	Timber Harvest	5,333	Limestone, Needles 2, Wabash, Silverstar, Goat, Little Quincy, Quincy Bug, Tenderfoot Bug, Joe Gulch, Atlantic Bug, BX10 Settlement, Garsong, Painter
2000-2011	Pre-commercial Thinning	960	Limestone, Needles 2, Goat
2000-Present	Burn and Rehab Piles	350	Needles 2, Buckhorn, Goat, Thunderhead, Bismarck, Limestone, Sanator, Painter, Elephant
2000-Present	Jackpot Burning	25	Needles 2, Goat, Buckhorn,
2000-2011	Wildlife Habitat	170	Bismarck, Buckhorn, Custer, Limestone,

	Improvement - Forage		Needles 2, Goat
2000-2011	Wildlife Habitat Improvement – thin/ weed and release	282	Needles 2, Limestone
2000-2011	Weed Spraying	1,944	Painter, Limestone, Needles 2, Custer, Garsong, Thunderhead, Minnie, Laughing, Pringle
2007	Site prep for Natural Regeneration	108	Painter
2011	POL Thinning	345	Tenderfoot Bug, Joe Gulch, Atlantic Bug
2011	MPB Prevention Spraying		Bismarck Lake Campground & Day Use Area
	Weed Spraying	111	Custer County RAC

Present Actions

Years	Type of Activity	Measure	Project Name	Comments
2011-2013	Timber Harvest	1,181 ac	Wabash Resale	
2011-2012	POL Thinning	102 ac	Quincy Bug	
2011-2014	POL Thinning	1,111 ac	Goat	
2011-2014	Precommercial Thinning	256 ac	Goat	
2011-2015	MPB Prevention Spraying		Bismarck Lake Campground & Day Use Area, Bob Marshall Camp	
On-going	Maintaining Issued Easements	48 easements		
On-going	Special Use Permits		Multiple projects	
On-going	Land Exchange		Cattail Land Exchange, Deer Valley Administrative Site Sale, Tenderfoot Creek Acquisition,	Federal parcels identified for conveyance or acquisition.
On-going	Encroachments			Trespass & encroachment, dumping garbage/storage of personal items
	Livestock Grazing Permits		Allotments: Cicero, French Creek, North Custer, South Custer, Tenderfoot	

Reasonably Foreseeable Actions

Years	Type of Activity	Measure	Project Name
	Forest-wide level planning project in response to the mountain pine beetle epidemic.	Forest-wide	Mountain Pine Beetle Response Project
	Burn and Rehab Piles	50	Tenderfoot Bug, North Wabash
	Jackpot Burning	272 acres	Goat
2016	Broadcast Burn	32 acres	Goat
2013, 2014	Wildlife Habitat Improvement	166 acres	Goat
	Weed Spraying	508 acres	Goat

	Range Improvement -implementation (dugouts, fencing, etc.)		French Creek Range 2010 EA (HC Range EA)
	Thinning within a 1 mile buffer around Custer City		Mountain Pine Beetle Project (Custer County Commissioners)
	MPB Prevention Spraying		Bismarck Lake Campground & Day Use
	MPB Prevention Spraying		Camp Bob Marshall
	Lake Enhancement		Bismarck Lake Dredging
	Road Maintenance – Implementation of Travel Management		Black Hills Travel Management Plan
	Land Exchange & Acquisitions		Cattail Land Exchange, Deer Valley Administrative Site Sale, Tenderfoot Creek Acquisition,
	Access Issues/Road System Management		As private land owners subdivide or develop property, access issues would occur.
	Special Use Permits		As private land owners develop property an increase in special use requests and applications for various uses would be expected.
	Small Tracts Act		May be opportunities to pursue conveying land.
	Utility Lines		With new subdivisions emerging, new requests for electric, fiber optic, telephone lines that cross NFS land would be expected.
	Encroachments		Trespass & encroachment, dumping garbage/storage of personal items would continue to be expected.
	Mining	1 Mine	Straight 8 Placer Mine

The State of South Dakota has an ongoing program to assist private landowners with identification of mountain pine beetle infested trees and initiation of other preventative treatments. It is expected that a significant number of acres of private land will be involved with this program in the next several years. More information on this program may be found here: http://www.sdda.sd.gov/Forestry/.

Appendix G:

SUMMARY: BIOLOGICAL ASSESSMENT and BIOLOGICAL EVALUATION

Summary of Botany and Wildlife

Biological Assessment and Biological Evaluation

Introduction

This is a summary of the Vestal project Biological Assessment/Biological Evaluations (BA/BE's), and is a review and analysis of actions proposed in the Vestal Project Draft Environmental Impact Statement. The full BA/BE's are in the Vestal project file. The purpose of a BA/BE is to determine how the proposed action and alternatives to the proposed action will affect federally listed species or sensitive species listed by the Rocky Mountain Region (FSM 2670, R2 Supplement No. 2600-2011-1, 2672.11 – Exhibit 01, effective June 10, 2011). The Vestal BA/BE's were prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act of 1973 (19 U.S.C. 1536 (c)), and follow standards established in Forest Service Manual direction (2672.42) and the Code of Federal Regulations (50 CFR §402). The Vestal BA/BE's tier directly to the EIS for the revised Black Hills National Forest Land and Resource Management Plan (Forest Plan) as amended, the BA/BE completed for the Forest Plan revision, and the BA/BE prepared for the Phase II Amendment (USDA Forest Service 2006).

Pre-field Review and Field Reconnaissance

Botany

Federally Listed Plant Species

The U.S. Fish and Wildlife Service (USFWS) website list for Threatened and Endangered species was accessed on September 14, 2010 for the state of South Dakota. There are **no threatened or endangered plant species habitat known to occur in the State of South Dakota**, nor does habitat that could support threatened or endangered plant species known from adjacent states occur in the project area (USFWS 2010a).

Region 2 Sensitive Plant Species

The Region 2 Forest Service sensitive species list was updated by the Regional Forester on June 10, 2011 (USDA Forest Service 2011). All R2 sensitive plant species potentially occurring in the Black Hills National Forest were considered in the evaluation. Based on the pre-field review, *Viola selkirkii* is the only known Region 2 Sensitive Plant Species that occurs within the project area. Suitable habitat is however present in the area for two other species. A pre-field review was conducted of available information to assemble occurrence records, describe habitat needs and ecological requirements, and determine whether field reconnaissance is needed to complete the analysis. Sources of information included botanical surveys, Forest Service records and files, local professional judgment, and published research.

Table G-1. Region 2 Sensitive plant species occurring within or with suitable habitat within the Vestal Project Area

Scientific Name **Common Name**	**Distribution and Habitat**	**Species Known to Occur in Project Area?**	**Suitable Habitat Present in Project Area?**
Cypripedium parviflorum yellow lady's slipper	Primarily circumboreal in distribution and rangewide is generally found in shady deciduous and mixed woodlands near streams, shrublands, swamps, bogs, and wet forests. Habitat in the Black Hills includes stream banks under both white spruce and deciduous overstories, moist cliffs and moist areas/seeps under white spruce or mixed conifer forest. Occasionally, it is found on upper mesic forest slopes. Black Hills occurrences range in elevation from 3,500 to 6,500 ft.	No	Yes
Platanthera orbiculata large round-leaf orchid	Endemic to the boreal regions of northern North America, with a more southern distribution in the eastern United States. Black Hills occurrences are found primarily on shady, north-facing slopes in paper birch/hardwood or white spruce forests on moist, rich, humus soil. Black Hills occurrences range in elevation from 4,300 to 6,200 ft.	No	Yes
Viola selkirkii great-spurred violet	*Viola selkirkii* is a circumboreal herbaceous species, and rangewide it is locally abundant in specialized microsites in coniferous and deciduous forests. Black Hills occurrences are known from BKF lands, Custer State Park and Mt. Rushmore National Monument and are restricted to a concentrated area (ca. 36 square miles) of the central core on igneous or metamorphic bedrock. Microhabitats are often moist, cold air drainages, in shaded to open areas, and often in the vicinity of granitic rock outcrops. White spruce is usually the dominant overstory with a variable understory. All currently known occurrences on BKF lands are located within the Black Elk Wilderness and/or the Norbeck Wildlife Preserve. Black Hills occurrences range in elevation from 5,200 to 7,000 ft.	Yes	Yes

Wildlife

Federally Listed Wildlife Species

There are no federally listed wildlife species in the Vestal project area. A list of federally threatened, endangered and proposed species has been provided by the U.S. Fish and Wildlife Service (USFWS), South Dakota State Office, and was last verified on September 01, 2011 (USFWS 2011a). The South Dakota State Office is the primary center for all of the Black Hills, including Wyoming. The USFWS lists the following endangered and/or threatened species for Pennington County, South Dakota: whooping crane, Sprague's pipit, and black-footed ferret.

The whooping crane and least tern have been removed from the list of species considered on the Black Hills National Forest under Section 7 consultation (letter of concurrence from D. Gober, Field Supervisor, USFWS, Pierre, South Dakota, dated August 8, 2003). It was determined that management activities on the Forest would have **'no effect'** on these species because the Black Hills National Forest lacks suitable habitat.

The U.S. Fish and Wildlife Service reviewed the conservation status of Sprague's Pipit to determine whether the species warrants protection under the Endangered Species Act. *The status review found that listing Sprague's Pipit as threatened or endangered is warranted, but that listing the species at this time is precluded by the need to complete other listing actions of a higher priority.* To ensure this review was comprehensive, the Service solicited information from state and federal natural resource agencies and all interested parties regarding the Sprague's pipit and its habitat. Sprague's pipits use grassland habitat almost exclusively throughout the year. During the breeding season, Sprague's pipits favor relatively large grassland patches. The grassland habitat associated with the project area consists of relatively smaller grassland patches mixed with areas of ponderosa pine forest. This species would be expected to migrate through the project area at most. This species was not observed during field surveys of the project area (2008-2011). The Vestal Project on the Black Hills National Forest system land would not reduce habitat for this species and therefore would have '**no effect'** on the Sprague's pipit.

Although the black-footed ferret is listed for Custer County, it is an experimental population located in eastern Pennington County; it is an endangered population, with provisions for accidental 'take', located in southern Custer County, where they have been re-introduced into Wind Cave National Park. Habitat for the black-footed ferret is not present in the project area because there are no large-sized prairie dog colonies. The Vestal Project would have '**no effect**' on ferrets because the project area lacks suitable habitat.

Table G-2. Expected Occurrence of Threatened and Endangered Species within the Project Area.

Species	**Status[1]**	**Species Present[2]**	**Habitat Present[3]**	**Further Analysis Provided[4]**	**Habitat Description/Analysis Rationale**
Black footed ferret *(Mustela nigripes)*	E	NO	NO	NO	Prairie dog towns (USFWS 2011b). No reintroduction sites or other known suitable habitat in the project area.
Sprague's Pipit (*Anthus spragueii*)	C	NO	NO	NO	Large grasslands (USFWS 2011e). No suitable habitat present.

[1] E= Endangered in Custer County; C= Candidate in Custer County.
[2] Confirmed records of species in project area or immediate vicinity.
[3] Habitat Present- Suitable habitat known or suspected to occur.
[4] Further Analysis Provided- If the species is not suspected to occur and if suitable habitat is not present or habitat would not be affected by the proposed project then no further effects analysis for that species is necessary because they would not be expected to be adversely affected by the project as proposed. Refer to the **Habitat Description/Analysis Rationale** section of Table G-2.

Region 2 Sensitive Wildlife Species

The current sensitive species list for the Rocky Mountain Region (R2) was renewed on June 10, 2011. Sensitive species for the Black Hills National Forest are listed on the R2 threatened, endangered and sensitive species home page (USDA Forest Service 2011). There are now 25 species on the Region 2 sensitive species list that could be present in the Black Hills.

The pre-field review of Region 2 Sensitive Species was completed using survey results, district records, literature reviews, on-line databases, and the South Dakota Natural Heritage Database. There are two, one of which was new in 2011, goshawk territories that have been monitored within the project area. There are two Frest sites within the project area, but no sensitive species have been recorded there. Stream surveys conducted by the South Dakota Department of Game, Fish and Parks, document the mountain suckers within the analysis area.

The following table lists Region 2 sensitive species that may be present in the Black Hills. Fourteen R2 sensitive species occur or could potentially occur (habitat may be present) in the Vestal project area (Table G-3).

Table G-3. Expected Occurrence of R2 Sensitive Species within the Vestal project area.

Species	**Species Present**[1]	**Habitat Present**[2]	**Further Analysis Provided**[3]	**Habitat Description/Analysis Rationale**
Fringed Myotis (*Myotis thysanodes*)	YES	YES	YES	This species forages on insects in a wide variety of habitats including grasslands and forested areas. Roosting sites also vary but include snags, caves, mines, and rock crevices (Keinath 2004).
Townsend's big-eared bat (*Corynorhinus townsendii)*	YES	YES	YES	Forages on insects in a variety of habitats including forested and wet areas. Roosts in a variety of structures including caves, mines, and buildings (Gruver and Keinath 2006).
Hoary bat (*Lasiurus cinereus)*	NO	YES	YES	This bat roosts primarily among foliage in deciduous and coniferous trees, often along the edges of clearings. Forages on insects, especially moths (Valdez and Cryan 2009).
Black-tailed prairie dog (*Cynomys ludovicianus*)	YES	YES	YES	Short-grass and mixed-grass prairies (USFWS 2011c). There is one prairie dog town within the project area.
American marten (*Martes americana*)	NO	YES	YES	Spruce forests with complex near-ground structure, extending into Adjacent ponderosa pine stands (Buskirk 2002).
Bighorn Sheep *(Ovis canadensis canadensis)*	NO	NO	NO	Prefers vegetative openness (grasslands, rocky areas, large burns and clear-cuts). Existing herds in the Black Hills are mostly located in Custer State Park, in the Spring Creek area, and in the Elk Mountain range (Beecham et al. 2007).
Bald Eagle (*Haliaeetus leucocephalus*)	YES	YES	YES	In the Black Hills, bald eagles are still considered winter residents or spring/fall migrants. Usually found near unfrozen water or carrion in winter (Tallman et al. 2002, USFWS 2011d).

Northern goshawk (*Accipiter gentilis)*	YES	YES	YES	Forages in a variety of forested areas and small openings; nests primarily in dense mature conifer forests (Kennedy 2003).
American peregrine falcon (*Falco peregrinus anatum*)	NO	NO	NO	Tall cliffs in open areas near water (Johnsgard 1990). Not suspected to occur in project vicinity. There are no cliffs over 25’ high near open water in the project area.
Northern harrier (*Circus cyaneus*)	YES	NO	NO	Prairies, open fields and marshes (Tallman et al. 2002). Not suspected to occur in project vicinity. Suitable habitat for this species is not present on federal lands within the project area; however, they have been observed in a private meadow, but no activities are expected to occur there.
Yellow-billed cuckoo (*Coccyzus americanus*)	NO	NO	NO	Low elevation riparian areas and woodlands characterized with cottonwood-willow or bur oak (Panjabi 2003). Suitable habitat for this species is not present in the project area.
Burrowing owl (*Athene cunicularia*)	NO	NO	NO	Dry grasslands and pastures, usually associated with prairie dogs or ground squirrels (Tallman et al. 2002). Not suspected to occur in project vicinity. Suitable habitat for this species is not present in the project area because only a small prairie dog town is within the project area.
Flammulated owl (*Otus flammeolus*)	NO	YES	YES	Open ponderosa pine forests, cavity nester (McCallum 1994).
Lewis’s woodpecker (*Melanerpes lewis*)	NO	NO	NO	Open areas with large snags; oak and cottonwood forests (Anderson 2003, Panjabi 2003). Large acres of suitable habitat are not present within the project area, but it can be found adjacent to the project area in burned areas.
Black-backed woodpecker (*Picoides arcticus*)	YES	YES	YES	Burned areas with a high density of pre-burn snags; dense and/or mature forests with a high snag density (Anderson 2003, Panjabi 2003).
Loggerhead shrike (*Lanius ludovicianus*)	NO	NO	NO	Open country with scattered, low deciduous thickets (Tallman et al. 2002). Not suspected to occur in project vicinity because suitable habitat is not present.
Grasshopper sparrow (*Ammodramus savannarum*)	NO	NO	NO	Found almost exclusively in native mixed-grass prairies (Panjabi 2003). Suitable habitat for this species is not present in the project area.

Long-billed curlew (*Numenius americanus*)	NO	NO	NO	Considered native prairie specialists requiring short-grass or mixed-grass prairie habitat with nearly flat topography (Sedgwick 2006). Suitable habitat for this species is not present in the project area.
Northern leopard frog (*Rana pipiens)*	YES	YES	YES	Riparian and wetland areas for tadpoles, sub adults, and breeding adults; upland habitats for foraging adults (Smith and Keinath 2007).
Black Hills redbelly snake (*Storeria occipitomaculata pahasapae*)	YES	YES	YES	Wet meadows, woodlands, and forest-meadow edge habitat in the Black Hills (Smith and Stephans 2003). Denning habitat could include anthills and rocky outcrops areas near these habitats.
Lake chub (*Couesius plumbeus*)	NO	NO	NO	Present only in Deerfield Reservoir (Isaak et al. 2003) which is not in the Vestal Project Area.
Finescale dace (*Phoxinus neogaeus*)	NO	NO	NO	Small lakes and cool, boggy environments associated with springs or beaver dams in the Redwater Drainage (Isaak et al. 2003). Species is not present in the project area.
Mountain sucker (*Catostomus platyrhynchus*)	YES	YES	YES	Cool, clear, moderately swift mountain streams with mud, cobble, or boulder substrate (Isaak et al. 2003). Reported in French Creek downstream of Stockade Lake.
Cooper's mountain snail (*Oreohelix strigosa cooperi*)	NO	YES	YES	Lowland wooded or riparian areas on limestone soils (Frest and Johannes 2002).
Regal fritillary butterfly (*Speyeria idalia*)	NO	YES	YES	Tallgrass prairie and extensive grasslands with violets (Royer and Marrone 1992). Not suspected to occur in project vicinity.

[1] Confirmed records of species in project area or immediate vicinity.
[2] Habitat Present – Suitable habitat known or suspected to occur.
[3] Further Analysis Provided – If the species is not suspected to occur and if suitable habitat is not present or habitat would not be affected by the proposed project then no further effects analysis for that species is necessary because they would not be expected to be adversely affected by the project as proposed. Refer to the **Habitat Description/Analysis Rationale** section of Table G-3.

Determinations Summary – Flora (Botany)

The action alternative will result in both positive and negative impacts to *Cypripedium parviflorum* and *Platanthera orbiculata*. Positive impacts will be a decrease in the potential for a high intensity fire and increased water yields. Negative impacts may include an increase in noxious weeds and damage to any unknown or known individual plants. Any negative impacts to individuals are expected to be short-term, while long-term impacts should be beneficial. The following determination is valid for both species: **"May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend for federal listing."**

The action alternative will result in both positive and negative impacts to *Viola selkirkii*. Positive impacts will be a decrease in the potential for a high intensity fire and increased water yields. Negative impacts may include an increase in noxious weeds and damage to any unknown or known individual plants. Any negative impacts to individuals are expected to be short-term, while long-term impacts should be beneficial. The following determination is valid: "**May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend for federal listing."**

Table G-4. Determination Summary for R2 Sensitive Species

Species	Alternative 1 Determination	Alternative 2 Determination
Cypripedium parviflorum yellow lady's slipper	MAII	MAII
Platanthera orbiculata large round-leaf orchid	MAII	MAII
Viola selkirkii great-spurred violet	MAII	MAII

NI = No impact
MAII = May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.

Determinations Summary – Fauna (Wildlife)

The determination of effects on federally listed wildlife species and Region 2 Sensitive Species in this BA/BE were made as the result of the information gathered in the pre-field review, field reconnaissance, and effects analysis for all alternatives. The basis for these determinations was potential habitat, distribution, and effects from proposed activities, and the Black Hills National Forest Plan, including the Phase II Amendment (Standards and Guidelines). The determination language is set forth in Forest Service Manual 2670 and by the USFWS.

The Phase II Forest Plan Amendment FEIS (USDA Forest Service 2005b) evaluated population viability, and determined that all federally listed and sensitive species are likely to persist on the Forest over the next 50 years if standards and guidelines are followed, and if conditions move toward Forest Plan objectives. All standards and guidelines will be followed in proposed action of the Vestal project. Furthermore, all alternatives are consistent with Objective 221, which is to conserve or enhance habitat for sensitive species. Mountain pine beetle activity is expected to affect habitat within the project area, but the project activities are following standards and guidelines. Therefore, persistence of all R2 sensitive species would not be affected by the proposed action of the Vestal project.

With implementation of Forest Plan direction and project-specific design criteria, the following determinations are made for R2 Sensitive Species (Table G-5):

Table G-5. Determination Summary for R2 Sensitive Species

Species	Alternative 1 Determination	Alternative 2 Determination
Bald eagle	NI	NI

Species	Alternative 1 Determination	Alternative 2 Determination
Fringed myotis	MAII	MAII
Townsend's big-eared bat	MAII	MAII
Hoary bat	MAII	MAII
Northern goshawk	MAII	MAII
Flammulated owl	MAII	MAII
Black-backed woodpecker	MAII	MAII
Northern leopard frog	MAII	MAII
Black Hills redbelly snake	NI	MAII
Cooper's mountain snail	MAII	MAII
Regal fritillary butterfly	NI	MAII
Mountain Sucker	MAII	MAII
Black-tailed prairie dog	NI	MAII
American marten	MAII	MAII

NI = No impact
MAII = May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.

Appendix H:
EPIDEMIC DETERMINATION

Forest Service

Black Hills National Forest
Supervisor's Office

1019 N. 5th Street
Custer SD 57730-8214
Tel. 605/673-9200
FAX 605/673-9350

File Code: 1950 **Date:** April 11, 2011

Subject: Determination of an Insect Epidemic in the Vestal Project Area

To: Lynn D. Kolund, Hell Canyon District Ranger

The Vestal Project Area of the Hell Canyon Ranger District is currently experiencing an active and rapidly expanding mountain pine beetle epidemic. Forest-wide, mountain pine beetle activity has increased dramatically over the last 10 years. Information presented in Mountain Pine Beetle Conditions in the Vestal Area, March 25, 2011 prepared by Kurt Allen, Entomologist, Rapid City Service Center, specifically addressed the Vestal Project Area. Data presented in this report concludes that the project area is experiencing mountain pine beetle caused mortality and brood sampling suggests that mortality will continue to increase. The mountain pine beetle is at epidemic levels across this area right now and is expected to continue to increase across the entire project area over the next few years.

In light of the recent and projected insect activity within the project area, changes in fuels profiles are expected. Insect damage will alter several stand characteristics including canopy fuels, down woody fuels, duff, ladder fuels, herbaceous fuels, and microclimate, in turn altering the fire hazard and potential fire behavior. Once trees are killed by mountain pine beetles, they generally break off or fall to the ground within 3-5 years. These dead, dry fuels contribute to increased fire hazard.

There is one At-Risk Community (ARC) located within the Vestal project and three ARC located within six miles of the project boundary. Based on Custer County data, there are approximately 3,194 private structures within the project area.

Currently, based on ground data collected last year, there is an average of 27 trees per acre killed over the past 3 years in stands in the project area. This is in comparison to what was found in the fall of 2008 in this same area when there were about 7 trees per acre killed on average. Of the trees killed over the past 3 years 77% of them are green, currently infested trees attacked in the summer of 2010 which will produce beetles that attack new trees in 2011. Approximately 19% of the trees were killed in 2009 and turned red in 2010 and only 5% are trees that were killed in 2008. These values indicate a rapidly expanding epidemic.

The northern and western portions of the project area have higher levels of MPB activity. However, the southern portion is in the initial stages of an epidemic with indications that populations are rapidly expanding in this area. Pine tree mortality throughout the project area is expected to increase, likely at a rapid pace.

Strategies available to reduce mountain pine beetle caused mortality include; Prevention thinning to reduce basal area; Suppression through sanitation, or removal of green trees that have live beetle brood in them; and Spraying of high value trees with insecticide prior to infestation. It is recommended that treatments be implemented as soon as possible to be most effective.

Given the information referenced above, I conclude that there is a mountain pine beetle epidemic in the Vestal Project area that meets Section 102(a)(4) of HFRA. I believe that the continued spread of this epidemic includes: Increased tree mortality across the landscape; further accumulation of hazardous fuels and increased potential for severe large-scale wildfires within the wildland urban interface; major changes in the scenery; and alteration of wildlife habitat. Therefore, I wholly support the Hell Canyon Ranger District's proposal to address this epidemic in the Vestal Project Area by utilizing authority provided in the Healthy Forests Restoration Act.

/s/ Craig Bobzien
CRAIG BOBZIEN
Forest Supervisor