ENVIRONMENTAL ASSESSMENT

FOR THE

BABIONE VEGETATION

MANAGEMENT PROJECT

May 2009
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Figure 1. Vicinity map of the Babione vegetation management project area.
Background

The Bighorn National Forest is proposing to reduce hazardous fuel conditions and lower the potential for high severity, stand replacing wildland fire on national forest system (NFS) lands in the Babione project area. This environmental assessment (EA) discusses the findings of analysis conducted for the Babione Vegetation Management Project (Babione project). Additional documentation may be found in the project file located at the Tongue Ranger District office in Sheridan, Wyoming and on the Bighorn National Forest internet website.¹ The purpose of this environmental assessment is to briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact (40 CFR 1508.9).

The Babione project is authorized under the Healthy Forest Restoration Act (HFRA) criteria. The Community Wildfire Protection Plan for Sheridan County identified two wildland/urban interface (WUI) areas in the project area: Dome Lake and Big Goose. In the Dome Lake area, there is a high risk of fire spreading from the forest onto the Dome Lake Club private lands and threatening life and property. There is also a high risk of fire spreading from the Dome Lake Club lands onto the adjacent national forest system lands.

Project Area Description

The 9,800-acre Babione project is located in the Big Horn Mountains, near the center of the Bighorn National Forest as shown on Map 1-1. The general project area is bounded on the west by the Dome Lake Club private land and on the west by Antler Creek. The northern boundary is forest system road (FSR) 26 (Red Grade Road), while the southern boundary is formed by the Cloud Peak Wilderness. About two thirds of the project area is within Sheridan County, with the balance in Johnson County.

Public Involvement and Collaboration

In July 2006, the project was included in the Bighorn National Forest’s schedule of proposed actions (SOPA). This document is a quarterly report mailed to individuals, agencies, and interest groups on the SOPA mailing list and posted to the forest’s web page. Progress updates on the planning process have been included in this report since that time.

Two pre-scoping collaboration meetings were held with members of the Dome Lake Club, Wyoming State Trails and State Forestry, the Sheridan County fire warden, range permittees, and the Wyoming Game and Fish Department (WGF). Public scoping for proposed activities in the Babione project area was initiated in December 2006 when an information letter and scoping document were mailed to about 60 individuals, organizations, agencies, and American Indian tribes for their comment. The documents included background information and the preliminary issues shown above for the project area. The letter and scoping document were also posted on the Bighorn National Forest’s web page. A legal notice was placed in the Casper Star Tribune on December 28, 2006.

On January 20, 2009, an open house was held at the Tongue District Office in Sheridan, WY to explain the use of HFRA authority in this analysis. Seven individuals representing WGF and various interest groups attended the meeting. A project update was presented which included information on how the project falls under the HFRA and how that authority differs from the previous proposal.

**Purpose of, and Need for, Action**

The purpose of, and need for, this proposal is to reduce the risk of stand-replacing wildfire on national forest system (NFS) lands. Specifically there is a need to utilize fire/fuels management techniques for wildland fire control and management in the Dome Lake area. The *Community Wildfire Protection Plan for Sheridan County* identified two wildland/urban interface (WUI) areas in the project area: Dome Lake and Big Goose. In the Dome Lake area, there is a high risk of fire spreading from the forest onto the Dome Lake Club private lands and threatening life and property. There is also a high risk of fire spreading from the Dome Lake Club lands onto the adjacent national forest system lands.

Fire management techniques would be used to accomplish the following:

- Reduce fuel densities and fire hazard at the stand and landscape scales.
- Provide defensible space around structures near Long Park.
- Improve the safety of existing public and firefighter escape routes, primarily along FSR 283.
- Implement suppression strategies as needed to minimize epidemic outbreaks of insect and disease in areas managed for timber production, developed recreation, viewshed (e.g., concern level 1 and 2 roads, cultural sites, and wild and scenic river corridors) and administrative sites as described in management area desired conditions (forest plan chapter 1, goal 1c., strategy 4, page 1-5).

The purpose and need for this project is to reduce hazardous fuel conditions in the project area by changing existing condition classes 2 and 3 (described as having high, unnatural fuel loads) to condition class 1 (described as a more natural, balanced fuel load and setting). The purpose and need can be achieved through the use of prescribed fire, thinning, commercial and pre-commercial forest vegetation management treatments.

The intent and design of this project is to create a spatial distribution of forested vegetation classes and structure that is more resistant to large scale, high intensity wildfires. Subsequently, wildfire incidents that do occur would result in less severe fires that would be easier to manage and safer for firefighting personnel. The proposed treatments reflect the forest plan objective 1.c, strategy and desired future condition (forest plan chapter 1, pages 1-4, 1-5, and 1-14 through 1-19).

There is also a need to improve public and firefighter safety in the area by managing road access in the Dome Lake area within the project area. During a wildfire, it is critical to know where the access routes are and whether anyone is using them. A user-created road connecting FSR 283 to FSR 334313 is currently being used by all terrain vehicles (ATV) and is not managed or maintained by the Forest Service. Both FSR 283 and 334313 provide access to and from the area so this user-created road is not needed. The user-created route is not on any maps and known only by people who reside in the area. It poses a safety risk during a wildfire because someone
could be using the road to enter an unsafe area and firefighters would not know to patrol it. Closing this user-created road would allow the Forest Service to better manage public safety during a wildfire.

Following the severe wildland fire season of 2000, two key reports were developed to provide federal agencies with direction for fighting wildfires on public lands. *Managing the Impacts of Wildfires on Communities and the Environment: A Report to the President in Response to the Wildfires of 2000 (U.S. Department of Agriculture and U.S. Department of the Interior 2000)* and *Wildland Fire Management: A Cohesive Strategy and Clear Cost-Containment Goals Are Needed for Federal Agencies to Manage Wildland Fire Activities Effectively (U.S. Government Accounting Office 2007)* provide direction to the Forest Service to reduce the amount of fuel in fire-prone forests to protect people and sustain resources. The wildland-urban interface, areas where flammable wildland fuels are near homes and communities, is one of the highest priorities for treatment.

Pursuant to the Healthy Forest Restoration Act (section 101(A)), Sheridan County established the wildland urban interface in their *Community Wildfire Protection Plan for Sheridan County*. The plan identified the Dome Lake and Big Goose areas as wildland-urban interfaces. This area fits the Healthy Forest Restoration Act definition of an at-risk community: “a group of homes and other structures with basic infrastructure and services within or adjacent to federal land and in which conditions are conducive to a large-scale wild-land fire disturbance event and for which a significant threat to human life or property exists as a result of a wildland fire disturbance event.”

**Existing Condition**

To determine existing conditions, an analysis of fire history, fire regime and condition class, fire risk, fire hazard and values at risk was completed (fire and fuels specialist report, pages 4 through 10). The lack of fire occurrence within the project area has resulted in a continuous stand of timber mainly consisting of lodgepole pine.

Most of the project area is in fire regime 4, condition class 2. This fire regime/condition class is characterized by stand-replacing fires; vegetation composition, structure, and fuels show moderate to high departure from historic ranges; and there is a moderate to high risk of losing key ecosystem components in the event of a wildfire.

**Desired Condition**

The desired condition for the project area is to create a distribution of forest structural and development classes that are more resistant to large scale fires. Wildfire incidents that do occur would result in less intense fires, a higher probability of fire fighters successfully defending structures and private lands, and increased firefighter and public safety.

A trend toward the forest plan desired condition for structure distribution would decrease the risk of large scale, stand replacement fire, and risk to adjacent private property. The desired condition would result in a reduction in canopy bulk density, an increase in canopy base height, and surface fuels more consistent with historic conditions across the project area.
The desired condition for fire and fuels management is to reduce the likelihood of stand-destroying fires that cover large areas, to reduce the threat of wildfire to public and private developments, and to reduce activity fuels resulting from all projects and activities to acceptable levels in a cost effective manner.

**Alternative 2 – Historic Scale Openings (Proposed Action)**

The Bighorn National Forest is proposing to reduce hazardous fuels and the potential for insect and disease epidemics by treating lodgepole pine and some spruce in the 9,800-acre Babione project area (see figure 2). Treatments (approximately 1,610 acres) will include non-commercial and commercial thinning and a variety of other silvicultural methods. Vegetation treatment activities are estimated to begin in the summer of 2012 and end in late 2023.

Depending on current stand condition, one or more treatments may be required to achieve desired stand conditions and ultimately desired fuel condition. For example, the thinning of a dense stand of lodgepole may require multiple entries, each removing a percent of the trees, to reduce chances of blowdown from the wind.

By using non-commercial, commercial, and burning treatments, a diversity of stand development stages would be created to meet the goal of moving the stands within the project area from a condition class 2 toward a condition class 1. Based on the existing condition assessment, large-scale, stand-replacement events have a higher risk of occurring as compared with an untreated forested stand. After treatment, stand replacement events may still occur, however the affected acreage would be smaller and the landscape more resilient to the fire effects.

Under alternative 2, forested vegetation would be treated using the even-aged management techniques listed in the following table. Clearcutting (CC) and fill-in planting are proposed for six units on approximately 480 acres, ranging from 7 to 200 acres. Four of the clearcut units would be greater than 40 acres (64, 83, 110, and 200 acres).

**Table 1. Alternative 2 silvicultural treatments by unit.**

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<tr>
<th>Unit</th>
<th>Acres</th>
<th>Prescription</th>
<th>Slash treatment</th>
<th>% removal*</th>
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Environmental Assessment for the Babione Vegetation Management Project

### Table

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</tr>
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TSI = timber stand improvement  
WUI = wildland/urban interface  
CC = clearcut  
SWPC = shelterwood prep cut  
RX burn = prescribed burn  
Comm thin = commercial thinning  
PCC = patch clearcut  
SWOR = shelterwood overstory removal  
Precomm = precommercial thinning  
* % removal refers to the approximate percent of stems removed.  
** Precommercial thinning is expressed as % remaining and it varies by unit.

The primary transportation system is in place. Existing roads are shown on the alternative maps. Pre-use maintenance would be performed on roads used for timber harvest; roads would also be maintained during and after operations, as needed.

Approximately 11 miles of short duration² roads would be constructed to access the stands proposed for treatments. These roads would be kept open for post-sale activities. When post sale activities are complete, roads would be decommissioned using techniques such as ripping, scattering wood/rock debris onto the road for a sight distance and applying grass seed as needed. Post sale monitoring would determine the best on-the-ground methods to use.

² Short duration roads are system or nonsystem roads which are used for a single purpose (forest plan appendix G – Glossary, page G-52). These roads are decommissioned following accomplishment of the prescribed purpose.
Figure 2. Map of alternative 2 treatment units – historic scale openings.
Alternative 3 – Small Scale Openings

Alternative 3 would also reduce hazardous fuels and the potential for insect and disease epidemics by treating lodgepole pine and some spruce in the 9,800-acre Babione project area (see figure 3); however, the size of the units that create openings would be less than 40 acres. Treatments (approximately 1,160 acres) will include non-commercial and commercial thinning and a variety of other silvicultural methods. Vegetation treatment activities are estimated to begin in the summer of 2012 and end in late 2023.

Under alternative 3, forested vegetation would be treated using the even-aged management techniques listed in the following table. Clearcutting (CC) and fill-in planting are proposed for eleven units on approximately 250 acres, ranging from seven to forty acres. All other proposed actions are the same as alternative 2.

Table 2. Alternative 3 silvicultural treatments by unit.

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<tr>
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<th>Prescription</th>
<th>Slash treatment</th>
<th>% removal *</th>
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<td>21_4</td>
<td>21</td>
<td>WUI Comm thin</td>
<td>RX burn clearcuts, whole tree skid</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WUI PCC</td>
<td>RX burn clearcuts, whole tree skid</td>
<td>95%</td>
</tr>
<tr>
<td>22</td>
<td>48</td>
<td>WUI Comm thin</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>20%</td>
</tr>
<tr>
<td>23</td>
<td>42</td>
<td>SWOR</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>80%</td>
</tr>
<tr>
<td>25_1</td>
<td>28</td>
<td>CC</td>
<td>Broadcast burn</td>
<td>95%</td>
</tr>
<tr>
<td>25_2</td>
<td>25</td>
<td>CC</td>
<td>Broadcast burn</td>
<td>95%</td>
</tr>
<tr>
<td>26</td>
<td>20</td>
<td>Precomm TSI</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>Varies**</td>
</tr>
<tr>
<td>27</td>
<td>17</td>
<td>Precomm TSI</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>Varies**</td>
</tr>
<tr>
<td>28</td>
<td>2</td>
<td>Precomm TSI</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>Varies**</td>
</tr>
<tr>
<td>29</td>
<td>19</td>
<td>Precomm TSI</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>Varies**</td>
</tr>
<tr>
<td>30</td>
<td>2</td>
<td>Precomm TSI</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>Varies**</td>
</tr>
<tr>
<td>31</td>
<td>13</td>
<td>Precomm TSI</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>Varies**</td>
</tr>
<tr>
<td>32</td>
<td>6</td>
<td>Precomm TSI</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>Varies**</td>
</tr>
<tr>
<td>33</td>
<td>24</td>
<td>Precomm TSI</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>Varies**</td>
</tr>
<tr>
<td>34</td>
<td>12</td>
<td>Precomm TSI</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>Varies**</td>
</tr>
<tr>
<td>35</td>
<td>5</td>
<td>Precomm TSI</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>Varies**</td>
</tr>
<tr>
<td>36</td>
<td>17</td>
<td>Precomm TSI</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>Varies**</td>
</tr>
<tr>
<td>37</td>
<td>13</td>
<td>Precomm TSI</td>
<td>Lop &amp; scatter, whole tree skid</td>
<td>Varies**</td>
</tr>
</tbody>
</table>

TSI = timber stand improvement  
WUI = wildland/urban interface  
CC = clearcut  
SWPC = shelterwood prep cut  
RX burn = prescribed burn  
* % removal refers to the approximate percent of stems removed.  
Comm thin = commercial thinning  
PCC = patch clearcut  
SWOR = shelterwood overstory removal  
Precomm = precommercial thinning  
** Precommercial thinning is expressed as % remaining and it varies by unit.
Figure 3. Map of alternative 3 treatment units – small scale openings.
Design Criteria Common to Alternatives 2 and 3

**Forested Vegetation and Silvicultural Systems**
1. Prohibit log hauling on weekends (Friday-4 p.m. through Sunday-10 p.m.) and federal holidays (24-hour period) to minimize conflicts with other forest users using the access roads.
2. Ensure regeneration of clearcut units using methods including, but not limited to, the following:
   a. Leave sufficient lodgepole pine cones in clearcut areas. These cones are serotinous which means they need heat to open. Heat from prescribed burning can accomplish this.
   b. Use broadcast burning for site preparation in clearcuts to evoke lodgepole pine cone opening where practicable.
   c. Plan fill-in planting with seedlings if reforestation surveys indicate stocking levels do not comply with forest plan and National Forest Management Act (NFMA) 5-year regeneration requirements.
3. Protect desired existing advanced tree regeneration in partial cut units during timber harvest and post harvest activities. Methods include, but are not limited to, the following:
   a. Use directional felling during harvest activities to fall cut trees away from advanced regeneration where possible.
4. Restrict timber harvest operations from November 15 through June 30 to reduce impacts to the Wyoming state snowmobile routes, unless alternate routes are established or snow conditions are not conducive to snowmobiling. This restriction would also minimize disturbances to big game movement and calving (moose and elk) during the spring months.

**Fuels Management**
1. Manage slash to avoid excessive accumulation of fuels in all units by utilizing whole tree skidding as much as possible. Where sufficient cones are required, tree tops will be scattered to a depth no greater than 24 inches.
2. Additional fuel reduction activities (e.g., piling and burning) will be designed to reduce the threat of wildfire along public access routes and to private developments in the project area.

**Terrestrial Wildlife and Threatened, Endangered and Sensitive Plants**
1. Provide appropriate spatial and/or temporal buffers as determined by ID Team if sensitive or species of local concern are found during project implementation. Refer to the plant and wildlife biological evaluations in project record (forest plan chapter 1, pages 1-40 and 1-46).
2. Restrict timber harvest activities from March 15 to August 15 within 2,600 feet (1/2 mile) of any active raptor nest in the project area (Guidelines for Raptor Protection from Human and Land Use Disturbances, USFWS 2002); this applies to active nests discovered after award of the contract. Leave approximately 30 acres around any known raptor nest trees as a no-cut area for mechanical harvest. Site-specific modifications may be made by an ID Team process approved by the district ranger.

3. To help maintain elk security per forest plan direction (forest plan goal 1, objective 1b, strategy 6, page 1-3; forest plan chapter 1, wildlife guideline 6 page 1-46), convert forest system trail 110 to a nonmotorized system trail. To convert the existing motorized trail to nonmotorized, FSR 406 will be closed before it crosses Antler Creek and the termination point will be located in a place where vehicles can turn around.

**Soil and Aquatic Resources**

1. Implement the Watershed Conservation Practices Handbook (WCPH) guidelines shown in appendix A of the aquatics specialist report (forest plan chapter 1, forest plan soil, water, riparian and wetland guideline 1, page 1-26).

2. To minimize sedimentation, maintain adequate buffer width and integrity for all channel types as directed by the forest plan (forest plan chapter 1, forest plan soil, water, riparian and wetland standard 1, page 1-26) and WCPH (aquatics specialist report, appendix A).


4. In the water influence zone³ (WIZ), allow harvest of old trees which are susceptible to disease if the need is identified and agreed upon by specialists. Prescribed techniques should minimize impact to the WIZ and result in improved forest health and stand vigor.


6. Prescribe road construction that minimizes length of road within the WIZ (aquatics specialist report, appendix A, pages 46-48).

7. To the maximum extent practical, design road crossings to be perpendicular to the WIZ (aquatics specialist report, appendix A, page 45).

8. Prescribe adequate road drainage and buffering for roads within the WIZ (aquatics specialist report, appendix A, page 46).

**Range and Livestock**

1. Construct a new drift fence if problems arise because of the loss of the natural barrier (trees) between the Big Goose and Walker Prairie cattle and horse (C&H) allotments.

2. Utilize timber sale contract provisions to insure that fence gates are closed from June 21 to September 25 while livestock are in the allotments.

³ “The water influence zone is the aquatic ecosystem, the riparian ecosystem, characterized by distinct vegetation and associated valley bottom (Winters et al. 2003), wetlands, and ecosystems that remain within approximately 100 feet horizontally from both edges of all perennial and intermittent streams and from the shores of lakes and other still water bodies. It includes adjacent, unstable and highly erodible soil.” (forest plan chapter 1, forest plan soil, water, riparian and wetland standard 1, page 1-26)
Invasive Species and Noxious Weed Management

1. To control the spread of noxious and/or invasive weed and protect against new weed species, all off-road equipment will be cleaned (washed) prior to coming onto the project area. The same equipment would be cleaned (washed) prior to moving from an infected unit to an un-infected unit within the project area per standard contract clause.

Public Health and Safety

1. Access to the user-created ATV route from FSR 283 (Dome Lake Road) to FSR 334313 along Dome Rock Meadows will be physically restricted to deter unauthorized motorized use.

2. To further control access on FSR 334313 beyond the existing gate, a second gate will be installed just prior to the “Dome Rock Meadows.”

Scenery

1. Do not clearcut in units 03, 04, and 05 within 300 feet of the eastern border of the Dome Lake Club (private inholding).

2. Avoid altering more than 1/3 of the edge of a natural opening whenever an artificially created opening lies adjacent to a natural opening (forest plan chapter 1, silviculture guideline 1, page 1-36).

3. Meet the scenic integrity objective of moderate in the foreground zone along concern level 1 and 2 roads (FSRs 26, 283, 299) (forest plan chapter 2, management area 5.4 guideline 1, page 2-59).

No Action Alternative

No action provides a baseline for comparison of environmental consequences of the proposed action to the existing condition and is a management option that could be selected by the responsible official. The results of taking no action would be the current condition as it changes over time due to natural forces.

No action continues standard protection and maintenance activities such as fire suppression, access management, and road maintenance. There would be no timber harvest and no regeneration treatments conducted, beyond personal use permits. The forested stands would generally change under the processes of natural succession, with the disturbance elements of fire, blowdown from wind, insects, and diseases as the major element of change.

Motorized use would be allowed under the current rules. The road closure gates would remain where they are, and be closed under the current enforcement and maintenance rules. Other travel management rules, such as seasonal closures for snowmobile trails, would continue to be regulated. Routine road and trail maintenance would continue.

Alternative Development

Other alternatives were considered but they did not meet the purpose and need and were not analyzed in detail. Additional information about these alternatives is located in the public involvement section of project record.
Environmental Assessment for the Babione Vegetation Management Project

Environmental Consequences

This section describes the environmental impacts of the proposed action and alternatives in relation to whether there may be significant environmental effects as described at 40 CFR 1508.27. Further analysis and conclusions about the potential effects are available in resource specialist reports and other supporting documentation located in the project record and on the Bighorn National Forest website at www.fs.fed.us/r2/bighorn/projects/projectfiles/ under Babione Vegetation. The following are discussions of resources with relevance to determination of significance.

The Council on Environmental Quality (CEQ), provided federal agencies with guidance for considering past actions in cumulative effects analysis. CEQ stated “NEPA is forward looking, in that it focuses on the potential impacts of the proposed action” and “generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historic details of individual past actions” (CEQ memo, pg 2). Cumulative impact is defined in CEQ NEPA regulations as the “impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions…” (40 CFR 1508.7). CEQ has interpreted this regulation as referring only to the cumulative impact of the direct and indirect effects of the proposed action and its alternatives when added to the aggregate effects of past and reasonable foreseeable future actions (CEQ memo pg 2).

Consistent with the CEQ guidance, the past, present and reasonable foreseeable actions were considered for analysis of cumulative effects where appropriate for each resource. Past actions include those that contributed to establishing the current baseline conditions of the project. The following table provides a summary of the past, present and reasonably foreseeable future activities that were considered in the cumulative effects analyses and includes activities within the project area, ranger district, and on private property.

Table 3. Past, present, and reasonably foreseeable future actions considered in the cumulative effects analysis for the Babione vegetation management project.

<table>
<thead>
<tr>
<th>Project/Activity</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historic timber sales</td>
<td>Project area</td>
<td>There is evidence of past timber harvest dating back to the 1890s. Sawmills were set up on Babione creek.</td>
</tr>
<tr>
<td>Dome Rock timber sale</td>
<td>T53N R86W Section 4, 5, 6, 8</td>
<td>1992 144 acres of clearcuts, less than 24 acres each.</td>
</tr>
<tr>
<td></td>
<td>T53N R87W Section 1, 7, 12</td>
<td></td>
</tr>
<tr>
<td>Post and pole removal</td>
<td>Project area</td>
<td>Post and pole size material (up to 7” dbh) have been removed from this area for over a hundred years. Currently it is restricted to identified stands with road access.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project/Activity</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teepee pole sales</td>
<td>Project area</td>
<td>Teepee pole size material (up to 5” dbh) has been removed from this area since before European settlement. Currently it is restricted to identified stands with road access.</td>
</tr>
<tr>
<td>Squirrel timber sale</td>
<td>T54N R86W Section 31, 32, 33</td>
<td>1998</td>
</tr>
<tr>
<td>Dispersed recreation</td>
<td>Project area</td>
<td>Ongoing Some use primarily during hunting season.</td>
</tr>
<tr>
<td>Dome Lake Club work</td>
<td>T53N R87W Section 11, 12, 13, 14</td>
<td>Much of the existing structures were built from local timber starting in the 1890s. More recently the Club has done some fuels mitigation work around the structures and plans on more in the future. Small scale logging for fuels reduction.</td>
</tr>
<tr>
<td>Livestock grazing</td>
<td>Project area</td>
<td>Ongoing Big Goose Allotment, 1 pasture in project, light grazing use now and in the future.</td>
</tr>
<tr>
<td>Recreational residences</td>
<td>T54N R86W Section 31, 32, 33</td>
<td>Along Red Grade road and just east of project.</td>
</tr>
<tr>
<td>Fire suppression and forest maturity</td>
<td>In the project area</td>
<td>Fire suppression activities have been occurring since the early 1890s. Fuels are increasing and conifers are encroaching into meadows.</td>
</tr>
<tr>
<td>Forest insects and disease</td>
<td>In the project area</td>
<td>There are numerous species active at endemic levels: mountain pine beetle, spruce bark beetle, and subalpine fir decline are examples. Effects are isolated patches of dead trees, increased risk of wildfire, and changes to forest habitat conditions.</td>
</tr>
</tbody>
</table>

**Reasonably Foreseeable Actions**

<table>
<thead>
<tr>
<th>Livestock grazing</th>
<th>Goose Creek watershed</th>
<th>Allotment management planning for six allotments.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forestwide aspen and meadow enhancement</td>
<td>In project area</td>
<td>2006 – 2016 Non-commercial removal of conifers from aspen stands and meadows.</td>
</tr>
</tbody>
</table>

**Fire and Fuels Management**

**Alternative 1 – No Action**

**Direct and Indirect Effects:** With no treatments, fire hazard would increase and the timber stands would become more vulnerable to crown fire and its potential detrimental affects to watersheds and wildlife habitat would become greater. Forested stands would continue to become denser with more surface fuel loading. Suppression capability (resistance to control, firefighter safety, and public safety) would decrease over time. Unpredictable crown fires and intense surface fires from the current stand conditions and accumulation of dead and down
Cumulative Effects: Past timber harvest and other fuels reduction projects in and adjacent to the project area have helped to reduce the fire hazard but only account for approximately 2 percent of the project area. The no action alternative would add to the accumulation of natural fuels. This has the potential to increase the costs of fire suppression and increase the potential for damages and loss of human life.

Alternative 2 – Historic Scale Openings (Proposed Action)

Direct and Indirect Effects: Proposed treatments would reduce fuels and enhance defensible space. Large openings mimic the natural disturbance regime for lodgepole pine better than several small openings. The 490 acres of clearcuts ranging in size from 19 to 200 acres proposed under this alternative would accomplish this. In addition, closing Trail 110 to motorized vehicles would reduce the amount of human activity in the area therefore probably reduce the risk of human-caused fire (fire and fuels report, page 13).

Cumulative Effects: Past timber harvest and other fuels reduction projects in and adjacent to the project area have helped to reduce the fire hazard and account for approximately 2% of the project area. The proposed actions under this alternative would reduce the accumulation of natural fuels on an additional 17% of the project area. With this additional treatment, approximately 19% of the project area would be treated.

Many of the treatments are overlapping and strategically located immediately adjacent and within the wildland urban interface. This would potentially provide a higher probability of wildland fire management success, reduce the costs of fire suppression and reduce the possibility of damages and loss of human life (fire and fuels report, page 14).

Alternative 3 – Small Scale Openings

Direct and Indirect Effects: The smaller clearcut treatments under this alternative, along with the other proposed treatments, would still reduce fuels and enhance defensible space. In addition, closing Trail 110 to motorized vehicles would reduce the amount of human activity in the area and therefore probably reduce the risk of human-caused fire (fire and fuels report, page 14).

Cumulative Effects: The proposed actions under this alternative would reduce the accumulation of natural fuels on an additional 11% of the project area. With this additional treatment, approximately 13% of the project area would be treated. Since this alternative only treats 13% of the project area, it is not as effective as alternative 2. Though many of the treatments are overlapping and strategically located immediately adjacent and within the wildland urban interface, the probability of wildland fire management success, reduced costs of fire suppression and the reduced possibility of damages and loss of human life would be less than under alternative 2 (fire and fuels report, pages 14, 15).
Forested Vegetation

Alternative 1 – No Action

Direct and Indirect Effects: The likelihood of fire would increase, as the stand fuel "succession" moves to more flammable stages (Lotan, 1985). As the trees age, they become less resilient against insect and disease damage. As the forest canopy falls down and small areas open up, the mistletoe, comandra blister rust, root rots, and western gall rust from adjacent stands would infect the regeneration, and the subsequent forest would be even more infected than the current condition. Potential growth and yield of wood fiber and stand vigor would be lower under this alternative (forested vegetation specialist report, page 8).

Cumulative Effects: This alternative poses the greatest risk of large scale wildfires as it proposes no increase in structural diversity or fuel treatments to reduce fuel hazards.

Past wildfires, blowdown from wind events, insect and disease activity, harvest activities, and growth of trees all have contributed to the forested vegetation we see today. Americans Indians used the Big Horn Mountains for lodge poles well before written history documented the early harvesting of trees starting in the 1890s. Much of the current landscape conditions are due to large wildfires documented between 1860s and 1890s.

Alternative 2 – Historic Scale Openings

Direct and Indirect Effects: The incidence of dwarf mistletoe, Comandra blister and western gall rusts in the regenerated stands would be the least of all the alternatives. The risk of future mountain pine beetle outbreak would be lower than under the no action alternative because of increased age and size class diversity (Alexander 1986; Amman 1977). The increase in overall diversity, especially the early structural stages, would increase the resilience of the area to catastrophic events (forested vegetation specialist report, page 9). The "natural" fuel succession would be set back and be more diverse in size and age structure, so the lodgepole forests involved would be more resilient, over the long-term, to large scale events, such as wildfires, compared to the other alternatives (forested vegetation specialist report, page 10).

The larger openings created in the lodgepole pine forest would make diseases such as mistletoe, Comandra blister rust, root rots, and western gall rust more difficult to transfer to the regenerated stands from adjacent stands than the no action or alternative 3 (forested vegetation specialist report, page 11).

Cumulative Effects: This alternative proposes to treat the most acres. There would be the greatest amount of change to the structural diversity and fuel treatments to reduce fuel hazards. The larger openings would emulate the natural scale of events seen on the Forest.
Alternative 3 – Small Scale Openings

Direct and Indirect Effects: The incidence of dwarf mistletoe, Comandra blister and western gall rusts in the regenerated stands would be more than alternative 2, with its larger openings but less than the no action with the smaller scale openings created. The risk of future mountain pine beetle outbreak would be lower than under the no action alternative because of increased age and size class diversity (Alexander, 1986, Amman, 1977). The increase in overall diversity, especially the early structural stages, would increase the resilience of the area to catastrophic events, though not to the extent of alternative 2. The "natural" fuel succession would be set back and be more diverse in size and age structure, so the lodgepole forests involved would be more resilient, over the long-term, to large scale events, such as wildfires, compared to the other alternatives (forested vegetation specialist report, page 12).

The areas treated would be less dense or younger stages and be more resilient against insect and disease damage. The smaller scale created openings in this alternative would make diseases such as mistletoe, Comandra blister rust, root rots, and Western Gall rust easier transfer to the regenerated stands from adjacent stands than alternative 2 but more difficult than the no action alternative (forested vegetation specialist report, page 14).

Cumulative Effects: This alternative proposes to treat fewer acres on smaller units. There would be lesser amounts of change to the structural diversity and fuel treatments to reduce fuel hazards. The smaller openings would grow into stands of trees, but their smaller-than-historic size would continue to be evident into the future.

Aquatic Resources

Alternative 1 – No Action

Direct and indirect effects: Implementing alternative 1 would have no new effects to aquatic resources within the analysis or project areas. Alternative 1 poses the least risk to aquatic resources of the three alternatives. No new road construction or timber harvest would occur. The existing road system would continue to contribute sediment to the watershed and stream channels and other ground disturbing activities such as livestock grazing would continue (air, soils, geology, aquatics, and fisheries report, page 27).

Cumulative Effects: As there are no direct/indirect effects of implementing Alternative 1 to aquatic resources, there are no cumulative effects (air, soils, geology, aquatics, and fisheries report, page 27).

Effects Common to Alternatives 2 and 3

Both action alternatives would result in low intensity, short-term sedimentation increases. Increased levels of sedimentation would depend on acres harvested, length of road constructed, and location of harvest and road construction. The most likely site for increased sedimentation would be at new stream crossings (air, soils, geology, aquatics, and fisheries report, page 23). Application of the design criteria for soil and aquatic resources (see page 11 of this document) would minimize the risk of adverse impacts to aquatic resources.
Alternative 2 – Historic Scale Openings (Proposed Action)

**Direct and Indirect Effects:** Alternative 2 poses the greatest risk to water quality and increased sedimentation of all the alternatives because of the higher volume of timber proposed for harvest. Miles of road construction and number of stream crossings are the same for alternatives 2 and 3. Timber harvest, road building, and installation of stream crossings would likely cause a temporary increase in sediment delivery to streams. The temporary increase in sediment is not expected to degrade water quality (air, soils, geology, aquatics, and fisheries report, page 27).

**Cumulative Effects:** Alternative 2 poses the greatest risk of adding cumulatively to past and existing effects because it proposes the greatest amount of harvest. Past timber harvest, road building, reservoir construction, and livestock grazing have resulted in loss of fully functioning riparian areas. The loss of function is greatest in the East Fork Goose watershed and expressed to the greatest extent downstream of the project area. Riparian areas included in proposed harvest would be buffered in such a manner to maintain function and integrity.

The effects of past harvest, road building and livestock grazing have contributed to increased sedimentation. The cumulative effect of small increases in sedimentation resulting from proposed timber harvest and road construction could delay recovery of the two watersheds (East Fork and West Fork Big Goose). Units and roads would be designed to minimize sedimentation.

This alternative proposes to harvest up to 1,610 acres. Cumulative harvest would be 9% in the East Fork Big Goose watershed and 3% in the West Fork Big Goose watershed. No increase in water yield would be expected as literature suggests greater than 25% of a watershed must be harvested before measurable changes in water yield are detected (air, soils, geology, aquatics, and fisheries report, pages 27, 28).

Alternative 3 – Small Scale Openings

**Direct and Indirect Effects:** The increased risk of sedimentation and risk to water quality would be less in this alternative than in alternative 2 because less timber harvest is proposed. Road building and installation of stream crossings would likely cause a temporary increase in sediment delivery to streams. The temporary increase in sediment is not expected to degrade water quality (air, soils, geology, aquatics, and fisheries report, page 28).

**Cumulative Effects:** This alternative poses the least risk of adding cumulatively to past and existing effects because it proposes the least amount of harvest and would require the least amount of WIZ buffer. Past timber harvest, road building, reservoir construction, and livestock grazing have resulted in loss of fully functioning riparian areas. The loss of function is greatest in the East Fork Goose watershed and expressed to the greatest extent downstream of the project area. Riparian areas included in proposed harvest will be buffered in such a manner to maintain function and integrity.

The effects of past harvest, road building and livestock grazing have contributed to increased sedimentation. The cumulative effect of small increases in sedimentation resulting from proposed timber harvest and road construction could delay recovery of the two watersheds (East Fork and West Fork Big Goose). Units and roads would be designed to minimize sedimentation.
This alternative proposes to harvest up to 1,160 acres. Cumulative harvest would be 7% in the East Fork Big Goose watershed and 2% in the West Fork Big Goose watershed. No increase in water yield would be expected as literature suggests greater than 25% of a watershed must be harvested before measurable changes in water yield are detected (air, soils, geology, aquatics, and fisheries report, page 28).

**Soil Resources**

**Alternative 1 – No Action**

**Direct and indirect effects:** Implementing alternative 1 would have no new effects to soils within the analysis or project areas because there is no prescribed burning or timber harvest proposed (air, soils, geology, aquatics, and fisheries report, page 25).

**Cumulative effects:** As there are no direct/indirect effects of implementing alternative 1 to soil resources, there are no cumulative effects (air, soils, geology, aquatics, and fisheries report, page 25).

**Effects Common to Alternatives 2 and 3**

Regardless of alternative, the East Fork Big Goose watershed contains the majority of proposed activities and thus would have the greatest risk of detrimentally affected soils. Both action alternatives would directly result in soil displacement, mixing, compaction, and rutting. Indirect effects would include reduced infiltration; saturated hydraulic conductivity; sorptivity (uptake and hold); pore-size distribution and volume; nitrogen mineralization; and microbial number, biomass, and activity. They could also include increased soil water holding, unsaturated water flow, root contact with soil, and nitrogen uptake (Ares et al. 2005).

The effects would happen during road construction and harvesting activities. Effects from road construction would be long-term. Constructing new roads to meet or exceed BMP standards would minimize future detrimental effects to soils. Restricting use of roads following harvest activities would allow the affected soils to recover slowly over the long-term.

Direct effects would also occur within the harvest unit boundaries, with the most detrimental effects occurring on skid trails. Repeated passes by rubber-tired skidders would result in rutting, compaction, and displacement. Skidding when soils are drier, frozen at least two inches deep, or covered by more than one foot of packed snow would reduce effects. Placement of slash on skid trails following harvest would also reduce erosion (air, soils, geology, aquatics, and fisheries report, pages 22, 23).

**Alternative 2 – Proposed Action, Historic Scale Openings**

**Direct and indirect effects:** Alternative 2 poses the greatest risk to soil resources of all alternatives due to more acres of proposed harvest. The amount of proposed new road is the same as in alternative 3.

Compaction, displacement, rutting and mixing would occur on approximately 19 acres of soil due to road construction. Maintenance of newly constructed “spec” roads would cause long-
term erosion effects to the watersheds. Decommissioned roads would contribute sedimentation and erosion effects for the life of the road, and effects would decrease as the road re-vegetated following decommissioning. Construction would also indirectly reduce infiltration rates; hydraulic conductivity; pore-size distribution; and microbial number, biomass and activity (Ares 2005). Skid trails within harvest units would also create these direct and indirect effects. Compaction, displacement, rutting, and mixing would occur at various unknown intensities wherever heavy machinery was operated and would lead to increased erosion. Due to the amount of vegetation left as ground cover, unit locations, and slopes found within units, it is not expected any sediment would leave a 100-ft buffer surrounding a unit (air, soils, geology, aquatics, and fisheries report, pages 25, 26).

**Cumulative effects:** Alternative 2 poses the greatest risk of the three alternatives in terms of adding cumulatively to past and present activities. Effects to soils would gradually subside as the harvested areas regenerated and roads became more stable and revegetated following closure (air, soils, geology, aquatics, and fisheries report, page 26).

**Alternative 3 – Small Scale Openings**

**Direct and indirect effects:** Alternative 3 proposes less harvest than alternative 2 thus reducing its risk; however; it proposes harvest making it a higher risk to affect soils than alternative 1. The direct and indirect effects to soils caused by implementing alternative 3 would be the same as described in alternative 2 in terms of road construction. Roads would contribute both short- and long-term erosion effects. The greatest rates of erosion would be seen in the short-term. Compaction, displacement, rutting, and mixing would occur on approximately 19 acres of soil. Construction would also indirectly reduce infiltration rates; hydraulic conductivity; pore-size distribution; and microbial number, biomass, and activity (Ares 2005). Skid trails within harvest units would also create these direct and indirect effects (air, soils, geology, aquatics, and fisheries report, page 26).

**Cumulative effects:** Alternative 3 poses less risk than alternative 2, but greater risk than alternative 1 in terms of adding cumulatively to past and present activities. Implementation of alternative 3 would add cumulatively to past activities such as vegetation management, road construction, and livestock grazing. Effects to soils would gradually subside as the harvested areas regenerated and roads became more stable and revegetated following closure (air, soils, geology, aquatics, and fisheries report, page 27).

**Livestock Grazing**

**Alternative 1 – No Action**

**Direct, indirect, and cumulative effects:** This alternative would create no new openings in existing timber stands and therefore would have no direct or indirect effect on transitory range (available forage) or livestock distribution. Because there are no direct or indirect...
effects, there are no cumulative effects (livestock grazing, invasive species, and rangeland vegetation report, page 4).

**Effects Common to Alternatives 2 and 3**

**Direct and indirect effects:** Large clearcuts would increase available forage in the short-term (5-10 years) through creation of transitory range. The effects of creating transitory range would be small because it is not used for stocking allocation, and it declines over time.

Livestock wandering could be created by ongoing timber harvest activities. In addition, the movement of harvesting equipment through wire gates could be a problem if the gates are not immediately closed after passage. Range and livestock design criteria #1 and #2 would prevent timber harvest from directly or indirectly effecting livestock distribution (livestock grazing, invasive species, and rangeland vegetation report, page 4).

**Cumulative Effects**

Dome timber sale and Squirrel timber sale units are still providing transitory range but this is on the decline and is expected to be fully forested within the next 10 years (livestock grazing, invasive species, and rangeland vegetation report, page 5). The transitory range created by this project would last for about 20-30 years, and therefore slow the ‘loss’ of transitory range from the area. This is a small effect because it is not used for stocking allocation, and it declines over time.

There would be no cumulative effects on livestock distribution because none of the other projects listed in table 3 affect livestock distribution.

**Recreation**

**Alternative 1 - No Action**

**Direct and indirect effects:** Alternative 1 would allow continued motorized use on the Antler Creek Trail 110. The backlog of deferred maintenance needed to allow this trail to be within required trail standards would continue to increase. Motorized users would continue to enjoy use on the trail. Nonmotorized users would continue to experience conflicts due to noise and emissions created by the motorized equipment. Most conflict would occur during hunting season (recreation report, page 11).

**Effects Common to Alternatives 2 and 3**

**Direct and indirect effects:** Recreation opportunities would not be notably affected as a result of implementing either action alternative. The primary effect would be to Antler Creek Trail, which would only allow nonmotorized use. Motorized users would no longer be able to access this trail unless using nonmotorized means. Nonmotorized users would not experience conflicts with motorized uses, including those during hunting season. The trail condition would not be degraded as rapidly as it would be if motorized use were allowed to continue (recreation report, page 12).
Cumulative Effects – All Alternatives

The cumulative effects from the past, present, and reasonably foreseeable future actions identified in table 3 would have a negligible effect to the recreation resource (recreation report, page 12).

Scenery

Alternative 1 – No Action

Direct and Indirect Effects: The current low level of scenic integrity would gradually improve as young trees in previous harvest units (Dome Rock, Squirrel) reach maturity. Short-term effects (0-15 years) on the existing landscape character would be lowest under this alternative, barring a large natural disturbance (fire, epidemic, wind). The long-term (15-150) risk of large scale stand-replacing natural disturbance with significant effects on the existing landscape character would increase under this alternative as time passes (scenery specialist report, page 7).

Cumulative Effects: The effect of the past activities would be expected to diminish over time as new trees grow. The impact of existing developed features (e.g., recreation residences, campgrounds, administrative sites, roads, etc) on scenic integrity would be expected to remain constant or gradually increase. The impact of dispersed recreation including dispersed camping and unauthorized user-created ATV routes might increasingly affect scenic integrity by increasing the density of campsites and travel routes (scenery specialist report, page 7).

Alternative 2 – Historic Scale Openings (Proposed Action)

Direct and Indirect Effects: The larger harvest areas under this alternative would tend to dominate the landscape character of the uplands until new stands reach ½ the height of the surrounding un-treated trees. The landscape occurring between the main travel corridors and the wilderness boundary would be more intensively managed.

In the short term (0 – 25 years), the decline in scenic integrity would be greater under this alternative than it would under alternative 1 or alternative 3. In the long term (25 – 150 years), the less varied stand conditions would result in existing scenic integrity that would be higher than under alternative 1 but lower than under alternative 3 (scenery specialist report, pages 7, 8).

Cumulative Effects: The addition of the proposed treatments to impacts from past timber activity would cause a decline in scenic integrity. The effect of past and proposed activities would be expected to diminish over time as new trees grow. The impact of existing developed features (e.g., recreation residences, campgrounds, administrative sites, roads, etc) on scenic integrity would be expected to remain constant or gradually increase. The impact of dispersed recreation including dispersed camping and unauthorized user-created ATV routes might increasingly affect scenic integrity by increasing the density of campsites and travel routes (scenery specialist report, page 8).
Alternative 3 – Small Scale Openings

Direct and Indirect Effects: The number of created openings would be greater than would be expected to occur naturally from minor fire events because the time frame would be significantly condensed. Short-term effects (0 – 25 years) on the existing landscape character would generally be greater than under alternative 1 and less than under alternative 2. The short-term risk of a large scale fire would probably be less than alternative 1 and more than alternative 2 (scenery specialist report, page 9).

Cumulative Effects: The addition of the proposed treatments to impacts from past timber activity would cause a decline in scenic integrity. The effect of past and proposed activities would be expected to diminish over time as new trees grow. The impact of existing developed features (e.g., recreation residences, campgrounds, administrative sites, roads, etc) on scenic integrity would be expected to remain constant or gradually increase. The impact of dispersed recreation including dispersed camping and unauthorized user-created ATV routes might increasingly affect scenic integrity by increasing the density of campsites and travel routes (scenery specialist report, page 9).

Cultural Resources

Alternatives 1, 2, and 3

Two cultural resource Class III Inventories were conducted within the project area (Sutton 2006, Richards 2008) that resulted in 1) the examination of approximately 2,831 acres, and 2) no new historic property was located. The two inventories were sent forward to the Wyoming State Historic Preservation Office (SHPO) for comments pursuant to 36 CFR 800 and compliance with the National Historic Preservation Act, Section 106. SHPO concurred with the forest’s decision that sufficient inventory had been complete and the implementation of the project would result in a determination of no historic properties affected (SHPO file numbers 0207JPL004 and 0207JPL004). Therefore, since no historic property would be affected, alternatives 1, 2, or 3 would have no direct, indirect, or cumulative effects to cultural resources.

Invasive Species

Alternative 1 – No Action

Direct, indirect, and cumulative effects: This alternative would not create new ground disturbance and would therefore have no direct or indirect effect to invasive plant species. Because there are no direct/indirect effects, there would be no cumulative effect (livestock grazing, invasive species, and rangeland vegetation report, page 4).

Effects Common to Alternatives 2 and 3

Direct and indirect effects: There would be potential for the spread of existing populations or for the introduction of new populations of invasive plant species to the Babione project area. This effect would be directly proportional to the acres of new disturbance created.
Given the low occurrence of invasive plant species in the project area, the chance of creating additional invasive plant infestations would likely be very small when following the design criteria (range and livestock design criteria 3 and 4) (livestock grazing, invasive species, and rangeland vegetation report, page 5).

**Cumulative effects:** Some of the past timber sales listed in table 3 disturbed the area, creating potential weed populations. Recreation activities would continue to be noxious weed vectors but effects would be minimal with the proactive invasive species management on the forest (livestock grazing, invasive species, and rangeland vegetation report, page 5). The potential for additional invasive plant infestations from activities proposed under alternatives 2 and 3 would be mitigated by the range and livestock design criteria 3 and 4, so there would be little, if any, incremental additional impacts.

**Fisheries Resources**

**Alternative 1 – No Action**

**Direct and indirect effects:** Implementing alternative 1 would have no new effects to fishery resources within the analysis or project areas. Alternative 1 poses the least risk to fish habitat of the three alternatives because no new road construction or timber harvest would occur. The existing road system would continue to contribute sediment to the watershed and other ground-disturbing activities such as livestock grazing would continue (air, soils, geology, aquatics, and fisheries report, page 25).

**Cumulative effects:** As there are no direct/indirect effects of implementing alternative 1 to fishery resources, there are no cumulative effects.

**Effects Common to Alternatives 2 and 3**

Indirect effects would occur as a result of effects described in the soils and aquatic resource sections. Increased sedimentation would be the most harmful effect to fish. This effect would be short-term in nature as little sediment is expected to reach streams from timber harvest and road construction activities (air, soils, geology, aquatics, and fisheries report, page 24).

**Alternative 2 – Proposed Action, Historic Scale Opening**

**Direct and indirect effects:** Alternative 2 would pose the greatest risk to fisheries habitat of the two action alternatives due to the greatest amount of harvest being proposed. Short-term increases in sedimentation would be expected following timber harvest and road construction. Design measures included in the alternative (soil and aquatic resources design criteria, page 11 of this document)and meeting BMPs and forest plan direction (forest plan chapter 1, fisheries guideline 3, page 1-30) is expected to maintain water quality within standards established by the state of Wyoming. This in turn is expected to maintain fish habitat over the long-term with temporary short-term decrease in habitat quality (air, soils, geology, aquatics, and fisheries report, page 29).

**Cumulative effects:** Alternative 2 would pose the greatest risk of adding cumulatively to past and existing effects because it proposes the greatest amount of harvest. There is no
difference between action alternatives in terms of road construction. The effects of past harvest, road building and livestock grazing have contributed to increased sedimentation. The cumulative effect of small increases in sedimentation resulting from proposed timber harvest and road construction could delay recovery of the two watersheds. Units and roads would be designed to minimize sedimentation.

Cumulative harvest would be 9% in the East Fork Big Goose watershed and 3% in the West Fork Big Goose watershed. No increase in water yield is expected as literature suggests greater than 25% of a watershed must be harvested before measurable changes in water yield are detected. Therefore no changes in fish habitat would occur due to increased flow (air, soils, geology, aquatics, and fisheries report, pages 29, 30).

**Alternative 3 – Small Scale Opening**

**Direct and indirect effects:** Alternative 3 would pose less risk to fisheries habitat than alternative 2 but more risk than alternative 1. Alternative 3 proposes to harvest the least volume of the two action alternatives. Short-term increases in sedimentation would be expected following timber harvest and road construction. Design measures included in the alternative (soil and aquatic resources design criteria, page 11) and meeting BMPs and forest plan direction (forest plan chapter 1, fisheries guideline 3, page 1-30) are expected to maintain water quality within standards established by the state of Wyoming. This in turn is expected to maintain fish habitat over the long-term with temporary short-term decrease in habitat quality (air, soils, geology, aquatics, and fisheries report, page 30).

**Cumulative effects:** Alternative 3 is in the middle of the three alternatives in regards of risk of adding cumulatively to past and existing effects: risk of effects to fish habitat are less than in alternative 2, but greater than in alternative 1. The effects of past harvest, road building, and livestock grazing have contributed to increased sedimentation. The cumulative effect of small increases in sedimentation resulting from proposed timber harvest and road construction could delay recovery of the two watersheds. Units and roads would be designed to minimize sedimentation.

Cumulative harvest would be 7% in the East Fork Big Goose watershed and 2% in the West Fork Big Goose watershed. No increase in water yield is expected as literature suggests greater than 25% of a watershed must be harvested before measurable changes in water yield are detected. Therefore no changes in fish habitat would occur due to increased flow (air, soils, geology, aquatics, and fisheries report, page 30).

**Wildlife**

**Summary of Determinations**

**Threatened species**

**Canada lynx:** the no action alternative and proposed action (alternative 2) would have no effect on Canada lynx (biological assessment/evaluation for threatened, endangered, and sensitive species [wildlife], page 4).
**Forest Service sensitive species:** The no action alternative and proposed action (alternative 2) would likely have no impact on the following species (biological assessment/evaluation for threatened, endangered, and sensitive species [wildlife], pages 1 and 5-9):

- **Amphibians:** northern leopard frog, spotted frog, wood frog.
- **Birds:** bald eagle, peregrine falcon, greater sage grouse, flammulated owl, short-eared owl, northern harrier, Lewis’ woodpecker, Brewer’s sparrow, loggerhead shrike, harlequin duck, grasshopper sparrow, sage sparrow.
- **Mammals:** wolverine, Townsend’s big-eared bat, spotted bat, fringed-tailed myotis, water vole, northern river otter.

The proposed action (alternative 2) may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide of any of the following sensitive species (biological assessment/evaluation for threatened, endangered, and sensitive species [wildlife], pages 1 and 5-9):

- **Birds:** boreal owl, northern goshawk, American three-toed woodpecker, olive-sided flycatcher.
- **Mammals:** marten.

**Alternative 1 – No Action**

**Direct Effects:** Old-growth forests = no effect
- Moose winter cover = no effect
- Elk security areas = no change
- Raptor nesting = no effect
- Habitat for TES, MIS, and other emphasis species = no effect (terrestrial wildlife resource report, page 4).

**Indirect Effects:** Implementing this alternative would not change the current mix of forested structural stages. This would have the indirect effect of not meeting the intent of management prescription 5.4 since the diversity of forested areas would not be improved. Another indirect effect of implementing this alternative is that motorized use would continue in the Antler creek area, and elk security would not be improved in that specific location (terrestrial wildlife resource report, page 5).

**Cumulative Effects:** The only wildlife-related cumulative effect of doing nothing is that hiding cover would increase in the short-term. This would be due to the growth of young pine trees in the previous clearcut areas (past actions). However, it should be noted that the amount of elk security would not change since road density would remain constant (terrestrial wildlife resource report, page 5).
Alternative 2 – Historic Scale Openings (Proposed Action)

Direct Effects: There would be a net gain of about 500 acres of elk security areas in the Goose Creek Geographic Area. The project would not affect the forestwide or herd unit population trends of elk, based on minimal effects to elk security or habitat (terrestrial wildlife resource report, page 5; emphasis species assessment, page 9).

There are no known raptor nest sites within or adjacent to proposed cutting units. If an active nest site is located during the layout phase, an area described by the zone biologist would be eliminated (dropped) from mechanical harvest (terrestrial wildlife resource report, page 5).

For beaver (MIS), there would be virtually no effect because riparian habitats would not be impacted (terrestrial wildlife resource report, page 6; emphasis species assessment page 8).

For red-breasted nuthatch (MIS), forested habitat would be affected which means there would be some effect to this species. Population trends at the forestwide scale should not be affected by this project due to the relatively small size of the area being treated by this project and the fact that there is no planned harvest in prime habitat (old growth) (terrestrial wildlife resource report, page 6; emphasis species assessment, pages 10, 11).

For red squirrel (MIS), there would be some effects. Some forested habitat (cover trees or cone bearing trees) would be lost in the short-term, and red squirrel habitat would be adversely affected at the localized scale. Based on the amount of unharvested areas in the project area, this is not thought to be significant and is within the context of the effects estimated in the Revised Plan FEIS that found no likely effects of the anticipated level of commercial harvest on viability of species dependent on this type of habitat (terrestrial wildlife resource report, page 6; emphasis species assessment, pages 12, 13).

For Brewers’ sparrow (MIS), there would be no effect because sagebrush habitats would not be affected (terrestrial wildlife resource report, page 6; emphasis species assessment, page 13).

Cumulative Effects: Past timber sales and road construction have combined to affect elk habitat security. Past timber sales have also contributed to the current mix of forest structural stages. Implementing this alternative would have a slight cumulative effect on elk hiding cover which would reduce the amount of elk security habitat. This effect would be offset by the closure of trail 110 which would convert more area to existing security cover than would be lost from harvest. The cumulative effect on elk security cover would be a minor increase for the Goose Creek Geographic Area (terrestrial wildlife resource report, page 7).

Alternative 3 – Small Scale Openings

Direct Effects: Direct harvest of trees in areas which currently meet the definition of hiding cover would reduce elk security by 1,210.5 acres. The closure of Trail 110 in Antler Creek would convert 1,739.6 acres of potential elk security to existing elk security in the Geographic Area. There would be a net gain of about 500 acres of elk security areas in the Goose Creek Geographic Area (terrestrial wildlife resource report, page 8).
There are no known raptor nest sites within or adjacent to proposed cutting units. If an active nest site is located during the layout phase, an area described by the zone biologist will be eliminated (dropped) from mechanical harvest (terrestrial wildlife resource report, page 8).

**Cumulative Effects:** Past timber sales and road construction have combined to affect elk habitat security. Past timber sales have also contributed to the current mix of forest structural stages. Implementing alternative 3 would have a slight cumulative effect on elk hiding cover which would reduce the amount of elk security habitat. This effect would be offset by the closure of trail 110 which would convert more area to existing security cover than would be lost from harvest. The cumulative effect on elk security cover would be a minor increase for the Goose Creek Geographic Area (terrestrial wildlife resource report, page 9).

**Effects Common to Alternatives 2 and 3**

**Species of Local Concern:** This project would have no direct or indirect effect on the following species of local concern: long-eared myotis, Rocky Mountain bighorn sheep, common loon, calliope humming-bird, golden-crowned kinglet (emphasis species assessment, pages 3, 4).

For Swainson’s hawks, this project would not effect meadow habitat; however, mechanical disturbance in meadows near the cutting units could displace individuals (emphasis species assessment, page 3).

For the hoary bat, pygmy nuthatch, and great gray owl, this project would result in small losses of snag resources associated with timber sale activities (emphasis species assessment, pages 3, 4).

**Demand Species:** For the following species, mechanical harvest would directly and indirectly affect habitat; short-term disturbance could displace some individuals: mule deer, black bear, mountain lion, and blue grouse (emphasis species assessment, pages 5, 6).

For moose, there would be minimal, if any, effects to willow/riparian habitat or spruce-fir as only road maintenance activities would occur in riparian areas (emphasis species assessment, page 5).

There would be no effect to habitat for the following species: ruffed grouse, Merriam’s turkey (emphasis species assessment, pages 5, 6). For gray partridge, plains sharp-tailed grouse, and chukar partridge, no effects would be anticipated due to lack of potential habitat and no known occurrences (emphasis species assessment, page 6).

**Rare Plants**

**Effects Common to All Alternatives**

**Direct and Indirect Effects:** The lack of timber harvest and associated activities under alternative 1 would not affect the following R2 sensitive plant species: upward-lobed moonwort, peculiar moonwort, russet cottongrass, lesser bladderwort, and northern blackberry. There would be no direct or indirect effects under alternatives 2 and 3, due to the application of design criteria to protect riparian areas, the limited amount of habitat affected, and the lack of known occurrences in the project area. The limited habitat for northern
blackberry and lesser bladderwort is located within riparian buffers and therefore outside any treatment units (biological evaluation of threatened, endangered, proposed, and sensitive plant species, pages 8-13).

The following sensitive plant species are not known to occur in the project area, nor do they have potential habitat in the project area; they were not analyzed further: Kotzebue’s grass of Parnassus, Hall’s fescue, Cary’s beardtongue, mountain lady’s-slipper, tranquil goldenweed, woolly twinpod, and large yellow lady’s-slipper (biological evaluation of threatened, endangered, proposed, and sensitive plant species, pages 8, 9).

**Cumulative Effects:** Because there are no direct or indirect effects to R2 sensitive plant species from any of the alternatives, there are no cumulative effects.

**Alternative 1 – No Action**

**Direct and Indirect Effects:** For the following plant species of local concern and demand species, there is no effect from alternative 1 because of the lack of timber harvest and associated activities: lance-leaved grapefern, leathery grapefern, woodland horsetail, aromatic pussytoes, pygmy pussytoes, mingan moonwort, mud sedge, short-leaved sedge, leafy thistle, northern twayblade, broad-leaved twayblade, large-leaved pondweed, soft aster, sweetgrass, and purple coneflower.

**Alternatives 2 and 3**

**Direct and Indirect Effects:** Under alternatives 2 and 3, the riparian protection measures in soil and aquatics design criterion #1 (page 11 of this document) would mitigate any direct or indirect effects to the following plant species of local concern and demand: lance-leaved grapefern, leathery grapefern, woodland horsetail, mingan moonwort, mud sedge, northern twayblade, broad-leaved twayblade, and large-leaved pondweed (species assessment for plant species of local concern and demand species, pages 5-10).

Under alternatives 2 and 3, there would be no direct or indirect effects to the following species due to the lack of potential habitats (sedimentary soils, fellfields and rocky meadows, alpine/subalpine) in the project area: aromatic pussytoes, pygmy pussytoes, short-leaved sedge, and purple coneflower (species assessment for plant species of local concern and demand species, pages 5-11).

Mechanical disturbance under alternatives 2 and 3 could adversely affect leafy thistle, if it exists in the project area (species assessment for plant species of local concern and demand species, page 6).

Under alternatives 2 and 3, unit 19 is scheduled to be clearcut followed by burning. If sweetgrass is present in the unit, it may burn individual plants, which should do no long term damage to any plants that might occur as grass species are typically adapted to fire (species assessment for plant species of local concern and demand species, page 11).

Under alternatives 2 and 3, direct effects from prescribed fire may improve habitat for soft aster as this plant has evolved in a habitat where fire occurred (species assessment for plant species of local concern and demand species, page 10).
**Cumulative Effects:** Because there are no direct or indirect effects from alternatives 2 and 3, there are no cumulative effects to the following plant species of local concern and demand species: lance-leaved grapefern, leathery grapefern, woodland horsetail, mingan moonwort, mud sedge, northern twayblade, broad-leaved twayblade, large-leaved pondweed, aromatic pussytoes, pygmy pussytoes, short-leaved sedge, and purple coneflower (species assessment for plant species of local concern and demand species, pages 5-11).

For leafy thistle, cumulative effects from invasive species could have an adverse effect, if the invasive species colonize habitat following project activities. The magnitude of this effect is considered to be small. Invasive species could also impact habitat for sweetgrass if weed species colonize the project area after treatment (species assessment for plant species of local concern and demand species, page 6).

For soft aster, cumulative effects from noxious weeds would have the potential to reduce habitat. Cumulative effects from grazing may include actual consumption of the plant, although it is not thought to be a preferred species as it occurs throughout forest in active allotments (species assessment for plant species of local concern and demand species, page 10).