


**Table 2.5-2
Summary Comparison of Potential Effects by Alternative within the Study Area**

Parameter	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Geology and Soil Resources				
<i>Impacts to Soil Resources</i>				
Temporary Soil Impacts (ac.)	0.0	+57.3	+50.0	+19.5
Permanent Soil Impacts (ac.)	62.0	+7.0	+5.3	+5.4
Total Soil Impacts (ac.)	62.0	+64.3	+55.3	+24.9
<i>Sediment Yield to Streams</i>				
SF Brackett (tons/yr.)	89.8	+1.6	+1.6	+0.0
Upper Bridger (tons/yr.)	161.2	+3.5	+3.5	+2.4
Maynard (tons/yr.)	63.7	+2.5	+2.5	+1.3
Slushman (tons/yr.)	100.0	+1.5	+0.0	+1.5
Totals (tons/yr.)	414.7	+9.1	+7.6	+5.2
Water Resources				
<i>Road Characteristics</i>				
Road Network (mi.)	15.9	+1.8	+1.0	+1.1
Road Network Density (mi/mi ²)	4.0	+0.4	+0.3	+0.3
Perennial Stream Crossings	5	+1	0	+1
Intermittent Stream Crossings	24	0	0	0
<i>Wetland Impacts</i>				
Impacts from Grading(ac.)	0.0	0	0	0
Impacts from Clearing (ac.)	0.0	-0.48	-0.48	0
Total (acres)	0.0	-0.48	-0.48	0
Vegetation (Forest Cover)				
Old Growth Forest Impacts (ac.)	182.9	-17.1	-17.1	-0.1
Mature Forest Impacts (ac.)	603.0	-26.1	-23.1	-7.6
Immature Forest Impacts (ac.)	184.6	-2.6	-0.5	-2.1
Total Forest Cover Impacts (ac.)	970.5	-45.8	-41.3	-9.8
Non-forest Cover Impacts	1,542.7	-13.2	-10.9	-9.5
Total Vegetation Impacts (ac.)	2,513.2^a	-59.0	-51.6	-19.3
Wildlife				
<i>Impacts to T & E Species</i>				
Gray wolf	No Effect	No Effect	No Effect	No Effect
Bald Eagle	No Effect	No Effect	No Effect	No Effect
Grizzly bear	No Effect	No Effect	No Effect	No Effect
Canada lynx	No Effect	Likely to adversely affect lynx habitat.	Likely to adversely affect lynx habitat.	May affect, not likely to adversely affect individuals.
<i>Impacts to RI Sensitive Species</i>				
	No effect	May impact individuals of certain species.	May impact individuals of certain species.	May impact individuals of certain species.
<i>Impacts to Game Species</i>				
	No effect	May impact individuals of certain species.	May impact individuals of certain species.	May impact individuals of certain species.

Implementation of Alternative 2 would have no effect on the sensitive plant species surveyed for under the 1997 sensitive plant survey, as no sensitive plant species were identified. Under mitigation measure VM-5 (see Table 2.6-1), the two sensitive plant species which were not surveyed for during the 1997 survey, Shoshonea and Small-flowered pennycress, and the three 1999 newly listed plants, would be surveyed for prior to any disturbance relating to proposed activities. Habitat for these sensitive plant species does occur within the Study Area and may be impacted by the proposed alternative. 

Habitat for the three sensitive plant species listed in 1999, English sundew (*Drosera anglica*), Slender cottongrass (*Eriophorum gracile*), and Beaked spikerush (*Eleocharis rostellata*) does occur within the Bridger Bowl Study Area. Surveys for these sensitive plant species have not been conducted. The "Sensitive Plant Survey Form" used in the McCarthy 97 sensitive plant survey does not list the occurrence of these species. Impacts to these sensitive plant species can not be determined at this time because a survey was not done specifically for these species in 1997 and would be addressed under mitigation measure VM-5 (see Table 2.6-1).

Fragmentation and Old Growth

The proposed activities under Alternative 2 in the Bradley Meadows area would fragment a portion of the second largest interior forest patch in the FAA. It is important to note that the largest interior forest patch in the FAA is actually located in the Bangtail Mountains. So the interior forest patch in the Bradley Meadows area is the largest patch in the Bridger Range, but the second largest in the FAA. This interior forest patch would change from an existing area of 832 acres to two smaller patches of 413 acres and 182 acres. The other nine interior forest patches within the FAA would not be affected by Alternative 2 (Novak, 2003). The current amount of forested habitat identified within the FAA as interior forest is 35 percent. Interior forest was defined as any patch greater than 80 acres of mature and old growth forest. If the chairlifts and runs proposed in the Bradley Meadows area under Alternative 2 are constructed, interior forest within the FAA would decrease by approximately 2 percent from existing conditions. The reduction of interior forest due to Alternative 2 would be occurring in an area (FAA) where fragmentation is high in relation to other compartments analyzed on the Gallatin National Forest (GNF) (Novak, 2003). Actions proposed in the Slushman Creek Drainage under Alternative 2 would have no effect to the fragmentation of interior forest in the FAA.

Activities proposed under Alternative 2 would clear approximately 17.1 acres of old growth within the Bridger Bowl Study Area. Approximately 75 percent of the old growth impacted would be in the spruce/sub alpine fir plant community type. As directed by the GNF Forest Plan, potential impacts to old growth were also analyzed at the Timber Compartment scale to determine consistency with the Forest Plan. According to GIS analysis, approximately 1.6 acres of existing old growth forest would be cleared in Timber Compartment 504, resulting in a 0.4 percent change in the amount of old growth forest in the compartment. Since the existing amount of old growth in compartment 504 is 7.00 percent, implementation of Alternative 2 would reduce the ability of the Forest to meet the Forest Plan Standard of striving to develop a 10% old growth successional stage in timber compartments with suitable timber. In compartment 515, approximately 15.5 acres of existing old growth forest would be cleared, resulting in a 1.5 percent change in the amount of old growth forest in the compartment. This

Wolverine (Gulo gulo)



Alternative 2 involves full expansion to the north and south of the existing ski area SUP boundary. Direct effects of this alternative include habitat alteration and associated disturbance and displacement of wolverines due to noise and activity from timber harvest and construction activities. Timber harvest proposed in the north expansion area is scheduled to occur in winter and would overlap with the wolverine denning season. If this alternative were selected, then a total of 435 acres of wolverine denning habitat would be included within the new SUP boundary. This figure represents 17% of the available denning habitat in the wolverine analysis area. Further, forest clearing for lifts and runs in the north expansion area would fragment one of the largest remaining intact blocks of mature forest habitat in the project area. Forest fragmentation can affect wolverines by breaking up security habitat, and facilitating increased competition for prey from more generalist predators. Additional snow compaction from ski area expansion would also be expected to impact wolverines in the project area. Approximately 1.17 miles of new road would be built under this alternative, which would increase road density in the project area to 1.87 miles per square mile.

Indirect effects of this alternative would be associated with mitigation measures proposed to compensate for adverse impacts that cannot be avoided with implementation of full expansion. Mitigation measures are described in Chapter 2, Table 2.6.1, page 27, but basically amount to changing management area direction and imposing travel restrictions elsewhere in the wolverine analysis area, in order to compensate for the breach of existing security/denning habitat that would occur with ski area expansion.

Northern goshawk (Accipiter gentilis)



Habitat within the proposed expansion areas is comprised of mature and old growth Douglas fir, lodgepole pine, spruce, and subalpine fir. No goshawks were detected in surveys in 1996 and 2000 (USFS, 2000). However, dispersing individuals may colonize the area in the future, making the amount of suitable available habitat an important component of the Study Area. Under Alternative 2, approximately 43.2 acres of goshawk nesting and foraging habitat would be removed within the Study Area (see Table 4.5-1).

Direct impacts to habitat would result from the removal of trees for the creation of ski trails and/or road and lift construction which would reduce suitable nesting habitat for goshawks in the Bridger Range. Indirect effects on foraging habitat would occur through removal of trees, snags, brush and/or down woody debris, which many of the goshawk's prey species utilize for nesting, foraging and security. In addition, goshawks are known to be sensitive to human activity and disturbance, especially during breeding and nesting (June-August). Increased human activity within the Study Area would likely cause goshawk to seek suitable nesting habitat in another location away from noise and disturbance. Goshawks are also known to occasionally use the thermal air currents produced by the Bridger Range. There is potential for direct mortality due to collisions with aircraft used during the construction phases of the proposed expansion. This issue is addressed in Table 2.6-1.



Western big-eared bat (Corynorhinus townsendi)

Impacts to western big-eared bats would be limited under Alternative 2 due to the lack of caves in the Study Area. Quality summer roosting habitat is available in the northern expansion area in mature and old growth forests. Approximately 27.6 acres of mature and old growth forest would be directly impacted as trees are removed for lift, trail and road construction (see Table 4.5-1). However, the trees removed for the project comprise only a miniscule proportion of potential summer roosting habitat available for bats in the Bridger Range. Additional direct effects would include loss of foraging habitat in riparian areas as trails are managed for vegetative growth. Mitigation measure RP-1, which is designed to minimize adverse effects on riparian areas, would add a measure of protection to the foraging habitat of the western big-eared bat (see Table 2.6-1).

Indirect effects would result from the clearing of trees which could produce short-term improvements in foraging habitat for western big-eared bats, as this species is known to feed along forest edges (Clark et al., 1993; Freeman, 1984), which would be increased through the clearing of trees. However, the lepidopteran insects upon which the western big-eared bat feeds almost exclusively reproduce in shrubs and trees and not in grasses. Conversion of native vegetation (e.g., trees and shrubs) to grasses and rock surfaces through lift and trail construction and maintenance, and construction of new road surfaces would result in a reduction of potential foraging habitat for the western big-eared bat.

Northern leopard frog (Rana pipiens)



Impacts to northern leopard frog habitat would occur in the northern expansion area where suitable habitat exists in the form of seeps and wetlands (see Figure 4-2). Approximately 0.48 acres of wetlands would be impacted under the Proposed Action (see Table 4.3-2). Impacts to wetlands would consist of hand clearing of vegetation and no mechanical equipment would be used. Construction activities of all types may cause increases in sedimentation to seeps and wetlands. Mitigation measures proposed in Table 2.6-1 would help offset these impacts and implementation of BMPs would protect streams and wetlands from sedimentation and erosion. Direct mortality of individuals could occur during construction, especially during summer when the northern leopard frog is known to move upland from aquatic habitats. Impacts due to wintertime operation of the ski area are not expected to impact this species as its habitat would be located under several feet of snow.

Indirect impacts would result from the fragmentation of forest, which would create edges that the frog may be unwilling or unable to cross without sufficient cover. The northern leopard frog is not expected to reside within the Study Area due to the lack of documented presence as well as the high elevation of habitat (above 6500 feet); however, this does not preclude the likelihood of occasional presence of this species.

Boreal toad (Bufo boreas boreas)



Although no boreal toads have been identified within the Study Area, potential impacts to their habitat will be discussed because suitable habitat is available and the Study Area is within the range of this species. Distribution of the boreal toad is restricted to areas with suitable breeding habitat in spruce-fir forests and alpine meadows. Breeding habitat includes lakes, marshes,

to date) do result from collisions with vehicles on Bridger Canyon Road; however, this highway does not currently pose a serious impediment to wildlife movement.

The proposed action is predicted to increase the capacity at BBSA from the current level of 3,200 to accommodate 7,000 skiers at one time. Increased skier capacity at Bridger Bowl and associated resort amenities could increase the volume of traffic on Bridger Canyon Road considerably. This road is currently a two-lane highway with posted speed limits of 70 mph during the day and 55 mph at night. The increased traffic generated by the ski area expansion may influence movement patterns of wildlife by prohibiting attempted highway crossings during high traffic periods. Peak traffic flow would occur on weekends during daylight hours. Daily traffic volumes on Bridger Canyon Road have been estimated at 800 vehicles along the approach to the BBSA access road. This figure represents an average volume and would be higher on weekends during the ski season. BBSA currently averages between 1,500 and 2,500 skiers per day on weekends. Canadian research of traffic effects on carnivores indicates that traffic volumes of 2,000 - 3,000 vehicles per day are considered problematic (Ruediger et al. 2000:2-17).

Cumulative effects to linkage areas primarily result from residential development in the valley lands surrounding the Bridger Range. Resort development on private land within and adjacent to the BBSA could encourage additional development on other private land in the area. This type of high-density development on private land has the potential to degrade or fragment habitat connectivity in linkage areas. The Forest Service is in the process of completing a land exchange with private landowners in the Brackett Creek area of the LAU. This project involves transfer of properties including lynx habitat as well as adjacent linkage area. The Forest Service stands to gain a slight net increase in lynx habitat within the LAU, and would receive about an equal exchange of connecting habitat in the linkage area along state route 86. The potential for this land exchange to contribute cumulative effects to linkage areas comes from the consolidation of private lands resulting from the exchange. Unifying the private property and removing the inclusion of public land improves the potential for development. The current landowner involved in the exchanged has expressed no interest in developing the affected land beyond the level necessary to accommodate immediate family. Additional cumulative effects may be incurred through development of other private lands in the linkage areas.

Determination of Effects

I have determined that implementation of the proposed federal action is **likely to adversely affect** lynx habitat. This determination is based on several factors. Impacts from the proposed action are neither immeasurable nor discountable. The Bridger Range is a small, isolated mountain range. Although the proposed ski area expansion is relatively small compared with some ski areas in the nation, the proportional impact on lynx habitat would be greater in the Bridger Range than if the proposal were located in a larger range within contiguous lynx habitat. The BBSA is located in the middle of the SB LAU and contains considerable amounts of permanently unsuitable lynx habitat and