

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES – CONTINUED

ENVIRONMENTAL CONSEQUENCES OF FIVE SITE- SPECIFIC TRAVEL PLANS

This section discusses effects of alternatives for five site-specific travel plans (implementation decisions). After a discussion of Analysis Assumptions, the section is organized by travel planning area such that all effects (including cumulative effects) are described for the various resources and resource uses contiguously for each specific travel planning area. Alternatives for the Helena, East Helena, Lewis and Clark County NW, Boulder/Jefferson City, and Upper Big Hole River Travel Planning Areas (TPAs) are discussed.

Adjustments made to the Preferred Alternative for travel management between the Draft RMP/EIS and the Proposed RMP/Final EIS were assessed to be so minor as to not cause any marked changes in analyses or conclusions based on road management. Therefore, while actual road mileage changes are reflected for each TPA where pertinent in the Proposed RMP/Final EIS, road-based analyses (such as road density calculations, road-based moving windows analyses, mileage distribution by soil erosion impact categories, economic analyses) were not re-done since the Draft RMP/EIS.

ANALYSIS ASSUMPTIONS

Travel Management and Access

- Designating roads as either “Open Yearlong,” “Open with Restrictions,” or “Closed Yearlong” would improve travel management and protection of natural resources.
- Comprehensive inventories of all existing routes would be used.
- Routes were considered non-motorized if they were existing trails, closed roads or decommissioned roads.
- Visitor-use and demand is likely to continue to increase for both motorized as well as non-motorized users.
- Demand for adequate public and agency access to public lands will remain high in the future.
- Changes in OHV and snowmobile design and technology will continue, enabling OHV users to travel into areas that were once thought of as inaccessible due to terrain and water or soil features.
- Analysis of the travel system only included routes documented during the inventory period.

Transportation Facilities

- Road maintenance will be conducted on routes designated as Open and Restricted.
- Annual road maintenance is estimated at \$400/mile for this analysis.
- Annual trail maintenance is estimated \$200/mile for this analysis and would only be performed on motorized trails.
- Periodic road stabilization is estimated at \$40/mile for this analysis.
- Periodic trail stabilization is estimated at \$20/mile for this analysis and would only be performed on motorized trails.
- Twenty percent of Open/Restricted routes will require annual maintenance.
- Eighty percent of Open/Restricted routes will require periodic maintenance.
- Monitoring/compliance costs are estimated at \$50/mile for this analysis.
- Weed control is estimated for this analysis at 2.5 acres of spraying/mile of road at \$15/mile.

Air Quality

- Visitor use and demand for recreational motorized use is expected to continue to increase, resulting in higher vehicle emissions (exhaust gasses, particulates) levels.
- Most BLM roads and motorized trails have dirt or granitic surfaces. Few have been paved or graveled. This situation is unlikely to change, due to budget restraints, and user preference. Motorized travel across these substrates creates airborne dust. Wind erosion of these substrates also creates airborne dust. In sufficient quantities, airborne dust could pose a safety hazard (visual obstruction), or act as a respiratory irritant.
- Drier climate conditions could make unimproved route surfaces (soil road base) more susceptible to motorized erosion, resulting in higher levels of airborne dust.

Soil Resources

- BLM roads will continue to be maintained, with priority placed on those most heavily used by the public.
- State and major county roads will continue to be maintained to current levels and generally, county roads will not be abandoned. BLM facilities, mainly

roads, will continue to be maintained, with priority placed on those most heavily used by the public.

- Natural process assumptions include: roads in the Butte Field Office will continue to erode from natural causes, increased vegetative cover would lead to reduced soil erosion, and removal of conifer encroachment could minimize accelerated soil erosion.

Water Resources

- Natural process assumptions include: roads in the Butte Field Office will continue to erode from natural causes resulting in potential impacts on water quality in adjacent streams, increased vegetative cover will lead to reduced soil erosion and in certain instances reduced deposition of sediments into streams, and removal of conifer encroachment could result in an increased quantity of water.

HELENA TPA

The Helena TPA area contains 10,162 acres of BLM lands within the 95,492-acre TPA. The majority of lands in the TPA are privately owned (56,499 acres) with USFS lands making up a substantial portion as well (23,911 acres). The approximately 52.2 miles of BLM roads make up about 7.5 percent of the approximate total of 694 road miles in the entire TPA. Most roads (528 miles) are on private lands.

AIR QUALITY

Effects Common to All Alternatives

Motorized recreation use is expected to continue to increase, resulting in higher levels of vehicle emissions.

Motorized travel across dry unpaved routes or trails would continue to produce airborne dust.

There could be areas with localized air pollution as a result of higher use numbers, and more concentrated use on fewer miles of available routes.

Drier climate conditions could make soils more susceptible to the effects of motorized travel, resulting in higher levels of airborne dust.

Impacts to air quality vary by alternative and travel plan area. In general, alternatives that reduce the level of motorized use (have fewer available miles) could have a positive impact on air quality; while alternatives that maintain or increase the level of motorized use, could lead to increased air quality impacts. This would not necessarily be a direct relationship, however, because reduction in available road miles for motorized use could redistribute use or focus more use on remaining open routes.

Under all alternatives, impacts from airborne dust could be reduced through mitigation such as hardening native surface roads with gravel or periodically spraying them with water trucks during the dry season. During BLM

project work, in addition to watering native surface roadbeds, speed limits could be reduced to further minimize dust emissions.

Effects of the Alternatives

Under Alternative A (present management), adverse impacts to air quality would be expected to continue, and likely increase, concurrent with higher levels of motorized recreational use. Each of the action alternatives, however, would provide fewer available motorized routes. Alternatives B and C would provide 80 percent and 85 percent fewer motorized routes respectively than Alternative A, while Alternative D would provide 58 percent fewer routes than Alternative A. As a result, airborne dust and vehicle emissions would be taking place on fewer BLM routes and could be reduced.

It should be noted that even without motorized use, airborne dust, resulting from wind erosion of exposed native surface roads will continue. Therefore, travel plans with more miles of native surface roads would result in more airborne dust.

Under all alternatives, mitigation measures, such as graveling and /or watering native surface roads, could reduce dust emissions even further, and/or help offset the effects of increased or concentrated use on the remaining open routes.

Cumulative Effects on Air Quality

Under all alternatives, the cumulative effects to air quality from travel management in the Helena TPA would arise from a number of past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands.

For perspective, BLM managed lands in the Helena Travel Plan area represent approximately 11 percent of the total travel planning area (95,492 total acres, 10,162 BLM acres). Under present management (Alternative A) BLM routes represent a small portion, approximately 7.5 percent, of the total routes available (693 total miles, 52.2 miles BLM roads/trails). Potential air quality impacts associated with activities on non-BLM lands and roads would be a greater contributor to cumulative effects to air quality than activities on BLM lands and roads.

In the past, prior to the 2003 Statewide OHV ROD, BLM management allowed unrestricted cross country travel by all forms of wheeled motorized use. Under present management, in the absence of other existing travel plan direction, all motorized wheeled travel is restricted to existing roads and trails. Under current management, all BLM routes in the Helena TPA are open yearlong. This mileage available for use would be reduced under the action alternatives as described above with associated potential differences in effects to air quality.

Under all alternatives, cumulative increases in human population, urbanization, recreation use, user conflicts; and concerns for wildlife, noxious weed spread, soil erosion, air/water quality, and illegal activities may lead to increased demands to restrict motorized travel.

SOILS

Effects Common to All Alternatives

Road construction, use, and maintenance affect soils in a number of ways. Soils are often compacted by these activities. Soil compaction can lessen the amount of precipitation that can infiltrate into soil and increase runoff, erosion, and sedimentation – in turn decreasing soil/site stability and hydrologic function, as well as soil productivity and plant vigor and diversity.

Ground disturbance associated with road construction, use, and maintenance can result in erosion. Erosion affects soil/site stability and hydrologic function. Erosion and sedimentation can destabilize the surface and sub-surface cohesion of the soil, resulting in soil loss from erosion sites. Loss of soil can impede or prevent establishment and development of vegetation communities.

Closing or decommissioning roads often leads to beneficial effects to soils through decreased site disturbance and re-establishment of vegetative cover on road surfaces. This tends to reduce soil erosion and stabilize soils. Decommissioning roads may in some cases entail ripping road surfaces to de-compact them, thus improving water infiltration, hydrologic function, and the ability of the treated area to revegetate more successfully.

Impacts to soils associated with site-specific travel plan alternatives were assessed based on the potential for soil erosion using the following erosion risk criteria:

- High – the area a route travels through has slopes greater than 30 percent gradient.
- Moderate – the area a route travels through has slopes ranging from 15 to 30 percent gradient; or, for granitic soils, slopes ranging from 0 to 30 percent gradient.
- Low – the area a route travels through has slopes ranging from zero to 15 percent gradient and soils are not granitic in origin.
- Unrated – road mapping not available at time of erosion impact rating.

Effects of the Alternatives

The distribution of road miles by erosion impact category and by proposed road management category for all the alternatives is shown for the Helena TPA in **Table 4-48** Error! Reference source not found.. Roads in the “unrated” category were excluded from detailed consideration and are provided for the purpose of displaying the extent of lacking information.

Under current conditions (Alternative A) approximately 11.8 miles of open BLM roads are located in areas with high erosion risk, and 34.3 miles are in moderate erosion areas. Soil erosion would be reduced under Alternative B because this alternative would reduce those open road mileages in high and moderate erosion categories to 4.4 miles and 7.4 miles, respectively. Approximately 28.2 miles of road in the high and moderate classes would be closed under Alternative B with an additional 6.6 miles in these categories being decommissioned. Vegetative recovery should occur on closed and decommissioned roads, with a beneficial effect on soils of reducing erosion from these areas.

Soil erosion would be most reduced under Alternative C because the lowest mileage of roads in the high and

Proposed Road Management	Erosion Risk Category	Alternative A	Alternative B	Alternative C	Alternative D
Open Road Miles (including Open w/restrictions)	High	11.8	4.4	2.1	6.3
	Moderate	34.3	7.4	4.0	13.4
	Low	3.5	0.9	0.8	0.8
	Unrated	2.6	1.0	0.1	0.8
Closed Road Miles	High	0	4.5	8.1	5.4
	Moderate	0	23.7	27.7	17.7
	Low	0	2.2	2.3	2.3
	Unrated	0	1.7	2.6	2.2
Decommissioned Road Miles	High	0	3.0	1.7	0.2
	Moderate	0	3.2	2.6	2.6
	Low	0	0.4	0.4	0.4
	Unrated	0	0	0	0

Note: Open roads include seasonally open roads as well as roads open yearlong.

moderate erosion categories would be left open (6.1 miles combined), while the greatest mileage in these categories would be closed (35.8 miles combined) of all alternatives. An additional 4.3 miles in these categories would be decommissioned under Alternative C.

Soil erosion associated with roads would be reduced under Alternative D compared to Alternative A, but would still be higher than under either Alternative B or C. Approximately 19.7 miles of BLM road in the moderate and high erosion categories combined would remain open under Alternative D, while about 23.1 miles in these categories would be closed and 2.8 miles would be decommissioned under this alternative.

Cumulative Effects on Soils

Under all alternatives, cumulative effects to soils in the Helena TPA would arise from a number of past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands. Within this 95,492-acre TPA, BLM lands comprise about 10,162 acres or 11 percent of total lands. The approximately 52 miles of BLM roads (under Alternative A) make up about 7.5 percent of the approximately 693 road miles in the TPA. Therefore road-related effects to soils described by alternative for BLM roads would affect about 7.5 percent of all roads in the TPA. The majority of lands and roads within the TPA boundary are private property. Non-BLM roads are managed by the county, Forest Service, state, and private landowners.

Approximately 8,000 acres of land in the Helena TPA are managed by the National Guard. In addition to having and using various barracks and classrooms present, the Guard conducts various military maneuvers and training on these lands including non-live fire training and off-road use of military vehicles. Some helicopter-based training also occurs here including landings to drop off soldiers. Some soil erosion and compaction as well as loss of vegetative ground cover further exacerbating soil effects occur here, but to an unknown degree.

Approximately 481 BLM acres are permitted for various rights-of-way and leases. About 359 of these acres are for specific road rights-of-way. The remaining 122 acres are associated with powerlines, waterlines, communication sites, oil and gas pipelines, and other utility facilities.

Impacts to soils range from compaction and occupation of ground with buildings, roadbeds, and other facilities, to revegetation and ground cover being re-established to stabilize soils.

Selective timber harvest has occurred on about 133 acres of BLM land in the TPA since 1995. Adverse effects on soils were minor with treated areas having undergone revegetation and soil stabilization since treatment. Timber harvest has also occurred on private and Forest Service lands, will likely continue, and will likely have localized impacts on soils for the foreseeable future.

From 1981 to 2004, wildland fire has burned across 65 acres in the Helena TPA, having a mosaic of soil effects with more severely burned areas experiencing localized erosion while many areas were relatively little affected.

There has been one fuels reduction treatment on BLM lands in the TPA in the last 10 years. Approximately 150 acres in the Scratchgravel Hills around the Wildland Urban Interface had hazardous fuels mechanically removed and ground up on site. Effects to soils from this project were negligible. Within the next several years, BLM anticipates additional fuels treatments on 1,500 to 2,500 acres of WUI areas in the Scratchgravel Hills. These treatments would consist of a combination of mechanical and prescribed fire treatments and would generally have minor effects on soils. Prescribed burning would occur under conditions where fire severity and intensity would be low, thereby minimizing potential damage to soil or desired vegetation. All treatments would minimize compaction so as to promote vegetative recovery. Fuels treatments conducted on private and Forest Service lands will also likely occur for the foreseeable future with variable effects to soils. Reducing fuels under the controlled conditions of deliberate treatments may benefit soils in the long-term by reducing the risk of high severity fires in treated areas.

Livestock grazing on BLM lands, other public and private lands throughout much of the TPA has created areas of localized soil erosion and compaction. This will continue to occur for the foreseeable future.

Increasing residential development will likely continue for the foreseeable future to variable degrees within the TPA. Erosion, compaction, and covering of soils would occur due to additional road construction, clearing/leveling for home sites, and establishment of utility infrastructure for residential developments.

Under Alternative A, the contribution to cumulative effects on soils from BLM road management would continue as it occurs today. Retaining approximately 52 miles of road open yearlong would allow for the same level of compaction and erosion impacts that currently exist.

From a BLM road management perspective, all action alternatives would benefit soil resources compared to Alternative A. Alternative B would benefit soils by providing for a reduced contribution to adverse cumulative effects than would Alternative A because about 73 percent of BLM roads would be closed or decommissioned under Alternative B (compared to all being open yearlong under Alternative A). Erosion should be reduced on these closed/decommissioned roads as disturbance is eliminated and revegetation occurs and stabilizes soils.

Alternative C would benefit soils the most and provide for the least contribution to adverse cumulative effects on soils of all alternatives. This alternative would provide for closure or decommissioning of about 86 percent

of BLM roads in the TPA, thus allowing these areas to vegetatively recover and stabilize soils.

Alternative D would provide for the greatest contribution to adverse cumulative effects on soils of the action alternatives, but would still provide for greater long-term benefits to soils than Alternative A. Alternative D would provide for closure or decommissioning (and therefore vegetative recovery and/or soil stabilization) of about 58 percent of BLM roads in the TPA, compared to 73 percent for Alternative B, and 86 percent for Alternative C.

Due to the scattered distribution and relatively small proportion of BLM lands (11 percent) and roads (7.5 percent) relative to the total quantities of lands and roads in the TPA, none of the BLM alternatives would substantially contribute to cumulative effects to soils at the scale of the entire Helena TPA.

WATER RESOURCES

Effects Common to All Alternatives

Hydrologic function is an interaction between soil, water, and vegetation, and reflects the capacity of a site to:

- Capture, store, and safely release water from rainfall, runoff, and snowmelt;
- Resist a reduction in this capacity; and
- Recover this capacity following degradation.

Interception of precipitation results when precipitation falls on vegetation. When vegetation is removed, precipitation falls directly on the soil. This can increase surface erosion and sedimentation, and decrease the amount of time between initial precipitation arrival and peak surface runoff – in turn decreasing soil/site stability and hydrologic function. Roads remove vegetation and therefore decrease interception of precipitation.

Infiltration is the process of precipitation entering and traveling through soil. Infiltration reduces the peak runoff during precipitation events by extending the period of runoff after a precipitation event. Infiltration also filters precipitation and reduces erosion and sedimentation. If infiltration is reduced, runoff and erosion will increase and hydrologic function will decrease. Generally, roads are compacted surfaces that have decreased infiltration, thus increasing runoff and potentially increasing erosion.

Runoff can affect the amount of erosion and sedimentation, as well as flooding – both onsite and offsite. If runoff is increased, all of these effects can increase with a result that water quality and hydrologic function will decrease.

Increased sediment entering water bodies increases turbidity; increases width-to-depth ratios, and consequently increases temperature and dissolved oxygen saturation levels; and creates adverse habitat for aquatic animals and plants.

Alteration of flow routing can also affect water resources. For example, roadcuts into areas with relatively shallow groundwater can intercept groundwater, bring it to the surface, and transport it some distance (i.e. in a roadside ditch) before delivering it to a stream. This can lead to erosion of road ditchlines and subsequent sedimentation of streams during runoff periods, or increased thermal loading of water before delivery to streams during summer periods.

Closure and decommissioning of roads tend to reduce erosion and sedimentation effects stemming from roads on water quality. On an equivalent road mile basis, decommissioning roads would benefit water quality to a greater degree than closing roads because the decommissioning process would often entail implementing measures to restore hydrologic function. During road decommissioning, items such as compaction, drainage, stream crossing culverts, and ground cover are often addressed in a manner that markedly improves hydrologic function. These features are not fully addressed on roads that are merely “closed”. However, because surface disturbance is reduced on newly closed roads, and because vegetation tends to re-establish ground cover on them, erosion and subsequent sedimentation effects to water quality are often reduced from closed roads.

Effects of the Alternatives

Generally, road density is an indicator of overall watershed health and function. Watersheds with higher road densities tend to have lower water quality due to greater disruption of hydrologic function (described above), and potential for erosion and subsequent sedimentation. Road density also is related to the distribution and spread of noxious weeds. **Table 4-49** shows acres of BLM land in three road density categories by alternative for the Helena TPA. These data reflect differences between alternatives based on roads proposed for “decommissioning” by alternative. While many “closed” roads would gradually contribute to increased hydrologic function over time, decommissioned roads would more directly contribute to hydrologic function because restoring hydrologic function would likely be part of the treatment during decommissioning. Alternative A would have the greatest amount of BLM land with “high” road densities of greater than 2 mi/mi². Alternative B would

TPA Alternative	Road Density Category		
	Low (<1 mi/mi ²)	Moderate (1 to 2 mi/mi ²)	High (> 2 mi/mi ²)
A	461	1,446	8,294
B	461	1,623	8,117
C	461	1,539	8,200
D	461	1,484	8,258

have the lowest acreage in the high category with the greatest acreage in the moderate category of all alternatives. Alternative C would have the next lowest acreage in the high road density category while Alternative D would have more acres in the high category than either Alternative B or C, but less than Alternative A. Overall, all the action alternatives would improve hydrologic function but by this measure Alternative B would make the greatest contribution to improved hydrologic function of all the alternatives.

Motorized routes within 300 feet of streams generally have greater potential to directly impact water quality through erosion and sedimentation, increased water temperatures (due to loss of shading vegetation), and direct alteration of stream channel morphology than those farther away. **Table 4-50** shows the miles of open and closed roads on BLM lands within 300 feet of streams by alternative. Under Alternative A there are about 7 miles of open road within 300 feet of streams. All action alternatives would improve water quality by closing or decommissioning roads in close proximity to perennial streams. Alternatives B and C would create the most benefit as both would close or decommission 4.1 of the seven total miles of road within 300 feet of streams. Alternative D would have slightly less benefit by closing or decommissioning 2.5 of these 7 miles.

Cumulative Effects on Water Resources

Cumulative effects to water resources in the East Helena TPA would arise from a number of past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands. Within this 95,492-acre TPA, BLM lands comprise about 10,162 acres or 11 percent of total lands. The approximately 52 miles of BLM roads (Alternative A) make up about 7.5 percent of the approximately 693 road miles in the TPA. Therefore road-related effects to water resources described by alternative for BLM roads would pertain to about 7.5 percent of all roads in the TPA. Within the entire TPA (all land ownerships) there are approximately 108 miles of perennial streams, including 37 miles of fish bearing streams. Of these, approximately 8 miles (including 2 miles of fish bearing) flow through BLM lands. The majority of lands and roads within the TPA boundary are private

property. Non-BLM roads are managed by the county, Forest Service, state, and private landowners.

Some of the main access roads (non-BLM) follow valley bottoms and parallel streams. Many of these roads are directly affecting stream channel and floodplain function by filling or impinging on active stream channels or floodplains, precluding the presence of riparian vegetation (including large woody material in forested locations), producing sedimentation in streams (from road surfaces, ditchlines, winter “road sanding” operations), and promoting thermal loading by lessening streamside shade.

Approximately 8,000 acres of land in the Helena TPA are managed by the National Guard. In addition to having and using various barracks and classrooms present, the Guard conducts various military maneuvers and training on these lands including non-live fire training and off-road use of military vehicles. Some helicopter-based training also occurs here including landings to drop off soldiers. Some soil erosion and compaction as well as loss of vegetative ground cover occur here. This is exacerbating potential erosion and sedimentation effects, but to an unknown degree. Sevenmile Creek, one of the streams listed as impaired by Montana Department of Environmental Quality on the 303(d) list flows through these lands.

Approximately 481 BLM acres are permitted for various rights-of-way and leases. About 359 of these acres are for specific road rights-of-way. The remaining 122 acres are associated with powerlines, waterlines, communication sites, oil and gas pipelines, and other utility facilities. Impacts to water resources are generally minor with some localized erosion and sedimentation emanating from areas of ground disturbance.

Selective timber harvest has occurred on about 133 acres of BLM land in the TPA since 1995. Adverse effects on water resources were minor with treated areas having undergone revegetation to minimize erosion. Timber harvest has also occurred on private and Forest Service lands and will likely continue. This activity will have localized sedimentation and possibly increased runoff effects associated with compaction for the foreseeable future.

Table 4-50
Miles of Open and Closed Roads on BLM Lands within 300 ft. of Fish-Bearing Streams and Perennial, Non-Fish-Bearing Streams by Alternative for the Helena TPA

	Perennial Fish-Bearing Streams		Perennial Non-Fish-Bearing Streams	
	# Open Road Miles	# Closed Road Miles	# Open Road Miles	# Closed Road Miles
Alt. A	1.7	0	5.3	0
Alt. B	1.7	0	1.2	4.1
Alt. C	1.7	0	1.2	4.1
Alt. D	1.7	0	2.8	2.5

Note: Open roads include seasonally open roads as well as roads open yearlong. Closed roads include decommissioned roads.

From 1981 to 2004, wildland fire has burned across 65 acres in the Helena TPA, having minimal effects in streams.

There has been one fuels reduction treatment on BLM lands in the TPA in the last 10 years. Approximately 150 acres in the Scratchgravel Hills around the Wildland Urban Interface had hazardous fuels mechanically removed and ground up on site. Effects to water resources from this project were negligible as site-specific ground disturbance was minor and there are no streams in this portion of the TPA. Within the next several years, BLM anticipates additional fuels treatments on 1,500 to 2,500 acres of WUI areas in the Scratchgravel Hills. These treatments would consist of a combination of mechanical and prescribed fire treatments and would likely have minor effects on water resources. Prescribed burning would occur under conditions where fire severity and intensity would be low so as not to scorch soils and facilitate severe erosion. All treatments would minimize compaction so as to promote vegetative recovery and retain hydrologic function. There are no perennial streams in the area where this project is being planned so effects to water resources are expected to be minor to negligible.

Fuels treatments conducted on private and Forest Service lands will also likely occur for the foreseeable future with variable effects to water quality. Reducing fuels under the controlled conditions of deliberate treatments may benefit water quality in the long-term by reducing the risk of high severity fires in treated areas.

Livestock grazing on BLM land, other public and private lands throughout much of the TPA has created areas of localized streambank trampling, soil erosion and compaction, and nutrient inputs to streams. In severe cases stream channel morphology may be altered due to severe loss of riparian vegetation, loss of streambank integrity, channel widening and shallowing, and substantial sediment inputs. These effects to water quality will continue to occur for the foreseeable future. Agricultural water withdrawals occur on private lands in this TPA. These withdrawals reduce stream flows in the TPA, notably in Sevenmile Creek (listed as impaired water body by MDEQ on the 303(d) list).

Increasing residential development will likely continue for the foreseeable future to variable degrees within the TPA. Impairments to hydrologic function such as erosion, soil compaction, and runoff would likely increase due to additional road construction, clearing/leveling for home sites, and establishment of utility infrastructure for residential developments. Nutrient, chemical pollutant, and pathogen inputs to streams would also likely increase due to leaching from septic systems, urban runoff (fertilizer, chemicals, and petroleum pollutants), and waste from livestock.

Under Alternative A, the contribution to cumulative effects on water quality from BLM road management

would continue as it occurs today. Retaining approximately 52 miles of road open yearlong would allow for the same level of effects to water resources that currently exist.

From a BLM road management perspective, all action alternatives would benefit water resources compared to Alternative A. Alternative B would benefit water quality by providing for a reduced contribution to adverse cumulative effects from BLM roads compared to Alternative A because about 81 percent of BLM roads would be closed or decommissioned under Alternative B (compared to all being open yearlong under Alternative A). Alternative B would provide for decommissioning the greatest road mileage (6.5 miles) of all alternatives. Erosion and sedimentation should be reduced on these closed/decommissioned roads as disturbance is eliminated and vegetation becomes re-established on roadbeds. On an equivalent road mile basis, decommissioning roads would benefit water quality to a greater degree than closing roads because the decommissioning process would often entail implementing measures to restore hydrologic function.

Alternative C would reduce the contribution to adverse cumulative effects from BLM roads (and benefit water resources) to a similar degree as Alternative B although there are some differences between the two alternatives. Alternative C would provide for the most closed roads (40.7 miles compared to 36 under Alternative B) of all alternatives, but only the second most decommissioned roads (4.6 miles).

Alternative D would provide for the greatest continuing contribution to adverse cumulative effects on water resources of the action alternatives, but would still provide for greater long-term benefits to water resources than Alternative A. Alternative D would provide for closure (27.7 miles) or decommissioning (3.1 miles) of about 58 percent of BLM roads in the TPA, compared to 81 percent for Alternative B, and 86 percent for Alternative C.

Due to the scattered distribution and relatively small proportion of BLM lands (11 percent) and roads (7.5 percent) relative to the total quantities of lands and roads in the TPA, none of the BLM alternatives would substantially contribute to cumulative effects on water resources at the scale of the entire Helena TPA.

VEGETATIVE COMMUNITIES – FOREST RESOURCES AND FOREST AND WOODLAND PRODUCTS

Effects of the Alternatives

Under all alternatives, existing roads and roads built to access timber and forest product sales on BLM lands may encourage timber harvest and forest product sales on adjacent lands, particularly where landowners and other agencies are looking to improve economic effi-

ciency or opportunities in the management on their lands.

In general, vegetative treatment contractors tend to bid more readily on projects in areas with vehicle access or valuable forest products. BLM often prioritizes forest vegetation management activities such as forest products and forest protection activities (e.g. wildfire suppression and forest insect and disease control) in similar areas.

Rehabilitation of roads (decommissioning or in some cases road closure) would revegetate currently unvegetated roadbeds, which would increase vegetation biomass production on the landscape through colonization of sites with grasses, forbs, shrubs, and trees. Increases in revegetated area would occur at a rate of approximately 1.5 to 3 acres per mile of rehabilitated road. Eventually rehabilitated roads would support plant communities consistent with site potentials which would help resist weed invasions. However, road closures and removals (decommissioning) could make vegetation management treatments more difficult and costly, thereby inhibiting proposed treatments, reducing public access for forest product use and removal, and potentially slowing fire detection and suppression.

Under Alternatives A (52.2 open road miles) and D (21.9 open road miles) in the Helena TPA, the major vehicle access roads in the forest and woodland areas remain open, so there would be little increase in project analysis and implementation costs, and no change in the feasibility of vegetative and fuels reduction treatments. Under Alternatives B (9.8 open road miles) and C (7 open road miles), the access roads into the forest and woodland areas would be closed, so there could be a reduction in the feasibility of many projects. For projects that are feasible, there could also be increases in vegetative analysis, project planning, and treatment costs to the BLM.

In the context of gathering firewood and other forest products by the general public, mileage of open roads would represent the relative extent of public opportunities by alternative. For the Helena TPA, Alternative A would retain the most public opportunities for these activities, followed in sequence by Alternative D, Alternative B, then Alternative C.

Cumulative Effects on Forest and Woodland Resources and Products

No BLM forest health/silvicultural treatments or resource product removal projects are currently imminent in this TPA within the next five years. Fuels reduction projects with forest health considerations have a high priority because of the high degree of residential development surrounding BLM lands. The major block of land that includes BLM forest and woodlands in this TPA is located in the Scratchgravel Hills, with some woodland stands in a block located northwest of Fort Harrison near Austin. One fuels reduction project (antic-

ipated at 1,500 to 2,000 acres) is currently being planned in the Scratchgravel Hills area. These stands are of low productivity and commercial value, so the forest products generated would provide little revenue in timber sale projects. In other vegetation manipulation projects, derived products would provide only small offsets to costs for stewardship (exchange of goods for services) projects.

Forested vegetation on BLM lands would also be affected by approximately 481 acres of rights-of-way and leases on BLM land. Forested vegetation located in these areas usually is harvested and/or removed to accommodate the necessary access or facilities. Forest vegetation removal would occur on new authorizations in the future and would occur as necessary to maintain sight distances and safety clearances associated with roads and facilities.

Urbanization is expected to continue on the 56,499 acres of private lands within this TPA. Forest products are commonly removed from these areas prior to permanent construction. Urbanization is likely to continue in the future and will affect forested vegetation at an unknown rate. As private construction increases, miles of road on private land will most likely increase from the current 528 miles.

Risk to forests from human-caused wildfires is commonly associated with miles of open roads because increased fire starts occur in these areas. Risk to forests from wildfire on BLM lands would be greatest under Alternative A with 52.2 miles of open road. Alternative B would have less risk of human-caused fire starts with 9.8 miles of open road. Alternative C would have the least risk to forests of all alternatives with only 7.0 miles of road open during summer months. Alternative D (21.9 miles) would have less risk than Alternative A but more risk than either Alternative B or C. Given that the majority of roads in the TPA (92 percent) are non-BLM roads, this contribution to reduced fire risk from BLM roads in the action alternatives is relatively small in the context of the entire TPA.

Since BLM roads constitute only 7.5 percent of all roads in this TPA, and BLM lands make up only 11 percent of all lands in the TPA, urbanization and activities on open non-BLM roads in the vicinity may have more cumulative effects on forested vegetation in the TPA than BLM decisions regarding miles of open and closed road.

VEGETATIVE COMMUNITIES – NOXIOUS WEEDS

Under all alternatives, any snowmobile use would have negligible effects on noxious weed spread. Invasive noxious weeds and non-native species are degrading wildland health. These aggressive plants can outcompete many native plants, as they have few natural enemies to keep them from dominating an ecosystem. These plant species are spread by many means. However, any land

disturbing activity in the TPA has the most potential to introduce and spread weed species. Motorized vehicles are one vector for noxious weed spread as weed seed becomes attached to vehicles and their tires, and are transported from one area to another where seeds become detached and germinate to inhabit new areas.

Effects of Alternative A

Under Alternative A, all existing routes in the Helena TPA would continue to be open yearlong (52.2 miles open yearlong, zero miles seasonally restricted and closed) to wheeled motorized users. Cross-country snowmobile travel would continue to be allowed as well as travel on all routes. Under Alternative A the open BLM roads would represent about 7.5 percent of all open roads in the Helena TPA.

Alternative A would have the most roads open and in turn would promote the greatest amount of weeds and other undesirable plant spread and production of all alternatives. More herbicide control would be needed to control weeds under Alternative A than under the other alternatives.

Effects of Alternative B

Under Alternative B wheeled motorized travel (9.8 miles open yearlong) would be restricted in the Scratchgravel Hills to routes leading to five non-motorized trailheads; as well as several routes needed for residential access. Roads would be open yearlong. Cross-country snowmobile use would be allowed, as well as snowmobile travel on all existing routes during the season of use (12/2-5/15), conditions permitting. Under Alternative B, 42.5 miles of BLM road would be closed or decommissioned, leaving 9.8 miles open yearlong as compared to 52.2 miles of road open yearlong under Alternative A. This would prevent weed spread caused by motorized vehicles on these closed routes, but would increase spread on the open routes because of the more concentrated use of these routes. Overall Alternative B would reduce weed spread, but would increase weed treatment costs per road mile on the remaining open road miles compared to Alternative A. Under Alternative B, the 9.8 miles of open BLM road would constitute about 2 percent of all open roads in the Helena TPA.

Effects of Alternative C

Alternative C would restrict wheeled motorized travel to five non-motorized trailheads in the Scratchgravel Hills. This alternative would provide the least number of wheeled motorized routes in the Helena TPA (7.0 miles open yearlong). Under this alternative, no snowmobile use would be allowed, including at the trailhead access routes. Under Alternative C, 40.7 miles of BLM road would be closed, leaving 7.0 miles open yearlong as compared to 52.2 miles of road open yearlong under Alternative A and 9.8 miles open under Alternative B. This would prevent weed spread caused by motorized

vehicles on these closed routes, but would increase spread on the open routes because of the more concentrated use of these routes. Overall Alternative C would reduce weed spread more than any other alternative, but would increase weed treatment costs per road mile on the remaining open road miles compared to Alternative A. Under Alternative C, the 7 miles of open BLM road would make up about 1 percent of all open roads in the Helena TPA.

Effects of Alternative D

Under Alternative D, 21.9 miles of open routes would be available yearlong for wheeled motorized use. Of the action alternatives, Alternative D would provide the greatest opportunities for motorized users, and the least for non-motorized users. Cross-country snowmobile use would be allowed, as well as travel on all existing routes during the season of use (12/2-5/15), snow conditions permitting. This alternative would close 27.7 miles of road leaving 21.9 miles open yearlong as compared to 52.2 miles of road open yearlong for Alternative A. This would prevent weed spread caused by motorized vehicles on these closed routes, but would increase spread on the open routes because of the more concentrated use of these routes. Overall Alternative D would reduce weed spread more than Alternative A but less than Alternatives B and C, but would increase weed treatment costs per road mile on the remaining open road miles compared to Alternative A. Under Alternative D, the 21.9 miles of open BLM road would make up about 3 percent of all open roads in the Helena TPA.

Cumulative Effects on Noxious Weeds

Under all alternatives, other past, present and reasonably foreseeable future BLM and non-BLM actions and outside influences affect noxious weeds.

Recreation use is well established in the TPA. Primary recreation activities include motorized OHV uses (ATV, motorcycle) and non-motorized uses (hiking, jogging, horseback riding, mountain biking, etc.). Motorized recreation uses are one of the leading causes of introduction and spread of noxious weeds and non native species. Weed seeds are transported by many recreational vectors (i.e. motorized vehicles including their tires), non-motorized vehicles including their tires, pack animals, and humans.

Urban development may lead to an increase in right-of-way permits on public lands to accommodate private property/development access. As a result, soil disturbing activities (i.e. roads, powerlines, telephone lines, etc.), will increase causing weeds to increase.

A variety of resource management projects, such as BLM initiated vegetation treatments, or fuels reduction projects, could affect weeds in the TPA. The Scratchgravel Hills Fuel Treatment Project is proposed in this TPA. It will consist of mechanical and/or prescribed fire treatments on from 1,500 to 2,500 acres focused on the

urban interface areas. There has been a fuels treatment project completed in the Scratchgravel Hills in the last 5 years which consisted of reducing fuels on a 150 acre area. Any project creating soil disturbance has the capability to increase weedy plant species. Prescribed burning projects give the ground surface a fertilization effect and eliminate some plant competition for weedy species giving them a niche for establishment and expansion in some areas. Ground disturbing equipment could also transport noxious weed seed to these project sites. BLM implements weed control measures in the aftermath of such ground-disturbing activity so as to minimize noxious weed spread.

Wildland fires create good seed beds and supply nutrients for weed species introduction and production. From 1981 to 2004 there have been 14 wildland fires that have burned about 65 acres. This TPA contains sufficient fuel to support a wildland fire in the foreseeable future.

Mining is a land disturbing activity and the activity itself and weed seed contaminated equipment that is used could promote weeds in the area. There are a number of active claims in the TPA but relatively little ground-disturbing activity associated with them is taking place at this time.

Noxious weeds and non-native invasive species are well established and spreading in the area. Weed control activities by BLM and other entities, while often effective at reducing or minimizing weed spread and weed populations, can also lead to some weed spread. Herbicide spray equipment is driven through weed infestations and weed seeds as well as other weed vegetative parts are spread to other lands during and following treatment. Herbicide and biological control treatments in recent years have been accomplished on approximately 30 to 40 acres in the Scratchgravel Hills area. These weed treatments have varying success in killing undesirable plants, depending on many environmental parameters. The weeds that have been treated are primarily in the urban interface area where heavy motorized use plays a large role in the distribution of noxious weeds.

Timber sales have built in stipulations for mitigating weed production and spread. However, with ground disturbance the potential exists for weed introduction to occur on these sites. Vehicular access for tree plantings could contribute to the spread of existing weeds on site. Since 1984, there has been 10 acres of forest planting. From 1995 to the present there has been 133 acres of timber harvest in the TPA. Herbicide treatment of existing weeds was coordinated with tree seedling planting locations and timing so as to minimize potential exacerbation of weed spread. Reclamation associated with abandoned mine lands has led to some spread of weeds. Herbicide control treatments have followed these reclamation actions to minimize or eliminate impacts.

Future travel management (for all agencies, nationwide) is likely to lead to fewer opportunities for motorized recreational use than under current management (particularly for OHV use). As a result, the Scratchgravel Hills could experience increased use from displaced users, and such use could cause a larger than anticipated introduction and spread of weeds. An increase in weeds would lead to an increase in needed treatment on BLM lands.

The National Guard manages approximately 8,000 acres of land (Fort Harrison) in the Helena area. These actions could potentially increase weed spread and production on (and off) BLM managed lands.

Portions of the TPA provide winter range for mule deer and elk. The Birdseye section is within a wildlife movement corridor that provides a connection between the Northern Continental Divide Ecosystem and the Greater Yellowstone Ecosystem, as well as local daily movements and seasonal movements between higher elevation summer ranges. Noxious weed seed are transported and spread by wildlife through their digestive systems and by attaching to the animals themselves and then being released at a later time.

Livestock grazing on and off BLM lands also contributes to weed spread either through seed being introduced by livestock themselves, or through vehicular uses needed to manage grazing operations.

Like much of the West, the Helena Valley has been experiencing steady human population growth. This trend is expected to continue, along with increased recreational use of this travel planning area. The increasing population in the Helena area will in turn lead to an increase in use of this TPA creating more opportunities for weed spread and production.

The majority of BLM managed routes for the Helena Travel Planning area are located in or adjacent to the Scratchgravel Hills and Birdseye area. Scratchgravel Hills is basically an island of undeveloped hills surrounded by residential development (there is some internal development as well). Residential development has tripled from 300 residential homes in 1984 to over 1,000 homes today. Additional development is ongoing. This development/increase in human population has led to an increase in use of the Scratchgravel Hills area by residents living adjacent to or within this area which in turn leads to an increase in weed spread and propagation.

Only 7.5 percent of all the travel routes in the Helena TPA are located on BLM managed lands (under Alternative A). Lands near roads and away from roads in the TPA are infested with weeds. The travel on all roads in the TPA is spreading weeds and weeds off these roads are being spread by the weed plants themselves and other natural means. Because the majority of roads (92 percent) and lands (89 percent) in the TPA are non-BLM, activities in these areas play a stronger role than activi-

ties on BLM lands in determining the status of weed spread and weed populations in the TPA overall.

VEGETATIVE COMMUNITIES – RIPARIAN VEGETATION

Effects Common to All Alternatives

This section focuses on effects to riparian vegetation. For additional discussion of effects to water quality and stream channels, see the Water Resources and Fish sections.

Roads in riparian areas constitute ground disturbance that can eliminate or preclude presence of native riparian vegetation. This ground disturbance and loss of riparian vegetation may facilitate erosion and sedimentation of streams. Roads may also interfere with natural stream channel functions by occupying floodplains or active stream channel margins (see Water Resources section for more discussion). Noxious weeds may dominate riparian vegetation communities after some type of disturbance (such as roads, livestock grazing, mining, etc.) has reduced native vegetation. Noxious weed seed can be spread into riparian areas by motor vehicles via open roads. Closure of roads and trails can improve or maintain riparian condition by reducing avenues of noxious weed spread, as well as allowing for bare area revegetation which filters sediment in addition to stabilizing banks in some areas. Road and trail restrictions have the same effects but to a lesser degree, because some traffic will inhibit vegetation growth and recovery.

Effects of the Alternatives

As a means of comparing alternatives, **Table 4-51** depicts the miles of wheeled motorized routes that cross or are within 300 feet of streams on BLM lands for the Helena TPA.

Under Alternative A, 10.9 miles of roads and trails would remain open that cross or are within 300 feet of streams on BLM lands. The noxious weed spread, streambank, and sediment delivery effects would continue as described above.

Under Alternative B, 4.2 miles of BLM roads and trails that cross or are within 300 feet of streams would remain open, and 6.7 miles of roads and trails would be closed. The noxious weed spread, streambank, and sediment

delivery effects would be slightly reduced in comparison to Alternative A, however the roads along Sevenmile Creek and Skelly Gulch which impact riparian areas the most would remain open because they are non-BLM county roads and provide access to these respective areas.

Under Alternative C, 3.4 miles of BLM roads and trails that cross or are within 300 feet of streams would remain open, and 7.4 miles of roads and trails would be closed. The noxious weed spread, streambank, and sediment delivery effects would be slightly reduced in comparison to Alternatives A and B, however the roads along Sevenmile Creek and Skelly Gulch which impact riparian areas the most would remain open because they are non-BLM county roads and provide access to these respective areas. Alternative C would provide the most benefit of all alternatives to riparian vegetation on BLM lands.

Under Alternative D, 4.9 miles of BLM roads and trails that cross or are within 300 feet of streams would remain open, and 6.0 miles of roads and trails would be closed. The noxious weed spread, streambank, and sediment delivery effects would be slightly reduced in comparison to Alternatives A, but would be greater than under Alternatives B and C. The roads along Sevenmile Creek and Skelly Gulch which impact riparian areas the most would remain open because they are non-BLM county roads and provide access to these respective areas.

Cumulative Effects on Riparian Vegetation

Noxious weed spread, mining, roads and trails, logging operations, and livestock grazing have affected riparian resource conditions in all TPAs, including the Helena TPA. Some of these factors continue to cause riparian area degradation primarily through direct disturbance or loss of riparian vegetation. Ground disturbance and loss of riparian vegetation facilitate erosion and sedimentation of streams. In the case of noxious weeds, they usually dominate riparian vegetation communities after some type of disturbance (such as roads, livestock grazing, mining, etc.) has reduced native vegetation.

Anticipated subdivision growth on private lands will lead to more road construction and maintenance. More roads and development will increase severity of runoff events which in turn will cause more sediment delivery to creeks and streams. The additional sediment is likely to affect the functioning condition of some riparian areas by causing streambeds to aggrade at unnatural rates. Streambanks may also be affected if road placements do not allow for natural stream movements or meanders.

Logging and forestry practices on public and private lands are subject to streamside management zone (SMZ) requirements designed to maintain water quality and riparian vegetation. The proposed Riparian Management Zones under Butte RMP Alternatives B and C would be wider than SMZs and activities in these areas would be

Miles of Wheeled Motorized Routes	ALT A	ALT B	ALT C	ALT D
Open	10.9	4.2	3.4	4.9
Restricted	0	0	0	0
Closed	0	6.7	7.4	6.0

designed to benefit riparian resources, thus providing more riparian protection and more targeted management of riparian vegetation in both forested and non-forested areas than under RMP Alternatives A and D. The disturbance associated with timber activities does have the potential to increase noxious weed spread which degrades riparian area function and health. On public lands noxious weed control is a standard feature of any ground disturbing activities whereas on private lands noxious weed control is variable.

Livestock grazing will continue in the area and has the potential to impact riparian resource conditions. On BLM lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain riparian vegetation health and vigor. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided. Riparian conditions may improve or degrade as management changes.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, riparian conditions would improve because of the streambank protection gained from shrubby root systems and filtering capability of native riparian sedge and rush species.

The BLM fuels reduction project currently being planning for the Scratchgravel Hills would not have any cumulative effects to riparian vegetation because no activities would be planned near riparian areas. There are very few riparian areas in the Scratchgravel Hills portion of the TPA.

Cumulatively the effects of Alternative B would be similar to Alternative A, but would be a slight improvement to riparian vegetation. The closure of a few roads may slightly offset some of the private land road construction and maintenance effects described above.

Cumulatively the effects of Alternative C would be similar to Alternatives A and B, though Alternative C would make the greatest contribution to riparian vegetation by closing the greatest mileage of riparian roads on BLM lands of all alternatives. In comparison to Alternative B, the closure of a few more roads than Alternative B may slightly offset more of the private land road construction and maintenance effects described above.

Cumulatively the effects of alternative D would be similar to alternatives A, B, and C. In comparison to Alternatives B and C, the closure of a few less roads than Alternatives B or C may slightly offset less of the private land road construction and maintenance effects described above.

Overall, because BLM roads make up only 7.5 percent of all roads in the TPA (under Alternative A), and BLM lands make up 11 percent of all lands in the TPA, the contributions to riparian vegetation benefits associated with closing riparian roads on BLM lands would be minor at the scale of the entire Helena TPA.

WILDLIFE

Effects of Alternative A

Under Alternative A, the Helena TPA would have substantially more open roads (52 miles) compared to the action alternatives and would have the highest actual road density on BLM lands, 1.9 mi/mi² (Table 4-52) compared to the action alternatives. Open roads typically increase the level of recreation adjacent to roads. This can result in additional disturbance and displacement of wildlife species. Roads can also encourage the public to recreate in areas that had formerly been secluded. Roads can cause direct mortality to wildlife through road kill, prevent wildlife movement, create disturbance to wildlife via vehicular use, cause the spread of noxious weeds, reduce or eliminate habitat and cause habitat fragmentation on the landscape (Joslin et al. 1999). Open road miles that exceed 1 mi/mi² have also been found to provide less than 60 percent of functional habitat for elk (Christensen et al. 1993). Permanent and temporary roads could negatively impact wildlife, including special status species, particularly if roads are open during critical periods such as during the winter or breeding seasons.

Under Alternative A, this TPA would have fewer acres of functional winter range (461 acres of low road density area) compared to the action alternatives (Table 4-52). The action alternatives would all provide a similar amount of functional winter range, approximately 1,200 acres. Due to the isolated nature of BLM parcels and the substantial amount of development in the TPA, winter range value for big game species is extremely low compared to other areas.

Table 4-52
Decision Area Road Densities (mi/mi²) within Elk Winter Range in the Helena Travel Planning Area

	Actual Road Density	Acres of Low Road Density	Acres of Moderate Road Density	Acres of High Road Density
Alternative A	1.9	461	1,331	2,611
Alternative B	1.0	1,152	1,165	2,087
Alternative C	0.7	1,270	1,113	2,021
Alternative D	0.9	1,267	1,110	2,027

Low Density = 0-1 mi/mi², Moderate Density = 1-2 mi/mi², High Density = >2 mi/mi²

Although the Helena TPA is open for cross country snowmobile use under Alternatives A, B and D, BLM lands in this TPA do not often get favorable snow conditions for this use. Due to snow conditions, the use of snowmobiles would be limited and the effects to big game and other wildlife species would be expected to be minimal the majority of the time. However, when snow conditions do become favorable, snowmobile use of the TPA could have negative effects to big game and other wildlife species. The negative effects due to cross-country snowmobile use could include harassment of big game and other species during the high stress winter season (Joslin et al. 1999). This could cause individuals to leave an area (temporarily or permanently) and/or an increase in stress that could lead to mortality.

In evaluating impacts of travel planning on elk and other big game species, it is important to consider impacts on security habitat. Elk security is the inherent protection allowing elk to remain in an area despite increases in stress or disturbance associated with the hunting season or other human activities. Security habitat includes blocks of nonlinear forested habitats greater than 250 acres in size that are at least 0.5 mile from an open road (Hillis et al. 1991). Security habitat should also consist of larger trees (greater than 8 inches DBH) with vegetation dense enough to hide an adult elk (Thomas et al. 2002). Under Alternatives A and D, there would be no functional security habitat for big game species and Alternatives B and C would provide only a negligible amount of security habitat (257-404 acres) (Table 4-53). As with winter range, the isolated nature of BLM parcels along with development of private lands and open roads throughout the TPA prevents the area from having a large amount of functional security habitat.

	A	B	C	D
Helena TPA	0	257	404	0

Core areas are areas large enough for wildlife (especially animals with large home ranges such as carnivores and big game) to forage and reproduce. Subcore areas are areas that could act as stepping stones for wildlife as they move through the region (Craighead et al. 2002). For all lands in the Helena TPA, all alternatives would have the same amount of acres with low (5,942 acres with road density less than 1 mi/mi²), moderate (2,762 acres with road densities of 1-2 mi /mi²), and high (2,061 acres with road densities greater than 2 mi/mi²) road densities in core and subcore habitat.

On BLM lands, there are only 501 acres in core/subcore habitat. All alternatives would have the same acres in low (71 acres), moderate (216 acres) and high (114 acres) road densities for core and subcore habitat.

Wildlife corridors are areas of predicted movement within or between core and subcore areas. Within the Helena TPA there are no acres identified as “high quality” wildlife movement corridors under any land ownership. There are approximately 21,804 acres identified as moderate quality corridors for all land ownerships and 19,439 acres within low quality corridors. Under all alternatives, moderate quality movement corridors would have 6,455 acres with low road density, 4,803 acres with moderate road density but the majority of acres, 10,546, would be in high road density. On BLM lands in the TPA there are only 379 acres mapped as moderate quality movement corridors but there is more BLM land (2,660 acres) in areas considered to be low quality corridors.

Riparian areas provide crucial habitat and critical travel corridors for wildlife including special status species. Riparian areas also provide a refuge for native plants and animals in times of stress such as drought or fire. Roads in riparian areas can prevent use of these crucial areas by wildlife, limit use, or cause loss of habitat (Wisdom et al. 2000). Under Alternative A, there would be 10.9 miles of open roads in riparian areas, the most of any alternative.

Effects of Alternative B

Under Alternative B, the Helena TPA would have substantially fewer open roads (9.8 miles) compared to Alternative A (52 miles). Alternative B would have more open road than Alternative C (7 miles) but less than Alternative D (22 miles). Alternative B would decrease harassment to wildlife during all seasons of use compared to Alternatives A and D. This alternative would also improve habitat and reduce fragmentation more than Alternatives A and D but less than Alternative C.

Under Alternative B, the actual road density in elk winter range in the Helena TPA would be at the 1 mi/mi² recommended as a maximum by FWP in big game winter range. This is lower than the road density under Alternative A, 1.9 mi/mi², higher than Alternative C (0.7 mi/mi²) and higher, but similar, to Alternative D (0.9 mi/mi²) (Table 4-52). Open road miles that are 1 mi/mi² have also been found to provide roughly 60 percent of functional habitat for elk (Christensen et al. 1993).

Under Alternative B, this TPA would have more acres of functional winter range (1,152 acres) compared to Alternative A (461 acres), slightly less than Alternative C (1,270 acres) but also slightly less than Alternative D (1,267 acres) (Table 4-52). All action alternatives would improve the quality and quantity of winter range in the Helena TPA to a similar degree and all action alternatives would have more beneficial effects on winter range compared to Alternative A.

Like Alternatives A and D, the entire Helena TPA would be open for cross country snowmobile use with Alternative B. The effects would be the same as described under Alternative A.

The amount of big game security habitat would be low, but still more under Alternatives B and C (257 and 404 acres, respectively) compared to Alternatives A and D which would have no functional security habitat (**Table 4-53**).

Alternative B would protect and restore more riparian habitat than Alternative A by reducing the miles of open roads in riparian areas to 4.2 miles (from 10.9 miles under Alternative A). Alternative B would have more open roads in riparian areas than Alternative C (3.4 miles) but less than Alternative D (4.9 miles). Alternative B would allow for more breeding, foraging, and hiding habitat as well as improve more movement corridors for a wide variety of species than Alternatives A and D but less than Alternative C.

Effects of Alternative C

Under Alternative C, the Helena TPA would have substantially fewer open roads (7.0 miles) compared to Alternative A (52 miles). Alternative C would also have fewer open roads than Alternative B (9.8 miles) and Alternative D (22 miles). Alternative C would decrease harassment to wildlife during all seasons of use compared to all other alternatives. This alternative would also improve habitat and reduce fragmentation more than all other alternatives.

Under Alternative C, the actual road density in elk winter range in the Helena TPA on BLM lands would be 0.7 mi/mi², below the maximum of 1 mi/mi² recommended by FWP in big game winter range. This is lower than the road density under Alternative A (1.9 mi/mi²), lower than Alternative B (1.0 mi/mi²) and lower than Alternative D (0.9 mi/mi²) (**Table 4-52**). Christensen et al. (1993) found that reducing open road miles to 0.7 mi/mi² would increase the amount of effective habitat available to elk to roughly 65 percent.

Under Alternative C, this TPA would have more acres of functional winter range (1,270 acres) compared to Alternative A (461 acres), slightly more than Alternative B (1,152 acres) and nearly the same as Alternative D (1,267 acres) (**Table 4-52**). All action alternatives would improve the quality and quantity of winter range in the Helena TPA to a similar degree and all action alternatives would have more beneficial effects on winter range compared to Alternative A.

Under Alternative C, snowmobile use throughout the entire Helena TPA would be limited to open routes (2.8 miles). This would greatly reduce the negative effects associated with snowmobile use to big game and other wildlife species compared to all other alternatives.

The amount of big game security habitat under Alternative C would be low (404 acres), but would still be greater than under any other alternative (**Table 4-53**).

Alternative C would protect and restore more riparian habitat than Alternative A by reducing the miles of open roads in riparian areas to 3.4 miles (from 10.9 under

Alternative A). Alternative C would also have fewer open roads in riparian areas than Alternative B (4.2 miles) and Alternative D (4.9). Alternative C would allow for more breeding, foraging, and hiding habitat as well as improve more movement corridors for a wide variety of species more than all other alternatives.

Effects of Alternative D

Under Alternative D, the Helena TPA would have considerably fewer open roads (22 miles) compared to Alternative A (52 miles). Alternative D, however, would have considerably more open roads than Alternative B (9.8 miles) and, especially, Alternative C (7 miles). Alternative D would allow considerably more harassment to wildlife during all seasons of use than Alternatives B and C but less than Alternative A. This alternative would also restore fewer acres of habitat and allow more fragmentation than Alternatives B and C but substantially less than Alternative A.

Under Alternative D, the actual road density in elk winter range in the Helena TPA would be below the maximum of 1 mi/mi² recommended by FWP in big game winter range at 0.9 mi/mi². This is lower than the road density under Alternative A (1.9 mi/mi²), lower than Alternative B (1.0 mi/mi²) and higher than Alternative C (0.7 mi/mi²) (**Table 4-52**).

Under Alternative D, this TPA would have more acres of functional winter range (1,267 acres) compared to Alternative A (461 acres), slightly more than Alternative B (1,152 acres) and nearly the same as Alternative C (1,270 acres) (**Table 4-52**).

Like Alternatives A and B, the entire Helena TPA would be open for cross country snowmobile use with Alternative D. The effects would be the same as described under Alternative A.

There would be no functional big game security habitat under Alternatives D and A. Although low, there would be 257 acres of security habitat under Alternative B and 404 acres under Alternative C (**Table 4-53**).

Alternative D would protect and restore more riparian habitat than Alternative A by reducing the miles of open roads in riparian areas to 4.9 miles (from 10.9 under Alternative A). Alternative D would have more open roads in riparian area than Alternative B (4.2 miles) and Alternative C (3.4 miles). Alternative D would allow for more breeding, foraging and hiding habitat as well as improve more movement corridors for a wide variety of species than Alternative A but less than Alternatives B and C.

Cumulative Effects on Wildlife

Wildlife habitat in the Helena TPA has been affected by roads, historic and current mining, timber harvest, weed infestations, urbanization and development, recreation, powerline corridor development and communication sites.

Like much of the West, the Helena Valley has been experiencing steady population growth. This trend is expected to continue, along with increased recreational use of this travel planning area. The majority of BLM managed routes for the Helena TPA are located in or adjacent to the Scratchgravel Hills and Birdseye area. The Scratchgravel Hills is an island of undeveloped hills surrounded by residential development. Residential development has tripled from 300 residential homes in 1984 to over 1,000 homes today. Additional development is ongoing.

Land that was traditionally used for ranching, forest products, or mining is now being converted to home sites in the Helena Valley. Although these lands had historic human uses, they also provided quality wildlife habitat. These areas historically provided a diversity of habitats that contributed to; big game winter range, travel corridors, habitat for resident and migrating wildlife, as well as foraging, breeding and hiding habitat. Many of the areas currently experiencing residential development are in big game winter range. Because of the loss of winter range on private lands, it is critical that public and state lands maintain quality and secure winter range or improve the habitat in these areas.

For many plant and animal communities, native species richness decreases as housing density increases. Non-native species, however, tend to increase with development (Hansen et al. 2005). Wildlife populations, including carnivores, may be reduced even at very low levels of residential development due to; loss of habitat, an increase in human access (from roads) in areas that previously had low levels of disturbance, and an increase in hunting pressure. Residential development can also lead to an increase in noxious weed infestations that can reduce the quality and quantity of wildlife habitat.

Pets can also have a negative impact to native wildlife. Cats hunt and kill bird and small mammals. Dogs that are allowed to roam can chase, injure, or kill wildlife. This can result in areas becoming unavailable to wildlife.

Approximately 8,000 acres within the TPA is also managed by the National Guard for military maneuvers and training. Some helicopter-based training also occurs there.

Recreation use is well established in the TPA. Primary recreation activities include motorized OHV uses (ATV, motorcycle) and non-motorized uses (hiking, jogging, horseback riding, mountain biking, etc.).

The Scratchgravel Hills contains precious and base metals in both hard rock and placer deposits. Over the years there have been a large number of patented and unpatented mining claims distributed throughout the area. Currently, only a few claims are maintained but increases in mineral prices could lead to increased or renewed mining activity.

In the TPA, there are eight powerlines and six pipelines. There are no existing communication sites in the TPA and, in the future, communication sites on BLM lands will be restricted to existing sites. No future communication sites are expected on BLM lands in the TPA but could occur on private or other public lands. There is the potential for future powerlines and pipelines to be built in this TPA.

There are approximately 26 rights-of-way (ROW) in the TPA and applications for ROW permits to access private property or for commercial development are likely to increase in the future. As a result, public access to BLM lands could increase. Fewer ROWs would be expected under Alternative A because all BLM roads would remain open under this alternative. Alternative B would be expected to have fewer ROWs than Alternative C but more than Alternatives A and D. Alternative C would be expected to have the most ROWs and, of the action alternatives, Alternative D would have the fewest.

From 1981-2004 there have been 14 wildland fires that burned 65 acres of BLM lands (it is unknown how many acres burned in the entire TPA). Eleven of the fires were identified as human-caused and these fires burned the majority of the BLM acres (54). There has been one fuels reduction treatment that consisted of grinding small to medium size understory trees on 150 acres in the Scratchgravel Hills. Timber harvest has occurred on approximately 133 acres of BLM lands in the TPA over the last 17 years. In the foreseeable future, approximately 1,500-2,000 acres of BLM lands will likely be treated in the Scratchgravel Hills to thin dense, overstocked stands of dry Douglas fir and ponderosa pine as well as remove conifer encroachment from meadows. This would improve habitat for dry forest species. Vegetative treatments on BLM lands have had minor effects to wildlife habitat in the TPA. However, timber harvest and development on private lands has substantially altered the landscape and caused a substantial decline in the quality and quantity of wildlife habitat in the TPA.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the TPA. Motorized activities play a large role in the distribution of noxious weeds. The cumulative effects of the spread of noxious weeds from open roads would be greater under Alternative A than all other alternatives. Alternative A would result in more wildlife habitat being lost or degraded due to noxious weed infestations compared to the action alternatives. Alternative B would have fewer open roads than Alternatives A and D resulting in fewer infestations of noxious weeds. Alternative C would close the most roads and would have the fewest cumulative effects from loss of habitat due to noxious weeds of all alternatives. Open roads and development adjacent to BLM lands and the substantial amount of public use this area receives would still allow for the spread of noxious weeds.

Fragmentation of BLM lands in the TPA (only 11 percent of the TPA is in BLM ownership); open roads on BLM (52 miles), private (about 581 miles), and other public lands (about 60 miles); as well as adjacent residential development has reduced the quality of wildlife habitat within the TPA. Roads and development within the TPA can cause disturbance to wildlife along with fragmentation and loss of habitat. Roads are associated with nearly every type of activity that has the potential to occur in the TPA including; vegetation treatments, timber salvage, mining, access to private lands (ROWs), fire suppression, powerline corridors and recreation. Open roads in the Planning Area would likely increase due to development and management of private lands. Alternative A would have the greatest negative cumulative effects to wildlife and wildlife habitat from open roads with 52 miles of open roads. Alternative B would have fewer negative cumulative effects with 9.8 miles of open road than Alternatives A and D (22 miles) but more than Alternative C (7 miles).

Of the action alternatives, Alternative C would have the most beneficial cumulative effects by reducing habitat fragmentation, restoring habitat, and reducing disturbance. Alternative B would be more beneficial than Alternatives A and D but less than Alternative C.

Historic and recent timber cutting (mostly on private lands), past mining activity and firewood gathering in the TPA has reduced the amount of suitable snag habitat for cavity nesting species and the area is snag deficient. Alternative A would allow a substantial amount of access to the area for firewood cutting. This could continue to prevent snag recruitment for snag dependant species and minimize the amount of down woody material. Alternative B would protect more snag and down wood habitat from loss due to firewood cutting than Alternatives A and D but would protect less of this habitat type than Alternative C.

In the Helena TPA, open habitat of grasslands and shrublands along with high road densities in both the Decision and Planning Areas have prevented BLM lands from providing suitable security habitat for big game during the hunting seasons. Under Alternatives A and D, there would be no security habitat in the TPA in the Decision Area and there would be no security habitat in the future. Alternatives B and C would provide some security habitat for big game (257 and 404 acres, respectively). Security habitat would still be limited on private (unless closed to hunting) and other public lands.

There would be no differences in cumulative effects from travel planning with any alternative for core/subcore habitat or wildlife movement corridors in the Helena TPA. Fragmentation of habitat due to development, roads, and disturbance has caused the greatest impact on the amount and quality of core/subcore habitat and wildlife movement corridors. Only 11 percent of the TPA is considered core/subcore habitat and the majority of this is on Forest Service lands.

The cumulative effects of high road densities would continue to negatively affect wildlife species during the breeding season more under Alternative A than under the action alternatives. Alternatives B and C would have the most beneficial cumulative effects to wildlife during the breeding season compared to Alternative D and, especially, Alternative A.

FISH

For the sake of this discussion, “open” roads include roads that are open with seasonal restrictions as well as roads that are open yearlong. Roads identified as “closed” within 300 feet of streams also include roads that would be “decommissioned” in these areas by alternative. Effects to water quality described in the Water Resources section would affect fish populations and fish habitat quality. Analyses described and tabulated in the Water Resources section are referred to in the context of effects to fish in the discussion below.

Effects of Alternative A

Under Alternative A, the Helena TPA would have substantially more open roads (52 miles) compared to the action alternatives. Roads can have a wide range of effects on fish and fish habitat. These effects would include, but are not limited to, increased sedimentation from road construction and vehicle use, increased runoff, changes in surface water and drainage patterns from stream crossings, conduits for noxious weeds, loss of riparian vegetation, potential decreases in stream shading that could lead to water temperature increases, and changes in local fish populations when culverts are impassable and limit fish migration.

Watershed (or hydrologic) function can be used as an indicator of relative risk or impacts to fish habitat (Doppelt et al. 1993). Generally, watersheds with high road densities often have the largest negative effects on fish and aquatic resources. To determine the effects on watershed function, a moving windows analysis was conducted on BLM lands to look at the miles of roads that would be decommissioned and removed from the landscape for each alternative. During this analysis, it was assumed that even though closing roads would improve watershed function, closed roads would remain on the landscape and could still have negative impacts to water quality and prevent or impede the restoration of riparian vegetation. Under all alternatives, there would be 461 acres with low road density on BLM lands in the TPA (Table 4-49). Alternatives A and D would have nearly similar acres with moderate road density (1,446 and 1,484 acres, respectively), which would be less than Alternatives B (1,623 acres) and C (1,539 acres). All alternatives would have similar acres with high road density, ranging from 8,117 to 8,294 acres. This comparison shows relatively little difference between Alternative A and the action alternatives. Because the action alternatives close more roads, they would be expected to

have fewer negative effects to fish habitat than Alternative A.

For this discussion, road miles within 300 feet of fish bearing streams on BLM lands would be considered an indicator of direct effects to fish habitat and fish populations. Under all alternatives, there would be 0 miles of closed road and 1.7 miles of open road within 300 feet of fish bearing streams on BLM lands. All miles of open roads would be adjacent to streams (Greenhorn Creek and Skelly Gulch) with BLM special status species (westslope cutthroat trout). There is no difference between alternatives in terms of direct effects to fish habitat in the Helena TPA.

Perennial non-fish bearing streams contribute to fish habitat indirectly by serving as conduits of watershed products (water, sediment, nutrients, contaminants, and in some cases woody material) to fish bearing streams. Under Alternative A, there would be 0 miles of closed road and 5.3 miles of open road within 300 feet of perennial non-fish bearing streams on BLM lands in the TPA. Alternative A would have more miles of open road adjacent to perennial streams than Alternative B (1.2 miles) Alternative C (1.1 miles) and Alternative D (2.8 miles). Alternative A would have the greatest negative impacts to fish and aquatic resources from open roads.

Effects of Alternative B

Under Alternative B, the Helena TPA would have substantially fewer open roads (9.8 miles) compared to Alternative A (52 miles). Alternative B would have more open roads than Alternative C (7 miles) but less than Alternative D (22 miles).

All alternatives would have the same acreage of BLM lands in the low road density category, and relatively similar acreages of land in moderate and high road density categories (Table 4-49). However, Alternative B would provide the greatest acreage in the moderate road density category, and the lowest acreage in the high road density category of all alternatives. Alternative B would also improve watershed function and slightly lessen impacts to fish compared to Alternative A because the closed roads under Alternative B would make a slight contribution to improved watershed function.

Effects associated with roads within 300 feet of fish bearing streams (Greenhorn Creek and Skelly Gulch) on BLM lands under Alternative B would be the same as under Alternative A.

Alternative B would contribute fewer indirect effects to fish habitat associated with roads within 300 feet of perennial non-fish bearing streams on BLM lands than Alternative A. Under Alternative B there would be 4.1 miles of closed road and 1.2 miles of open road within 300 feet of perennial non-fish bearing streams on BLM lands in the TPA. Under Alternative A there would be no closed roads and 5.3 miles of open road in these riparian areas.

Overall, Alternative B would have fewer negative effects to fish and aquatic habitats from increased fine sediment inputs, loss of large woody material and loss of riparian vegetation than Alternative A.

Effects of Alternative C

Under Alternative C, the Helena TPA would have substantially fewer open roads (7.0 miles) compared to Alternative A (52 miles). Alternative C would also have fewer open roads than Alternative B (9.8 miles) and Alternative D (22 miles).

All alternatives would have the same acreage of BLM lands in the low road density category, and relatively similar acreages of land in moderate and high road density categories (Table 4-49). However, Alternative C would improve watershed function and slightly lessen impacts to fish compared to Alternatives A and D because the mileage of closed roads under Alternative C (compared to any other alternative) would contribute to improved watershed function.

Effects associated with roads within 300 feet of fish bearing streams (Greenhorn Creek and Skelly Gulch) on BLM lands under Alternative C would be the same as under Alternatives A and B.

Indirect effects associated with roads within 300 feet of perennial non-fish bearing streams on BLM lands under Alternative C would be the same as described under Alternative B.

Alternatives C and B would have similar benefits to fish habitat and would have fewer negative effects to fish and aquatic habitats from increased fine sediment, loss of large woody material and loss of riparian vegetation compared to Alternative A.

Effects of Alternative D

Under Alternative D, the Helena TPA would have fewer open roads (22 miles) compared to Alternative A (52 miles). Alternative D, however, would have more open roads than Alternative B (9.8 miles) and Alternative C (7 miles).

All alternatives would have the same acreage of BLM lands in the low road density category, and relatively similar acreages of land in moderate and high road density categories (Table 4-49). However, Alternative D would have the greatest acreage of BLM lands in the high road density category and the lowest acreage in the moderate road density category of the action alternatives. Still, Alternative D would contribute to improved watershed function and slightly lessen impacts to fish compared to Alternative A because approximately 30 miles of road would be closed or decommissioned in this alternative compared to all roads being open under Alternative A.

Effects associated with roads within 300 feet of fish bearing streams (Greenhorn Creek and Skelly Gulch) on

BLM lands under Alternative D would be the same as under all other alternatives.

Alternative D would contribute fewer indirect effects to fish habitat associated with roads within 300 feet of perennial non-fish bearing streams on BLM lands than Alternative A. Under Alternative D there would be 2.5 miles of closed road and 2.8 miles of open road within 300 feet of perennial non-fish bearing streams on BLM lands in the TPA. While it would be an improvement over the current condition, Alternative D would contribute more indirect effects to fish habitat from these streams than either Alternative B or Alternative C.

Alternative D would have more adverse effects to fish and aquatic habitats from increased fine sediment, loss of large woody material and loss of riparian vegetation than Alternatives B and C but less than Alternative A.

Cumulative Effects on Fish

The Helena TPA supports a variety of native and introduced fish species. One of the major human influences to fish in the TPA has been the introduction of non-native trout species including rainbow trout, brook trout, and brown trout throughout the TPA. Rainbow trout have hybridized with the native westslope cutthroat trout in many streams. Brook trout and brown trout have displaced the native cutthroats in other streams; especially those altered by sedimentation and increased water temperatures brought on by human activities.

Like much of the West, the Helena Valley has been experiencing steady human population growth. This trend is expected to continue, along with increased recreational use of this travel planning area. The majority of BLM managed routes for the Helena TPA are located in or adjacent to the Scratchgravel Hills and Birdseye area. Scratchgravel Hills is an island of undeveloped hills surrounded by residential development. Residential development has tripled from 300 residential homes in 1984 to over 1,000 homes today. Additional development is ongoing. There are no perennial streams in the Scratchgravel Hills portion of the TPA that could be affected by this development. However, development and urbanization have had substantial impacts to watershed function in this TPA.

Agricultural activities from farming and ranching also contribute increases in nutrients, sedimentation, and loss of aquatic habitats. Many streams in the TPA have been impacted by historic and on-going livestock grazing that breaks down streambanks, widens channels, removes vegetative cover, and causes an increase in fine sediment and nutrients.

The Scratchgravel Hills contains precious and base metals in both hard rock and placer deposits. Over the years there have been a large number of patented and unpatented mining claims distributed throughout the area. Although some streams in the TPA may have been impacted by historic mining activities, it is expected that

the amount of aquatic habitat impacted has been minimal due to the lack of streams in this portion of the TPA.

Fires, floods, and drought have historically affected fish habitat in the TPA. These disturbances can cause a pulse of sediment or may temporarily reduce the quality of fish habitat in some watersheds while leaving other streams largely unaffected. Natural disturbances are typically followed by periods of stability, during which fish habitats and populations recover. Population recovery in disturbed streams may be facilitated by fish immigration from nearby drainages less affected by the catastrophic event. From 1981-2004 there have been 14 wildland fires that burned 65 acres. Eleven of the fires were identified as human-caused and these fires burned the majority of the acres (54). There has been one fuels reduction treatment that consisted of grinding small to medium size understory trees on 150 acres in the Scratchgravel Hills. This project had no effects to aquatic habitats.

Timber harvest can alter the recruitment of large woody debris, reduce canopy closures, and result in an increase in fine sediment to streams. Timber harvest along with associated roads can contribute substantially to the overall cumulative effects in forested watersheds. Timber harvest has occurred on approximately 133 acres of BLM lands in the TPA over the last 17 years. In the foreseeable future, approximately 1,500-2,000 acres will be treated in the Scratchgravel Hills to thin dense, overstocked stands of dry Douglas fir and ponderosa pine as well as remove conifer encroachment from meadows. This would have no impacts to aquatic habitats or species. Vegetative treatments on BLM lands have had minor effects to aquatic habitats in the TPA. However, timber harvest and development on private lands have substantially altered the landscape and may have caused a decline in the quality and quantity of aquatic habitat in the TPA.

Roads are another major contributor of sediment to streams and a major problem with regards to cumulative watershed effects. Roads and trails can have localized effects on nearby stream segments or at stream crossing sites, especially fords. In some cases, effects are more extensive and may impair fish habitat for longer reaches of streams. Cumulatively, roads degrade aquatic habitat due to sedimentation from road construction and vehicle use, increased runoff, changes in surface water and drainage patterns from stream crossings, loss of riparian vegetation, loss of large woody material, and alteration of stream channels and floodplains. Roads can cause changes in local fish populations when culverts are impassable and limit fish migration. Alternative A would have more negative cumulative effects to watersheds and individual streams due to roads than the action alternatives. Alternative B would have fewer negative cumulative effects than Alternatives A and D but more than Alternative C. Alternative B would improve overall watershed functions as well as improve habitat in individual streams more than Alternatives A and D but less than

C. Alternative C would have the greatest beneficial effects to fish habitat of all alternatives.

SPECIAL STATUS PLANTS

Effects Common to All Alternatives

Ground-disturbing activities from road construction and maintenance, as well as road use by vehicles can affect special status plant populations and habitat. These activities can reduce sensitive plant species through disturbance to individual populations, increasing competition from invasive species, and reducing habitat connectivity. Closure of roads and trails can improve or maintain sensitive plant populations or habitat by reducing avenues of noxious weed spread, maintaining habitat connectivity, and improving pollinator habitat. Road and trail restrictions have the same effects but to a lesser degree.

Effects of the Alternatives

Under Alternative A, 52.2 miles of roads and trails would remain open. The effects would continue as described in the Effects Common to All Alternatives section.

Under Alternative B, 9.8 miles of roads and trails would remain open, 36 miles of roads and trails would be closed, and 6.5 miles would be decommissioned. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The seasonally restricted roads would reduce weed spread a limited amount. Alternative B would reduce risk to and benefit special status plants compared to Alternative A.

Under Alternative C, 7 miles of roads and trails would remain open, 40.7 miles of roads and trails would be closed, and 4.6 miles would be decommissioned. As with Alternative B, on the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The restricted roads would reduce weed spread a limited amount. Alternative C would benefit and reduce the most risk to special status plants the most of all alternatives because it would eliminate disturbance, vehicular use, and spread of noxious weeds on the most road miles.

Under Alternative D, 21.9 miles of roads and trails would remain open, 27.7 miles of roads and trails would be closed, and 3.1 miles would be decommissioned. On the open roads, effects would continue as described in the Effects Common to All Alternatives section. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for special status plants and their pollinators. The restricted roads would reduce weed spread a limited amount. Alternative D would benefit and reduce risk to special status plants compared to Alternative A, but would pose more risk compared to Alternatives B and C.

Cumulative Effects on Special Status Plants

Under all alternatives there are a number of past, present, and reasonably foreseeable future actions that affect special status plant populations.

Livestock grazing will continue in the area and has the potential to impact sensitive plant populations and habitat. On public lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain sensitive species populations and habitat. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided. Conditions may improve or degrade as management changes.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, sensitive plants would benefit from the reduced competition. Use of herbicides for noxious weed control could cause mortality to special status plants if individual plants are inadvertently sprayed.

Recent and anticipated subdivision growth on private lands will lead to more road construction and maintenance. More roads and development will reduce sensitive plant species habitat and in some cases individual populations. Additionally, subdivisions have the potential to disrupt the connectivity of plant habitat and populations as well as disturbing or eliminating pollinators needed by sensitive species. Some sensitive species that require soil disturbance may benefit.

Timber sale activity disturbance can destroy or degrade sensitive plant habitat. On public lands, projects would be designed to avoid, mitigate, or enhance sensitive plant habitats. The disturbance associated with timber harvest activities does have the potential to increase noxious weed spread which degrades sensitive species habitat and individual plant populations.

The fuels reduction project scheduled for the Scratch-gravel Hills is not anticipated to have any adverse effects on special status plants. Treatments would be designed to minimize surface disturbance in sensitive plant habitat. Additionally, treatment would improve habitat in some areas by opening up parks and edges where trees have expanded into grassland soils and trees have thickened to the point of closing canopies.

At the scale of the entire Helena TPA (all land ownerships), the BLM travel plan alternatives would have slightly variable contributions to cumulative effects on special status plants. Under Alternative B adverse effects on special status plants would be slightly reduced compared to Alternative A because 5.6 percent of all roads in the TPA would be closed or decommissioned. Alternative C would provide the most benefits of all alternatives as 6.5 percent of all roads in the TPA would be closed or decommissioned. Alternative D would provide slightly

more benefits than Alternative A but slightly fewer benefits than either Alternatives B or C as 4.4 percent of all roads in the TPA would be closed or decommissioned. Because BLM lands make up only 11 percent of all lands in the TPA, activities on non-BLM lands would play a greater role in determining the status of special status plants.

WILDLAND FIRE MANAGEMENT

Travel planning alternatives were analyzed to determine whether they could result in impacts on wildland fire management, causing change to any of the following indicators:

- Fire regime condition class (FRCC)
- Firefighter and public safety
- Reducing threat to Wildland Urban Interface (WUI)

Effects Common to All Alternatives

Public road access during the fire season provides opportunities for human-caused fires either due to catalytic converters on vehicles igniting dry vegetation, or due to some types of human activities. Roads that are closed to public access reduce the risk of human-caused fire starts in those areas.

Decommissioned roads and roads that are closed and not regularly maintained for navigability reduce access for fire suppression. Closed roads may become impassible due to vegetation regrowth, downfall of trees, or severe erosion. Some roads may be closed with earthen berms or fallen trees and would need to be physically manipulated to make them useable for vehicles again. These roads would extend firefighting response time and have negative impacts on efforts to reduce wildland fire threat to WUI areas and firefighter and public safety. In an emergency fire suppression situation, any navigable closed roads needed for fire suppression would be used immediately. Non-navigable closed roads could also be used if deemed to be needed for fire suppression, after needed improvements are made to make those roads useable. Planning and implementation of fuels reduction treatments could occur in association with closed roads if variances for temporary road use were to be allowed. Variances would be subject to internal BLM review.

In the context of fuels reduction projects, availability of open roads is important to facilitating fuels project location as well as increasing project feasibility and decreasing costs. Open roads also facilitate spread of noxious weeds by transporting weed seed on vehicles and their tires. Presence of large noxious weed populations could delay or cause fuels projects to be cost-prohibitive due to the fact that the weeds may have to be treated before and/or after the fuels treatment. Also, some applications of fuel treatments (e.g., prescribed fire) may promote the spread of some weeds. The presence of weeds and non-

native species are indicators that FRCC has departed from historical conditions.

Noxious weeds and non-native invasive species are well established and spreading in the Helena TPA.

Effects of Alternative A

Under Alternative A all existing routes in the Helena TPA would continue to be open yearlong (52.2 miles) to wheeled motorized users. Alternative A would allow for the greatest flexibility between alternatives for access for suppression purposes. Fuels project feasibility would be highest under this alternative. However, public access during the fire season would be the greatest under this alternative and would provide the most opportunities for human-caused fire starts.

The distribution of noxious weeds could be the greatest under Alternative A with the most open roads and noxious weeds already well established. This would contribute to reduced feasibility of fuels projects more than under any other alternative.

Effects of Alternative B

Under Alternative B, wheeled motorized travel (9.8 miles) would be restricted to the following four areas in the Scratchgravel Hills: routes leading to five non-motorized trailheads; a short out-and-back route off of Norris Road; a loop route between Head Lane and Echo Lane; and all existing public access rights-of-way. Roads in these four areas would be open yearlong.

Alternative B would limit the flexibility for access for suppression purposes, and fuels project feasibility would go down compared to Alternative A due to the fact that access would be limited to 9.8 miles of road. Of the 42.5 of closed and decommissioned roads, 6.5 miles would be decommissioned. The risk of human-caused fires associated with motorized use would be limited compared to Alternative A, due to an 81 percent decrease in miles of road open to motorized public travel.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because more roads would be closed under this alternative, Alternative B should help reduce the spread of noxious weeds and may make fuels treatments more feasible than under Alternative A, reducing FRCC departure.

Effects of Alternative C

Alternative C would restrict wheeled motorized travel to five non-motorized trailheads in the Scratchgravel Hills. This alternative provides the least number of wheeled motorized routes in the Helena TPA (7.0 miles) but provides an extensive network of routes for non-motorized enthusiasts.

Alternative C would limit the flexibility for access for suppression purposes, and fuels project feasibility would go down due to the fact that access would be limited to 7

miles of road. Of the 45.2 miles of closed roads, 4.6 miles would be decommissioned. The risk of human-caused fires associated with motorized use would be reduced more than under either Alternatives A or B, due to an 87 percent decrease in miles of open road compared to Alternative A. However, this may promote more non-motorized users to a concentrated area, increasing the odds for a human-caused fire to occur by another ignition source.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because more roads would be closed than under any other alternative, Alternative C should help reduce the spread of noxious weeds and may make fuels treatment more feasible than any other alternative, reducing FRCC departure.

Effects of Alternative D

Under Alternative D, 21.9 miles of open routes would be available yearlong for wheeled motorized use and 3.1 miles of the 30.8 of closed roads would be decommissioned. Alternative D would be more flexible than alternatives B and C, but again it would limit flexibility for access for suppression purposes and fuels project feasibility would go down compared to Alternative A. The risk of human-caused fires associated with motorized use would be reduced compared to Alternative A but would be greater than under Alternatives B and C, due to a 58 percent decrease in miles of open road compared to Alternative A.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because an intermediate number of road miles would be closed under this alternative, Alternative D should help reduce the spread of noxious weeds and may make fuels treatments more feasible than under Alternative A, but would increase weed spread and potentially make projects less feasible than Alternatives B or C.

Cumulative Effects on Wildland Fire Management

Effects on wildland fire management associated with any of the BLM travel plan alternatives would be overshadowed by reasonably foreseeable uncharacteristic fire, continued fire suppression made necessary by WUI and intermingled landownership, and large-scale insect infestations and disease outbreaks that would continue to increase fuel loading for the planning period.

Revision of the Helena National Forest Plan could result in more or less treatment of adjacent areas. Because no decision has been made, the effects are not known. Wildland fire management on USFS lands will be determined in the plan decision, particularly areas where wildland fire use (management of naturally ignited wildland fires to achieve resource objectives) may occur. BLM would need to coordinate with USFS on all wild-

land fire use actions and events. Wildland fire use on USFS lands could affect FRCC on BLM lands. USFS lands make up 25 percent of all lands in the TPA so activities there would likely have more influence on future fire characteristics than activities on BLM lands (10.6 percent of all lands in TPA).

Additionally, decisions to increase the level of wildland fire use, prescribed fire, or open burning by public could impact the BLM's ability to use wildland fire and prescribed fire due to air quality concerns and requirements. This could postpone or eliminate BLM fuel reductions or treatments to improve FRCC.

Access is a critical component of wildland fire suppression. In some cases, access to public lands is being reduced by adjacent landowners gating or closing roads, which could hamper wildland fire suppression efforts and pose a risk to public and firefighter safety. Reducing access would also increase the potential for larger fires to occur due to an increase in time needed to access a fire and control it. Time needed to move in crews would be extended, and the ability to effectively apply and place resources (e.g., engines, water tenders, etc.) would be limited.

Effects on wildland fire management, including FRCC and firefighter and public safety due to management accomplished by other landowners may affect wildland fire management on public lands. When activity fuels (i.e. slash from logging) are not treated adequately, fuel hazard could increase on adjacent lands which could affect fire intensity and severity on public lands. When adjacent landowners treat fuels or implement fire mitigation plans in the WUI, fires are easier to suppress and firefighter safety is increased. In this TPA, activities on private lands (59 percent of all lands in TPA) would have more influence on future fire characteristics in the area overall than activities on BLM lands (10.6 percent of all lands in TPA). Human population increases and subsequent development are likely to expand the WUI and could alter forest management, taking the emphasis off restoring historic composition and structure and focusing more on fuels reduction.

CULTURAL AND PALEONTOLOGICAL RESOURCES

Effects Common to All Alternatives

Alternative-specific risks or impacts to cultural and paleontological resources are difficult to discern due to a lack of extensive site-specific knowledge about the presence of these resources in a given TPA. By designating open routes, limiting open-country travel, and closing some routes, inadvertent discovery of cultural and paleontological resources and vandalism to them is reduced. Higher road densities in a given area would allow greater access to more land on the average, but that does not imply greater amounts of vandalism, since the vehicles would remain on designated routes.

VISUAL RESOURCES

Effects Common to All Alternatives

Roads (temporary or permanent) may affect visual quality. Roads that remain open for public use may impact visual qualities where noticeable. The quantity of open roads would also influence sensitivity levels since with more open roads, more areas would generally be viewed by more members of the public. Closing or decommissioning roads would generally reduce effects to visual resources and reduce sensitivity levels because fewer members of the public would generally be accessing and viewing areas with closed roads.

Effects of the Alternatives

Under Alternative A, all 52.2 miles of BLM road would remain open, thereby providing for the greatest level of impact to visual resources of all alternatives.

Under Alternative B there would be 9 miles of open road, 36 miles of closed road, and 6.5 miles of decommissioned road. Road closures and decommissioning under this alternative would reduce effects on visual resources compared to Alternative A. Under Alternative C there would be 7 miles of open road, 40.7 miles of closed road, and 4.6 miles of decommissioned road. Alternative C would have fewer adverse effects and would improve visual resources the most of all alternatives.

Under Alternative D, there would be 21.9 miles of open road, 27.7 miles of closed road, and 3.1 miles of decommissioned road. Alternative D would improve visual resources compared to Alternative A, but would have more adverse effects than Alternatives B and C.

Cumulative Effects on Visual Resources

Under all alternatives, most activities on BLM lands would generally not adversely affect visual resources to unacceptable degrees because discretionary activities on BLM lands would be required to meet Visual Resource Management objectives within individual project areas. The Scratchgravel Hills fuels reduction project currently being planned would be designed to meet VRM objectives.

Activities on non-BLM lands, particularly activities near BLM lands associated with residential development, urbanization, or vegetation management, could have adverse cumulative effects on visual resources on BLM lands because BLM VRM objectives would obviously not apply to non-BLM activities.

LIVESTOCK GRAZING

Effects Common to All Alternatives

Roads and trails can potentially affect livestock grazing management. Roads and trails often act as avenues of noxious weed spread. Noxious and invasive weeds can reduce the quantity and quality of forage available for

livestock. Users of roads and trails can cause management problems for livestock permittees when they leave gates open at fences, vandalize range improvements, or harass livestock either purposely or unintentionally.

Closure of roads and trails can improve or maintain the forage base by reducing vectors of noxious weed spread. Additionally, road and trail closures can reduce management conflicts. On the other hand, closures may increase permittees' time requirements if and when work has to be conducted with horses or afoot. Permittees could minimize effects of closed roads on grazing management by seeking variances from the BLM for temporary use of specific closed roads.

Effects of the Alternatives

Under Alternative A, 52.2 miles of roads and trails would remain open. Effects associated with these roads would be as described above. All action alternatives would close or decommission more roads and trails than Alternative A. As more roads and trails are closed, noxious and invasive weed spread along with multiple user conflicts would be reduced. On the other hand, permittee management time may increase. Consequently, more effects as described under the Effects Common to All Alternatives section would occur under Alternative C (7 miles open, 45.3 miles closed or decommissioned) than under any other alternative. Alternative B (9.8 miles open, 42.5 miles closed or decommissioned) would produce fewer effects than Alternative than C, but more than Alternative A or Alternative D (21.9 miles open, 30.8 miles closed or decommissioned). Alternative D would have fewer effects than Alternatives B or C, but more than Alternative A.

Cumulative Effects on Livestock Grazing

A number of past, present, and reasonably foreseeable future actions affect livestock grazing at the scale of the entire Helena TPA. Livestock grazing will continue in the area and has the potential to impact forage quality and quantity. On public lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain forage quality and quantity. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, forage conditions would benefit.

The fuels reduction project scheduled for the Scratchgravel Hills is not anticipated to have any adverse effects on livestock grazing.

Because BLM lands make up only 11 percent of all lands in the Helena TPA, all of the BLM travel plan alternatives would have a minimal contribution to cumula-

tive effects on livestock grazing at the scale of all lands in the Helena TPA.

MINERALS

Effects Common to All Alternatives

Road closures and decommissioning could affect access to locatable minerals in areas of moderate or high mineral potential. Operators would be required to seek travel variances from the BLM to use motor vehicles to conduct mineral exploration on closed roads, or to conduct exploration on seasonally restricted routes during the season of closure. Decommissioned roads could not be used for motorized exploration. Travel management

provisions that require a permit or variance could result in reducing access to mining claims or interfere with the ability to conduct exploration work for some operators. Historic knowledge of mineralized areas associated with “closed” roads may be lost after long periods of time if no exploration occurs there. Additional costs and time could be required for exploration and development of mining projects associated with closed or decommissioned roads. Impacts of road closures or decommissioning in areas with low mineral potential would not be substantial to mineral development.

Effects of the Alternatives

Effects of the alternatives for the Helena TPA on access to mineralized areas are summarized in **Table 4-54**. Alternative A for the Helena TPA would not impact any mineralized areas as all roads would be left open.

Alternative B for the Helena TPA would close 56 percent and would decommission 12 percent of roads in high mineral potential areas. An additional 2 percent of the roads in moderate mineral potential areas would be closed under this alternative (**Table 4-54**). Alternative B would have more impacts than Alternative A.

Alternative C of the Helena TPA would close 72 percent and decommission 9 percent of the roads in areas with high mineral potential. Two percent of the roads in areas with moderate mineral potential would be closed under this alternative for this area (**Table 4-54**). Alternative C would have the most potential to affect access to mineralized areas of all the alternatives.

Alternative D of the Helena TPA would close 49 percent and decommission 6 percent of the roads in areas with high mineral potential. Two percent of the roads in areas with moderate mineral potential would be closed in this alternative in this TPA (**Table 4-54**). Alternative D would have more impacts than Alternative A, but less than Alternatives B and C.

Cumulative Effects on Access to Mineralized Areas

No other past, present, or reasonably foreseeable future actions in the Helena TPA would adversely affect mineral availability or access.

RECREATION

Effects of travel plan alternatives on Recreation in the Helena TPA are described qualitatively below.

Effects of Alternative A

Under Alternative A, all existing routes in the Helena TPA would continue to be open yearlong (52.2 miles) to wheeled motorized users. Cross-country snowmobile travel would continue to be allowed as well as travel on all routes. Alternative A provides the greatest opportunities for motorized users, and the least for non-motorized users (mountain bikers, hikers, cross-country skiers,

Mineral Potential	Open Miles (%)	Seasonally Restricted Miles (%)	Closed Miles (%)	Decom Miles (%)
Alternative A				
High	48.4 (93%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Moderate	1.0 (2%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Low	2.8 (5%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Total Miles = 52.2				
Alternative B				
High	12.9 (25%)	0.0 (0%)	29.1 (56%)	6.5 (12%)
Moderate	0.0 (0%)	0.0 (0%)	1.0 (2%)	0.0 (0%)
Low to none	0.7 (1%)	0.0 (0%)	2.0 (4%)	0.0 (0%)
Total Miles = 52.2				
Alternative C				
High	6.2 (12%)	0.0 (0%)	37.6 (72%)	4.6 (9%)
Moderate	0.0 (0%)	0.0 (0%)	1.0 (2%)	0.0 (0%)
Low to none	0.7 (1%)	0.0 (0%)	2.0 (4%)	0.0 (0%)
Total Miles = 52.2				
Alternative D				
High	20.0 (38%)	0.0 (0%)	25.9 (49%)	3.1 (6%)
Moderate	0.0 (0%)	0.0 (0%)	1.0 (2%)	0.0 (0%)
Low to none	1.9 (4%)	0.0 (0%)	0.8 (1%)	0.0 (0%)
Total Miles = 52.7 (Includes Proposed New Construction)				

Mineral Potential areas have been delineated by the Montana Bureau of Mines and Geology (MBMG)

snowshoers, etc.) of all alternatives. Conflicts between motorized and non-motorized users would be expected to increase under this alternative.

Effects of Alternative B

Under Alternative B, wheeled motorized travel (9.8 miles) would be restricted to four areas in the Scratchgravel Hills: routes leading to five non-motorized trailheads; a short out-and-back route off of Norris Road; and all existing public access rights-of-ways. Roads in these three areas would be open yearlong. Cross-country snowmobile use would be allowed, as well as snowmobile travel on all existing routes during the season of use (12/2-5/15), conditions permitting. Conflicts between non-motorized users (cross-country skiers, snowshoers) and snowmobilers would be expected to continue or increase as a result.

The effects of closing the Scratchgravel Hills interior area to motorized vehicle uses yearlong would reduce use violations, risks of human caused fires, conflicts with proximity residents and law enforcement incidents.

Effects of Alternative C

Alternative C would restrict wheeled motorized travel to five non-motorized trailheads in the Scratchgravel Hills. This alternative would provide the least number of wheeled motorized routes in the Helena TPA (7.0 miles), but would provide an extensive network of routes for non-motorized enthusiasts. Under Alternative C, no snowmobile use would be allowed, including the trailhead access routes.

Although closing the entire Scratchgravel Hills area to both motorized and non-motorized recreational uses after dark (dusk to dawn) yearlong would best protect the area from violations. Management and law enforcement demands would increase compared to Alternatives A, B, and D. Impacts on legitimate public users would be negligible as their use of the area after dark is minimal.

Effects of Alternative D

Under alternative D, 21.9 miles of open routes would be available yearlong for wheeled motorized use. Alternative D would provide the greatest opportunities for motorized users, and the least for non-motorized users. Cross-country snowmobile use would be allowed, as well as travel on all existing routes during the season of use (12/2-5/15), snow conditions permitting. Under Alternative D, conflicts between non-motorized users (cross-country skiers, snowshoers) and snowmobilers would be expected to continue or increase as a result.

Cumulative Effects on Recreation

Cumulative effects of travel plan alternatives are discussed below in the context of effects of past, present, and reasonably foreseeable future activities in the Helena TPA.

Under Alternative A, current travel management of the Scratchgravel Hills coupled with increased projections in area use and residential developments nearby would increase the potential for greater conflicts between motorized and non-motorized users. Projected fuel treatments, mining activity and inholding developments could adversely impact the natural setting and user experiences. Special Recreation Use Permits (SRP) events (folging, foot racing, horseback riding and mountain biking) would continue although social conflicts could increase. The three trailhead sites would continue to be maintained and user demands would continue to increase. Motorized users would be least impacted under this alternative.

Under Alternative B, closing all major motorized travel routes would greatly enhance non-motorized opportunities during the spring/summer and fall seasons and reduce user violations. Motorized opportunities would be greatly reduced and riders would be displaced to other areas. Increased demands on the area due to additional residential developments, rights-of-way permits, fuel treatments, and possible mining activities would present fewer social conflicts and management concerns given these additional restrictions. Unregulated snowmobile uses in the area could perpetuate future conflicts with non-motorized users and nearby residents during limited periods of favorable snow conditions. SRP events (folging, foot racing, horseback riding and mountain biking) would be enhanced and visitor uses at the established trailheads would be expected to increase moderately.

Under Alternative C, motorized travel management restrictions coupled with all other past, present and reasonably foreseeable actions described under Alternatives A and B would best enhance opportunities for non-motorized uses. Conflicts between motorized and non-motorized users would be minimized to the greatest extent while cumulative impacts on motorized users would be the highest. Other impacts would be similar to Alternative B.

Under Alternative D, travel management of the Scratchgravel Hills coupled with increased projections in area use and nearby residential developments would increase the potential for continued conflicts between motorized and non-motorized users. Projected fuel treatments, mining activity and inholding developments could adversely impact the natural setting and user experiences. SRP events (folging, foot racing, horseback riding and mountain biking) would continue although social conflicts could increase. The trailhead sites would continue to be maintained and user demands would continue to increase. Motorized users would be impacted less than under Alternatives B and C, but more than under Alternative A.

TRAVEL MANAGEMENT AND ACCESS

Effects of Alternative A

All existing routes in the Helena TPA would continue to be open yearlong (52.2 miles), providing a greater number of miles to wheeled motorized users than the action alternatives (Table-4-55). Cross-country snowmobile travel would continue to be allowed as well as travel on all routes, resulting in conflicts between non-motorized users (cross-country skiers, snowshoers) and snowmobilers. Non-motorized users would have a lower quality recreation experience due to the lack of separate use areas.

**Table-4-55
Helena TPA Route Management Summary**

Proposed Management	Total Miles			
	Alt A	Alt B	Alt C	Alt D
Wheeled Motorized Routes				
Open Yearlong	52.2	9.8	7.0	21.9
Seasonally Restricted	-	-	-	-
Closed	-	36.0	40.7	27.7
Decommissioned	-	6.5	4.6	3.1
Non-motorized trails ¹	-	42.5	45.3	30.8

¹Non-motorized trails include all existing trails, closed roads, and decommissioned roads.

Under Alternative A, BLM would continue to allow recreational activities, including motorized vehicle use, would continue 24 hours a day within the Scratchgravel Hills. This would allow more illegal activities to occur than under the action alternatives.

The extent of management activities and costs under Alternative A would be mixed. Less personnel time would be required to monitor travel compliance; however, more effort would be required for initial implementation (signing designated routes, installing bulletin boards).

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be minimal under this alternative, given the availability of motorized access. Estimated costs for road/trail maintenance would be highest of all alternatives.

Effects Common to Action Alternatives (B, C, and D)

All action alternatives call for a reduction of open routes in the Birdseye area.

User conflicts would be minimized in the Scratchgravel Hills by providing separate recreational opportunities for wheeled motorized and non-motorized users. This would provide for increased enjoyment for non-motorized recreationists and enhanced road and trail safety among all users of the area.

Illegal activities (underage alcohol use, drug use, vandalism, unauthorized travel, and dumping) in the Scratchgravel Hills would be reduced due to closure of at least 60 percent of the roads to motorized use.

Since the Scratchgravel Hills have historically been open to motorized use, a substantial effort would be required to educate the public on its change in use. BLM would need to enforce road closures through law enforcement actions until such a time when motorized users conform to the new restrictions. New signage would be required under all action alternatives; at designated trailheads, along roads and trails, and at other unauthorized access points originating from bordering private property.

Effects of Alternative B

Motorized wheeled travel in the Scratchgravel Hills would be restricted to designated routes leading to five non-motorized trailheads, and all existing public access rights-of-way. These roads would be managed as Open Yearlong. Alternative B would allow motorized use on 9.8 miles, about 19 percent of the number of open road miles under Alternative A. Alternative B would have 42.5 miles of closed roads that could serve as non-motorized trails, compared to none under Alternative A.

Motorized (wheeled) and non-motorized users would have separate routes and conflicts would be substantially reduced compared to Alternative A.

Route closures across 81 percent of the area would reduce unauthorized travel (illegal off-road use by ATVs and motorcycles) and illegal activities (underage alcohol use, drug use, vandalism, dumping) in the Scratchgravel Hills and elsewhere. With the exception of a few routes needed for residential access, public access would be restricted to non-motorized trailheads.

Cross-country snowmobile use would be allowed, as well as snowmobile travel on all existing routes during the season of use (12/2-5/15), conditions permitting. Conflicts between non-motorized users (cross-country skiers, snowshoers) and snowmobilers would be expected to continue or increase as a result.

The reduction in motorized use in the Scratchgravel Hills would greatly enhance safety for non-motorized users as compared to Alternative A.

The extent of management activities and costs under Alternative B would be mixed. Less personnel time would be required for initial implementation (signing designated routes, installing bulletin boards). However, more effort on the part of the BLM would be required for public education and compliance. Estimated costs for road/trail maintenance would be less than under Alternative A.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would increase under Alternative B compared to Alternative A.

Effects of Alternative C

Alternative C would restrict wheeled motorized travel to five non-motorized trailheads in the Scratchgravel Hills. This alternative would provide the least number of motorized routes in the Helena TPA (7.0 miles), which is about 85 percent fewer miles than Alternative A, and about 30 percent fewer miles than Alternative B.

This alternative would diminish the opportunity for motorized use of the Scratchgravel Hills, but would provide an extensive network of routes for enjoyment by non-motorized enthusiasts. Alternative C would have 6 percent more miles of closed roads that could serve as non-motorized trails than Alternative B, and would have more closed roads than any other alternative. Under Alternative C, no snowmobile use would be allowed, including on the trailhead access routes. This action would eliminate conflicts between snowmobilers and non-motorized winter users (cross-country skiing, snowshoeing).

Under Alternative C, unauthorized travel (illegal off-road use by ATVs and motorcycles) and illegal activities (underage drinking, vandalism, dumping) would be curtailed due to the restriction of motorized vehicles from the interior of the Scratchgravel Hills and closing the area after dark.

By eliminating motorized use within the interior of the Scratchgravel Hills there would be less potential for accident or injury resulting from conflict between user groups.

The five trailhead parking lots may need to be expanded to accommodate the number of vehicles bringing non-motorized users to the area. Since the Scratchgravel Hills have historically been open to motorized use, a substantial effort would be required to educate the public on its change in use. It is expected that the level of education and signage would be comparable to Alternative B, but less than required under Alternative A.

The extent of management activities and costs under Alternative C would be mixed. Less personnel time would be required for initial implementation (signing designated routes, installing bulletin boards). However, more effort on the part of the BLM would be required for public education and compliance. Estimated costs for road/trail maintenance would be the lowest of all the alternatives.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be the greatest under Alternative C than under any other alternative.

Effects of Alternative D

Alternative D would have 21.9 miles of open routes available for yearlong wheeled motorized travel (Table-4-55). This would be 58 percent less than under Alternative A, but 55 and 68 percent more than under

Alternatives B and C, respectively. Road system projects would include reconstructing some segments and constructing new connector routes between other segments. Through the development of interconnecting routes, motorized opportunities under Alternative D would be enhanced compared to Alternatives B and C. Non-motorized users would be accommodated through a network of routes that would be restricted from use by vehicles, ATVs and motorcycles, similar to Alternative B.

Under Alternative D, cross-country snowmobile use would be allowed, as well as travel on all existing routes during the season of use (12/2-5/15), snow conditions permitting. Conflicts between non-motorized users (cross-country skiers, snowshoers) and snowmobilers would be expected to continue or increase as a result.

Under Alternative D, illegal activities in the Scratchgravel Hills (underage alcohol use, unattended campfires, vandalism, dumping) are expected to be less than under Alternative A, but more than Alternatives B and C.

The extent of management activities and costs under Alternative D would be mixed. Less personnel time would be required to monitor travel compliance than under Alternatives B and C. However, more effort would be required for initial implementation (signing designated routes, installing bulletin boards). Estimated costs for road/trail maintenance would be higher than under the other action alternatives, but would be greater than under Alternative A.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be greater under Alternative D than under Alternative A, but less than under Alternatives B and C.

Cumulative Effects on Travel Management and Access

Under all alternatives, there are a number of past, present, and reasonably foreseeable BLM and non-BLM actions and activities affecting Travel management and access in the Helena TPA.

Like much of the west, the Helena Valley has been experiencing steady human population growth. This trend is expected to continue, along with increased recreational use of this travel planning area. These factors could lead to increased public pressure to alter travel planning to accommodate more, or less motorized use.

The majority of BLM managed routes for the Helena Travel Planning area are located in or adjacent to the Scratchgravel Hills and Birdseye areas. Scratchgravel Hills is basically an island of undeveloped hills surrounded by residential development (there is some internal development as well). Residential development has tripled from 300 residential homes in 1984 to over 1,000 homes today. This combination of rapid urbanization and increased recreational use has led to increased social

conflict; between area residents and recreation users, and among recreational users themselves (motorized/non-motorized). As a result, there have been public demands to alter the existing travel management to reduce motorized use.

Recreation use is well established in the TPA. Primary recreation activities include motorized OHV uses (ATV, motorcycle) and non-motorized uses (hiking, jogging, horseback riding, mountain biking, etc.). As recreation use grows, conflicts between non-motorized and motorized recreation users could lead to increased public demands for either more, or less motorized use.

Portions of the TPA provide winter range for mule deer and elk. The Birdseye section is within a wildlife movement corridor that provides a connection between the Northern Continental Divide Ecosystem and the Greater Yellowstone Ecosystem, as well as local daily and seasonal movement between higher elevation summer ranges. Concerns could lead to the need to restrict motorized use.

In some site specific cases, visual resource management may affect or restrict new road/trail construction.

Urban development may lead to an increase in right-of-way permits to accommodate private property/development access. As a result, public access to BLM lands, via these rights-of-way, could increase as well.

Limits or reductions in the BLM's funding and ability to maintain designated routes could lead to an overall reduction in open road miles.

A variety of resource management projects, such as BLM initiated vegetation treatments, or wildland fire fuels reduction projects, could affect travel management. Forest management activities from 1984 to present include 10 acres of forest planting and 133 acres of timber harvest. Wildland fire management activities from 1981 to 2004 include a fuels treatment (150 acres of fuels grinding) in the Scratchgravel Hills. Future projects include a 1,500-2,500 acre mechanical and/or prescribed fire treatment for the Scratchgravel Hills, anticipated to occur over a 5 year period. Depending on the type and scope of project, effects could vary from temporary, short-term area/route closures, to new opportunities (new routes) for motorized or non-motorized access.

The Scratchgravel Hills area contains precious and base metals in both hard rock and placer deposits. While presently, only a few mining claims are maintained on BLM lands, increases in mineral prices could lead to increased or renewed mining activity. Depending on the type and scope of mining activity, effects could vary from temporary, short-term area/route closures, to increased opportunities (new routes) for motorized or non-motorized access.

Noxious weeds and non-native invasive species are well established and spreading in the area. Motorized activi-

ties play a large role in the distribution of noxious weeds. Concerns over the spread of noxious weeds could influence travel management, and lead to fewer motorized opportunities.

Motorized use on dirt roads and trails is a major contributor to soil erosion and stream sedimentation. These concerns may influence travel management, and result in fewer motorized opportunities. This is an important consideration in the Helena area as the Montana Department of Environmental Quality is working on water quality restoration plans in the area.

Trash dumping, drug use, underage alcohol use, unattended camp fires, and vandalism occur throughout the travel planning area, but especially in the rural/urban interface areas. Most of these activities are directly associated with motorized use. Continuing concerns with illegal activities may influence travel management and lead to fewer motorized opportunities.

The National Guard manages approximately 8,000 acres of land (Fort Harrison) in the Helena City area. National Guard activities (helicopter landings, ground maneuvers, off-road travel, etc.) may influence travel management on adjacent BLM lands as well, exerting pressure for either more or less motorized access.

For perspective, BLM managed lands represent approximately 11percent of the total travel planning area (95,492 total acres, 10,162 BLM acres); while BLM managed routes under Alternative A represent approximately 7.5 percent of the total routes available (693 total miles, 52.2 miles BLM roads/trails). Future travel management (for all agencies, nationwide) is likely to lead to fewer opportunities for motorized recreational use than under current management (particularly for OHV use). As a result, BLM routes available to motorized use in this TPA (especially the Scratchgravel Hills area) could experience increased use from displaced users, leading to more concentrated use, increased resource impacts, user conflicts, and pressure to reduce motorized use.

Under all alternatives, increases in human population, urbanization, recreation use, user conflicts; and concerns for wildlife, noxious weed spread, soil erosion/water quality, and illegal activities are likely to lead to increased demands to restrict motorized travel, particularly in areas with urban development, such as the Scratchgravel Hills. Under Alternative A, as urbanization continues around the Scratchgravel Hills, and both motorized (wheeled and snowmobile) and non-motorized use increases, these conflicts would increase. Under Alternative B, these pressures would have less impact on travel management than under Alternatives A and D, due to the overall reduction in motorized opportunities and separation of uses under Alternative B. Alternative C would be more beneficial to reducing these conflicts in light of these pressures than all the other alternatives. Alternative D would lessen conflicts associated with these pres-

tures, but not as much as Alternatives B and C. Both motorized and non-motorized users would have dispersed recreational opportunities under Alternative D.

TRANSPORTATION FACILITIES

For the sake of this discussion, “open” roads include roads that are open yearlong as well as those that are open with seasonal restrictions.

Effects of Alternative A

The Helena TPA would have 52.2 miles of open roads and no motorized trails (**Table 4-56**). Estimated costs for annual maintenance and stabilization of roads under Alternative A would be highest of all alternatives; almost three times more than under Alternatives B and D, and six times higher than under Alternative C. Estimated annual costs for both monitoring, compliance and weed control would be much higher under Alternative A than under the action alternatives.

Effects of Alternative B

Under Alternative B, the Helena TPA would have 9.8 miles of open roads and no motorized trails (**Table 4-56**). Estimated costs for annual maintenance and stabilization of roads under Alternative B would be less than under Alternatives A and D, and more than under Alternative C.

Estimated annual costs for monitoring, compliance and weed control would also be less than under Alternatives A and D, but more than under Alternative C.

Restricting motorized access to the Scratchgravel Hills area to five existing non-motorized trailheads would result in an increase in transportation facility costs for trailhead maintenance and signage. Closing the Scratchgravel Hills to motorized vehicle use after dark would result in a short-term increase in facility costs for installing signs and gates at appropriate access points and a long-term increase in cost for sign maintenance. Effects of this alternative associated with the Scratchgravel Hills nighttime closure would be similar to Alternative C.

Effects of Alternative C

Under Alternative C, the Helena TPA would have 7 miles of open roads and no motorized trails (**Table 4-56**). Estimated costs for annual maintenance and stabilization of roads under Alternative C would be the least of all the alternatives due to the least number of motorized routes. Estimated annual costs for monitoring, compliance, and weed control would also be less than the other alternatives.

Closing the Scratchgravel Hills to motorized and non-motorized vehicle use after dark would result in a short-term increase in transportation facility costs for installing signs and gates at appropriate access points and a long-term increase in cost for personnel and sign maintenance. Effects of this alternative associated with the

Classification/ Cost	Alt A	Alt B	Alt C	Alt D
Miles of Open/ Restricted Roads	52.2	9.8	7	21.9
Motorized Trails	0	0	0	0
Annual Road Maintenance	\$4,176	\$784	\$560	\$1,752
Annual Trail Maintenance	\$0	\$0	\$0	\$0
Periodic Road Stabilization	\$1,670	\$313	\$224	\$701
Periodic Trail Stabilization	\$0	\$0	\$0	\$0
Monitoring/ Compliance	\$2,610	\$490	\$350	\$1,095
Weed Control	\$783	\$147	\$105	\$329

Scratchgravel Hills nighttime closure would be the same as under Alternative B.

Effects of Alternative D

Under Alternative D, the Helena TPA would have 21.9 miles of open roads and no motorized trails (**Table 4-56**). Estimated costs for annual maintenance and periodic stabilization of roads under Alternative D would be greater than under Alternatives B and C, but less than under Alternative A. Estimated annual costs for monitoring, compliance and weed control would be less under Alternative D than under Alternative A and more than under Alternatives B and C.

Constructing new connector routes and reconstructing several existing routes would result in a short-term increase in transportation facility costs for signage, and potentially for additional culverts, and a long-term increase for route maintenance.

LANDS AND REALTY

Effects Common to All Alternatives

The Butte Field Office administers approximately 57 rights-of-way (ROW) and 1 non-commercial occupancy lease within the boundaries of the Helena TPA, which encumber approximately 481 acres of BLM land (**Table 4-57**).

Various types of road rights-of-way (ROW) are the most common type of grant, accounting for 44 percent, or just under half of the total. Other types of authorized uses include: oil and gas pipelines, lines for electrical distribution and telephone facilities, ditches, railroads, and mineral material sites.

Approximately three right-of-way applications for new facilities as well as amendments, assignments, renewals, or relinquishments of existing right-of-way grants are

processed annually in the TPA. This would not vary by alternative.

Type	Approximate Number	Approximate Acres
Roads	26	359
Power	8	9
Telephone	12	11
O&G Pipelines	6	96
Comm. Sites	0	0
2920 Leases	1	1
Other	5	5
Totals	58	481

The general trend of granting rights-of-way is expected to increase through the planning period as a result of increasing public demands. From a cumulative effects standpoint, development of adjacent federal, state, and private land, increased recreational use and the trend of homeownership away from urban areas, coupled with traditional on-going uses, are all expected to require more guaranteed access involving public land, including BLM lands in this TPA.

SPECIAL DESIGNATIONS

There would be no effects to any special designation areas such as Wild and Scenic Rivers, Wilderness Study Areas, or Areas of Critical Environmental Concern under any of the travel plan alternatives for the Helena TPA. No areas with special designations are located within the Helena TPA.

EAST HELENA TPA

The 200,991-acre East Helena TPA contains 20,039 acres of BLM lands. There are approximately 71 miles of BLM road, making up about 8 percent of the approximate total of 892 road miles in the TPA. The majority of roads (690 miles) lie on private lands.

AIR QUALITY

Effects Common to All Alternatives

Motorized recreation use is expected to continue to increase, resulting in higher levels of vehicle emissions.

Motorized travel across dry unpaved routes or trails would continue to produce airborne dust.

There could be areas with localized air pollution as a result of higher use numbers, and more concentrated use on fewer miles of available routes.

Drier climate conditions could make soils more susceptible to the effects of motorized travel, resulting in higher levels of airborne dust.

Impacts to air quality vary by alternative and travel plan area. In general, alternatives that reduce the level of motorized use (have fewer available miles) could have a positive impact on air quality; while alternatives that maintain or increase the level of motorized use, could lead to increased air quality impacts. This would not necessarily be a direct relationship, however, because reduction in available road miles for motorized use could redistribute use or focus more use on remaining open routes.

Under all alternatives, impacts from airborne dust could be reduced through mitigation such as hardening native surface roads with gravel or periodically spraying them with water trucks during the dry season. During BLM project work, in addition to watering native surface roadbeds, speed limits could be reduced to further minimize dust emissions.

Effects of the Alternatives

Under Alternative A (present management), adverse impacts to air quality would be expected to continue, and likely increase, concurrent with higher levels of motorized recreational use. Each of the action alternatives, however, would provide fewer available motorized routes. Alternatives B and C would provide 61 percent and 73 percent fewer motorized routes, respectively, than Alternative A, while Alternative D would provide 14 percent fewer routes than Alternative A. As a result, impacts to air quality associated with airborne dust and vehicle emissions would be taking place on substantially fewer routes under Alternatives B and C, but only slightly fewer routes under Alternative D.

It should be noted that even without motorized use, airborne dust, resulting from wind erosion of exposed native surface roads will continue. Therefore, travel plans with more miles of native surface roads will result in more airborne dust.

Under all alternatives, mitigation measures, such as graveling and/or watering native surface roads, could reduce dust emissions even further, and/or help offset the effects of increased or concentrated use on the remaining open routes.

Cumulative Effects on Air Quality

Under all alternatives, the cumulative effects to air quality from travel management in the East Helena TPA would arise from a number of past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands.

For perspective, BLM managed lands in the East Helena Travel Plan area represent approximately 10 percent of the total travel planning area (200,991 total acres; 20,039 BLM acres). Under present management (Alternative A), BLM managed routes represent a small portion, approximately 8 percent, of the total routes available (892.2 total miles; 70.7 miles BLM roads/trails).

Potential air quality impacts associated with activities on non-BLM lands and roads would be a greater contributor to cumulative effects to air quality than activities on BLM lands and roads.

In the past, prior to the 2003 Statewide OHV ROD, BLM management allowed unrestricted cross country travel by all forms of wheeled motorized use. Under present management, in the absence of other existing travel plan direction, all motorized wheeled travel is restricted to existing roads and trails. Under current management, approximately 44.3 of the 70.7 miles of existing BLM routes are available for motorized use. This mileage available for use would be reduced under the action alternatives as described above with associated potential differences in effects to air quality.

Under all alternatives, cumulative increases in human population, urbanization, recreation use, user conflicts; and concerns for wildlife, noxious weed spread, soil erosion, air/water quality, and illegal activities may lead to increased demands to restrict motorized travel.

SOILS

Effects Common to All Alternatives

Road construction, use, and maintenance affect soils in a number of ways. Soils are often compacted by these activities. Soil compaction can lessen the amount of precipitation that can infiltrate into soil and increase runoff, erosion, and sedimentation – in turn decreasing soil/site stability and hydrologic function, as well as soil productivity and plant vigor and diversity.

Closing or decommissioning roads often leads to beneficial effects to soils through decreased site disturbance and re-establishment of vegetative cover on road surfac-

es. This tends to reduce soil erosion and stabilize soils. Decommissioning roads may in some cases entail ripping road surfaces to de-compact them, thus improving water infiltration, hydrologic function, and the ability of the treated area to revegetate more successfully.

Impacts to soils associated with site-specific travel plan alternatives were assessed based on the potential for soil erosion using the following erosion risk criteria:

- High – the area a route travels through has slopes greater than 30 percent gradient.
- Moderate – the area a route travels through has slopes ranging from 15 to 30 percent gradient; or, for granitic soils, slopes ranging from 0 to 30 percent gradient.
- Low – the area a route travels through has slopes ranging from zero to 15 percent gradient and soils are not granitic in origin.
- Unrated – road mapping not available at time of erosion impact rating.

Effects of the Alternatives

The distribution of road miles by erosion risk category and by proposed road management category by alternative is shown for the East Helena TPA in **Table 4-58**. Roads in the “unrated” category were excluded from detailed consideration and are shown for the purpose of displaying the extent of lacking information.

Under current conditions (Alternative A) approximately 6.9 miles of open BLM roads are located in areas with high erosion risk, and 23.3 miles are in moderate erosion areas. Soil erosion would be reduced under Alternative B because this alternative would reduce those open road

Proposed Road Management	Erosion Risk Category	Alternative A	Alternative B	Alternative C	Alternative D
Open Road Miles (including Open w/restrictions)	High	6.9	6.8	0.8	7.1
	Moderate	23.3	6.4	3.8	18.0
	Low	9.1	7.6	5.2	9.0
	Unrated	2.8	1.2	0.1	1.8
Closed Road Miles	High	6.8	5.8	12.0	5.7
	Moderate	15.5	29.1	31.9	18.8
	Low	3.9	5.3	7.8	3.9
	Unrated	0.2	1.7	2.9	1.2
Decommissioned Road Miles	High	0	1.2	1.0	1.0
	Moderate	0	3.3	3.0	1.9
	Low	0	0	0	0.1
	Unrated	0	0.1	0	0

Note: Open roads include seasonally open roads as well as roads open yearlong.

mileages in high and moderate erosion categories to 6.8 miles and 6.4 miles, respectively. Approximately 34.9 miles of road in the high and moderate classes combined would be closed under Alternative B with an additional 4.5 miles in these categories being decommissioned. This should allow vegetative recovery on these areas and further reduce soil erosion.

Under Alternative C, soil erosion from roads would be reduced more than under any other alternative because the lowest mileage of roads in the high and moderate erosion categories would be left open (4.6 miles combined), while the greatest mileage in these categories combined would be closed (43.9 miles) and decommissioned (4 miles) of all alternatives.

Soil erosion associated with roads would be reduced under Alternative D compared to Alternative A, but would still be higher than under either Alternative B or C. Approximately 25.1 miles of BLM road in the moderate and high erosion categories combined would remain open under Alternative D, while about 24.5 miles in these categories would be closed and 2.9 miles would be decommissioned under this alternative.

Cumulative Effects on Soils

Cumulative effects to soils in the East Helena TPA would arise from many past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands. Within this 200,991-acre TPA, BLM lands comprise about 20,039 acres or 10 percent of total lands. The approximately 71 miles of BLM roads make up about 8 percent of the approximately 892 road miles in the TPA. Therefore road-related effects to soils described by alternative for BLM roads would affect about 8 percent of all roads in the TPA. The majority of lands and roads within the TPA boundary are private property. Non-BLM roads are managed by the local counties, Forest Service, state, Bureau of Reclamation, and private landowners.

Approximately 1,609 BLM acres are permitted for various rights-of-way and leases. About 746 of these acres are for specific road rights-of-way. The remaining 863 acres are associated with powerlines, waterlines, railroads, communication sites, and other utility facilities. Impacts to soils range from compaction and occupation of ground with buildings, roadbeds, railroad tracks, and other facilities, to revegetation and ground cover being re-established to stabilize soils.

Since 1981 wildland fires have burned across approximately 15,577 acres in the East Helena TPA. The majority of these acres (15,535) burned in 2000 across a mixture of land ownerships. The fire burned with variable severity creating a mosaic of effects to soils. More severely burned areas underwent more severe erosion than areas burned less severely. Fire rehabilitation activities such as reseeding with grasses/herbaceous species, contour felling of trees/snags in severely burned areas to trap sediment, waterbarring of firelines, and

post-fire noxious weed treatments helped minimize soil loss due to post-fire erosion. Tree planting on approximately 250 BLM acres (in 2002) of this burned area have contributed to longer term soil stabilization.

From 1995 to the present, timber salvage has occurred on approximately 250 acres of BLM land in this TPA. Adverse effects on soils were minor with treated areas having undergone revegetation and soil stabilization since treatment. Timber harvest has also occurred on private and Forest Service lands and will likely continue into the foreseeable future. These activities will have localized impacts (compaction, erosion) on soils.

While there have been no hazardous fuels treatment projects here in the last 10 years, BLM anticipates treating approximately 500 to 1,500 acres within this TPA to reduce hazardous fuels in Wildland Urban Interface areas within the next several years. Treatments would consist of mechanical and/or prescribed fire treatments. Effects to soils would likely be variable but for the most part would be minor. Prescribed burns would occur under prescriptions to minimize fire severity and impacts to soils. Mechanical treatments would be designed to minimize ground disturbance that could facilitate compaction or erosion. Fuels treatments conducted on private and Forest Service lands will also likely occur for the foreseeable future with variable effects to soils. Reducing fuels under the controlled conditions of deliberate treatments may benefit soils in the long-term by reducing the risk of high severity fires in treated areas.

Livestock grazing on public and private lands throughout much of the TPA has created areas of localized soil erosion and compaction, especially in grassland and shrubland areas. This will continue to occur for the foreseeable future.

Increasing residential development will likely continue for the foreseeable future. Erosion, compaction, and covering of soils would occur due to additional road construction, clearing/leveling for home sites, and establishment of utility infrastructure for residential developments.

Under Alternative A, the contribution to cumulative effects on soils from BLM road management would continue as it occurs today. Retaining approximately 36 miles of road open yearlong and an additional approximately 7 miles open with a seasonal restriction of 10/15 to 12/1 would allow for the same level of compaction and erosion impacts that currently exist.

From a BLM road management perspective, all action alternatives would benefit soil resources compared to Alternative A. Alternative B would benefit soils by providing for a reduced contribution to adverse cumulative effects than would Alternative A because about 68 percent of BLM roads would be closed or decommissioned under Alternative B (compared to 39 percent under Alternative A). Of the approximately 22 miles of open road, nearly one half of them (about 10 miles) would be

seasonally restricted to exclude motorized vehicle use in the wet spring runoff period each year. This would reduce erosion from these BLM roads.

Alternative C would benefit soils the most and provide for the least contribution to adverse cumulative effects of all alternatives. This alternative would provide for closure or decommissioning of about 86 percent of BLM roads in the TPA, thus allowing these areas to vegetatively recover and stabilize soils.

Alternative D would provide for the greatest contribution to adverse cumulative effects on soils of the action alternatives, but would still provide for greater long-term benefits to soils than Alternative A. Alternative D would provide for closure or decommissioning (and therefore vegetative recovery and soil stabilization) of about 48 percent of BLM roads in the TPA, compared to 39 percent for Alternative A, 68 percent for Alternative B, and 86 percent for Alternative C.

Due to the scattered distribution and relatively small proportion of BLM lands (10 percent) and roads (8 percent) relative to the total quantities of lands and roads in the TPA, none of the BLM alternatives would substantially contribute to cumulative effects on soils at the scale of the entire East Helena TPA.

WATER RESOURCES

Effects Common to All Alternatives

There are a number of key concepts that are critical to understanding road effects to water resources.

Hydrologic function is an interaction between soil, water, and vegetation. It reflects the capacity of a site to:

- Capture, store, and safely release water from rainfall, runoff, and snowmelt;
- Resist a reduction in this capacity; and
- Recover this capacity following degradation.

Interception of precipitation results when precipitation falls on vegetation. When vegetation is removed, precipitation falls directly on the soil. This can increase surface erosion and sedimentation, and decrease the amount of time between initial precipitation arrival and peak surface runoff – in turn decreasing soil/site stability and hydrologic function. Roads remove vegetation and therefore decrease interception of precipitation.

Infiltration is the process of precipitation entering and traveling through soil. Infiltration reduces the peak runoff during precipitation events by extending the period of runoff after a precipitation event. Infiltration also filters precipitation and reduces erosion and sedimentation. If infiltration is reduced, runoff and erosion will increase and hydrologic function will decrease. Generally, roads are compacted surfaces that have decreased infiltration, thus increasing runoff and potentially increasing erosion.

Runoff can affect the amount of erosion and sedimentation, as well as flooding – both onsite and offsite. If runoff is increased, all of these effects can increase with a result that water quality and hydrologic function will decrease.

Increased sediment entering waterbodies increases turbidity, increases width-to-depth ratios, and consequently increases temperature and dissolved oxygen saturation levels, and creates adverse habitat for aquatic animals and plants.

Alteration of flow routing can also affect water resources. For example, roadcuts into areas with relatively shallow groundwater can intercept groundwater, bring it to the surface, and transport it some distance (i.e. in a roadside ditch) before delivering it to a stream. This can lead to erosion of road ditchlines and subsequent sedimentation of streams during runoff periods, or increased thermal loading of water before delivery to streams during summer periods.

Closure and decommissioning of roads tend to reduce erosion and sedimentation effects stemming from roads on water quality. On an equivalent road mile basis, decommissioning roads would benefit water quality to a greater degree than closing roads because the decommissioning process would often entail implementing measures to restore hydrologic function. During road decommissioning, items such as compaction, drainage, stream crossing culverts, and ground cover are often addressed in a manner that markedly improves hydrologic function. These features are not fully addressed on roads that are merely “closed”. However, the reduced disturbance on newly closed roads combined with the tendency for revegetation to re-establish ground cover on them, reduces erosion and subsequent sedimentation effects to water quality.

Effects of the Alternatives

Generally, road density is an indicator of overall watershed health and function. Watersheds with higher road densities tend to have lower water quality due to greater disruption of hydrologic function (described above), and potential for erosion and subsequent sedimentation. Road density also is related to the distribution and spread of noxious weeds.

Table 4-59 shows acres of BLM land in three road density categories by alternative for the East Helena TPA. These data reflect differences between alternatives based on roads proposed for “decommissioning” by alternative. While many “closed” roads would gradually contribute to increased hydrologic function over time, decommissioned roads would more directly contribute to hydrologic function because measures aimed at restoring hydrologic function would likely be part of the treatment during decommissioning. Alternative A would have the greatest amount of BLM land with “high” road densities of greater than 2 mi/mi². Alternative B would have the lowest acreage in the high category with the greatest

TPA Alternative	Road Density Category		
	Low (<1 mi/mi ²)	Moderate (1 to 2 mi/mi ²)	High (> 2 mi/mi ²)
Alt. A	5,969	4,665	9,317
Alt. B	6,557	4,457	8,936
Alt. C	6,500	4,384	9,066
Alt. D	6,502	4,353	9,096

acreage in the low category of all alternatives. Alternatives C and D would be similar but Alternative C would have the next lowest acreage in the high road density category while Alternative D would have more acres in the high category than either Alternative B or C, but less than Alternative A. Overall, all the action alternatives would improve hydrologic function but by this measure Alternative B would make the greatest contribution to improved hydrologic function of all the alternatives.

Motorized routes within 300 feet of streams generally have greater potential to directly impact water quality through erosion and sedimentation, increased water temperatures (due to loss of shading vegetation), and direct alteration of stream channel morphology than those farther away. **Table 4-60** shows the miles of open and closed roads on BLM lands within 300 feet of streams by alternative. Under Alternative A there are about 7 miles of open road within 300 feet of streams. All action alternatives would improve water quality by closing or decommissioning roads in close proximity to perennial streams. Alternative C would create the most benefit followed closely by Alternative B, then Alternative D.

Although the benefits to water resources are fairly similar between alternatives, overall Alternative C would contribute the most benefits to water resources of all alternatives, followed by Alternative B, Alternative D, then Alternative A which would retain the same effects as currently exist.

Cumulative Effects on Water Resources

Cumulative effects to water resources in the East Helena TPA would arise from many past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands. Within this 200,991-acre TPA, BLM lands comprise about 20,039 acres or 10 percent of total lands. The approximately 71 miles of BLM roads make up about 8 percent of the approximately 892 road miles in the TPA. Therefore road-related effects to water resources described by alternative for BLM roads would affect about 8 percent of all roads in the TPA.

There are approximately 171 miles of perennial non-fish bearing streams and 100 miles of fish bearing streams in the TPA. Of these, there are about 7.6 miles of perennial non-fish bearing streams and 1 mile of fish bearing stream on BLM lands. The majority of lands and roads within the TPA boundary are private property. Non-BLM roads are managed by the local counties, Forest Service, state, Bureau of Reclamation, and private landowners.

Approximately 1,609 BLM acres are permitted for various rights-of-way and leases. About 746 of these acres are for specific road rights-of-way. The remaining 863 acres are associated with powerlines, waterlines, railroads, communication sites, and other utility facilities. Impacts to water resources are generally minor with some localized erosion and sedimentation and some contribution to decreased hydrologic function (decreased infiltration, increased runoff) due to compaction.

Since 1981 wildland fires have burned across approximately 15,577 acres in the East Helena TPA. The majority of these acres (15,535) burned in 2000 across a mixture of land ownerships. The fire burned with variable intensity and severity creating a range of effects to water resources. In burned areas, nutrient inputs to streams increased (perhaps for several years). Streams in more severely burned areas (some near Canyon Ferry Reservoir) underwent more severe erosion and sedimentation than those in areas burned less severely. Water temperatures in some streams may have increased due to loss of stream-side shade from the fires. Wood recruit-

	Perennial Fish-Bearing Streams		Perennial Non-Fish-Bearing Streams	
	# Open Road Miles	# Closed Road Miles	# Open Road Miles	# Closed Road Miles
Alt. A	0	0.4	2.0	0.7
Alt. B	0	0.4	0.9	1.8
Alt. C	0	0.4	0.7	2.0
Alt. D	0	0.4	1.0	1.7

Note: Open roads include seasonally open roads as well as roads open yearlong. Closed roads include decommissioned roads.

ment to streams in forested areas of high burn intensity may be increasing due to riparian tree mortality from fires. Stream flows may increase in some streams for several years. Peak flows may increase due to reduced snow interception by vegetation resulting in greater snow accumulations available for snowmelt in warmer periods. Summer flows may increase due to a lack of live vegetation to conduct evapotranspiration of water so more groundwater may reach stream channels. Fire rehabilitation activities such as reseeding burnt ground with grasses/herbaceous species, contour felling of snags in severely burned areas to trap sediment, waterbarring of firelines, and post-fire noxious weed treatments helped stabilize soils and minimize sedimentation effects to streams due to post-fire erosion. Tree planting on approximately 250 BLM acres (in 2002) of this burned area have contributed to longer term soil stabilization and subsequent reduction of stream sedimentation.

From 1995 to the present, timber salvage has occurred on approximately 250 acres of BLM land in this TPA. Adverse effects on water resources were minor to negligible from this activity. Timber harvest has also occurred on private and Forest Service lands and will likely continue into the foreseeable future. Ground disturbance from these activities will have localized impacts to water resources including some sedimentation, loss of woody material recruitment for streams, and potential water temperature increases due to shade loss.

While there have been no hazardous fuels treatment projects here in the last 10 years, BLM anticipates treating approximately 500 to 1,500 acres within this TPA to reduce hazardous fuels in Wildland Urban Interface areas within the next several years. Treatments would consist of mechanical and/or prescribed fire treatments. Prescribed burns would occur under prescriptions to minimize fire severity and impacts to soils and desirable vegetation, thereby minimizing effects to hydrologic function. Mechanical treatments would be designed to minimize ground disturbance that could facilitate compaction or erosion. These project design measures would minimize potential erosion/sedimentation effects to water resources. Fuels treatments conducted on private and Forest Service lands will also likely occur for the foreseeable future with variable effects to water resources. Reducing fuels under the controlled conditions of deliberate treatments may benefit water resources in the long-term by reducing the risk of future high severity fires that could have severe adverse effects on water resources in treated areas.

Livestock grazing on BLM land, other public and private lands throughout much of the East Helena TPA has created areas of localized streambank trampling, soil erosion and compaction, and nutrient inputs to streams. In severe cases stream channel morphology may be altered due to severe loss of riparian vegetation, loss of streambank integrity, channel widening and shallowing, and substantial sediment inputs. These effects to water

quality will continue to occur for the foreseeable future. Agricultural water withdrawals occur on private lands in this TPA. These withdrawals reduce stream flows in the TPA, including within Prickly Pear Creek, one of two streams that flows through BLM lands and is listed as an impaired water body by MDEQ.

Increasing residential development will likely continue for the foreseeable future to variable degrees within the TPA. Impairments to hydrologic function such as erosion, soil compaction, and runoff would likely increase due to additional road construction, clearing/leveling for home sites, and establishment of utility infrastructure for residential developments. Nutrient, chemical pollutant, and pathogen inputs to streams would also likely increase due to leaching from septic systems, urban runoff (fertilizer, chemicals, and petroleum pollutants), and waste from livestock.

Damming of the Missouri River to create Holter Lake, Hauser Lake, and Canyon Ferry Reservoir dramatically altered water resources. Approximately 40 miles of the Missouri River were converted into lake habitat, dramatically altering water quality and quantity.

Canyon Ferry Reservoir and the Missouri River from Canyon Ferry Dam to Hauser Lake are both identified as impaired water bodies on the MDEQ 303(d) list. Canyon Ferry Reservoir has impairments related to excess nitrogen and ammonia as well as excess algal growth, likely related to municipal point source discharges, septic systems, agriculture, and abandoned mine lands. Canyon Ferry also has excessive arsenic and thallium attributed to contamination from abandoned mine lands. Missouri River from Canyon Ferry Dam to Hauser Lake has impairments primarily related to excessive nutrients and dissolved oxygen deficiency. These impairments are attributed to dam construction, grazing in riparian or shoreline zones, municipal point source discharges, and septic systems. These impairments will continue into the foreseeable future although ongoing efforts are gradually addressing some of them.

Hauser Lake (3,800 acres) is listed as impaired on the 303(d) list due to pesticide contamination, mercury, and dissolved oxygen impairments attributed to agriculture, silvicultural activities, natural sources (mercury), impacts from hydrostructure flow regulation, and highway/road/bridge runoff. Holter Lake (5,500 acres) is listed as impaired on the 303(d) list due to mercury contamination attributed to placer mining, inappropriate waste disposal, abandoned mine lands, historic bottom deposits, and atmospheric deposition. Lake Helena (1,600 acres) is listed as impaired on the 303(d) list due primarily to heavy metal contamination attributed to acid mine drainage, abandoned mine lands, hydrostructure flow regulation, irrigated crop production, and natural sources. All of these impairments in these reservoirs will continue for the foreseeable future although ongoing efforts are gradually addressing some of them.

Bureau of Reclamation manages the Canyon Ferry Reservoir and Dam on the Missouri River. The reservoir (35,200 acres, 76 miles of shoreline perimeter) is operated to provide flood control, power generation, irrigation, municipal water, and to enhance recreation, fish, and wildlife benefits. The reservoir is generally managed to stabilize downstream flows. By preventing flows from becoming too low, this management tends to minimize potential further water resource concerns during summer periods.

Pennsylvania Power and Light of Montana manages water flows through Hauser and Holter Lake dams in close coordination with the Bureau of Reclamation at Canyon Ferry upstream. Hauser and Holter Lakes are managed as full-pool, run-of-the-river reservoirs as per FERC re-licensing completed in 2000. Flows are managed to optimize energy production, provide for water right uses, and maintain appropriate conditions for fisheries, wildlife, and recreation values. By preventing flows from becoming too low, this management tends to minimize potential further water resource concerns during summer periods.

Under Alternative A, the contribution to cumulative effects on water resources from BLM road management would continue as it occurs today. Retaining approximately 36 miles of road open yearlong and an additional approximately 7 miles open with a seasonal restriction of 10/15 to 12/1 would allow for the same level of effects on water resources that currently exist.

From a BLM road management perspective, all action alternatives would benefit water resources compared to Alternative A. Alternative B would benefit water resources by providing for a reduced contribution to adverse cumulative effects compared to Alternative A because about 68 percent of BLM roads would be closed or decommissioned under Alternative B (compared to 39 percent closed under Alternative A). Of the approximately 22 miles of open road under Alternative B, nearly one half of them (about 10 miles) would be seasonally restricted to exclude motorized vehicle use in the wet spring runoff period each year. This would reduce erosion from these BLM roads and further benefit water resources.

Although the greatest road mileage would be decommissioned under Alternative B (4.7 miles), Alternative C would likely benefit water resources the most and provide for the least contribution to adverse cumulative effects on water resources of all alternatives. This alternative would provide for closure or decommissioning of about 86 percent of BLM roads in the TPA (compared to about 68 percent for Alternative B), thus allowing these areas to vegetatively recover, stabilize soils, and reduce erosion.

Alternative D would provide for the greatest contribution to adverse cumulative effects on water resources of the action alternatives, but would still provide for greater

long-term benefits to water resources than Alternative A. Alternative D would provide for closure or decommissioning (and therefore vegetative recovery, soil stabilization, and reduced erosion/sedimentation) on about 48 percent of BLM roads in the TPA, compared to 39 percent for Alternative A, 68 percent for Alternative B, and 86 percent for Alternative C.

Due to the scattered distribution and relatively small proportion of BLM lands (10 percent) and roads (8 percent) relative to the total quantities of lands and roads in the TPA, none of the BLM alternatives would substantially contribute to cumulative effects on the streams and reservoirs in the East Helena TPA on the whole.

VEGETATIVE COMMUNITIES – FOREST RESOURCES AND FOREST AND WOODLAND PRODUCTS

Effects of the Alternatives

Under all alternatives, existing roads and roads built to access timber and forest product sales on BLM lands may encourage timber harvest and forest product sales on adjacent lands, particularly where landowners and other agencies are looking to improve economic efficiency or opportunities in the management on their lands.

In general, vegetative treatment contractors tend to bid more readily on projects in areas with vehicle access or valuable products. BLM often prioritizes forest vegetation management activities such as forest products and forest protection activities (e.g. wildfire suppression and forest insect and disease control) in similar areas.

Rehabilitation of roads (decommissioning and in some cases road closure) would revegetate currently unvegetated roadbeds, which would increase vegetation biomass production on the landscape through colonization of sites with grasses, forbs, shrubs, and trees. Increases in revegetated area would occur at a rate of approximately 1.5 to 3 acres per mile of rehabilitated road. Eventually rehabilitated roads would support plant communities consistent with site potentials which would help resist weed invasions. However, road closures and removals (decommissioning) could make vegetation management treatments more difficult and costly, thereby inhibiting proposed treatments, reducing public access for product use and removal, and potentially slowing fire detection and suppression.

Under Alternative A where 37 percent of the existing roads have been historically closed, there would be no increase in project analysis and implementation costs. However, under Alternative B approximately 50 percent of roads into forested areas would be closed. Under Alternative C about 83 percent of roads into forested areas would be closed, while under Alternative D about 46 percent of these roads would be closed. These closures would result in commensurate potential increases in ve-

getative analysis and treatment costs by alternative. These potential cost increases would need to be considered on a case by case basis by the BLM during project feasibility determinations, and additional funding may be needed to analyze and implement the projects that would remain feasible. Road closures could also result in potential decreases in quantities of forest products removed. The extent of the effects described above would be minimized because BLM would likely still be able to plan and implement projects in many areas on closed roads through the variance process for temporary road use. Road-related effects would be greatest under Alternative C, followed in sequence by Alternative B, then Alternative D.

Roaded access to forested areas would also affect the gathering of firewood and other forest products by the general public. Most public parties prefer to drive close to areas of product removal so they do not have to carry products over long distances to their vehicles. There have been few publicly requested small sales of materials in most areas of this TPA. Requests received have been concentrated mainly where the lands are crossed by main access routes or in the vicinity of mining claims and homes. The requests received have generally been few due to the preponderance of pine trees which are generally considered to be low quality firewood and Christmas trees. It is likely that local requests for products would continue as has occurred in the past. For the East Helena TPA, Alternative A would retain the most public opportunities for these activities, followed in sequence of decreasing opportunities by Alternative D, Alternative B, then Alternative C. Alternatives B and D would have similar effects to public access for forest product gathering. Under the action alternatives, public searching for, and removal of personal use and small products would generally be confined to motorized travel corridors along the main roads.

Cumulative Effects on Forest and Woodland Resources and Products

No BLM forest health/silvicultural treatments or resource product removal projects are currently scheduled in this TPA within the next five years. Fuels reduction projects with forest health considerations have a high priority in general and would likely occur in this area in the future due to the close proximity of wildland urban interface areas adjacent to several blocks of BLM lands. The major blocks of BLM forest and woodlands in this TPA are located in the North Hills, the Ward Ranch area by Hauser Lake and the Spokane Hills west of Canyon Ferry Lake. These generally contain stands of low productivity and commercial value as in the northern portions of the North Hills and the Spokane Hills (approximately 40 percent of BLM lands in the TPA) where wildfire has severely damaged the forest and woodland stands over the last 25 years. The formerly privately-owned Ward Ranch area has undergone commercial logging that has removed the larger trees since the early

1900s. The products from the forested areas in this TPA would provide little revenue in timber sale projects. In other vegetation manipulation projects, derived products would provide only small offsets to costs for stewardship projects where goods are exchanged for services.

There would be little cumulative effect from any of the action alternatives to forest management activities on inholding and adjacent private lands, as many of the proposed closed roads end in public lands along the shores of the Missouri River and the Lakes. Those roads used for main access to private lands would continue to provide vehicular access through BLM lands under all alternatives for personal use or authorized purposes for the landowners. Projects on private lands would promote fuels reduction objectives in the area as well.

Forested vegetation on BLM lands would also be affected by approximately 1,609 acres of rights-of-way and leases on BLM land. Forested vegetation located in these areas usually is harvested and/or removed to accommodate the necessary access or facilities. Forest vegetation removal would occur on new authorizations in the future and would occur as necessary to maintain sight distances and safety clearances associated with roads and facilities.

Urbanization is expected to continue on the 128,048 acres of private lands (64 percent of total acreage) within this TPA. Forest products are commonly removed from these areas prior to permanent construction. Urbanization is likely to continue in the future and will affect forested vegetation at an unknown rate. As private construction increases, miles of road on private will most likely increase from the current 690 miles.

Risk to forests from human-caused wildfires is commonly associated with miles of open roads. Risk to forests from wildfire is greatest under Alternative A with 44.3 miles of open roads. Alternative B would have less risk of human-caused fire starts with about 17 miles of open road during summer months. Alternative C would have the least risk to public forests with only 12.0 miles of road open during summer months. Alternative D (38 miles of open road during summer) would have more risk than either Alternatives B or C, but less risk than Alternative A. Given that the majority of roads in the TPA (92 percent) are non-BLM roads, this contribution to reduced fire risk from BLM roads in the action alternatives is relatively small in the context of the entire TPA.

Since BLM roads constitute only 8 percent of all roads in this TPA, and BLM lands make up only 10 percent of all lands in the TPA, urbanization and activities on open non-BLM roads in the vicinity may have more cumulative effects on forested vegetation in the TPA than BLM decisions regarding miles of open and closed road.

VEGETATIVE COMMUNITIES – NOXIOUS WEEDS

Under all alternatives, any snowmobile use would have negligible effects on noxious weed spread and populations. Invasive noxious weeds and non-native species are degrading wildland health. These are aggressive plants that can outcompete many native plants, as they have few natural enemies to keep them from dominating an ecosystem. These plant species are spread by many means. However, any land disturbing activity in the TPA has the most potential to introduce and spread weed species. Motorized vehicles are one vector for noxious weed spread as weed seed becomes attached to vehicles and their tires, and are transported from one area to another where seeds become detached and germinate to inhabit new areas.

Effects of Alternative A

Under Alternative A, a total of 44.3 miles of wheeled motorized routes are open (36.6 miles open yearlong, 7.7 miles seasonally restricted, 26.4 miles closed). With the exception of the Ward Ranch, McMasters, and Spokane Hills temporary area closures, the remainder of the travel planning area would remain available to cross-country area snowmobile use, as well as travel on all existing routes during the season of use (12/2-5/15), conditions permitting.

Alternative A would leave the most roads open and in turn would promote the greatest amount of weeds and other undesirable plant spread and production of all alternatives. More herbicide control would be needed to control weeds than under the other alternatives. Under Alternative A the 44.3 miles of open BLM road would make up about 4 percent of all open roads in the East Helena TPA.

Effects of Alternative B

Under Alternative B, 13.7 miles of wheeled motorized routes would be available yearlong, and 3.3 miles would be open with seasonal restrictions. Cross-country snowmobile travel would be allowed, as well as travel on all existing routes during the season of use (12/2-5/15), except for the North Hills, Dana's Bar, and the area located to the west of Prickly Pear Creek. The remainder of the travel planning area (McMaster Hills, Ward Ranch, and Spokane Hills) would be closed to all cross-country snowmobile use, including travel on existing roads and trails. This alternative would close 41.9 miles of road leaving 13.7 miles open yearlong as compared to 36.6 miles of road open yearlong under Alternative A. This would prevent weed spread caused by motorized vehicles on closed routes, but would increase weed spread on open routes because of the more concentrated use on the fewer available routes. Overall Alternative B would reduce weed spread, but would increase weed treatment costs per road mile on remaining open roads

compared to Alternative A. Under Alternative B the 13.7 miles of BLM road open yearlong along with the 3.3 miles of seasonally restricted road would make up about 2 percent of all open roads in the East Helena TPA.

Effects of Alternative C

Alternative C would provide the least amount of wheeled motorized access in the East Helena travel planning area. Under Alternative C, 12.0 miles of wheeled motorized routes would be available yearlong. No cross-country snowmobile use would be allowed; use would be restricted to designated routes only during the season of use (12/2-5/15), snow conditions permitting. This alternative would close 54.6 miles of road leaving 12.0 miles open yearlong as compared to 36.6 miles of road open yearlong for Alternative A. This would prevent weed spread caused by motorized vehicles on these closed routes, but would increase weed spread on open routes because of the more concentrated use on the fewer available road miles. Overall Alternative C would reduce weed spread more than any other alternative, but would increase weed treatment costs per road mile on the remaining open roads compared to Alternative A. Under Alternative C the 12 miles of open BLM road would make up about 1 percent of all open roads in the East Helena TPA.

Effects of Alternative D

Alternative D would provide the highest level of motorized access (of the action alternatives), and the least non-motorized opportunities. Under Alternative D, 36.0 miles of wheeled motorized routes would be available yearlong, and 1.9 miles would be open with seasonal restrictions. Snowmobile management under this alternative would be as follows: cross-country travel would be allowed, as well as travel on all existing routes during the season of use (12/2-5/15), for the North Hills, Dana's Bar, and the area located to the west of Prickly Pear Creek. The Ward Ranch and the Big Bend areas would be closed to all cross-country snowmobile use as well as travel on designated routes. This alternative would close 29.7 miles of road, leaving 36.0 miles open yearlong as compared to 36.6 miles of road open yearlong for Alternative A. This alternative would have very similar environmental effects as Alternative A, though to a slightly lower degree. Under Alternative D the open BLM roads would make up about 4 percent of all open travel routes in the East Helena TPA.

Cumulative Effects on Noxious Weeds

Under all alternatives, other past, present and reasonably foreseeable future BLM and non-BLM actions and outside influences affect noxious weeds.

Recreation use is well established in the TPA. Primary recreation activities include water based activities, big game hunting, non-motorized uses (hiking, jogging, horseback riding, mountain biking, etc), and OHV uses

(ATV, motorcycle). Motorized recreation uses are one of the leading causes of introduction and spread of noxious weeds and non-native species. Weed seeds are transported by many recreational vectors such as water recreation uses, motorized vehicles including their tires, non-motorized vehicles including their tires, pack animals, and humans.

Urban development may lead to an increase in right-of-way permits to accommodate private property/development access. As a result, soil disturbing activities (i.e. roads, powerlines, telephone lines, etc.), will increase causing weeds to increase.

A variety of resource management projects, such as BLM initiated vegetation treatments, or wildland fire fuels reduction projects, could affect weeds in the TPA. There have been no fuels treatments in this area in the last 10 years. There are as yet unplanned fuels treatments potentially slated for planning and implementation over the next five years for this area, mainly in the area of the North Hills. These treatments would consist of mechanical and/or prescribed burning from 500 to 1,500 acres focused on the urban interface areas. Any project creating soil disturbance has the capability to increase weedy plant species. Prescribed burning projects give the ground surface a fertilization effect and eliminate some plant competition for weedy species giving them a niche for establishment and expansion in some areas. Ground disturbing equipment could also transport noxious weed seed to these project sites. BLM implements weed control measures in the aftermath of such ground-disturbing activities so as to minimize noxious weed establishment and spread.

Wildland fires create good seed beds and supply nutrients for weed species introduction and production. From 1981 to 2004 there have been 18 wildland fires that burned approximately 15,577 acres in this TPA. The 2000 Bucksnot Fire accounts for the large majority of this total. This fire has promoted and increased noxious weed production in this TPA. Part of fire rehabilitation activities involved weed treatments to minimize weed spread.

Mining is a land disturbing activity and the activity itself and potentially weed seed contaminated equipment that is used could promote weeds in the area.

Noxious weeds and non-native invasive species are well established and spreading in the area. Weed control activities by BLM and other entities, while often effective at reducing or minimizing weed spread and weed populations, can also lead to some weed spread. Herbicide spray equipment is driven through weed infestations and weed seeds as well as other weed vegetative parts are spread to other lands during and following treatment. The Bucksnot Wildfire area received ground treatments of about 75 acres in size following the fire. In 2003 herbicide and biological control treatments on the Bucksnot fire area were approximately 500 acres in size.

Much of this treatment acreage was by aerial means coordinated with the Natural Resource Conservation Service (NRCS) and Lewis and Clark County. These weed treatments have varying success in killing undesirable plants, depending on many environmental parameters. The weeds that have been treated are primarily in the urban interface area where heavy motorized use plays a large role in the distribution of noxious weeds.

Timber sales have built in stipulations for mitigating weed production and spread. However, with ground disturbance the potential exists for weed introduction to occur on these sites. Vehicular access for tree plantings could contribute to the spread of existing weeds on site. Since 1995 there has been 250 acres of timber salvage and 250 acres of forest planting (replanted in 2002). Herbicide treatment of existing weeds was coordinated with tree seedling planting locations and timing, so as to minimize potential exacerbation of weed spread.

Future travel management (for all agencies, nationwide) is likely to lead to fewer opportunities for motorized recreational use than under current management (particularly for OHV use). As a result, BLM routes available to motorized use could experience increased use from displaced users, leading to more concentrated use. Such use could cause a larger than anticipated introduction and spread of weeds. An increase in weeds would lead to an increase in needed treatment on BLM lands.

The Bureau of Reclamation (BOR) manages approximately 11,500 acres of land surrounding Canyon Ferry Reservoir. BOR actions (such as new recreation site developments) could influence travel management on adjacent BLM lands. These actions could potentially increase weed spread and production on BLM managed lands.

Portions of the TPA (North Hills, areas adjacent to Canyon Ferry and Hauser Lakes) provide winter range for mule deer and elk. Noxious weed seed are transported and spread by wildlife through their digestive system and by attaching to the animals themselves and then being released at a later time.

Livestock grazing on and off BLM lands also contributes to weed spread either through seed being spread by livestock themselves, or through vehicular uses needed to manage grazing operations.

East Helena Valley has been experiencing steady population growth. This trend is expected to continue, along with increased recreational use of this travel planning area. These factors could lead to increased public pressure to alter travel planning for either more, or less motorized use. The increasing population in the Helena and East Helena areas will in turn lead to an increase in use of this TPA creating more opportunities for weed spread and production.

The majority of BLM managed routes for the East Helena Travel Planning area are located in or adjacent to the

Ward Ranch or North Hills sub-travel planning areas. The remaining routes are located in the Spokane Hills and Townsend sub-travel planning areas. As with the Scratchgravel Hills (Helena TPA), the Ward Ranch and North Hills sub-planning areas are surrounded by residential development (there is some internal development as well). Like the Scratchgravel Hills, they have experienced steady residential development over the past 15-20 years. The Spokane Hills and Townsend sub-travel planning areas are more rural in character, but also have experienced residential/subdivision growth, near the northern and southwest portions of the Spokane Hills and north of Townsend. This development/increase in population has led to an increase in use of the TPA by residents living adjacent to or within this area which in turn leads to an increase in weed spread and propagation.

Only 8 percent of all the travel routes in the East Helena TPA are located on BLM managed lands (under Alternative A). Lands near roads and away from roads in the TPA are infested with weeds. The travel on all roads in the TPA spreading weeds, and weeds off these roads are being spread by the weed plants themselves and other natural means. Because the majority of roads (92 percent) and lands (90 percent) in the TPA are non-BLM, activities in these areas play a stronger role than activities on BLM lands in determining the status of weed spread and weed populations in the TPA overall.

**VEGETATIVE COMMUNITIES –
RIPARIAN VEGETATION**

Effects Common to All Alternatives

This section focuses on effects to riparian vegetation. For additional discussion of effects to water quality and stream channels, see the Water Resources and Fish sections.

Roads in riparian areas constitute ground disturbance that can eliminate or preclude presence of native riparian vegetation. This ground disturbance and loss of riparian vegetation may facilitate erosion and sedimentation of streams. Roads may also interfere with natural stream channel functions by occupying floodplains or active stream channel margins (see Water Resources section for more discussion). Noxious weeds may dominate riparian vegetation communities after some type of disturbance (such as roads, livestock grazing, mining, etc.) has reduced native vegetation. Noxious weed seed can be spread into riparian areas by motor vehicles via open roads. Closure of roads and trails can improve or maintain riparian condition by reducing avenues of noxious weed spread, as well as allowing for bare area revegetation which filters sediment in addition to stabilizing banks in some areas. Road and trail restrictions have the same effects but to a lesser degree, because some traffic will inhibit vegetation growth and recovery.

Effects of the Alternatives

As a means of comparing alternatives, **Table 4-61** depicts the miles of wheeled motorized routes that cross or are within 300 feet of streams and wet areas on BLM lands by alternative for the East Helena TPA.

Miles of Wheeled Motorized Routes	ALT A	ALT B	ALT C	ALT D
Open	3.5	3.0	3.0	3.9
Restricted	0	0	0	1.9
Closed	3.6	4.1	4.1	1.2

Under Alternative A, 3.5 miles of BLM roads and trails would remain open that cross or are within 300 feet of streams or wet areas, and 3.6 miles of roads and trails would remain closed. The noxious weed spread, streambank, and sediment delivery effects would continue on the open roads and trails as described above. BLM roads and trails have very minor effects on riparian conditions in this TPA because the roads and trails parallel the Missouri River/Hauser Lake shore for quite short distances or simply dead-end at or before water’s edge.

Under Alternative B, 3.0 miles of BLM roads and trails would remain open that cross or are within 300 feet of streams or wet areas, and 4.1 miles of roads and trails would be closed. The noxious weed spread, streambank, and sediment delivery effects would continue on the open roads and trails as described in the effects common to all section. Alternative B would have slightly reduced effects to riparian areas than Alternative A.

Effects of Alternative C would be the same as those described for Alternative B.

Under Alternative D, 3.9 miles of BLM roads and trails would remain open that cross or are within 300 feet of streams or wet areas, 1.9 miles of roads and trails would have seasonal restrictions, and 1.2 miles of roads and trails would remain closed. The noxious weed spread, streambank, and sediment delivery effects would continue on the open roads and trails as described above. Restricted roads would reduce some of these effects. BLM roads and trails have very minor effects on riparian conditions in this TPA because the roads and trails parallel the Missouri River/Hauser Lake shore for quite short distances or simply dead-end at or before water’s edge. Alternative D could have slightly greater effects than all other alternatives on riparian vegetation on BLM lands, but these differences in effects would be minor.

Cumulative Effects on Riparian Vegetation

Noxious weed spread, mining, roads and trails, logging operations, and livestock grazing have affected riparian resource conditions in all TPAs, including the East Helena TPA. Some of these factors continue to cause riparian area degradation primarily through direct disturbance or loss of riparian vegetation. Ground disturbance and loss of riparian vegetation facilitate erosion and sedimentation of streams. In the case of noxious weeds, they usually dominate riparian vegetation communities after some type of disturbance (such as roads, livestock grazing, mining, etc.) has reduced native vegetation.

Anticipated subdivision growth on private lands will lead to more road construction and maintenance. More roads and development will increase severity of runoff events which in turn will cause more sediment delivery to creeks and streams. The additional sediment is likely to affect the functioning condition of some riparian areas by causing streambeds to aggrade at unnatural rates. Streambanks may also be affected if road placements do not allow for natural stream movements or meanders.

Logging and forestry practices on public and private lands are subject to streamside management zone (SMZ) requirements designed to maintain water quality and riparian vegetation. The proposed Riparian Management Zones under Butte RMP Alternatives B and C would be wider than SMZs and activities in these areas would be designed to benefit riparian resources, thus providing more riparian protection and more targeted management of riparian vegetation in both forested and non-forested areas than under RMP Alternatives A and D. The disturbance associated with timber activities does have the potential to increase noxious weed spread which degrades riparian area function and health. On public lands noxious weed control is a standard feature of any ground disturbing activities whereas on private lands noxious weed control is variable.

Livestock grazing will continue in the area and has the potential to impact riparian resource conditions. On BLM lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain riparian vegetation health and vigor. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided. Riparian conditions may improve or degrade as management changes.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, riparian conditions would improve because of the streambank protection gained from shrubby root systems and filtering capability of native riparian sedge and rush species.

The Bucksnot Fire of 2000 burned a large portion of the Spokane Hills (approximately 15,535 acres) across mul-

tipale land ownerships. Before the vegetation could recover, subsequent storm events caused considerable sediment delivery to Canyon Ferry Reservoir from a number of ephemeral gulches.

While there are slight differences in effects to riparian vegetation between East Helena travel plan alternatives at the site scale on BLM lands as described above, in the context of cumulative effects the differences between alternatives would be negligible.

Overall, because BLM roads make up only 8 percent of all roads in the TPA (under Alternative A), and BLM lands make up 10 percent of all lands in the TPA, the contributions to riparian vegetation benefits associated with closing riparian roads on BLM lands would be minor at the scale of the entire East Helena TPA. Activities on private lands (64 percent of total acreage in TPA) would play a dominant role in determining riparian conditions at the scale of the entire TPA.

WILDLIFE

Effects of Alternative A

Under Alternative A, the East Helena TPA would have substantially more open roads (44 miles) compared to the action alternatives and would have the highest actual road density in elk winter range, 1.1 mi/mi² (**Table 4-63**) compared to the action alternatives. Open roads typically increase the level of recreation adjacent to roads which can result in additional disturbance and displacement of wildlife species. Roads can also encourage the public to recreate in areas that had formerly been secluded. Roads can cause direct mortality to wildlife through road kill, prevent wildlife movement, create disturbance to wildlife via vehicular use, cause the spread of noxious weeds, reduce habitat and cause habitat fragmentation on the landscape (Joslin et al. 1999). Open road miles that exceed 1 mi/mi² have also been found to provide less than 60 percent functional habitat for elk (Christensen et al. 1993). Permanent and temporary roads could negatively impact wildlife including special status species, particularly if roads are open during critical periods such as during the winter or breeding seasons.

High open road densities under Alternative A could result in the loss of year-round habitat and migration corridors, disturbance and displacement of wildlife, road kill, and fragmentation of habitat. Wildlife, including special status species, that are especially sensitive to roads in the TPA include (but are not limited to) elk, northern goshawk and boreal toads. The detrimental effects of open road densities to wildlife under Alternative A could be minor to major and long-term. This alternative would have the greatest negative impacts to wildlife including special status species from open roads.

Under Alternative A, this TPA would have slightly fewer acres of functional winter range (6,415 acres of area with low road density) compared to Alternative B (6,915

acres), but considerably less than Alternative C (8,899 acres) (Table 4-63). This Alternative, however, would have more functional winter range than Alternative D (5,923 acres).

Under Alternative A, approximately 1,600 acres of the East Helena TPA would be closed to snowmobile use in the Ward Ranch and McMasters areas but approximately 15,000 acres would be open for cross country use by snowmobiles. An additional 3,600 acres would be available for snowmobile use on open routes only (44 miles of open roads). Although the majority of the East Helena TPA is open to cross country snowmobile use or for use on open roads, BLM lands in this TPA do not often get favorable snow conditions for snowmobiling. Due to snow conditions, the use of snowmobiles would be limited and the effects to wintering big game and other wildlife species would be expected to be minimal the majority of the time. However, when snow conditions do become favorable, snowmobile use of the TPA could have considerable negative effects to big game and other wildlife species. The negative effects due to cross-country snowmobile use could include harassment of big game and other species during the high stress winter season (Joslin et al. 1999). This could cause individuals to leave an area (temporarily or permanently) and/or an increase in stress that could lead to mortality.

In evaluating impacts of travel planning on elk and other big game species, it is important to consider impacts on security habitat. Elk security is the inherent protection allowing elk to remain in an area despite increases in stress or disturbance associated with the hunting season or other human activities. Security habitat includes blocks of nonlinear forested habitats greater than 250 acres in size that are at least 0.5 mile from an open road (Hillis et al. 1991). Security habitat should also consist of larger trees (greater than 8 inches DBH) with vegetation dense enough to hide an adult elk (Thomas et al. 2002). There would be less big game security habitat under Alternative A (1,181 acres) compared to Alternatives B (1,447 acres) and C (1,546 acres), but slightly more than Alternative D (1,048 acres) (Table 4-62).

	A	B	C	D
East Helena TPA	1,181	1,447	1,546	1,048

Core areas are areas large enough for wildlife (especially animals with large home ranges such as carnivores and big game) to forage and reproduce. Subcore areas are areas that could act as stepping stones for wildlife as they move through the region (Craighead et al. 2002).

Within the East Helena TPA, there are 20,266 acres of BLM lands. On BLM lands, 2,142 acres provide good quality habitat for core or subcore habitat and 6,361 acres were identified as low quality wildlife movement corridors (Craighead et al. 2002). The remaining 11,763 acres of BLM lands do not provide highly functional or predictable corridors for wildlife movement due to fragmentation of habitat, high road densities, and development.

Within all lands of the East Helena TPA there are approximately 17,292 acres identified as “core/subcore” habitat. Under this alternative, there would be 8,209 acres with low road density (less than 1 mi/mi²), 3,270 with moderate road density (1-2 mi/mi²) and 5,814 acres with high road density (greater than 2 mi/mi²) in the TPA for all land ownerships. Alternative A would provide slightly lower quality habitat in core and subcore habitat at the landscape level compared to the other alternatives.

On BLM lands, there are approximately 2,142 acres in core/subcore habitat. In core/subcore habitat under Alternative A, there would be 1,436 acres with low road density, 311 acres with moderate road density and 395 acres with high road density. Alternative A would provide slightly lower quality habitat in core and subcore habitat in the Decision Area compared to the other alternatives.

	Actual Road Density	Acres of Low Road Density	Acres of Moderate Road Density	Acres of High Road Density
Alternative A	1.1	6,415	2,252	2,547
Alternative B	0.5	6,915	3,349	950
Alternative C	0.3	8,899	1,606	709
Alternative D	0.7	5,923	3,024	2,267

Low Density = 0-1 mi/mi², Moderate Density = 1-2 mi/mi², High Density = >2 mi/mi²

Wildlife corridors are areas of predicted movement within or between core and subcore areas. Within the East Helena TPA there are no acres identified as “high quality” wildlife movement corridors under any land ownership. There are approximately 3,374 acres identified as moderate quality corridors for all land ownerships but the majority of movement corridors are considered to be low quality (35,123 acres) due to development and road densities. In moderate quality movement corridors all alternatives would have 1,808 acres with low road density, 1,485 acres with moderate road density and 81 acres with high road density.

Riparian areas provide crucial habitat and critical travel corridors for wildlife including special status species. Riparian areas also provide a refuge for native plants and animals in times of stress such as drought or fire. Roads in riparian areas can prevent use of these crucial areas by wildlife, limit use, or cause loss of habitat (Wisdom et al. 2000). Under Alternative A there would be 3.5 miles of open roads in riparian areas.

Effects of Alternative B

Under Alternative B, the East Helena TPA would have substantially fewer open roads (17 miles) compared to Alternative A (44 miles). Of the 17 miles of open roads, 13.7 would be open year round and the remaining 3.3 miles would be seasonally restricted. Alternative B would have more open roads than Alternative C (12 miles) but considerably less than Alternative D (38 miles). Alternatives B and C would decrease harassment to wildlife during all seasons of use compared to Alternatives A and D. Alternatives B and C would also improve habitat and reduce fragmentation more than Alternatives A and D.

Under Alternative B, the actual road density in elk winter range in the East Helena TPA would be 0.5 mi/mi², below the maximum of 1 mi/mi² recommended by FWP in big game winter range. This is substantially lower than the road density under Alternative A (1.1 mi/mi²), higher than Alternative C (0.3 mi/mi²) and lower than Alternative D (0.7 mi/mi²) (Table 4-63). Christensen et al. (1993) found that reducing open road miles to 0.5 mi/mi² would increase the amount of effective habitat available to elk to greater than 70 percent.

Under Alternative B, this TPA would have more acres of functional winter range (6,915 acres) compared to Alternative A (6,416 acres), less than Alternative C (8,899 acres) but more than Alternative D (5,923 acres) (Table 4-63). Alternative B would improve the quality and quantity of winter range in the East Helena TPA compared to Alternatives A and D but would have substantially fewer beneficial effects to winter range than Alternative C.

Alternatives B and C would close more acres to cross country snowmobile use than Alternatives A (15,066 open acres) and D (14,461 open acres). Approximately 6,400 acres would be open to cross country snowmobile

use under Alternative B and Alternative C would limit all snowmobile use to existing roads with no open areas for cross-country snowmobiling. Due to unfavorable snow conditions, the use of snowmobiles would most likely be limited in the TPA and the affects to wintering big game and other wildlife species would be expected to be minimal the majority of the time. However, when snow conditions do become favorable, snowmobile use under Alternative B would have fewer negative effects to big game and other wildlife species than Alternatives A and D.

The amount of big game security habitat would be slightly more under Alternative B (1,447 acres) compared to Alternatives A and D (1,181 and 1,048 acres, respectively) (Table 4-62).

For all land ownerships, Alternatives B and C would have identical acres of core and subcore habitat in low (8,624 acres), moderate (3,180 acres) and high road densities (5,488 acres). Alternatives B and C would have 415 more acres in the low road density category and 326 fewer acres in the high road density category than Alternative A. Alternatives B and C would improve the quality of core/subcore habitat across the landscape more than Alternative A.

Under Alternatives B and C, BLM lands in core and subcore habitat would have slightly higher acres in low road density (1,703 acres) compared to Alternative A (1,436 acres). Alternatives B and C would also have fewer acres with moderate road density (191 acres) compared to Alternative A (311 acres) and slightly fewer acres with higher road density (249 acres) compared to Alternative A (394 acres). Alternatives B and C would improve the quality of core/subcore habitat on BLM lands more than Alternative A.

Alternatives B and C would protect and restore more riparian habitat than Alternative A by reducing the miles of open roads in riparian areas to 3.0 miles (from 3.5 under Alternative A). Reducing roads in riparian habitats under Alternatives B and C would allow for more breeding, foraging and hiding habitat as well as improve movement corridors for a wide variety of species.

Effects of Alternative C

Under Alternative C, the East Helena TPA would have substantially fewer open roads (12 miles) compared to Alternative A (44 miles). Alternative C would have fewer open roads than Alternative B (17 miles) and considerably less than Alternative D (38 miles). Alternatives C and B would decrease harassment to wildlife during all seasons of use compared to Alternatives A and D. Alternatives C and B would also improve habitat and reduce fragmentation more than Alternatives A and D.

Under Alternative C, the actual road density in elk winter range in the East Helena TPA would be 0.3 mi/mi², below the 1 mi/mi² recommended by FWP in big game winter range. This is substantially lower than the road

density under Alternative A (1.1 mi/mi²) and also lower than Alternative B (0.5 mi/mi²) and Alternative D (0.7 mi/mi²) (Table 4-63). Christensen et al. (1993) found that reducing open road miles to 0.3 mi/mi² would increase the amount of effective habitat available to elk to greater than 80 percent.

Under Alternative C, this TPA would have substantially more acres of functional winter range (8,899 acres) compared to Alternative A (6,416 acres), Alternative B (6,915 acres) and Alternative D (5,923 acres) (Table 4-63). Alternative C would improve the quality and quantity of winter range in the East Helena TPA more than all other alternatives.

Under Alternative C, snowmobile use throughout the entire East Helena TPA would be limited to open routes (12 miles). This would greatly reduce the negative effects associated with snowmobile use to big game and other wildlife species compared to all other alternatives.

The amount of big game security habitat on BLM lands would be greater under Alternative C (1,546 acres) than under any other alternative (Table 4-62).

Effects associated with core and subcore habitat under Alternative C would be the same as under Alternative B.

Effects associated with riparian habitat under Alternative C would be the same as under Alternative B.

Effects of Alternative D

Under Alternative D, the East Helena TPA would have fewer open roads (38 miles) compared to Alternative A (44 miles). Of the 38 miles of open roads, 36 would be open year-round and the remaining 1.9 miles would be seasonally restricted. Alternative D would have considerably more open roads than Alternative B (17 miles) and Alternative C (12 miles). Alternatives D and A would allow more harassment to wildlife during all seasons of than Alternatives B and C. Alternatives D and A would restore less habitat and allow more fragmentation of habitats than Alternatives B and C.

Under Alternative D, the actual road density in elk winter range in the East Helena TPA would be 0.7 mi/mi², below the maximum of 1 mi/mi² recommended by FWP in big game winter range. This is lower than the road density under Alternative A (1.1 mi/mi²), higher than Alternative B (0.5 mi/mi²), and considerably higher than Alternative C (0.3 mi/mi²) (Table 4-63).

Under Alternative D, this TPA would have the fewest acres of functional winter range (5,923 acres) of any alternative. Alternative A would have 6,416 acres, Alternative B would have 6,915 acres, and Alternative C would have 8,899 acres of functional winter range (Table 4-63). Alternative D would have substantially fewer beneficial effects to winter range than all other alternatives.

Alternative D would close more acres (5,805 closed acres) to cross country snowmobile use than Alternative A, but would close less area than Alternatives B and C. While no areas would actually be “closed” under Alternative C, the entire TPA would be in the “limited” category, meaning that snowmobile use would only be allowed on open roads and trails. Under Alternative D, approximately 14,460 acres would be open to cross country snowmobile use. Alternative D would have more acres open to cross country snowmobile use than Alternatives B and C but fewer than Alternative A. Due to snow conditions, the use of snowmobiles would most likely be limited in the TPA and the effects to wintering big game and other wildlife species would be expected to be minimal the majority of the time. However, when snow conditions do become favorable, snowmobile use under Alternative D would have greater negative effects to big game and other wildlife species than Alternatives B and, especially, C because Alternative C would limit all snowmobile use to open roads (12 miles), with no open cross country use areas.

The amount of big game security habitat under Alternative D would be 1,048 acres, the least of all alternatives (Table 4-62).

For all land ownerships in core and subcore habitat, Alternative D would have more acres (8,434 acres) with low road density than Alternative A (8,209 acres). However, Alternative D would have fewer acres with low road density than the other action alternatives. Alternatives B and C would have approximately 8,624 acres with low road density. Alternative D would also provide more acres in moderate road density (3,359 acres) than Alternative A (3,270 acres) as well as more than Alternatives B and C (3,180 acres). Alternative D would also have fewer acres in high road density (5,500 acres) compared to Alternative A (5,814 acres), but would have slightly more than Alternatives B and C (5,488 acres). Alternative D would improve the quality of core/subcore habitat across the landscape more than Alternative A but slightly less than Alternatives B and C.

Under Alternative D, BLM lands in core and subcore habitat would have slightly higher acreage with low road density (1,549 acres) compared to Alternative A (1,436 acres), but would have fewer acres with low road density compared to Alternatives B and C (1,703 acres). Alternative D would also have more acres with moderate road density than Alternatives A (311 acres), B and C (191 acres for both Alternatives B and C). Alternative D would have the same amount of acres with high road density as Alternatives B and C (249 acres) which would be fewer than those in Alternative A (394 acres). Alternative D would improve the quality of core/subcore habitat on BLM lands more than Alternative A but slightly less than Alternatives B and C.

Alternative D would protect and restore less riparian habitat than all other alternatives. Alternative D would

provide the most negative effects to riparian habitats with 3.9 miles of open roads.

Cumulative Effects on Wildlife

Wildlife habitat in the East Helena TPA has been affected by roads, historic and current mining, timber harvest and salvage, weed infestations, urbanization and development, recreation, powerline corridor development, and communication sites.

The East Helena Valley has been experiencing steady population growth. This trend is expected to continue, along with increased recreational use of this travel planning area. Primary recreation activities in the TPA include big game hunting, non-motorized uses (hiking, jogging, horseback riding, mountain biking, etc) and OHV uses (ATV, motorcycle).

Land that was traditionally used for ranching, forest products, or mining is now being converted to home sites in the East Helena Valley. Although these lands had historic human uses, they also provided quality wildlife habitat. These areas historically provided a diversity of habitats that contributed to; big game winter range, travel corridors, habitat for resident and migrating wildlife, as well as foraging, breeding and hiding habitat. Many of the areas currently experiencing residential development are in big game winter range. Because of the loss of winter range on private lands, it is critical that public and state lands maintain quality and secure winter range or improve the habitat in these areas.

For many plant and animal communities, native species richness decreases as housing density increases. Non-native species, however, tend to increase with development (Hansen et al. 2005). Wildlife populations, including carnivores, may be reduced even at very low levels of residential development due to; loss of habitat, an increase in human access (from roads) in areas that previously had low levels of disturbance, and an increase in hunting pressure. Residential development can also lead to an increase in noxious weed infestations that can reduce the quality and quantity of wildlife habitat.

Pets can also have a negative impact to native wildlife. Cats hunt and kill bird and small mammals. Dogs that are allowed to roam can chase, injure, or kill wildlife. This can result in areas becoming unavailable to wildlife.

Active mining claims are common in the area, and there are active notices in the travel planning area as well. Increases in mineral prices could lead to increased or renewed mining activity. Mineral activity along with associated road construction and development on both private and public lands could add substantially to the negative cumulative effects to wildlife and wildlife habitats in this TPA.

In the TPA, there are 16 powerlines, three pipelines and four communication sites. In the future, communication sites on BLM lands will be restricted to existing sites but

future communication sites could be built on private and other public lands in the TPA. There is the potential for future powerlines and pipelines to be built in this TPA.

There are approximately 21 right-of-ways (ROW) in the TPA and applications for ROW permits to access private property or for commercial development are likely to increase in the future. As a result, public access to BLM lands could increase. Fewer ROWs would be expected under Alternative A because more BLM roads would remain open under this alternative. Alternatives B and C would be expected to have more ROWs than Alternative D.

From 1981-2004 there have been 18 wildland fires that burned 15,577 acres in the Planning Area. Five of the fires were identified as human-caused and these fires burned the majority of the acres (15,535 acres). After the 2000 Bucksnot Fire, timber salvage occurred on approximately 250 acres of BLM lands as well as on many acres of private lands. Vegetation treatments may occur on BLM lands in the future and timber harvest is expected on private as well as other public lands in the future. Vegetation treatments would be expected to be less under Alternatives A and C than Alternatives B and D. Overall, vegetative treatments on BLM lands have had minor effects to wildlife habitat in the TPA. However, timber salvage on BLM lands has substantially reduced the distribution and amount of snag habitat for snag dependant species in the salvage units. Timber harvest along with residential development on private lands has substantially altered the landscape and caused a decline in the quality and quantity of wildlife habitat in the TPA.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the TPA. Motorized activities play a large role in the distribution of noxious weeds. The cumulative effects of the spread of noxious weeds from open roads would be greater under Alternative A than all other alternatives. Alternative A would result in more wildlife habitat being lost or degraded due to noxious weed infestations compared to the action alternatives. Alternative B would have fewer open roads than Alternatives A and D resulting in fewer infestations of noxious weeds. Alternative C would close the most roads and would have the fewest cumulative effects from loss of habitat due to noxious weeds. Open roads adjacent to BLM land would still be a conduit for the spread of noxious weeds.

Fragmentation of BLM lands in the TPA (only 10 percent of the TPA is in BLM ownership) as well as open roads on BLM lands (about 71 miles), private lands (about 769 miles), and other public lands (about 52 miles) has reduced the quality of wildlife habitat within the TPA. Roads within the TPA can cause disturbance to wildlife along with fragmentation and loss of habitat. Roads are associated with nearly every type of activity that has the potential to occur in the TPA including; vegetation treatments, timber salvage, mining, access to

private lands (ROWs), fire suppression, powerline corridors and recreation. Open roads in the Planning Area would likely increase due to development and management of private lands. Alternative A would have the greatest negative cumulative effects to wildlife and wildlife habitat from open roads with 44 miles of open roads. Alternative B would have fewer negative cumulative effects with 17 miles of open road than Alternatives A and D (38 open miles) but more than Alternative C (12 miles).

Historic and recent timber cutting, salvage harvest, past mining activity and firewood gathering in the TPA may have reduced the amount of suitable snag habitat for cavity nesting species. Alternative A would allow continued access to the area for firewood cutting. This could continue to prevent snag recruitment for snag dependant species and minimize the amount of down woody material. Alternative B would protect more snag and down woody habitat from loss due to firewood cutting than Alternatives A and D but would protect less of this habitat type than Alternative C.

Alternative A would have the greatest negative cumulative effects from open roads to wildlife and wildlife habitat of all alternatives. Under Alternative A, habitat on BLM lands would not be restored and would continue to be degraded over time. Disturbance to wildlife from open roads would continue to impact the distribution and use of the TPA by wildlife. Alternatives B and C would have greater beneficial cumulative affects to wildlife and wildlife habitats from closing roads than Alternatives A and D.

Even though the East Helena TPA is large (approximately 200,991 acres), open habitats of grasslands and shrublands along with high road densities in both the Decision and Planning Areas have prevented BLM lands from providing a large amount of suitable security habitat for big game during the hunting seasons. Under Alternatives A and D, roads would continue to reduce functional security habitat in this TPA more than Alternatives B and C.

Habitat mapped as core and subcore habitat and wildlife movement corridors would continue to have higher road densities and more negative cumulative effects under Alternative A than under the action alternatives. An increase in open roads in both the Decision and Planning Areas could result in a loss of core and subcore habitat under all alternatives but, especially, Alternatives A and D. The cumulative effects to core and subcore habitat and wildlife movement corridors would be beneficial under the action alternatives, especially Alternatives B and C.

The cumulative effects of high road densities would continue to negatively affect wildlife species during the breeding season more under Alternative A than under the action alternatives. Alternatives B and C would have the most beneficial cumulative effects to wildlife during

the breeding season compared to Alternative D and, especially, Alternative A.

FISH

For the sake of this discussion, “open” roads include roads that are open with seasonal restrictions as well as roads that are open yearlong. Roads identified as “closed” within 300 feet of streams also include roads that would be “decommissioned” in these areas by alternative. Effects to water quality described in the Water Resources section would affect fish populations and fish habitat quality. Analyses described and tabulated in the Water Resources section are referred to in the context of effects to fish in the discussion below.

Effects of Alternative A

Under Alternatives A, the East Helena TPA would have substantially more open roads (44 miles) compared to the action alternatives. Roads can have a wide range of effects on fish and fish habitat. These effects would include, but are not limited to, increased sedimentation from road construction and vehicle use, increased runoff, changes in surface water and drainage patterns from stream crossings, conduits for noxious weeds, loss of riparian vegetation, potential decreases in stream shading that could lead to water temperature increases, and changes in local fish populations when culverts are impassable and limit fish migration.

Watershed (or hydrologic) function can be used as an indicator of relative risk or impacts to fish habitat (Doppelt et al. 1993). Generally, watersheds with high road densities often have the largest negative effects on fish and aquatic resources. To determine the effects on watershed function, a moving windows analysis was conducted on BLM lands to look at the miles of roads that would be decommissioned and removed from the landscape for each alternative. During this analysis, it was assumed that even though closing roads would improve watershed function, closed roads would remain on the landscape and could still have negative impacts to water quality and prevent or impede the restoration of riparian vegetation. Under Alternative A, there would be 5,969 acres with low road density (**Table 4-59**), 4,665 acres with moderate road density, and 9,317 acres with high road density on BLM lands in the TPA. Alternative A would have fewer acres with low road density and more acres with high road density than the action alternatives. This alternative would be expected to have greater overall negative effects to watershed function due to roads than the action alternatives.

For this discussion, road miles within 300 feet of fish bearing streams on BLM lands would be considered an indicator of direct effects to fish habitat and fish populations. Under all alternatives, there would be 0.4 miles of closed road and 0 miles of open road within 300 feet of fish bearing streams. There are no roads (open or closed)

within 300 feet of streams containing special status fish species on BLM lands in the TPA.

Perennial non-fish bearing streams contribute to fish habitat indirectly by serving as conduits for watershed products (water, sediment, nutrients, contaminants, and in some cases woody material) (Meehan 1991 and Reid et al. 1994) to fish bearing streams (Forest Ecosystem Management Assessment Team 1993 and Takahi et al. 2002). Under Alternative A, there would be 0.7 miles of closed road and 2.0 miles of open road within 300 feet of perennial non-fish bearing streams on BLM lands in the TPA. Alternative A would have 1-1.3 more miles of open roads and 1-1.3 fewer miles of closed roads within 300 feet of perennial streams than the action alternatives.

This alternative would have the greatest negative impacts to fish and aquatic resources from open roads of all the alternatives.

Effects of Alternative B

Under Alternative B, the East Helena TPA would have substantially fewer open roads (17 miles) compared to Alternative A (44 miles). Alternative B would have more open roads than Alternative C (12 miles) but less than Alternative D (38 miles). In the context of watershed function, Alternative B would have approximately 588 more acres in the low road density category and 381 fewer acres in the high road density category on BLM lands than Alternative A (Table 4-59). Alternative B would contribute to improved hydrologic function more than Alternative A. This analysis does consider “decommissioned” roads, but does not consider “closed” roads as contributing to watershed function. Even though closed roads could still have adverse effects to aquatic habitats, these roads have more potential to become revegetated and lessen sedimentation and runoff, and restore riparian vegetation (thus contributing to improved fish habitat conditions) than open roads. Under Alternative B, there would be approximately 15 more miles of closed roads than under Alternative A, an additional indication that Alternative B would pose less risk to fish habitat than Alternative A.

Effects associated with roads within 300 feet of fish bearing streams on BLM lands under Alternative B would be the same as under Alternative A. Alternative B would contribute fewer indirect effects to fish habitat associated with roads within 300 feet of perennial non-fish bearing streams on BLM lands than Alternative A. Under Alternative B there would be 1.8 miles of closed road and 0.9 mile of open road within 300 feet of perennial non-fish bearing streams on BLM lands in the TPA. Alternative A would leave 1.1 more miles open, and this same mileage less closed in these areas than Alternative B.

Overall, Alternative B would have fewer adverse effects to fish and aquatic habitats from increased fine sediment inputs, loss of large woody material, and loss of riparian vegetation than Alternative A.

Effects of Alternative C

Under Alternative C, the East Helena TPA would have substantially fewer open roads (12 miles) compared to Alternative A (44 miles). Alternative C would have fewer, but similar, miles of open road as Alternative B (17 miles) and considerably less than Alternative D (38 miles).

In the context of watershed function, Alternative C would have approximately 531 more acres in the low road density category and 251 fewer acres in the high road density category on BLM lands than Alternative A (Table 4-59). This alternative would have 57 fewer acres in the low road density category and 130 more acres in the high road density category than Alternative B. Alternative C would contribute to improved hydrologic function more than Alternative A, but to a similar degree as Alternative B. This analysis does consider “decommissioned” roads, but does not consider “closed” roads as contributing to watershed function. Even though closed roads could still have adverse effects to aquatic habitats, these roads have more potential to become revegetated and lessen sedimentation and runoff, and restore riparian vegetation (thus contributing to improved fish habitat conditions) than open roads. Under Alternative C, there would be approximately 28 more miles of closed roads than under Alternative A, and about 13 more miles than under Alternative B.

Effects associated with roads within 300 feet of fish bearing streams on BLM lands under Alternative C would be the same as under Alternatives A and B.

Alternative C would contribute fewer indirect effects to fish habitat associated with roads within 300 feet of perennial non-fish bearing streams on BLM lands than all other alternatives. Under Alternative C there would be 2.0 miles of closed road and 0.7 mile of open road within 300 feet of perennial non-fish bearing streams on BLM lands in the TPA. This is a range of 0.2-1.3 more closed miles than the other alternatives. Alternatives C and B would have fewer negative effects to fish and aquatic habitats from fine sediment, loss of large woody material and loss of riparian vegetation compared to Alternative D and, especially, Alternative A.

Effects of Alternative D

Under Alternative D, the East Helena TPA would have fewer open roads (38 miles) compared to Alternative A (44 miles). Alternative D would have considerably more open roads than Alternative B (17 miles) and Alternative C (12 miles).

With regard to hydrologic function, Alternative D is very similar to Alternative C. Alternative D would have approximately 533 more acres in the low road density category and 221 fewer acres in the high road density category on BLM lands than Alternative A (Table 4-59). This alternative would have 55 fewer acres in the low road density category and 160 more acres in the high

road density category than Alternative B. Alternative D would contribute to improved hydrologic function more than Alternative A. Under Alternative D, there would be approximately 3 more miles of closed roads than under Alternative A, about 12 miles less than under Alternative B, and about 25 miles less than under Alternative C. Since Alternative D would have fewer closed roads than Alternatives B and C, overall watershed function would be expected to be less under this alternative.

Effects associated with roads within 300 feet of fish bearing streams on BLM lands under Alternative D would be the same as under the other alternatives.

Alternative D would contribute fewer indirect effects to fish habitat associated with roads within 300 feet of perennial non-fish bearing streams on BLM lands than Alternative A. This alternative would have similar effects as Alternative B in this respect as it would leave 0.1 more mile of road open in these areas. Alternative D would have more road-related adverse effects to fish and aquatic habitats than Alternatives B and C, but would improve conditions over the current conditions in Alternative A.

Cumulative Effects on Fish

The East Helena TPA supports a variety of native and introduced fish species. One of the major human influences to fish in the TPA has been the introduction of non-native trout species including rainbow trout, brook trout, and brown trout throughout the TPA and also Yellowstone cutthroat trout into Beaver Creek. Rainbow trout have hybridized with the native westslope cutthroat trout in many streams. Brook trout and brown trout have displaced the native cutthroats in other streams especially those altered by sedimentation and increased water temperatures brought on by human activities. Non-native fish stocking has eliminated native westslope cutthroat trout from much of its historic habitat in this TPA.

Damming of the Missouri River to create Holter Lake, Hauser Lake, and Canyon Ferry Reservoir dramatically altered aquatic habitat. Approximately 40 miles of the Missouri River were converted into lake habitat. These alterations, along with long-term stocking of non-native fish and other human-caused impacts have combined to replace native westslope cutthroat trout populations with non-native sport fisheries such as walleye, yellow perch, rainbow trout, and brown trout. These reservoirs now have multiple water quality impairments (see Water Resources section).

The East Helena Valley has been experiencing steady population growth. This trend is expected to continue, along with increased recreational use of this travel planning area. Primary recreation activities in the TPA include big game hunting, non-motorized uses (hiking, jogging, horseback riding, mountain biking, etc) and OHV uses (ATV, motorcycle).

Land development and urbanization has caused substantial impacts to watershed function in this TPA.

Agricultural activities from farming and ranching also contribute increases in nutrients, sedimentation, and loss of aquatic habitats. Many streams in the TPA have been impacted by historic and ongoing livestock grazing that breaks down streambanks, widens channels, removes vegetative cover, and causes an increase in fine sediment and nutrients.

Active mining claims are common in the area and there are active notices in the TPA, as well. Increases in mineral prices could lead to increased or renewed mining activity. Many watersheds and aquatic habitats in the TPA have been degraded by historic mining activities.

Fires, floods, and drought have historically affected fish habitat in the TPA. These disturbances can cause a pulse of sediment or may temporarily reduce the quality of fish habitat in some watersheds while leaving other streams largely unaffected (Reeves et al. 1995 and Dunham et al. 2003). Natural disturbances are typically followed by periods of stability, during which fish habitats and populations recover. Population recovery in disturbed streams may be facilitated by fish immigration from nearby drainages less affected by the catastrophic event (Dunham et al. 2003). From 1981-2004 there have been 18 wildland fires that burned 15,577 acres. Five of the fires were identified as human-caused and these fires burned the majority of the acres (15,535). The largest fire to occur from 1981-present was the 2000 Bucksnot Fire.

Timber harvest can alter the recruitment of large woody debris, reduce canopy closures and resulted in an increase in fine sediment to streams. Timber harvest along with associated roads can contribute substantially to the overall cumulative effects in forested watersheds. After the 2000 Bucksnot Fire, timber salvage occurred on approximately 250 acres of BLM lands as well as on private lands. Additional vegetation restoration may occur on BLM lands in the future. Vegetative treatments would be expected to be less under Alternatives A and C than Alternatives B and D. Overall, vegetative treatments on BLM lands have had minor effects to aquatic habitat in the TPA.

Roads are another major contributor of sediment to streams and a major problem with regards to cumulative watershed effects. Roads and trails can have localized effects on nearby stream segments or at stream crossing sites, especially fords. In some cases, effects are more extensive and may impair fish habitat for longer reaches of streams. Cumulatively, roads degrade aquatic habitat due to sedimentation from road construction and vehicle use, increased runoff, changes in surface water and drainage patterns from stream crossings, loss of riparian vegetation, loss of large woody material and roads can cause changes in local fish populations when culverts are impassable and limit fish migration. Alternative A

would have more negative cumulative effects to watersheds and individual streams due to roads than the action alternatives. Alternative B would have fewer negative cumulative effects than Alternatives A and D but more than Alternative C. Alternative B would improve overall watershed function as well as improve habitat in individual streams more than Alternatives A and D, and to a similar degree as Alternative C.

SPECIAL STATUS PLANTS

Effects Common to All Alternatives

Ground-disturbing activities from road construction and maintenance, as well as road use by vehicles can affect special status plant populations and habitat. These activities can reduce sensitive plant species through disturbance to individual populations, increasing competition from invasive species, and reducing habitat connectivity. Closure of roads and trails can improve or maintain sensitive plant populations or habitat by reducing avenues of noxious weed spread, maintaining habitat connectivity, and improving pollinator habitat. Road and trail restrictions have the same effects but to a lesser degree.

Effects of the Alternatives

Under Alternative A, 36.6 miles of roads and trails would remain open, 7.7 miles of roads and trails would be open with seasonal restrictions, and 26.4 miles of roads and trails would be closed. On the open roads, effects would continue as described in the Effects Common to All Alternatives section. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators.

Under Alternative B, 13.7 miles of roads and trails would remain open, 3.3 miles of roads and trails would be open with seasonal restrictions, 41.9 miles of roads and trails would be closed, and 4.7 miles would be decommissioned. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The restricted roads would reduce weed spread a limited amount. By providing more closed and decommissioned roads, Alternative B would benefit and reduce risk to special status plants more than Alternative A.

Under Alternative C, 12 miles of roads and trails would remain open, 54.6 miles of roads and trails would be closed, and 4.0 miles would be decommissioned. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The restricted roads would reduce weed spread a limited amount. Alternative C would benefit and reduce risk to special status plants the most of all alternatives because it would eliminate disturbance, vehicular use, and spread of noxious weeds on the most road miles.

Under Alternative D, 36 miles of roads and trails would remain open, 1.9 miles of roads and trails would be open with seasonal restrictions, 29.7 miles of roads and trails would be closed, and 3.1 miles would be decommissioned. On the open roads, effects would continue as described in the Effects Common to All Alternatives section. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The restricted roads would reduce weed spread a limited amount. Alternative D would benefit and reduce risk to special status plants compared to Alternative A, but would pose more risk compared to Alternatives B and C.

Cumulative Effects on Special Status Plants

Under all alternatives there are a number of past, present, and reasonably foreseeable future actions that affect special status plant populations.

Livestock grazing will continue in the area and has the potential to impact sensitive plant populations and habitat. On public lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain sensitive species populations and habitat. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided. Conditions may improve or degrade as management changes.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, sensitive plants would benefit from the reduced competition. Use of herbicides for noxious weed control could cause mortality to special status plants if individual plants are inadvertently sprayed.

Recent and anticipated subdivision growth on private lands will lead to more road construction and maintenance. More roads and development will reduce sensitive plant species habitat and in some cases individual populations. Additionally, subdivisions have the potential to disrupt the connectivity of plant habitat and populations as well as disturbing or eliminating pollinators needed by sensitive species. Some sensitive species that require soil disturbance may benefit.

Timber sale activity disturbance can destroy or degrade sensitive plant habitat. On public lands, projects would be designed to avoid, mitigate, or enhance sensitive plant habitats. The disturbance associated with timber harvest activities does have the potential to increase noxious weed spread which degrades sensitive species habitat and individual plant populations.

The Bucksnot fire of 2000 burned a large portion of the Spokane Hills. The burn encouraged a lot of noxious weed spread, particularly Dalmatian toadflax on south facing slopes, which degraded sensitive plant habitat.

Conifer encroachment into grassland habitats was reversed by the fire thus restoring grassland habitat that could benefit some special status plant species.

At the scale of the entire East Helena TPA (all land ownerships), the BLM travel plan alternatives would have slightly variable contributions to cumulative effects on special status plants. Under Alternative A approximately 3 percent of all roads in the TPA would be closed. Under Alternative B adverse effects on special status plants would be slightly reduced compared to Alternative A because 5.2 percent of all roads in the TPA would be closed or decommissioned. Alternative C would provide the most benefits of all alternatives as 6.6 percent of all roads in the TPA would be closed or decommissioned. Alternative D would provide slightly more benefits than Alternative A but slightly fewer benefits than either Alternatives B or C as 3.7 percent of all roads in the TPA would be closed or decommissioned. Because BLM lands make up only 10 percent of the area in the TPA, activities on non-BLM lands would play a greater role in determining the status of special status plants.

WILDLAND FIRE MANAGEMENT

Travel planning alternatives were analyzed to determine whether they could result in impact on wildland fire management, causing change to any of the following indicators:

- Fire regime condition class (FRCC)
- Firefighter and public safety
- Reducing threat to Wildland Urban Interface (WUI)

Effects Common to All Alternatives

Public road access during the fire season provides opportunities for human-caused fires either due to catalytic converters on vehicles igniting dry vegetation, or due to some types of human activities. Roads that are closed to public access reduce the risk of human-caused fire starts in those areas.

Decommissioned roads and roads that are closed and not regularly maintained for navigability reduce access for fire suppression. Closed roads may become impassible due to vegetation regrowth, downfall of trees, or severe erosion. Some roads may be closed with earthen berms or fallen trees and would need to be physically manipulated to make them useable for vehicles again. These roads would extend firefighting response time and have negative impacts on efforts to reduce wildland fire threat to WUI areas and firefighter and public safety. In an emergency fire suppression situation, any navigable closed roads needed for fire suppression would be used immediately. Non-navigable closed roads could also be used if deemed to be needed for fire suppression, after needed improvements are made to make those roads useable. Planning and implementation of fuels reduction

treatments could occur in association with closed roads if variances for temporary road use were to be allowed. Variances would be subject to internal BLM review.

In the context of fuels reduction projects, availability of open roads is important to facilitating fuels project location as well as increasing project feasibility and decreasing costs. Open roads also facilitate spread of noxious weeds by transporting weed seed on vehicles and their tires. Presence of large noxious weed populations could delay or cause fuels projects to be cost-prohibitive due to the fact that the weeds may have to be treated before and/or after the fuels treatment. Also, some applications of fuel treatments (e.g., prescribed fire) may promote the spread of some weeds. The presence of weeds and non-native species are indicators that FRCC has departed from historical conditions.

Noxious weeds and non-native invasive species are well established and spreading in the East Helena TPA.

Effects of Alternative A

Alternative A provides more motorized opportunities than non-motorized opportunities. Under Alternative A, a total of 44.3 miles of wheeled motorized routes would continue to be open (36.6 open yearlong, 7.7 miles seasonally restricted), while 26.4 miles (37 percent of total) would continue to be closed. Alternative A would allow for the greatest flexibility between alternatives for access for suppression purposes. Fuels project feasibility would be highest under this alternative. However, public access during the fire season would be the greatest under this alternative and would provide the most opportunities for human-caused fire starts.

The distribution of noxious weeds could be the greatest under alternative A with the most open roads and noxious weeds already well established. This would contribute to reduced feasibility of fuels reduction projects more than under any other alternative.

Effects of Alternative B

Alternative B provides for separate use areas for wheeled motorized and non-motorized recreational opportunities. Under Alternative B, 13.7 miles of wheeled motorized routes would be available yearlong and 3.3 miles would be seasonally restricted. Alternative B would limit the flexibility for access for suppression purposes, and fuels project feasibility would go down compared to Alternative A due to the fact that motorized access would be limited to 17 miles of road. Of the 46.3 miles of closed roads, 4.7 miles would be decommissioned and would likely be unusable for fire suppression. The risk of human-caused fires associated with motorized use would be limited compared to Alternative A, due to a 28 percent decrease in miles of road open to motorized public travel compared to Alternative A.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Motorized

activities play a large role in the distribution of noxious weeds. Because more roads would be closed under this alternative, Alternative B should help reduce the spread of noxious weeds and may make fuels treatments more feasible than under Alternative A, reducing FRCC departure.

Effects of Alternative C

Alternative C would provide the least amount of wheeled motorized access in the East Helena travel planning area. Under Alternative C, 12.0 miles of wheeled motorized routes would be available yearlong.

Alternative C would limit the flexibility for access for suppression purposes, and fuels project feasibility would go down compared to both Alternatives A and B, due to the fact that access would be limited to 12 miles of road. Of the 58.6 miles of closed roads, 4.0 miles would be decommissioned and would likely be unusable for fire suppression. The risk of human-caused fires associated with motorized use would be the lowest of all alternatives, due to a 45 percent decrease in open road miles compared to Alternative A. However, this degree of reduced motorized access may promote more non-motorized users to a concentrated area, increasing the odds for a human-caused fire to occur by another ignition source.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because more road miles would be closed than under any other alternative, Alternative C should help reduce the spread of noxious weeds more than under any other alternative, and may make fuels treatments more feasible, reducing FRCC departure.

Effects of Alternative D

Under Alternative D, 36 miles of open routes would be available yearlong for wheeled motorized use and 1.9 miles would be seasonally restricted. Of the 32.8 miles of closed roads, 3.1 miles would be decommissioned and would likely be unusable for fire suppression. Alternative D would be more flexible than Alternatives B and C, but it would limit flexibility for access for suppression purposes, and fuels project feasibility would go down compared to Alternative A. The risk of human-caused fires associated with motorized vehicle use would be reduced compared to Alternative A, but would be greater than under Alternatives B and C, due to a 9 percent decrease in open roads compared to Alternative A.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because an intermediate number of road miles would be closed under this alternative, Alternative D should help reduce the spread of noxious weeds and may make fuels treatments more feasible than under Alternative A, but would increase weed spread and potentially make projects less feasible than under Alternatives B or C.

Cumulative Effects on Wildland Fire Management

Effects on wildland fire management associated with any of the BLM travel plan alternatives would be overshadowed by reasonably foreseeable uncharacteristic fire, continued fire suppression made necessary by WUI and intermingled landownership, and large-scale forest insect infestations and disease outbreaks that would continue for the planning period. BLM lands make up about 10 percent of all lands while BLM roads make up about 8 percent of all roads in the TPA.

Revision of the Helena National Forest Plan could result in more or less treatment of adjacent areas. Because no decision has been made, the effects are not known. Wildland fire management, particularly where wildland fire use (management of naturally ignited wildland fires to achieve resource objectives) may occur on USFS lands, will be determined in the plan decision. BLM would need to coordinate with USFS on all wildland fire use actions and events. Wildland fire use on USFS lands could affect FRCC on BLM lands. USFS lands make up 6.6 percent of all lands in the TPA.

Additionally, decisions to increase the level of wildland fire use, prescribed fire, or open burning by the public could impact the BLM's ability to use wildland fire and prescribed fire due to air quality concerns and requirements. This could postpone or eliminate BLM fuel reductions or treatments to improve FRCC.

Access is a critical component of wildland fire suppression. In some cases, access to public lands is being reduced by adjacent landowners gating or closing roads, which could hamper wildland fire suppression efforts and pose a risk to public and firefighter safety. Reducing access would also increase the potential for larger fires to occur due to an increase in time needed to access a fire and control it. Time needed to move in crews would be extended, and the ability to effectively apply and place resources (e.g., engines, water tenders, etc.) would be limited.

Effects on wildland fire management, including FRCC and firefighter and public safety due to management accomplished by other landowners may affect wildland fire management on public lands. When activity fuels (such as logging slash) are not treated adequately, fuel hazard could increase on adjacent lands which could affect fire intensity and severity on public lands. When adjacent owners treat fuels or implement fire mitigation plans in the WUI, fires are easier to suppress and firefighter safety is increased. In this TPA, activities on private lands (64 percent of all lands in TPA) would have more influence on future fire characteristics in the area overall than activities on BLM lands (10 percent of all lands in TPA).

Human population increases and subsequent residential development are likely to expand the WUI and could

alter forest management, taking the emphasis off restoring historic composition and structure and focusing more on fuel reduction.

CULTURAL AND PALEONTOLOGICAL RESOURCES

Effects Common to All Alternatives

Alternative-specific risks or impacts to cultural and paleontological resources are difficult to discern due to a lack of extensive site-specific knowledge about the presence of these resources in a given TPA. By designating open routes, limiting open-country travel, and closing some routes, inadvertent discovery of cultural and paleontological resources and vandalism to them is reduced. Higher road densities in a given area would allow greater access to more land on the average, but that does not imply greater amounts of vandalism, since the vehicles would remain on designated routes.

VISUAL RESOURCES

Effects Common to All Alternatives

Roads (temporary or permanent) may affect visual quality. Roads that remain open for public use may impact visual qualities where noticeable. The quantity of open roads would also influence sensitivity levels since with more open roads, more areas would generally be viewed by more members of the public. Closing or decommissioning roads would generally reduce effects to visual resources and reduce sensitivity levels because fewer members of the public would generally be accessing and viewing areas with closed roads.

Effects of the Alternatives

Under Alternative A, 44.3 road miles would be open (including open with seasonal restrictions), 26.4 miles would be closed. Alternative A would have the greatest impact on visual resources of all alternatives.

Under Alternative B there would be 17 miles of open road (including roads open with seasonal restrictions), 41.9 miles of closed road, and 4.7 miles of decommissioned road. Additional road closures and decommissioning under this alternative would reduce effects on visual resources compared to Alternative A.

Under Alternative C there would be 12 miles of open road, 54.6 miles of closed road, and 4 miles of decommissioned road. Alternative C would have fewer adverse effects and would improve visual resources the most of all alternatives.

Under Alternative D there would be 38.6 miles of open road (including roads open with seasonal restrictions), 29.7 miles of closed road, and 3.1 miles of decommissioned road. Effects to visual resources would be similar but slightly less than under Alternative A, the greater than under Alternatives B and C.

Cumulative Effects on Visual Resources

Under all alternatives, most activities on BLM lands would generally not adversely affect visual resources to unacceptable degrees because discretionary activities on BLM lands would be required to meet Visual Resource Management objectives within individual project areas.

Activities on non-BLM lands, particularly activities near BLM lands associated with residential development, urbanization, or vegetation management, could have adverse cumulative effects on visual resources on BLM lands because BLM VRM objectives would obviously not apply to non-BLM activities.

LIVESTOCK GRAZING

Effects Common to All Alternatives

Roads and trails can potentially affect livestock grazing management. Roads and trails often act as avenues of noxious weed spread. Noxious and invasive weeds can reduce the quantity and quality of forage for livestock. Users of roads and trails can cause management problems for livestock permittees when they leave gates open at fences, vandalize range improvements, or harass livestock either purposely or unintentionally.

Closure of roads and trails can improve or maintain the forage base by reducing vectors of noxious weed spread. Additionally, road and trail closures can reduce management conflicts. On the other hand, closures may increase permittees' time requirements if and when work has to be conducted with horses or afoot. Permittees could minimize effects of closed roads on grazing management time by seeking variances from the BLM for temporary use of specific closed roads.

Effects of the Alternatives

Under Alternative A, 44.3 miles of roads and trails would remain open during grazing season, and 26.4 miles of roads and trails would be closed. Effects would continue as described in the Effects Common to All Alternatives section. All action alternatives would close or decommission more roads and trails than Alternative A. As more roads and trails are closed, noxious and invasive weed spread along with multiple user conflicts would be reduced. On the other hand, permittee management time may increase. Consequently, more effects as described under the Effects Common to All Alternatives section would occur under Alternative C (12 miles open, 58.6 miles closed or decommissioned) than under any other alternative. Alternative B (16 miles open during grazing season, 46.6 miles closed or decommissioned) would produce fewer effects than Alternative C, but more than Alternative A or Alternative D (38 miles open during grazing season, 32.8 miles closed or decommissioned). Alternative D would have fewer effects than Alternatives B or C, but more than Alternative A.

Cumulative Effects on Livestock Grazing

A number of past, present, and reasonably foreseeable future actions affect livestock grazing at the scale of the entire East Helena TPA. Livestock grazing will continue in the area and has the potential to impact forage quality and quantity. On public lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain forage quality and quantity. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, forage conditions would benefit.

The Bucksnot fire of 2000 burned a large portion of the Spokane Hills. The burn encouraged a lot of noxious weed spread, particularly Dalmatian toadflax on south facing slopes. On the other hand, many grasslands were improved with the reduction of conifers; forage production for livestock increased substantially.

Because BLM lands make up only 11 percent of all lands in the East Helena TPA, all of the BLM travel plan alternatives would have a minimal contribution to cumulative effects on livestock grazing at the scale of the entire TPA.

MINERALS

Effects Common to All Alternatives

Road closures and decommissioning could affect access to locatable minerals in areas of moderate or high mineral potential. Operators would be required to seek travel variances from the BLM to use motor vehicles to conduct mineral exploration on closed roads, or to conduct exploration on seasonally restricted routes during the season of closure. Decommissioned roads could not be used for motorized exploration. Travel management provisions that require a permit or variance could result in reducing access to mining claims or interfere with the ability to conduct exploration work for some operators. Historic knowledge of mineralized areas associated with “closed” roads may be lost after long periods of time if no exploration occurs there. Additional costs and time could be required for exploration and development of mining projects associated with closed or decommissioned roads. Impacts of road closures or decommissioning in areas with low mineral potential would not be substantial to mineral development.

Effects of the Alternatives

Effects of the alternatives for the East Helena TPA on access to mineralized areas are summarized in **Table 4-64**. Alternative A would close 18 percent of the roads in high mineral potential areas.

Alternative B for the East Helena area travel plan would seasonally restrict 7 percent and would close 15 percent of the roads in high mineral potential areas (**Table 4-64**). Alternative B would have more impacts than Alternative A.

Alternative C would close 22 percent of the roads in areas with high mineral potential and 1 percent of those with moderate mineral potential (**Table 4-64**). Alternative C would have the most potential to affect access to mineralized areas of all the alternatives.

Alternative D would seasonally restrict 3 percent, and close 9 percent of the roads in areas with high mineral potential (**Table 4-64**). Alternative D would more impacts than Alternative A, but less than Alternatives B and C.

Table 4-64				
Analysis of Access to Mineral Potential Areas				
East Helena TPA				
Mineral Potential	Open Miles (%)	Seasonally Restricted Miles (%)	Closed Miles (%)	Decom Miles (%)
Alternative A				
High	8.8 (12%)	0.0 (0%)	12.4 (18%)	0.0 (0%)
Moderate	1.3 (2%)	0.1 (0%)	0.0 (0%)	0.0 (0%)
Low	26.5 (37%)	7.6 (11%)	14.0 (20%)	0.0 (0%)
Total Miles = 70.7				
Alternative B				
High	6.0 (8%)	4.8 (7%)	10.5 (15%)	0.0 (0%)
Moderate	0.5 (1%)	0.8 (1%)	0.1 (0%)	0.0 (0%)
Low to none	7.2 (10%)	4.8 (7%)	31.3 (44%)	4.7 (7%)
Total Miles = 70.7				
Alternative C				
High	5.4 (8%)	0.0 (0%)	15.8 (22%)	0.0 (0%)
Moderate	0.7 (1%)	0.0 (0%)	0.8 (1%)	0.0 (0%)
Low to none	6.0 (8%)	0.0 (0%)	38.0 (54%)	4.0 (6%)
Total Miles = 70.7				
Alternative D				
High	12.9 (18%)	1.9 (3%)	6.5 (9%)	0.0 (0%)
Moderate	1.4 (2%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Low to none	21.7 (31%)	0.0 (0%)	23.2 (33%)	3.1 (4%)
Total Miles = 70.7				

Mineral Potential areas have been delineated by the Montana Bureau of Mines and Geology (MBMG)

Cumulative Effects on Access to Mineralized Areas

No other past, present, or reasonably foreseeable future actions in the East Helena TPA would adversely affect mineral availability or access.

Overall, there is low potential for leasable fluid mineral development throughout federal mineral estate lands in the Butte Field Office. However, in this context, the Reasonably Foreseeable Development Scenario for the Butte RMP identified approximately 13,492 acres of federal mineral estate lands in this TPA where oil and gas development potential is slightly higher (low to moderate) and may potentially occur. Potential contribution of this activity to cumulative effects for other resources would be unknown until this activity is site-specifically planned.

RECREATION

Effects of travel plan alternatives on Recreation in the East Helena TPA are described qualitatively below.

Effects of Alternative A

Alternative A would provide more motorized opportunities than non-motorized opportunities. Under Alternative A, a total of 44.3 miles of wheeled motorized routes would be open (36.6 miles open yearlong, 7.7 miles seasonally restricted). With the exception of the Ward Ranch, McMasters, and Spokane Hills temporary area closures, the remainder of the travel planning area would remain available to cross-country area snowmobile use, as well as travel on all existing routes during the season of use (12/2-5/15), conditions permitting.

Effects of Alternative B

Alternative B would provide for separate use areas for wheeled motorized and non-motorized recreational opportunities. Under Alternative B, 13.7 miles of wheeled motorized routes would be available yearlong, and 3.3 miles would be seasonally restricted. Cross-country snowmobile travel would be allowed, as well as travel on all existing routes during the season of use (12/2-5/15), except for the North Hills, Dana's Bar, and the area located to the west of Prickly Pear Creek. The remainder of the travel planning area (McMasters Hills, Ward Ranch, and Spokane Hills) would be closed to all cross-country snowmobile use, including travel on existing roads and trails. Conflicts between non-motorized users (cross-country skiers, snowshoers) and snowmobilers would be expected to continue or increase in areas with shared use.

Effects of Alternative C

Alternative C would provide the least amount of wheeled motorized access in the East Helena travel planning area of all alternatives. Under Alternative C, 12.0 miles of wheeled motorized routes would be avail-

able yearlong. No cross-country snowmobile use would be allowed; use would be restricted to designated routes only during the season of use (12/2-5/15), snow conditions permitting. This would likely reduce conflicts with non-motorized winter users (cross-country skiing, snowshoeing).

Effects of Alternative D

Alternative D would provide the highest level of motorized access and the fewest non-motorized opportunities of the action alternatives. Under Alternative D, 36.0 miles of wheeled motorized routes would be available yearlong, and 1.9 miles would be seasonally restricted. Snowmobile management under would be as follows: cross-country travel would be allowed, as well as travel on all existing routes during the season of use (12/2-5/15), for the North Hills, Dana's Bar, and the area located to the west of Prickly Pear Creek. The Ward Ranch and the Big Bend areas would be closed to all cross-country snowmobile use as well as travel on designated routes.

Cumulative Effects on Recreation

Under Alternative A, motorized travel opportunities would be the greatest under this alternative given the miles of roads available to wheeled vehicles and the acres available to snowmobile use. Big game hunting opportunities within the North Hills, McMaster Hills, Ward Ranch and Spokane Hills would continue. Existing travel restrictions in these areas would encourage big game retention, quality walk-in hunting and game retrieval challenges as motorized vehicle use would be limited. During the non-hunting season conflicts between non-motorized and motorized users would remain relatively high within the North Hills. Public access and management of developed recreation sites along the Missouri River would continue to provide for a wide spectrum of water based opportunities and visitor trends are expected to increase. The newly constructed 30-unit campground and day-use facility at White Sandy on lower Hauser Lake scheduled to be open 5/25/07 will help meet growing visitation needs and better distribute use on the 15-mile lake.

Under Alternative B, motorized travel opportunities would be decreased while non-motorized opportunities would be enhanced overall. Big game hunting opportunities within the North Hills, McMaster Hills, Ward Ranch, and Spokane Hills would continue. Additional travel restrictions in these areas would promote more big game retention on public lands and better walk-in hunting experiences. Opportunities for individuals who are physically challenged would be improved in the Spokane Hills. In addition, game retrieval would be enhanced since motorized routes would be provided in the Spokane Hills. More emphasis would be placed on maintaining undeveloped open space areas for dispersed recreation. Given the increasing development pressures on adjoining private lands throughout the Missouri River

corridor, it is anticipated that these open areas will be more important with time. Use levels within the North Hills are expected to increase while conflicts between non-motorized and motorized users should be reduced. Although available travel routes and motorized riding opportunities would be limited, access to higher elevation lands and quality walk-in areas would be retained to help disperse users and ensure natural settings. Cumulative impacts on developed recreation sites and water based activities would be similar to Alternative A.

Alternative C would impose the greatest impacts on motorized travel opportunities while opportunities for non-motorized experiences would be the most benefited. Recreation Opportunity Spectrum management and big game hunting opportunities within the TPA would be similar to Alternative B with the exception that no motorized routes would be provided for big game retrieval or handicapped hunting in the Spokane Hills. Cumulative impacts on developed recreation sites and water based activities would be similar to Alternative A.

Under Alternative D, cumulative effects of the travel management actions coupled with all other existing and reasonably foreseeable actions would be similar to Alternative A.

TRAVEL MANAGEMENT AND ACCESS

Effects of Alternative A

Under Alternative A in the East Helena TPA, there would be 36.6 miles of BLM road open yearlong, 7.7 miles open with seasonal restrictions, and 26.4 miles of closed roads (Table 4-65). Alternative A would provide for the greatest degree of motorized opportunities, and the lowest degree of non-motorized opportunities of all alternatives. With the exception of the Ward Ranch, McMasters, and Spokane Hills temporary area closures, the remainder of the TPA would remain available to cross-country area snowmobile use, as well as travel on all existing routes during the season of use (12/2-5/15), conditions permitting.

The extent of management activities and costs under Alternative A would be mixed. Less personnel time would be required to monitor travel compliance than

under any alternative. However, more effort would be required for initial implementation (signing designated routes, installing bulletin boards) than under any other alternative. Estimated costs for road/trail maintenance would be highest of all alternatives.

The need for BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be minimal under this alternative, given the availability of motorized access.

Effects of Alternative B

Alternative B in the East Helena TPA would help provide separate use areas for wheeled motorized and non-motorized recreational opportunities. Motorized access in the North Hills area would decrease compared to Alternative A (Table 4-65). Other than route 516, the primary access route to a non-motorized trailhead in the North Hills, the remaining road network would be seasonally restricted to prevent soil erosion. The result of these management actions would increase opportunities for non-motorized users and enhance their enjoyment through the increase in trails exclusively for hiking, mountain biking, horseback riding, and other non-motorized activities.

Under Alternative B, cross-country snowmobile travel would be allowed, as well as travel on all existing routes during the season of use (12/2-5/15), for the North Hills, Dana's Bar, and the area located to the west of Prickly Pear Creek. The remaining areas (McMasters Hills, Ward Ranch, and Spokane Hills) would be closed to all cross-country snowmobile use, including travel on existing roads and trails. Conflicts between non-motorized users (cross-country skiers, snowshoers) and snowmobilers would be expected to continue or increase in areas with shared use.

Motorized access for the McMasters area would be reduced compared to Alternative A.

One additional non-motorized trailhead would be established in the Big Bend area, increasing opportunities for hiking, horseback riding, and other non-motorized pursuits.

Opportunities for disabled hunters would increase compared to the other alternatives. Motorized access to the southern portion of the Spokane Hills would be allowed for hunters with a disability for a two-week period each year. These same motorized routes would be available during the general hunting season for game retrieval opportunities.

Route closures across 60 percent of the area would reduce unauthorized travel (illegal off-road use by ATVs and motorcycles) and illegal activities (underage alcohol use, drug use, vandalism, dumping) in the North Hills and elsewhere.

The reduction in motorized use under Alternative B would enhance safety among users of the East Helena

Proposed Management	Total Miles			
	Alt A	Alt B	Alt C	Alt D
Wheeled motorized routes				
Open Yearlong	36.6	13.7	12.0	36.0
Seasonally Restricted	7.7	3.3	0	1.9
Closed	26.4	41.9	54.6	29.7
Decommissioned	0	4.7	4.0	3.1
Non-motorized trails ¹	26.4	47.1	59.1	32.6

¹ Non-motorized trails include all existing trails, closed roads, and decommissioned roads.

TPA, compared to Alternatives A and D, and to a similar extent as under Alternative C.

Trailhead development costs would be greater under Alternative B than under Alternative A due to the development of new non-motorized trailheads in the North Hills and Big Bend areas.

The extent of management activities and costs under Alternative B would be mixed. Less personnel time would be required for initial implementation (signing designated routes, installing bulletin boards) than under Alternative A. However, more effort would be required for public education and compliance than under Alternative A. Estimated costs for road/trail maintenance would be less than under Alternative A.

The need for BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be greater under Alternative B than under Alternative A.

Effects of Alternative C

Alternative C would provide the least amount of wheeled motorized access in the East Helena TPA of all alternatives. The area would feature only 12.0 miles of motorized access under Alternative C, which is about 73 percent less than under Alternative A, and 29 percent less than Alternative B (**Table 4-65**).

Closure and decommissioning of routes in the East Helena TPA would result in an increase in non-motorized opportunities with a corresponding decrease in motorized opportunities. Alternative C would provide 55 percent more miles of non-motorized trails than Alternative A, and 20 percent more than Alternative B.

No cross-country snowmobile use would be allowed. Use would be restricted to designated routes only during the season of use (12/2-5/15), snow conditions permitting. This would likely reduce conflicts between snowmobilers and non-motorized winter users (cross-country skiing, snowshoeing).

Having routes 0516A and 0516 provide the only motorized access to the North Hills would result in decreased motorized opportunities but increased opportunities for non-motorized recreation (and low levels of conflict).

Keeping route 050133A closed at its current location (regardless if the Ward Ranch is vacated in the future) would result in fewer motorized opportunities in the Ward Ranch area than under Alternative B. However, non-motorized opportunities would increase under Alternative C because visitors could park at the current motorized closure area, and walk approximately 0.25 mile to the ranch complex.

Motorized access to the McMasters area would be the same under Alternatives B and C, representing a reduction in motorized use to the area compared to Alternative A.

Allowing motorized access to only the primary residential access routes in the Prickly Pear Creek area (south of Black Sandy) and no motorized access in the Big Bend area would result in an increase in non-motorized recreational opportunities in both these areas. Motorized access for these areas would be more restricted under Alternative C than under all other alternatives.

Restricting motorized access in the Spokane Hills area to a non-motorized trailhead at the end of route EH07A would result in an increase in non-motorized opportunities in this area. Alternative C would be more restrictive than the other alternatives and would result in a decrease in motorized opportunities in this area.

Not developing a non-motorized trailhead in the Big Bend area would result in a decrease in travel management costs under Alternative C compared to Alternative B.

The extent of management activities (and costs) under Alternative C would be mixed. Less personnel time would be required for initial implementation (signing designated routes, installing bulletin boards) than under any other alternative. However, more effort would be required for public education and compliance than under any other alternative. Estimated costs for road/trail maintenance would be the lowest of the alternatives.

The need for BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be greater under Alternative C than under any other alternative.

Effects of Alternative D

Alternative D would provide the highest level of motorized access in the East Helena TPA of the action alternatives, featuring approximately 33 percent more open routes than under Alternatives B and C (**Table 4-65**). All of the designated routes would be available for motorized use in the North Hills compared to the seasonally restricted closures under Alternatives A, B, and C. Snowmobile management under Alternative D would be as follows: cross-country travel would be allowed, as well as travel on all existing routes during the season of use (12/2-5/15), for the North Hills, Dana's Bar, and the area located to the west of Prickly Pear Creek. The Ward Ranch and the Big Bend areas would be closed to all cross-country snowmobile use as well as travel on designated routes. Opportunities for snowmobile use would be less than under Alternative A, but greater than under Alternatives B and C.

Alternative D would not minimize or reduce conflicts between motorized and non-motorized recreation in the North Hills, where conflicts are most evident within the East Helena TPA, because dispersed recreational opportunities would not be provided. User conflict would be greater under Alternatives A and D than Alternatives B and C.

Increasing motorized access in the McMasters area by adding a new loop route would result in increased opportunities for motorized vehicle users. Reducing the number of non-motorized trailheads would result in a decrease in non-motorized opportunities in this area.

Increasing motorized access west of Prickly Pear Creek, in the Big Bend area, the Spokane Hills, and in the Townsend area would result in increased motorized opportunities. Conflict between motorized and non-motorized users would increase as well.

Relocating the trailhead in the Spokane Hills would result in increased travel management costs compared to Alternative A.

The extent of management activities and costs under Alternative D would be mixed. Less personnel time would be required to monitor travel compliance than under Alternatives B and C, but slightly more would be needed than under Alternative A. However, more effort would be required for initial implementation (signing designated routes, installing bulletin boards) than under Alternatives B and C, but less would be needed than under Alternative A. Estimated costs for road/trail maintenance would be higher than under the other action alternatives.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be greater under Alternative D than under Alternative A, but less than under Alternatives B and C.

Cumulative Effects on Travel Management and Access

Under all alternatives, there are a number of past, present, and reasonably foreseeable future BLM and non-BLM actions and activities affecting travel management and access in the East Helena TPA.

East Helena Valley has been experiencing steady human population growth. This trend is expected to continue, along with increased recreational use of this travel planning area. These factors could lead to increased public pressure to alter travel planning to accommodate either more, or less motorized use.

The majority of BLM managed routes for the East Helena Travel Planning area are located in or adjacent to the McMaster Hills/Spokane Bay, Mt. Bend, and North Hills sub-planning areas. As with the Scratchgravel Hills (Helena TPA), these areas are surrounded by residential development, and have experienced steady residential development over the past 15-20 years. This combination of rapid urbanization and increased recreational use has led to increased social conflict; between area residents and recreation users, and among recreational users themselves (motorized/non-motorized). As a result, there have been public demands to alter the existing travel management for these areas, to accommodate either

more, or less motorized use. The remaining routes for the TPA are located in the Spokane Hills and Townsend sub-travel planning areas. The Spokane Hills and Townsend sub-travel planning areas are more rural in character, but also have potential for urbanization.

Recreation use is well established in the TPA. Primary recreation activities include water based activities, big game hunting, non-motorized uses (hiking, jogging, horseback riding, mountain biking, etc.), and OHV uses (ATV, motorcycle). As recreation use grows, conflicts between non-motorized and motorized recreation users could lead to increased public demands for either more, or less motorized use.

Spokane Creek (Hauser Lake) is an important habitat for spawning fish. Portions of the TPA (North Hills, areas adjacent to Canyon Ferry and Hauser Lakes) provide winter range for mule deer and elk. Concerns could lead to demands to restrict motorized use in these areas.

The Lewis and Clark National Historic Trail, proposed Spokane Creek ACEC, and Missouri River eligible WSR segment (3 mile portion located below Hauser Dam) being considered in the RMP revision are located within the TPA. These special designations could influence (restrict) travel management for existing roads and trails as well as for new proposed roads and trails.

In some site specific cases, visual resource management may affect or restrict new road/trail construction.

Urban development may lead to an increase in right-of-way permits to accommodate private property/development access. As a result, public access to BLM lands, via these rights-of-ways, could increase as well.

Limits or reductions in the BLM's funding and ability to maintain designated routes could lead to an overall reduction in open road miles.

A variety of resource management projects, such as BLM initiated vegetation treatments, or wildland fire fuels reduction projects, could affect travel management. Forest management activities from 1984 to present include 250 acres of fire replanting and 250 acres of timber salvage. Future wildland fire management activities include a 500-1,500 acre mechanical and/or prescribed fire treatment for the North Hills, focused on the urban interface areas. This project is anticipated to begin in 2009, and last several years. Depending on the type and scope of project, effects could vary from temporary, short-term area/route closures, to new opportunities (new routes) for motorized or non-motorized access.

Active claims are common in the areas with high potential and there are active notices in the travel planning area as well. Increases in mineral prices could lead to increased or renewed mining activity. Depending on the type and scope of mining activity, effects could vary from temporary, short-term area/route closures, to in-

creased opportunities (new routes) for motorized or non-motorized access.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Motorized activities play a large role in the distribution of noxious weeds. Concerns over the spread of noxious weeds could influence travel management, and lead to fewer motorized opportunities.

Motorized use on dirt roads and trails is a major contributor to soil erosion and stream sedimentation. These concerns may influence travel management, and result in fewer motorized opportunities. This is an important consideration in the East Helena area as the Montana Department of Environmental Quality is working on water quality restoration plans in the area.

Trash dumping, drug use, underage alcohol use, unattended camp fires, and vandalism occur throughout the travel planning area, but especially in the rural/urban interface areas. Most of these activities are directly associated with motorized use. Continuing concerns with illegal activities may influence travel management and lead to fewer motorized opportunities.

The Bureau of Reclamation (BOR) manages approximately 11,500 acres of land surrounding Canyon Ferry Reservoir. BOR actions (such as new recreation site developments) could influence travel management on adjacent BLM lands as well, exerting pressure for either more or less motorized access.

For perspective, BLM managed lands represent approximately 10 percent of the total travel planning area (200,991 total acres, 20,039 BLM acres); while BLM managed routes represent approximately 8 percent of the total routes available (892.2 total miles, 70.7 miles BLM roads/trails). Future travel management (for all agencies, nationwide) is likely to lead to fewer opportunities for motorized recreational use than under current management (particularly for OHV use).

As a result, BLM routes available to motorized use could experience increased use from displaced users, leading to more concentrated use, increased resource impacts, user conflicts, and pressure to reduce motorized use.

Under all alternatives, overall increases in human population, urbanization, recreation use, user conflicts; and concerns for wildlife, noxious weed spread, soil erosion/water quality, and illegal activities are likely to lead to increased demands to restrict motorized travel, particularly in areas with urban development, such as the McMaster Hills/Spokane Bay, Mt. Bend, and North Hills areas. Under Alternative A, as urbanization continues and both motorized (wheeled and snowmobile) and non-motorized use increases, user conflict would increase in the East Helena TPA. Under the action alternatives, separate use areas and decreased road density would reduce user conflicts. Under Alternative B, these

pressures would have less impact on travel management than under Alternatives A and D, due to the overall reduction in motorized opportunities and separation of uses. Under Alternative C, these pressures would have the least impact on travel management than under the other alternatives, due to the reduction in motorized opportunities. Under Alternative D, these pressures may lead to increased demands to restrict motorized travel, particularly in areas with urban development, such as the McMaster Hills/Spokane Bay, Mt. Bend, and the North Hills areas.

TRANSPORTATION FACILITIES

For the sake of this discussion, “open” roads include roads that are open yearlong as well as those that are open with seasonal restrictions.

Effects of Alternative A

Under Alternative A, the East Helena TPA would have 44.3 miles of open roads and no motorized trails (**Table 4-66**). Estimated costs for annual maintenance and stabilization of roads under Alternative A would be similar to Alternative D and much less than under Alternatives B and C. Estimated annual costs for monitoring, compliance and weed control would be higher than under the action alternatives, but close to the same as under Alternative D.

Effects of Alternative B

Under Alternative B, the East Helena TPA would have 17 miles of open roads and no motorized trails (**Table 4-66**). Estimated costs for annual maintenance and stabilization of roads under Alternative B would be less than under Alternatives A and D but more than under Alternative C. Estimated annual costs for monitoring, compliance and weed control would also be less than under Alternatives A and D but more than under Alternative C.

The addition of a non-motorized trailhead at the end of route 50108 in the North Hills and on the ridge top near the end of EH 037 in the Big Bend area would result in an increase in transportation facility costs for trailhead development and maintenance. Designation of the “hunters with a disability” access in the South Hills would also represent an increase in transportation facility costs for signage and sign maintenance. These increases would be offset by reduced costs associated with having fewer open road miles to maintain in the long-term.

Effects of Alternative C

Under Alternative C, the East Helena TPA would have 12 miles of open roads and no motorized trails (**Table 4-66**). Estimated costs for annual maintenance and stabilization of roads under Alternative C would be the least of all the alternatives due to the least number of motorized routes. Estimated annual costs for monitoring,

compliance, and weed control would also be less than under the other alternatives.

There would be a short-term increase in transportation facility costs under Alternative C resulting from the increase in signage required to mark closed and restricted routes. Indirect costs associated with sign maintenance and replacement would be greater under Alternative C than under the other alternatives; however, this effect would be short term because the public would become accustomed to the route changes over time.

Effects of Alternative D

Under Alternative D, the East Helena TPA would have 37.9 miles of open roads and no motorized trails (**Table 4-66**). Estimated costs for annual maintenance and periodic stabilization of roads under Alternative D would be similar to Alternative A, and less than under Alternatives B and C. Estimated annual costs for monitoring, compliance and weed control would be less under Alternative D than Alternative A and more than under Alternatives B and C.

Constructing several new designated routes under Alternative D would result in a short-term increase in transportation facility costs for the signage and potentially for more culverts, and a long-term increase for route maintenance associated with new routes. These costs would be offset in the long-term by reduced costs associated

with having fewer road miles to maintain than under Alternative A.

Relocation of the trailhead in the Spokane Hills area would result in a short-term increase in transportation facility costs for trailhead development and signage.

LANDS AND REALTY

Effects Common to All Alternatives

The Butte Field Office administers approximately 62 rights-of-way (ROW) and 3 non-commercial occupancy leases within the boundaries of the East Helena TPA, which encumber approximately 1,609 acres of BLM land (**Table 4-67**). Various types of road rights-of-way are the most common type of grant, accounting for 34 percent, or about one third of the total. Other types of authorized uses include: oil and gas pipelines, lines for electrical distribution and telephone facilities, communication sites, ditches, railroads, and mineral material sites.

Approximately two right-of-way applications for new facilities as well as amendments, assignments, renewals, or relinquishments of existing right-of-way grants are processed annually in the TPA. This would not vary by alternative.

The general trend of granting rights-of-way is expected to increase through the planning period as a result of increasing public demands. From a cumulative effects

Table 4-66
East Helena TPA Route/Trail/Maintenance Costs

Classification/Cost	Alt A	Alt B	Alt C	Alt D
Miles of Open/Restricted Roads	44.3	17	12	37.9
Motorized Trails	0	0	0	0
Annual Roads Maintenance	\$3,544	\$1,360	\$960	\$3,032
Annual Trails Maintenance	\$0	\$0	\$0	\$0
Periodic Road Stabilization	\$1,418	\$544	\$384	\$1,213
Periodic Trails Stabilization	\$0	\$0	\$0	\$0
Monitoring/Compliance	\$2,215	\$850	\$600	\$1,895
Weed Control	\$665	\$255	\$180	\$569

Table 4-67
East Helena TPA ROWs/Leases

Type	Approximate Number	Approximate Acres
Roads	21	746
Power	16	257
Telephone	12	45
O&G Pipelines	3	84
Comm. Sites	4	8
2920 Leases	3	1
Other	6	468
Totals	65	1,609

standpoint, development of adjacent federal, state, and private land, increased recreational use and the trend of homeownership away from urban areas, coupled with traditional on-going uses, are all expected to require more guaranteed access involving public land.

SPECIAL DESIGNATIONS

There would be no effects to any special designation areas such as Wild and Scenic Rivers, Wilderness Study Areas, or Areas of Critical Environmental Concern under any of the travel plan alternatives for the East Helena TPA.

LEWIS AND CLARK COUNTY NW TPA

The 406,700-acre Lewis and Clark County Northwest TPA contains approximately 17,037 acres of BLM lands. There are approximately 68 miles of BLM roads, making up about 4.7 percent of the approximate total of 1,448 road miles in the TPA. The majority of roads (819 miles) lie on private lands.

AIR QUALITY

Effects Common to All Alternatives

Motorized recreation use is expected to continue to increase, resulting in higher levels of vehicle emissions.

Motorized travel across dry unpaved routes or trails would continue to produce airborne dust.

There could be areas with localized air pollution as a result of higher use numbers, and more concentrated use on fewer miles of available routes.

Drier climate conditions could make soils more susceptible to the effects of motorized travel, resulting in higher levels of airborne dust.

Impacts to air quality vary by alternative and travel plan area. In general, alternatives that reduce the level of motorized use (have fewer available miles) could have a positive impact on air quality; while alternatives that maintain or increase the level of motorized use, could lead to increased air quality impacts. This would not necessarily be a direct relationship, however, because reduction in available road miles for motorized use could redistribute use or focus more use on remaining open routes.

Under all alternatives, impacts from airborne dust could be reduced through mitigation such as hardening native surface roads with gravel or periodically spraying them with water trucks during the dry season. During BLM project work, in addition to watering native surface roadbeds, speed limits could be reduced to further minimize dust emissions.

Effects of the Alternatives

Under Alternative A (present management), adverse impacts to air quality would be expected to continue, and likely increase, concurrent with higher levels of motorized recreational use. Each of the action alternatives, however, would provide fewer available motorized routes. Alternatives B and C would provide 56 percent and 69 percent fewer motorized routes, respectively, than Alternative A, while Alternative D would provide 47 percent fewer routes than Alternative A. As a result, airborne dust and vehicle emissions would be taking place on fewer BLM routes and could be reduced.

It should be noted that even without motorized use, airborne dust, resulting from wind erosion of exposed native surface roads will continue. Therefore, travel plans with more miles of dirt roads would result in more airborne dust.

Under all alternatives, mitigation measures, such as graveling and/or watering native surface roads, could reduce dust emissions even further, and/or help offset the effects of increased or concentrated use on the remaining open routes.

Cumulative Effects on Air Quality

Under all alternatives, the cumulative effects to air quality from travel management in the Lewis and Clark County NW TPA would arise from a number of past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands.

For perspective, BLM managed lands in the Lewis and Clark County NW TPA area represent approximately 4.2 percent of the total travel planning area (406,700 total acres; 17,037 BLM acres). Under present management (Alternative A) BLM managed routes represent a small portion, approximately 4.7 percent, of the total routes available (1,447.7 total miles; 67.6 miles BLM roads/trails). Potential air quality impacts associated with activities on non-BLM lands and roads would be a greater contributor to cumulative effects to air quality than activities on BLM lands and roads.

In the past, prior to the 2003 Statewide OHV ROD, BLM management allowed unrestricted cross country travel by all forms of wheeled motorized use. Under present management, in the absence of other existing travel plan direction, all motorized wheeled travel is restricted to existing roads and trails. Under current management, approximately 64.2 of the 67.6 miles of existing BLM routes are available for motorized use. This mileage available for use would be reduced under the action alternatives as described above with associated potential differences in effects to air quality.

Under all alternatives, cumulative increases in human population, urbanization, recreation use, user conflicts; and concerns for wildlife, noxious weed spread, soil

erosion, air/water quality, and illegal activities may lead to increased demands to restrict motorized travel.

SOILS

Effects Common to All Alternatives

Road construction, use, and maintenance affect soils in a number of ways. Soils are often compacted by these activities. Soil compaction can lessen the amount of precipitation that can infiltrate into soil and increase runoff, erosion, and sedimentation – in turn decreasing soil/site stability and hydrologic function, as well as soil productivity and plant vigor and diversity.

Ground disturbance associated with road construction, use, and maintenance can result in erosion. Erosion affects soil/site stability and hydrologic function. Erosion and sedimentation can destabilize the surface and sub-surface cohesion of the soil, resulting in soil loss from erosion sites. Loss of soil can impede or prevent establishment and development of vegetation communities.

Closing or decommissioning roads often leads to beneficial effects to soils through decreased site disturbance and re-establishment of vegetative cover on road surfaces. This tends to reduce soil erosion and stabilize soils. Decommissioning roads may in some cases entail ripping road surfaces to de-compact them, thus improving water infiltration, hydrologic function, and the ability of the treated area to revegetate more successfully.

Impacts to soils associated with site-specific travel plan alternatives were assessed based on the potential for soil erosion using the following erosion risk criteria:

- High – the area a route travels through has slopes greater than 30 percent gradient.

- Moderate – the area a route travels through has slopes ranging from 15 to 30 percent gradient; or, for granitic soils, slopes ranging from 0 to 30 percent gradient.
- Low – the area a route travels through has slopes ranging from zero to 15 percent gradient and soils are not granitic in origin.
- Unrated – road mapping not available at time of erosion impact rating.

Effects of the Alternatives

The distribution of road miles by erosion impact category and by proposed road management category for all the alternatives is shown for the Lewis and Clark County NW TPA in **Table 4-68**. Roads in the “unrated” category were excluded from detailed consideration and are shown for the purpose of displaying the extent of lacking information.

Most roads in this TPA are in either the high or moderate erosion impact category. Under current conditions (Alternative A) approximately 45.6 miles of open BLM roads are located in areas with high erosion risk, and 16 miles are in moderate erosion areas. Soil erosion would be reduced under Alternative B because this alternative would reduce those mileages in the high and moderate erosion categories to 20.1 miles and 5.9 miles, respectively. Approximately 26.6 miles of road in the high and moderate categories combined would be closed under Alternative B with an additional 10.4 miles in these categories being decommissioned. Vegetative recovery should occur to varying degrees on closed and decommissioned roads, with a beneficial effect on soils of reducing erosion from these areas.

Proposed Road Management	Erosion Risk Category	Alternative A	Alternative B	Alternative C	Alternative D
Open Road Miles (incl. Open w/restrictions)	High	45.6	20.1	12.6	24.6
	Moderate	16.0	5.9	6.1	7.9
	Low	0.2	0.2	0.2	0.2
	Unrated	2.4	1.9	0.9	1.8
Closed Road Miles	High	3.1	19.7	31.4	14.6
	Moderate	0.3	6.9	8.8	5.6
	Low	0	0	0	0
	Unrated	0.1	0.2	1.3	0.1
Decommissioned Road Miles	High	0	8.6	4.2	6.8
	Moderate	0	1.8	0.8	1.5
	Low	0	0	0	0
	Unrated	0	0	0	0.5

Note: Open roads include seasonally open roads as well as roads open yearlong.

Soil erosion would be reduced more under Alternative C than under any other alternative because the lowest mileage of roads in the high and moderate erosion categories would be left open (18.7 miles combined), while the greatest mileage in these categories would be closed (40.2 miles combined) of all alternatives. An additional 5 miles in these categories would be decommissioned under Alternative C.

Soil erosion associated with roads would be reduced under Alternative D compared to Alternative A, but would still be higher than under either Alternative B or C. Approximately 32.5 miles of BLM road in the moderate and high erosion categories combined would remain open under Alternative D, while about 20.2 miles in these categories would be closed and 8.3 miles would be decommissioned under this alternative.

Cumulative Effects on Soils

Cumulative effects to soils in the Lewis and Clark County NW TPA would arise from a number of past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands. Within this 406,700-acre TPA, BLM lands comprise about 17,037 acres or 4 percent of total lands. The approximately 68 miles of BLM roads make up about 4.7 percent of the approximately 1,448 road miles in the TPA. Therefore road-related effects to soils described by alternative for BLM roads would affect about 4.7 percent of all roads in the TPA. The majority of lands and roads (over 50 percent of each) within the TPA boundary are private property. Non-BLM roads are managed by the county, Forest Service, state, and private landowners.

The Bald Butte Mine is located within this TPA. Currently this is a small scale open cut molybdenum mine of less than 5 acres in size on private land. It is anticipated to expand into approximately 5 acres of BLM land in the future and may occupy up to 30 acres of open area collectively at any one time in the future. Impacts to soils from this activity will include complete soil removal and displacement, erosion, compaction, and covering by facilities. Reclamation work would provide for stabilization of soils in the aftermath of mining activity.

Approximately 1,961 BLM acres are permitted for various rights-of-way and leases. About 558 of these acres are for specific road rights-of-way. An additional approximately 1,050 acres are associated with the Great Divide Ski Area. The remaining 353 acres are associated with powerlines, waterlines, communication sites, oil and gas pipelines, and other utility facilities. Impacts to soils range from compaction and occupation of ground with buildings, roadbeds, and other facilities, to revegetation and ground cover being re-established to stabilize soils. Much of the Great Divide Ski Area is a mosaic of ski runs and chair lifts nestled within forested or otherwise naturally vegetated areas. Impacts to soils from these features are minor.

From 1984 to 1995 timber harvest took place on about 82 acres of BLM land in this TPA (including timber salvage on 42 acres). From 1995 to the present timber harvest (predominantly selective harvest) has occurred on about 116 acres of BLM land in the TPA. Adverse effects on soils were generally minor with treated areas having undergone revegetation and soil stabilization since treatment. Timber harvest has also occurred on private and Forest Service lands and will likely continue for the foreseeable future, having localized compaction and erosion effects on soils.

From 1981 to 2004, wildland fire has burned across approximately 83 acres in the Lewis and Clark County NW TPA, creating a range of soil effects with more severely burned areas experiencing localized erosion and with other areas being relatively little affected.

There have been no fuels reduction treatments on BLM lands in the TPA in the last 10 years. While treatments of 1,500 to 3,000 acres (combination of mechanical and prescribed fire) may occur on BLM lands in the future, these treatments are not yet planned or designed. They would be designed to minimize effects to soils by minimizing compaction/disturbance from mechanical equipment and designing prescribed burns to be cool enough so as not to release nutrients from fuels but not scorch soils. Fuels treatments conducted on private and Forest Service lands will likely occur for the foreseeable future with variable effects to soils. Reducing fuels under the controlled conditions of deliberate treatments may benefit soils in the long-term by reducing the risk of high severity fires in treated areas.

Livestock grazing on public and private lands throughout much of the TPA has created areas of localized soil erosion and compaction, particularly in grassland and shrubland areas. This will continue to occur for the foreseeable future.

Increasing residential development will likely continue for the foreseeable future to variable degrees within the TPA. Erosion, compaction, and covering of soils would occur due to additional road construction, clearing/leveling for home sites, and establishment of utility infrastructure for residential developments.

Under Alternative A, the contribution to cumulative effects on soils from BLM road management would continue as it occurs today. Retaining approximately 58 miles of road open yearlong and an additional 7 miles open with seasonal restrictions would allow for the same level of compaction and erosion impacts that currently exist.

From a BLM road management perspective, all action alternatives would benefit soil resources compared to Alternative A. Alternative B would benefit soils by providing for a reduced contribution to adverse cumulative effects than would Alternative A because about 55 percent of BLM roads would be closed or decommissioned under Alternative B (compared to 5 percent under Alter-

native A). Erosion should be reduced on these closed/decommissioned roads as disturbance is eliminated and revegetation occurs and stabilizes soils. Of the approximately 28 miles of open road under Alternative B, about 14 miles would be seasonally restricted from motorized vehicle use from 12/2 to 5/15. This would prevent erosion associated with motorized use during the wet snowmelt/runoff period.

Alternative C would benefit soils the most and provide for the least contribution to adverse cumulative effects on soils of all alternatives. This alternative would provide for closure or decommissioning of about 69 percent of BLM roads in the TPA, thus allowing these areas to vegetatively recover and stabilize soils. Of the approximately 20 miles of open road in this alternative, about 12 of those miles would be seasonally restricted (12/2 to 5/15) to exclude motorized use during the wet snowmelt/runoff period. This would prevent erosion associated with this wet season use.

Alternative D would provide for the greatest contribution to adverse cumulative effects on soils of the action alternatives, but would still provide for greater long-term benefits to soils than Alternative A. Alternative D would provide for closure or decommissioning (and subsequent vegetative recovery and/or soil stabilization) of about 43 percent of BLM roads in the TPA, compared to 5 percent for Alternative A, 55 percent for Alternative B, and 69 percent for Alternative C.

Due to the scattered distribution and relatively small proportion of BLM lands (4 percent) and roads (4.7 percent) relative to the total quantities of lands and roads in the TPA, none of the BLM alternatives would substantially contribute to cumulative effects on soils at the scale of the Lewis and Clark County NW TPA.

WATER RESOURCES

Effects Common to All Alternatives

There are a number of key concepts that are critical to understanding road effects to water resources.

Hydrologic function is an interaction between soil, water, and vegetation and reflects the capacity of a site to:

- Capture, store, and safely release water from rainfall, runoff, and snowmelt;
- Resist a reduction in this capacity; and
- Recover this capacity following degradation.

Interception of precipitation results when precipitation falls on vegetation. When vegetation is removed, precipitation falls directly on the soil. This can increase surface erosion and sedimentation, and decrease the amount of time between initial precipitation arrival and peak surface runoff – in turn decreasing soil/site stability and hydrologic function. Roads remove vegetation and therefore decrease interception of precipitation.

Infiltration is the process of precipitation entering and traveling through soil. Infiltration reduces the peak runoff during precipitation events by extending the period of runoff after a precipitation event. Infiltration also filters precipitation and reduces erosion and sedimentation. If infiltration is reduced, runoff and erosion will increase and hydrologic function will decrease. Generally, roads are compacted surfaces that have decreased infiltration, thus increasing runoff and potentially increasing erosion.

Runoff can affect the amount of erosion and sedimentation, as well as flooding – both onsite and offsite. If runoff is increased, all of these effects can increase with a result that water quality and hydrologic function will decrease.

Increased sediment entering waterbodies increases turbidity, increases width-to-depth ratios, and consequently increases temperature and dissolved oxygen saturation levels, and creates an adverse habitat for aquatic animals and plants.

Alteration of flow routing can also affect water resources. For example, roadcuts into areas with relatively shallow groundwater can intercept groundwater, bring it to the surface, and transport it some distance (i.e. in a roadside ditch) before delivering it to a stream. This can lead to erosion of road ditchlines and subsequent sedimentation of streams during runoff periods, or increased thermal loading of water before delivery to streams during summer periods.

Closure and decommissioning of roads tend to reduce erosion and sedimentation effects stemming from roads on water quality. On an equivalent road mile basis, decommissioning roads would benefit water quality to a greater degree than closing roads because the decommissioning process would often entail implementing measures to restore hydrologic function. During road decommissioning items such as compaction, drainage, stream crossing culverts, and ground cover are often addressed in a manner that markedly improves hydrologic function. These features are not fully addressed on roads that are merely “closed”. However, the reduced disturbance on newly closed roads combined with the tendency for revegetation to re-establish ground cover on them would reduce erosion and subsequent sedimentation effects to water quality.

Effects of the Alternatives

Generally, road density is an indicator of overall watershed health and function. Watersheds with higher road densities tend to have lower water quality due to greater disruption of hydrologic function (described above), and potential for erosion and subsequent sedimentation. Road density also is related to the distribution and spread of noxious weeds.

Table 4-69 shows acres of BLM land in three road density categories by alternative for the Lewis and Clark County NW TPA. These data reflect differences between alternatives based on roads proposed for “de-

TPA Alternative	Road Density Category		
	Low (<1 mi/mi ²)	Moderate (1 to 2 mi/mi ²)	High (> 2 mi/mi ²)
Alternative A	2,614	3,444	10,979
Alternative B	3,075	4,526	9,436
Alternative C	2,693	4,076	10,268
Alternative D	2,935	4,446	9,655

commissioning” by alternative. While many “closed” roads would gradually contribute to increased hydrologic function over time, decommissioned roads would more directly contribute to hydrologic function because measures aimed at restoring hydrologic function would likely be part of the treatment during decommissioning. Alternative A would have the greatest amount of BLM land with “high” road densities of greater than 2 mi/mi². Alternative B would have the lowest acreage in the high category with the greatest acreage in the low category of all alternatives. Alternative D would benefit hydrologic function more than Alternative C but less than Alternative B by virtue of its greater acreage in the low and moderate road density categories than Alternative C. Alternative C would have the highest acreage in the high road density category of the action alternatives. Overall, all the action alternatives would improve hydrologic function but by this measure Alternative B would make the greatest contribution to improved hydrologic function of all the alternatives, followed by Alternative D, Alternative C, then Alternative A.

Motorized routes within 300 feet of streams generally have greater potential to directly impact water quality through erosion and sedimentation, increased water temperatures (due to loss of shading vegetation), and direct alteration of stream channel morphology than those farther away. **Table 4-70** shows the miles of open and closed roads on BLM lands within 300 feet of streams by alternative. Under Alternative A there are about 7.4 miles of open road within 300 feet of fish bearing streams and an additional 5 miles within 300 feet of perennial non-fish bearing streams. All action alternatives

would improve water quality by closing or decommissioning roads in close proximity to streams but Alternative C would provide for the greatest mileage. By this measure, Alternative C (total of 6.2 miles closed or decommissioned) would create the most benefit to water resources followed by Alternative B (5.4 miles), then Alternative D (4.6 miles).

Cumulative Effects on Water Resources

Cumulative effects to water resources in the East Helena TPA would arise from many past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands. Within this 406,700-acre TPA, BLM lands comprise about 17,037 acres or 4 percent of total lands. The approximately 68 miles of BLM roads make up about 4.7 percent of the approximately 1,448 road miles in the TPA. Therefore road-related effects to water resources described by alternative for BLM roads would be associated with management of about 4.7 percent of all roads in the TPA. There are approximately 292 miles of fish bearing stream and an additional 238 miles of perennial non-fish bearing stream in the TPA. On BLM lands there are about 11 miles of fish bearing stream and an additional 11 miles of perennial non-fish bearing stream. The majority of lands and roads (over 50 percent of each) within the TPA boundary are private property. Non-BLM roads are managed by the county, Forest Service, state, and private landowners.

Many of the main access roads (non-BLM) follow valley bottoms and parallel streams. Many of these roads are directly affecting stream channel and floodplain function by filling or impinging on stream channels or flood-

TPA Alternative	Perennial Fish-Bearing Streams		Perennial Non-Fish-Bearing Streams	
	# Open Road Miles	# Closed Road Miles	# Open Road Miles	# Closed Road Miles
Alt. A	7.4	0	5.0	0
Alt. B	5.3	2.1	1.7	3.3
Alt. C	4.8	2.6	1.4	3.6
Alt. D	5.3	2.1	2.5	2.5

Note: Open roads include seasonally open roads as well as roads open yearlong. Closed roads include decommissioned roads.

plains, precluding the presence of riparian vegetation (including large woody material in forested locations), producing sedimentation in streams (from road surfaces, ditchlines, winter “road sanding” operations) and potentially increasing thermal loading by lessening streamside shade. These effects are dominant in shaping stream channel and water quality conditions in many areas and will continue into the foreseeable future.

Approximately 1,961 BLM acres are permitted for various rights-of-way and leases. About 558 of these acres are for specific road rights-of-way. An additional approximately 1,050 acres are associated with the Great Divide Ski Area. The remaining 353 acres are associated with powerlines, waterlines, communication sites, oil and gas pipelines, and other utility facilities. Much of the Great Divide Ski Area is a mosaic of ski runs and chairlifts nestled within forested or otherwise naturally vegetated areas. Impacts to water resources are generally minor with some localized erosion and sedimentation and some contribution to decreased hydrologic function (decreased infiltration, increased runoff) due to compaction.

From 1984 to 1995 timber harvest took place on about 82 acres of BLM land in this TPA (including timber salvage on 42 acres). From 1995 to the present timber harvest (predominantly selective harvest) has occurred on about 116 acres of BLM land in the TPA. Adverse effects on water resources were minor from this activity. Timber harvest has also occurred on private and Forest Service lands and will likely continue for the foreseeable future. Ground disturbance from these activities will have localized impacts to water resources including some sedimentation, loss of woody material recruitment for streams, and potential water temperature increases due to riparian shade loss.

From 1981 to 2004, wildland fire has burned across approximately 83 acres in the Lewis and Clark County NW TPA, having negligible effects on water resources.

There have been no fuels reduction treatments on BLM lands in the TPA in the last 10 years. While treatments of 1,500 to 3,000 acres (combination of mechanical and prescribed fire) may occur on BLM lands in the future, these treatments are not yet planned or designed. They would be designed to minimize effects to water quality by minimizing compaction/disturbance from mechanical equipment and designing prescribed burns to be cool enough so as not to scorch soils and facilitate severe erosion. Fuels treatments conducted on private and Forest Service lands will likely occur for the foreseeable future with variable effects to soils. Reducing fuels under the controlled conditions of deliberate treatments may benefit water resources in the long-term by reducing the risk of high severity fires that could have severe adverse water quality effects in treated areas.

Livestock grazing on public and private lands throughout much of the Lewis and Clark County NW TPA has

created areas of localized streambank trampling, soil erosion and sedimentation, and nutrient inputs to streams. In severe cases stream channel morphology may be altered due to severe loss of riparian vegetation, loss of streambank integrity, channel widening and shallowing, and substantial sediment inputs. These effects to water quality will continue to occur for the foreseeable future. Agricultural water withdrawals occur on private lands in this TPA. These withdrawals reduce stream flows in the TPA, including within Little Prickly Pear Creek, one of several streams that flow through BLM lands and is listed as an impaired water body by MDEQ on the 303(d) list.

Several other streams listed as impaired by MDEQ flow through BLM lands in this TPA. Heavy metal contamination from abandoned mine lands has affected Virginia Creek, about 2 miles of which flows through BLM lands. The Blackfoot River (1.9 miles on BLM lands) is impaired by heavy metal contamination, sedimentation, and alteration of riparian vegetation. Probable sources of impairment include hard rock mining, agriculture, and timber harvest. Jennies Fork (0.2 miles on BLM lands) is impaired by lead contamination, nutrient inputs, and sedimentation. Probable sources of impairment are hard rock mining, riparian grazing, and roads. In the case of each of these impaired streams, BLM roads are not located in such a manner and are not a great enough proportion of ongoing activities as to play a substantial role in affecting water resource conditions.

Increasing residential development will likely continue for the foreseeable future to variable degrees within the TPA. Erosion, soil compaction, and runoff would likely increase due to additional road construction, clearing/leveling for home sites, and establishment of utility infrastructure for residential developments. Nutrient, chemical pollutant, and pathogen inputs to streams would also likely increase due to leaching from septic systems, urban runoff (fertilizer, chemicals, and petroleum pollutants), and waste from livestock.

Under Alternative A, the contribution to cumulative effects on water resources from BLM road management would continue as it occurs today. Retaining approximately 58 miles of road open yearlong and an additional approximately 7 miles open with seasonal restrictions would allow for the same level of effects to water resources that currently exists.

From a BLM road management perspective, all action alternatives would benefit water resources compared to Alternative A. Alternative B would benefit water resources by providing for a reduced contribution to adverse cumulative effects than would Alternative A because about 56 percent of BLM roads would be closed or decommissioned under Alternative B (compared to 5 percent closed under Alternative A). Of the approximately 28 miles of open road under Alternative B, nearly one half of them would be seasonally restricted to exclude motorized vehicle use in the wet spring runoff

period each year. This would reduce erosion from these roads and further benefit water resources.

Overall, Alternative B would likely benefit water resources the most and provide for the least contribution to adverse cumulative effects on water resources of all alternatives. Under this alternative the greatest mileage of BLM roads would be decommissioned (10.9 miles), benefiting hydrologic function to the greatest degree. Alternative C would provide for the greatest quantity of closed roads, but would only provide for 5.2 miles of decommissioning and would therefore have less benefit to hydrologic function. Alternative D would provide for 8.8 miles of decommissioning and would therefore have less benefits to hydrologic function than Alternative B, but more than Alternative C. Overall, Alternative D would provide for closure or decommissioning on about 43 percent of BLM roads in the TPA, compared to 5 percent for Alternative A, 56 percent for Alternative B, and 69 percent for Alternative C.

Due to the scattered distribution and relatively small proportion of BLM lands (4 percent) and roads (4.7 percent) relative to the total quantities of lands and roads in the TPA, none of the BLM alternatives would substantially contribute to cumulative effects on water resources in the Lewis and Clark County NW TPA.

VEGETATIVE COMMUNITIES – FOREST RESOURCES AND FOREST AND WOODLAND PRODUCTS

Effects of the Alternatives

Under all alternatives, existing roads and roads built to access timber and forest product sales on BLM lands may encourage timber harvest and forest product sales on adjacent lands, particularly where landowners and other agencies are looking to improve economic efficiency or opportunities in the management on their lands.

In general, vegetative treatment contractors tend to bid more readily on projects in areas with vehicle access or valuable products. BLM often prioritizes forest vegetation management activities such as forest products and forest protection activities (e.g. wildfire suppression and forest insect and disease control) in similar areas.

Rehabilitation of roads (decommissioning and in some cases road closure) would revegetate currently unvegetated roadbeds, which would increase vegetation biomass production on the landscape through colonization of sites with grasses, forbs, shrubs, and trees. Increases in revegetated area would occur at a rate of approximately 1.5 to 3 acres per mile of rehabilitated road. Eventually rehabilitated roads would support plant communities consistent with site potentials which would help resist weed invasions. However, road closures and removals could make vegetation management treatments more

difficult and costly, thereby inhibiting proposed treatments, reducing public access for product use and removal, and potentially slowing fire detection and suppression.

Under Alternative A there would be no increase in project analysis and implementation costs. However, under Alternative B approximately 55 percent of roads into forested areas would be closed. Under Alternative C about 69 percent of roads into forested areas would be closed, while under Alternative D about 43 percent of these roads would be closed. These closures would result in commensurate potential increases in vegetative analysis and treatment costs by alternative. These potential cost increases would be considered on a case by case basis by the BLM during project feasibility determinations, and additional funding may be needed to analyze and implement the projects that would remain feasible. Road closures could also result in potential decreases in quantities of forest products removed. The extent of the effects described above would be minimized because BLM would likely still be able to plan and implement projects in many areas on closed roads through the variance process for temporary road use. Road-related effects would be greatest under Alternative C, followed in sequence by Alternative B, then Alternative D.

Treatment projects that are small in nature or limited in scope such as vegetative manipulations of 50 acres or less, or restoration treatments removing only small proportions of stands (i.e. low intensity burns, selective thinning, interplanting), would have the greatest risk of becoming unfeasible in areas of closed roads under the action alternatives. However the higher productivity of the stands and higher value of the available products in most treatment areas in this TPA would be able of absorb the anticipated higher costs of treatments incurred by the BLM, and would increase the likelihood of successful project implementation.

Roaded access to forested areas would also affect the gathering of firewood and other forest products by the general public. The forested areas in the Marysville area are relatively heavily roaded and have received the highest public demand for forest products in the TPA due to their moderately productive forest and road accessibility. The smaller blocks of public land in the Stemple Pass area and the Sieben Ranch locality tend to be away from the main travel routes in their areas and thus being isolated, tend to have low demand for products. Most public parties prefer to drive close to areas of product removal so they do not have to carry products over long distances to their vehicles. With the low demand for products from the smaller blocks, implementation of alternatives B, C, and D would have little if any effect on product removal in those areas. However, Alternatives B, C and D would close roads in many forested portions of the Marysville area, generally restricting public searching for and removal of personal use and small products to motorized travel corridors along the

main roads. For the Lewis and Clark County NW TPA, Alternative A would retain the most public opportunities for these activities, followed in sequence of decreasing opportunities by Alternative D, Alternative B, then Alternative C. Alternatives B and D would have similar effects to public access for forest product gathering.

Cumulative Effects on Forest and Woodland Resources and Products

The western spruce budworm is present and heavily affecting forests within the TPA at higher levels than experienced in the last twenty years, with high levels of defoliation occurring around Marysville and in the Virginia Creek area. This insect is currently reducing the health of Douglas-fir stands, such that other pests such as the Douglas-fir beetle can take advantage of the low vigor and reduced resistance in the trees, and become entrenched and kill trees in the infested stands. Current insect levels are expected to remain high in the future. This insect moves freely between Douglas-fir on all ownerships and open roads can assist with control. Alternative A would provide the highest opportunity for control on BLM lands and adjacent lands under other ownerships in the TPA. Alternative D would provide the next greatest degree of opportunity, followed in sequence by Alternative B, then Alternative C.

Forested vegetation will also be affected by approximately 1,961 acres of rights-of-way and leases on BLM land. Forested vegetation located in these areas usually is harvested and/or removed to accommodate the necessary access or facilities. Forest vegetation removal will occur on new authorizations in the future and will occur as necessary to maintain sight distances and safety clearances associated with roads and facilities.

Urbanization is expected to continue on the 213,847 acres of private lands (53 percent of all lands) within this TPA. Forest products are commonly removed from these areas prior to permanent construction. Urbanization is likely to continue in the future and will affect forested vegetation at an unknown rate. As private construction increases, miles of road on private will most likely increase from the current 819 miles (57 percent of all roads in TPA).

Risk to forests from human-caused wildfires is commonly associated with open roads. Risk to forests from wild-fire would be greatest under Alternative A with 64.2 miles of road open during the summer (and yearlong). Alternative B would have less risk of human-caused fire starts with about 28 miles of open road during summer. Alternative C would have the least risk to public forests with only 19.7 miles of road open during summer months. Alternative D (34.1 miles of open road during summer) would have more risk than either Alternative B or C, but less risk than Alternative A. Given that the majority of roads in the TPA (95.3 percent) are non-BLM roads, this contribution to reduced fire risk from

BLM roads in the action alternatives is relatively small in the context of the entire TPA.

Since BLM roads constitute only 4.7 percent of all roads in this TPA, and BLM lands make up only 4.2 percent of all lands in the TPA, urbanization and activities on open non-BLM roads in the vicinity may have more cumulative effects on forested vegetation in the TPA than BLM decisions regarding miles of open and closed road.

VEGETATIVE COMMUNITIES – NOXIOUS WEEDS

Under all alternatives, any snowmobile use would have negligible effects on noxious weed spread and populations. Invasive noxious weeds and non-native species are degrading wildland health. These are aggressive plants that can outcompete many native plants, as they have few natural enemies to keep them from dominating an ecosystem. These plant species are spread by many means. However, any land disturbing activity in the TPA has the most potential to introduce and spread weed species. Motorized vehicles are one vector for noxious weed spread as weed seed and plant parts become attached to vehicles and their tires, and are transported from one area to another where seeds become detached and germinate to inhabit new areas.

Effects of Alternative A

Under Alternative A, the majority of routes in the Lewis and Clark County NW TPA would be available for wheeled motorized use (57.5 miles open yearlong, 6.7 miles seasonally restricted, 3.4 miles closed). Area wide snowmobile (cross-country travel) use would be available on 16,997 acres. Under Alternative A the open BLM roads would represent about 4.7 percent of all open roads in the Lewis and Clark County NW TPA.

Alternative A would have the most roads open and in turn would promote the greatest amount of weeds and other undesirable plant spread and production. More herbicide control would be needed to control weeds under Alternative A than under the other alternatives.

Effects of Alternative B

Under Alternative B, a total of 28.1 miles of routes would be available for motorized wheeled use (13.8 miles open yearlong, 14.3 miles seasonally restricted). The majority of routes located in the Stemple Pass and Lincoln areas would be closed. This alternative would close 26.8 miles of road leaving 13.8 miles open yearlong as compared to 57.5 miles of road open yearlong for Alternative A. This would prevent weed spread caused by motorized vehicles on these closed routes, but would increase spread on the open routes because of the more concentrated use of these routes. Overall Alternative B would reduce weed spread, but would increase weed treatment costs per road mile on the remaining open roads compared to Alternative A. Under Alterna-

tive B the 28.1 miles of open BLM road (including seasonally restricted miles) would constitute about 2 percent of all open road miles in the Lewis and Clark County NW TPA.

Effects of Alternative C

Alternative C would provide the least amount of wheeled motorized opportunities: 8.0 miles of routes open yearlong, and 11.7 miles seasonally restricted. Closure of the routes located in the northwest corner of the Marysville area would result in an enhancement of non-motorized opportunities and reduced weed spread there. Opportunities for cross-country snowmobile travel would be eliminated. Snowmobiles would be restricted to designated routes during the season of use (12/2-5/15), snow conditions permitting. This alternative would close 41.6 miles of road leaving 8.0 miles open yearlong as compared to 57.5 miles of road open yearlong for Alternative A. This would prevent weed spread caused by motorized vehicles on these closed routes, but would increase weed spread on the open routes because of the more concentrated use of these routes. Overall Alternative C would reduce weed spread more than any other alternative, but would increase weed treatment costs per road mile on the remaining open road miles compared to Alternative A. Under Alternative C the 19.7 miles of open BLM road (including seasonally restricted miles) would make up about 1.4 percent of all open roads in the TPA.

Effects of Alternative D

Under this alternative, a total of 34.1 miles of routes (19.6 miles open yearlong, 14.5 miles seasonally restricted) would be available for motorized use. Opportunities for ATV riders and hunters would be enhanced through the addition of a yearlong ATV-Only route and a game retrieval route. Motorized users would also have more opportunities in the Lincoln and Stemple Pass areas than under Alternatives B and C, facilitating continued weed spread via roads in these areas. Cross-country snowmobile travel would be allowed throughout the TPA with two exceptions, the Great Divide Ski area, and the northwest portion of the TPA. Travel in these areas would be restricted to existing routes only during the season of use (12/2-5/15), providing some dispersed recreation opportunities for non-motorized users. This alternative would close 20.3 miles of road leaving 19.6 miles open yearlong as compared to 57.5 miles of road open yearlong for Alternative A. This would prevent weed spread caused by motorized vehicles on these closed routes, but would increase weed treatment costs per road mile on the remaining open road miles compared to Alternative A. The 34.1 miles of open BLM road (including seasonally restricted routes) would Alternative D would make up about 2.4 percent of all open travel routes in the Lewis and Clark Northwest TPA.

Cumulative Effects on Noxious Weeds

Under all the alternatives, other past, present, and reasonably foreseeable future BLM and non-BLM actions affect noxious weeds.

Recreation use is well established in the TPA, especially for winter sports. Winter sport activities include: snowmobiling, downhill skiing, backcountry skiing, ski racing, snowboarding, and snowshoeing. An extensive network of roads and trails support a wide range of off-season activities. Non-winter motorized activities are also common in the TPA. Motorized recreation uses are one of the leading causes of introduction and spread of noxious weeds and non native species. Weed seeds are transported by many recreational vectors i.e. motorized vehicles including their tires, non-motorized vehicles including their tires, pack animals, and humans.

Urban development may lead to an increase in right-of-Way permits to accommodate private property/development access. As a result, soil disturbing activities (i.e. roads, powerlines, telephone lines, etc.), will increase causing weeds to increase.

A variety of resource management projects, such as BLM initiated vegetation treatments, or wildland fire fuels reduction projects, could affect weeds in the TPA. There have been no fuels treatments in this area in the last 10 years. There are fuels treatments scheduled for planning for this area in the next five years, mainly in the general area around Marysville. These treatments would consist of mechanical and/or prescribed burning from 1,500 to 3,000 acres focused on the urban interface areas. Any project creating soil disturbance has the capability to increase weedy plant species. Prescribed burning projects give the ground surface a fertilization effect and eliminate some plant competition for weedy species giving them a niche for establishment and expansion in some areas. Ground-disturbing equipment could also transport noxious weed seed to these project sites. BLM implements weed control measures in the aftermath of such ground-disturbing activities so as to minimize noxious weed spread.

Wildland fires create good seed beds and supply nutrients for weed species introduction and production. From 1981 to 2004 there have been 14 wildland fires that burned approximately 83 acres. These areas likely experienced an increase in weed spread.

Historical information indicates that since 1977, 3,357 claims have been made throughout the Marysville area. Today only 40 claims remain active, including the Bald Butte Mine, an open cut molybdenum mine. While currently a small scale operation (5 acres), there is a strong likelihood that Bald Butte will expand onto approximately 5 acres of BLM land in the future, and as many as 30 acres of open area collectively at one time. Activity began in 2006, and is anticipated to continue until at least 2015. Mining is a land disturbing activity and the

activity itself and weed seed contaminated equipment that is used could promote weeds in the area.

Noxious weeds and non-native invasive species are well established and spreading in the area. Weed control activities by BLM and other entities, while often effective at reducing or minimizing weed spread and weed populations, can also lead to some weed spread. Herbicide spray equipment is driven through weed infestations and weed seeds as well as other weed vegetative parts are spread to other lands during and following treatment. Herbicide and biological control treatments in recent years have been accomplished on approximately 20 to 30 acres in the Marysville area of the TPA. These weed treatments have varying success in killing undesirable plants, depending on many environmental parameters.

Timber sales have built-in stipulations for mitigating weed production and spread. However, with ground disturbance the potential exists for weed introduction to occur on these sites. Vehicular access for tree plantings could contribute to the spread of existing weeds on site. Since 1995 there have been 24 acres of timber salvage, 92 acres of timber harvest, and 48 acres of forest planting (replanted in 1998). Herbicide treatment of existing weeds is coordinated with tree seedling planting locations and timing, so as to minimize potential exacerbation of weed spread.

Future travel management (for all agencies, nationwide) is likely to lead to fewer opportunities for motorized recreational use than under current management (particularly for OHV use). As a result, BLM routes available to motorized use could experience increased use from displaced users, leading to more concentrated use and the potential for increased weed spread.

The TPA includes important wildlife habitat. The western half of the TPA is a wildlife movement corridor between the Northern Continental Divide Ecosystem and the Greater Yellowstone Ecosystem. Portions of the TPA are in the occupied range of grizzly bear range. Mule deer winter range is located along the eastern half of the TPA (158,140 acres) as well as near Lincoln (21,500 acres). Elk winter range is also located in the lower elevations along the eastern half of the TPA (193,800 acres) as well as around Lincoln (55,500 acres). Noxious weed seeds are transported and spread by wildlife through their digestive system and by attaching to the animals themselves and then being released at a later time.

Livestock grazing on and off BLM lands also contributes to weed spread either through seed being introduced/spread by livestock themselves, or through vehicular uses needed to manage grazing operations.

The majority of BLM routes in the Lewis and Clark County NW TPA are located in and around the town of Marysville, located approximately 25 miles northwest of Helena, Montana. Much of the use in the Marysville area (especially winter use) comes from Helena Valley resi-

dents. The Helena Valley has been experiencing steady human population growth. This trend is expected to continue, along with increased recreational use of this TPA. These factors could lead to increased public pressure to alter travel planning. The remaining BLM managed routes are located in three sub-planning areas: Stemple Pass, Sieben Ranch, and Lincoln (west of the small town of Lincoln, Montana). There is some residential development adjacent to the Lincoln sub-planning area that could influence travel management. The increasing population in the Helena area will in turn lead to an increase in use of this TPA creating more opportunities for weed spread and production.

The Marysville area is experiencing increased residential development, but to a lesser extent than the central Helena Valley area. This development/increase in population has led to an increase in use of the TPA by residents living adjacent to or within this area which in turn leads to an increase in weed spread and propagation. About 4.7 percent of all the open travel routes in the Lewis and Clark county NW TPA are located on BLM managed lands (under Alternative A). Lands near roads and away from roads in the TPA are infested with weeds. The travel on these roads is spreading weeds and weeds off these roads are being spread by the weed plants themselves and other natural means. Because the majority of roads (95.3 percent) and lands (95.8 percent) in the TPA are non-BLM, activities in these areas play a stronger role than activities on BLM lands in determining the status of weed spread and weed populations in the TPA overall.

VEGETATIVE COMMUNITIES – RIPARIAN VEGETATION

Effects Common to All Alternatives

This section focuses on effects to riparian vegetation. For additional discussion of effects to water quality and stream channels, see the Water Resources and Fish sections.

Roads in riparian areas constitute ground disturbance that can eliminate or preclude presence of native riparian vegetation. This ground disturbance and loss of riparian vegetation may facilitate erosion and sedimentation of streams. Roads may also interfere with natural stream channel functions by occupying floodplains or active stream channel margins (see Water Resources section for more discussion). Noxious weeds may dominate riparian vegetation communities after some type of disturbance (such as roads, livestock grazing, mining, etc.) has reduced native vegetation. Noxious weed seed can be spread into riparian areas by motor vehicles via open roads. Closure of roads and trails can improve or maintain riparian condition by reducing avenues of noxious weed spread, as well as allowing for bare area revegetation which filters sediment in addition to stabilizing banks in some areas. Road and trail restrictions have

the same effects but to a lesser degree, because some traffic will inhibit vegetation growth and recovery.

Effects of the Alternatives

As a means of comparing alternatives, **Table 4-71** depicts the miles of wheeled motorized routes that cross or are within 300 feet of streams or wet areas on BLM lands for the Lewis and Clark County NW TPA.

Miles of Wheeled Motorized Routes	ALT A	ALT B	ALT C	ALT D
Open	19.6	5.1	4.1	7.8
Restricted	0.4	3.4	2.8	3.4
Closed	0	11.5	13.2	8.8

Under Alternative A, 19.6 miles of BLM roads and trails would remain open that cross or are within 300 feet of streams or wet areas, and 0.4 miles of roads and trails would have seasonal restrictions. The noxious weed spread, streambank, and sediment delivery effects would continue as described in the Effects Common to All Alternatives section for the open roads. The BLM roads and trails most affecting riparian conditions along Ottawa Gulch, Woodchopper Gulch, Empire Creek, and Towsley Gulch would remain open. Alternative A would have the greatest adverse effects on riparian vegetation of all alternatives.

Under Alternative B, 5.1 miles of BLM roads and trails would remain open that cross or are within 300 feet of streams or wet areas; 3.4 miles of roads and trails would have seasonal restrictions; and 11.5 miles of roads and trails near riparian areas would be closed. The noxious weed spread, streambank, and sediment delivery effects would continue as described in the Effects Common to All Alternatives section for the open roads. The BLM trail that travels up Woodchopper Gulch would be closed which would allow the serious erosion problem there to re-vegetate. Additionally, a number of smaller riparian areas would improve in condition from road and trail closures. Roads and trails most affecting riparian conditions along Ottawa Gulch, Empire Creek, and Towsley Gulch would remain open for access purposes. Alternative B would benefit riparian vegetation greater than Alternative A as the closed riparian roads would have some opportunity to revegetate and stabilize.

Under Alternative C, 4.1 miles of BLM roads and trails would remain open that cross or are within 300 feet of streams or wet areas, 2.8 miles of roads and trails would have seasonal restrictions, and 13.2 miles of roads and trails near riparian areas would be closed. The noxious weed spread, streambank, and sediment delivery effects

would continue as described in the Effects Common to All Alternatives section for the open roads. As under Alternative B, the BLM trail that travels up Woodchopper Gulch would be closed which would allow the serious erosion problem there to re-vegetate. Additionally, a number of smaller riparian areas would improve in condition from road and trail closures. Roads and trails most affecting riparian conditions along Ottawa Gulch, Empire Creek, and Towsley Gulch would remain open for access purposes. Alternative C would provide the most benefit to riparian vegetation than all other alternatives.

Under Alternative D, 7.8 miles of BLM roads and trails would remain open that cross or are within 300 feet of streams or wet areas, 3.4 miles of roads and trails would have seasonal restrictions, and 8.8 miles of roads and trails near riparian areas would be closed. The noxious weed spread, streambank, and sediment delivery effects would continue as described in the Effects Common to All Alternatives section for the open roads. As under Alternatives B and C, the BLM trail that travels up Woodchopper Gulch would be closed which would allow the serious erosion problem there to re-vegetate. Additionally, a number of smaller riparian areas would improve in condition from road and trail closures. Roads and trails most affecting riparian conditions along Ottawa Gulch, Empire Creek, and Towsley Gulch would remain open for access purposes. Alternative D would provide greater benefits to riparian vegetation than Alternative A, but less than either Alternatives B or C.

Cumulative Effects on Riparian Vegetation

Noxious weed spread, mining, roads and trails, logging operations, and livestock grazing have affected riparian resource conditions in all TPAs, including the Lewis and Clark County NW TPA. Some of these factors continue to cause riparian area degradation primarily through direct disturbance or loss of riparian vegetation. Ground disturbance and loss of riparian vegetation facilitate erosion and sedimentation of streams. In the case of noxious weeds, they usually dominate riparian vegetation communities after some type of disturbance (such as roads, livestock grazing, mining, etc.) has reduced native vegetation.

Anticipated subdivision growth on private lands will lead to more road construction and maintenance. More roads and development will increase severity of runoff events which in turn will cause more sediment delivery to creeks and streams. The additional sediment is likely to affect the functioning condition of some riparian areas by causing streambeds to aggrade at unnatural rates. Streambanks may also be affected if road placements do not allow for natural stream movements or meanders.

Logging and forestry practices on public and private lands are subject to streamside management zone (SMZ) requirements designed to maintain water quality and

riparian vegetation. The proposed Riparian Management Zones under Butte RMP Alternatives B and C would be wider than SMZs and activities in these areas would be designed to benefit riparian resources, thus providing more riparian protection and more targeted management of riparian vegetation in both forested and non-forested areas than under RMP Alternatives A and D. The disturbance associated with timber activities does have the potential to increase noxious weed spread which degrades riparian area function and health. On public lands noxious weed control is a standard feature of any ground disturbing activities whereas on private lands noxious weed control is variable.

Livestock grazing will continue in the area and has the potential to impact riparian resource conditions. On BLM lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain riparian vegetation health and vigor. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided. Riparian conditions may improve or degrade as management changes.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, riparian conditions would improve because of the streambank protection gained from shrubby root systems and filtering capability of native riparian sedge and rush species.

A molybdenum mine was started on private land above Bald Butte. The mine may expand on other private and public lands in the future. The mine is at the headwaters of American Gulch and Dog Creek. Mine road traffic and maintenance has the potential to add extra sediment into the Ottawa Gulch and Dog Creek drainages. Abandoned mine lands were reclaimed in the Empire Creek and Piegan Creek watersheds in the 1990's. Riparian vegetation has recovered and improved in both drainages.

A number of privately owned blocks of land in the Dog Creek and Ottawa Creek drainages were logged within the past 20 years. Riparian vegetation was impacted at that time but has recovered to some degree.

Cumulatively the positive effects of Alternative B would be more than Alternative A. The closure and restrictions on 14.9 miles of roads would improve riparian conditions on several reaches. This may mitigate some of the predicted subdivision and potential mine road impacts.

Cumulatively the positive effects of Alternative C would be more than under either Alternatives A or B. The closure and restrictions on 16 miles of roads would improve riparian conditions on several reaches. This may mitigate some of the predicted subdivision and potential mine road impacts.

Cumulatively the positive effects of alternative D would be more than under Alternative A, but less than under either Alternatives B or C. The closure and restrictions on 11.4 miles of roads would improve riparian conditions on several reaches. This may mitigate some of the predicted subdivision and potential mine road impacts.

Overall, because BLM roads make up only 4.7 percent of all roads in the TPA (under Alternative A), and BLM lands make up 4.2 percent of all lands in the TPA, the contributions to riparian vegetation benefits associated with closing riparian roads on BLM lands would be relatively minor at the scale of the entire Lewis and Clark County NW TPA. Activities on private lands (53 percent of total acreage in TPA) and USFS lands (35 percent of total acreage in TPA) would play a dominant role in determining riparian conditions at the scale of the entire TPA.

WILDLIFE

Effects of Alternative A

Under Alternative A, the Lewis and Clark TPA would have considerably more open roads (64 miles) compared to the action alternatives and would have the highest actual road density in elk winter range, 2.6 mi/mi² (Table 4-72) compared to the action alternatives. Open roads typically increase the level of recreation adjacent to roads. This can result in additional disturbance and displacement of wildlife species. Roads can also encourage the public to recreate in areas that had formerly been secluded. Roads can cause direct mortality to wildlife through road kill, prevent wildlife movement, create

Table 4-72
Decision Area Road Densities (mi/mi²) within Elk Winter Range in the Lewis and Clark County NW Travel Planning Area by Alternative

	Actual Road Density	Acres of Low Road Density	Acres of Moderate Road Density	Acres of High Road Density
Alt. A	2.6	2,241	3,424	10,263
Alt. B	0.9	4,945	4,283	7,060
Alt. C	0.7	6,245	4,722	5,321
Alt. D	1.2	3,828	4,597	7,862

Low Density = 0-1 mi/mi², Moderate Density = 1-2 mi/mi²,
High Density = >2 mi/mi²

disturbance to wildlife via vehicular use, cause the spread of noxious weeds, reduce habitat and cause habitat fragmentation on the landscape (Joslin et al. 1999). Open road miles that are greater than 2.5 mi/mi² have also been found to provide less than 45 percent of functional habitat for elk (Christensen et al. 1993). Permanent and temporary roads could negatively impact wildlife including special status species, particularly if roads are open during critical periods such as in lynx winter habitat and during the summer months within occupied grizzly bear habitat.

High open road densities under Alternative A could result in the loss of year-round habitat and migration corridors, disturbance and displacement of wildlife, road kill and fragmentation of habitat. Wildlife, including special status species, that are especially sensitive to roads in the TPA include (but are not limited to) elk, grizzly bear, lynx, wolverine and some raptors. The detrimental effects of open road densities to wildlife under Alternative A could be minor to major and long-term. This alternative would have the greatest negative impacts to wildlife including special status species from open roads.

Under Alternative A, this TPA would have substantially fewer acres of functional winter range (2,241 acres with low road density) compared to the action alternatives (Table 4-72). Alternative A would cause more disturbance and displacement of big game in winter range than all other alternatives.

Under Alternative A, approximately 900 acres of the Lewis and Clark TPA would be closed to snowmobile use with the remaining 17,000 acres open for cross country snowmobile use. Snowmobiling occurs in both the Decision and Planning Areas and the use of snowmobiles could have substantial negative effects to wintering big game, lynx, wolverine, and other wildlife species. Cross-country snowmobile use could cause harassment of wildlife during the high stress winter season, which could lead to individuals leaving an area (temporarily or permanently) and/or an increase in stress that could lead to mortality. Alternative A would have more detrimental effects to wildlife from cross-country snowmobile use than the action alternatives.

In evaluating impacts of travel planning on elk and other big game species, it is important to consider impacts on security habitat. Elk security is the inherent protection allowing elk to remain in an area despite increases in stress or disturbance associated with the hunting season or other human activities. Security habitat includes blocks of nonlinear forested habitats greater than 250 acres in size that are at least 0.5 mile from an open road (Hillis et al. 1991). Security habitat should also consist of larger trees (greater than 8 inches DBH) with vegetation dense enough to hide an adult elk (Thomas et al. 2002). Under Alternative A, there would be no functional security habitat for big game species on BLM lands

(Table 4-73). All of the action alternatives provide at least some security habitat on BLM lands.

	A	B	C	D
Lewis and Clark County NW TPA	0	1,510	2,183	701

Core areas are areas large enough for wildlife (especially animals with large home ranges such as carnivores and big game) to forage and reproduce. Subcore areas are areas that could act as stepping stones for wildlife as they move through the region (Craighead et al. 2002). Within all lands of the Lewis and Clark TPA there are approximately 236,024 acres identified as “core/subcore” habitat. In core/subcore habitat under Alternative A, there would be 65,283 acres with low road density, 37,754 acres with moderate road density and 132,987 acres with high road density in the TPA for all land ownerships. Alternative A would provide the lowest quality core and subcore habitat across the landscape of all the alternatives due to open roads.

On BLM lands, there are approximately 12,349 acres in core/subcore habitat. Under Alternative A, there would be 1,244 acres with low road density, 2,419 acres with moderate road density, but the majority of acres have high road density (8,685 acres), within core and subcore habitat. On BLM lands, Alternative A would provide substantially lower quality habitat in core and subcore habitat due to open roads of all alternatives.

Wildlife corridors are areas of predicted movement within or between core and subcore areas. Within the Lewis and Clark TPA there are no areas in the TPA mapped as high quality wildlife movement corridors. There are 20,184 acres mapped as moderate quality movement corridors throughout the entire TPA. In moderate quality movement corridors under Alternatives A, B and D there would be 13,715 acres with low road density, 4,674 acres with moderate road density, and 1,795 acres would have high road densities. These alternatives would have fewer acres with low road density and more acres with high road density compared to Alternative C at the landscape level.

On BLM lands in the TPA there are only 831 acres mapped as moderate quality movement corridors. Under Alternatives A, B and D there would be 360 acres with low road density, 89 with moderate density, and 381 with high road density in moderate quality movement corridors. These alternatives would have fewer acres with low road density and more acres with high road density compared to Alternative C on BLM lands.

Riparian areas provide crucial habitat and critical travel corridors for wildlife including special status species. Riparian areas also provide a refuge for native plants and animals in times of stress such as drought or fire. Roads in riparian areas can prevent use of these crucial areas by wildlife, limit use or cause loss of habitat (Wisdom et al. 2000). Under Alternative A there would be 19.6 miles of open road (roads within 300 feet of streams) in riparian areas.

Road densities within occupied grizzly bear habitat were analyzed using a moving windows analysis, which can more accurately evaluate road density. **Table 4-74** displays the results of the moving windows analysis within the Lewis and Clark TPA in both the Planning and Decision Areas. The moving windows analysis displays the acres in low, moderate and high road densities. Higher densities of open roads can impact the quality and quantity of grizzly bear habitat. Research has indicated that grizzly bears underutilize habitat near roads and other human activities (Mace et al. 1996; Mace et al. 1998, McLellan and Shackleton 1989). Restricting motorized access can aid in minimizing negative impacts on bears related to disturbance and interactions with humans.

As shown in **Table 4-74**, occupied grizzly bear habitat in the Lewis and Clark TPA is dominated by acres with high road density in both the Planning and Decision Areas. However, the percentage of acres with low road densities is greater in the Planning Area (21 percent) compared to the Decision Area (6 percent). Alternative A would have substantially fewer acres with low road density compared to the action alternatives and would have the greatest negative effects to grizzly bears and other special status species from open roads.

The actual road density on BLM lands within occupied grizzly bear habitat overlaying the Lewis and Clark TPA would be 2.4 mi/mi² under Alternative A. Alternative A would have the highest road density in occupied grizzly bear habitat of all the alternatives and would have road densities above those recommended by MFWP. Montana Fish, Wildlife and Parks recommends that land management agencies manage for an open road density of 1 mi/mi² or less in grizzly bear habitat (this is consistent with MFWP's statewide Elk Management Plan guidelines as well).

Because Alternative A would have the least amount of closed roads compared to the action alternatives, this alternative would have higher road densities within occupied grizzly bear habitat of the Lewis and Clark TPA in both the Planning and Decision Areas than the action alternatives and would result in more negative effects to grizzly bears from open roads.

Effects of Alternative B

Under Alternative B, the Lewis and Clark TPA would have substantially fewer open roads (28 miles) compared to Alternative A (64 miles). Of the 28 miles of open roads, only 13.8 miles would be open year-round and the remaining 14.3 miles would be seasonally restricted. Alternative B would have more open roads than Alternative C (20 miles) but less than Alternative D (34 miles). Alternative B would decrease harassment to wildlife during all seasons of use but especially during the winter and spring compared to Alternatives A and D. This alternative would also improve habitat and reduce fragmentation more than Alternatives A and D, but less than Alternative C.

Under Alternative B, the actual road density in elk winter range in the Lewis and Clark TPA would be 0.9 mi/mi², less than the maximum of 1 mi/mi² recommended by FWP in big game winter range. This is substantially lower than the road density under Alternative A, 2.6 mi/mi², slightly higher than Alternative C (0.7 mi/mi²) and higher than Alternative D (1.2 mi/mi²) (**Table 4-72**). Open road miles that are 1 mi/mi² have been found to provide roughly 60 percent of functional habitat for elk (Christensen et al. 1993).

Under Alternative B, this TPA would have more BLM acres of functional winter range (4,945 acres in the low road density category) compared to Alternative A (2,241 acres), less than Alternative C (6,245 acres) and more than Alternative D (3,828 acres) (**Table 4-72**). Alternative B would improve the quality and quantity of winter range in the Lewis and Clark TPA compared to Alternatives A and D but would have substantially fewer beneficial effects to winter range than Alternative C.

All alternatives would have 888 acres closed to cross country snowmobile use. Alternatives B and D would have 12,650 acres open to cross country snowmobile use which would be lower than the acres open under Alternative A.

Table 4-74
Road Density within the Northern Continental Divide Ecosystem Distribution Zone of Grizzly Bear

Travel Plan Area	Low Density (0-1 mi/mi ²)				Moderate Density (1-2 mi/mi ²)				High Density (2-3 mi/mi ²)			
	A	B	C	D	A	B	C	D	A	B	C	D
Lewis and Clark TPA Planning Area	64,231	67,482	68,256	66,028	82,972	84,436	84,370	84,878	158,291	148,752	146,901	150,781
Lewis and Clark TPA Decision Area	665	3,097	3,781	1,976	2,348	3,563	3,650	3,696	9,059	3,390	2,660	4,635

native A (16,111 acres) but substantially more than would be open under Alternative C (0). Alternatives B and D would limit snowmobile use on 3,460 acres to open roads (49 miles). Alternatives B and D would have fewer negative effects to big game and other wildlife species than Alternatives A, but could have considerably more negative effects compared to Alternative C.

The amount of big game security habitat would be low, but still greater under Alternative B (1,510 acres) than Alternative A which would have no functional security habitat, and Alternative D which would have only 701 acres (**Table 4-73**). Alternative B would increase security habitat for big game more than Alternatives A and D.

For all land ownerships, Alternative B would increase the amount of core and subcore habitat with low road density to 68,109 acres, compared to 65,283 acres under Alternative A. Alternative B would also increase the acreage with moderate road density (38,719 acres) over Alternative A (37,754 acres), but would decrease acreage with high road density (129,195 acres) compared to Alternative A (132,987 acres). Alternative B would substantially improve core and subcore habitat across the landscape more than Alternatives A and D but less than Alternative C.

On BLM lands in core/subcore habitat, Alternative B would substantially increase the acreage with low road density (3,608 acres) compared to Alternative A (1,244 acres). Alternative B would also increase the acreage with moderate road density to 3,022 acres compared to Alternative A (2,419 acres) and would reduce the acreage with high road density to 5,719 acres compared to the 8,685 acres found under Alternative A. Alternative B would substantially improve core and subcore habitat on BLM lands in the TPA more than Alternatives A and D but less than Alternative C.

Effects of Alternative B on wildlife movement corridors would be the same as under Alternative A.

Alternative B would protect and restore more riparian habitat than Alternative A by reducing the miles of open roads in riparian areas to 5.1 miles (from 19.6 under Alternative A). Alternative B would allow for more breeding, foraging, and hiding habitat as well as improve more movement corridors for a wide variety of species than Alternatives A and D but less than Alternative C.

Under Alternative B, the actual road density within occupied grizzly bear habitat of the Lewis and Clark TPA and the Decision Area would be lower than under Alternatives A and D, but higher than under Alternative C. Under Alternative B, road densities in occupied grizzly bear habitat within the Lewis and Clark TPA would be 0.8 mi/mi² within the Decision Area. This would be below MFWP's maximum recommended road density in grizzly bear habitat of 1 mi/mi².

Road densities and open roads can impact the quality and quantity of grizzly bear habitat. Research has indi-

cated that grizzly bears underutilize habitat near roads and other human activities (Mace et al. 1996; McLellan and Shackleton 1989). Restricting motorized access can aid in minimizing negative impacts on bears related to disturbance and interactions with humans.

Under Alternative B, grizzly bear habitat with acres of low road density within the Decision Area of the Lewis and Clark County NW TPA would be 26 percent (3,097 acres) of the total available habitat (**Table 4-74**). This would be a higher percentage of acres with low road densities compared to those available at the Planning Area scale within the Lewis and Clark TPA (22 percent). This would be substantially more acres in low road densities than Alternative A (665 acres). Grizzly bears generally adjust to disturbance associated with roads by avoiding the area. This results in a reduction in the amount of habitat available to the bears in heavily roaded areas. Roads also provide increased access into remote areas and encourage human settlement, recreational use, and other land uses. These activities can increase the frequency of human-bear conflicts and ultimately reduce habitat availability and grizzly populations. By increasing low road density areas, Alternative B would provide more suitable habitat for grizzly bears than Alternatives A and D but less suitable habitat compared to Alternative C (**Table 4-74**).

Effects of Alternative C

Under Alternative C, the Lewis and Clark TPA would have substantially fewer open roads (20 miles) compared to Alternative A (64 miles). Of the 20 miles of open roads, only 8.0 miles would be open year-round and the remaining 12 miles would be seasonally restricted. Alternative C would also have fewer open roads than Alternative B (28 miles) and Alternative D (34 miles). Alternative C would decrease harassment to wildlife during all seasons of use but especially during the winter and spring more than all other alternatives. This alternative would also improve habitat and reduce fragmentation more than all other alternatives.

Under Alternative C, the actual road density in elk winter range in the Lewis and Clark TPA would be 0.7 mi/mi², less than the maximum of 1 mi/mi² recommended by FWP in big game winter range. This is substantially lower than the road density under Alternative A (2.6 mi/mi²), slightly lower than Alternative B (0.9 mi/mi²), and higher than Alternative D (1.2 mi/mi²) (**Table 4-72**).

Under Alternative C, this TPA would have substantially more BLM acres of functional elk winter range (6,245 acres in low road density) compared to Alternative A (2,241 acres) and Alternative D (3,828 acres). This alternative would also have more acres of functional winter range than Alternative B (4,945 acres) (**Table 4-72**). Alternative C would improve the quality and quantity of winter range in the Lewis and Clark TPA more than all other alternatives.

As with Alternatives A, B and D, this alternative would have 888 acres closed to cross country snowmobile use. The remaining 16,111 acres would be limited to use on open routes (8 miles). This would greatly reduce the negative effects associated with snowmobile use to big game and other wildlife species more than all other alternatives because there would be no acreage open to cross country use.

Under Alternative C, the amount of big game security habitat on BLM lands (2,183 acres) would be greater than under any other alternative (**Table 4-73**).

For all land ownerships, Alternative C would increase the acreage of core and subcore habitat with low road density to 69,476 acres, compared to 68,109 acres under Alternative B and 65,283 acres under Alternative A. The acreage with moderate road densities would be similar under both Alternatives C and B (38,924 and 38,719 acres, respectively), but would be an increase over Alternative A (37,754 acres). Alternative C would decrease the acreage in high road density to 127,624 acres, which would be lower than Alternative B (129,195 acres) and Alternative A (132,987 acres). Alternative C would substantially improve core and subcore habitat across the landscape more than all other alternatives.

On BLM lands in core/subcore habitat, Alternative C would substantially increase the acreage with low road density (4,640 acres) compared to Alternative A (1,244 acres) and Alternative B (3,608 acres). Alternatives C and B would have similar acreages with moderate road density (3,079 acres and 3,022 acres, respectively), which would be more than Alternative A (2,419 acres). Alternative C would also decrease the acreage with high road density to 4,631 acres, which would be lower than both Alternative A (8,685 acres) and Alternative B (5,719 acres). Alternative C would substantially improve core and subcore habitat on BLM lands in the TPA more than all other alternatives.

For all land ownerships in moderate quality movement corridors, Alternative C would increase the acreage with low road density to 13,812 acres, increase the acreage with moderate road density to 5,009 acres, and decrease the acreage with high road density to 1,363 acres. Alternatives A, B and D would have the same acreages with low (13,715 acres), moderate (4,674 acres), and high (1,795 acres) road densities.

Under Alternative C, BLM lands in moderate quality movement corridors would have more acreage with low road density (444 acres), more acreage with moderate road density (383 acres), and less acreage with high road density (3 acres) compared to Alternatives A, B and D. Alternatives A, B and D would have the same acreages in low (360 acres), moderate (89 acres), and high (381 acres) road densities. Alternative C would improve the quality of movement corridors more than all other alternatives.

Alternative C would protect and restore more riparian habitat than Alternative A by reducing the mileage of open roads in riparian areas to 4.1 miles (from 19.6 under Alternative A). Alternative C would also have fewer open roads in riparian areas than Alternative B (5.1 miles) and Alternative D (7.8 miles). Alternative C would allow for more breeding, foraging and hiding habitat as well as improve more movement corridors for a wide variety of species than all other alternatives.

Under Alternative C, the actual road density within occupied grizzly bear habitat of the Lewis and Clark TPA and the Decision Area would be lower than with all other alternatives. Under Alternative C, road densities in occupied grizzly bear habitat within the Lewis and Clark TPA would be 0.6 mi/mi² within the Decision Area. This would be well below the maximum road densities recommended by MFWP of 1 mi/mi² or less in grizzly bear habitat.

Within occupied grizzly bear habitat, the number of acres with low road density in the Lewis and Clark TPA would be 31 percent (3,781 acres) of total available habitat (**Table 4-74**). This would be higher than the percent of habitat available at the Planning Area scale (22 percent). Alternative C would have substantially more BLM acres with low road density in occupied grizzly bear habitat than Alternative A (665 acres) and moderately more than Alternative D (1,976 acres). Alternative C would provide slightly more acres with low road density compared to Alternative B (3,097 acres).

Through travel management, Alternative C would provide the greatest benefit to grizzly bears and other special status species by reducing fragmentation of habitats, protecting larger blocks of habitat and reducing disturbance in occupied grizzly bear habitat.

Effects of Alternative D

Under Alternative D, the Lewis and Clark TPA would have considerably fewer open roads (34 miles) compared to Alternative A (64 miles). Of the 34 miles of open roads, 19.6 miles would be open year-round and the remaining 14.5 miles would be seasonally restricted. Alternative D would have more open roads than Alternative B (28 miles) and Alternative C (20 miles). Alternative D would allow more harassment to wildlife during all seasons of use, especially during the winter and spring, than Alternatives B and C but less than Alternative A. This alternative would also improve habitat and reduce fragmentation more than Alternative A but less than Alternatives B and C.

Under Alternative D, the actual road density in elk winter range in the Lewis and Clark TPA would be 1.2 mi/mi², more than the 1 mi/mi² recommended by MFWP in big game winter range. This is lower than the road density under Alternative A (2.6 mi/mi²), but higher than Alternative B (0.9 mi/mi²) and Alternative C (0.7 mi/mi²) (**Table 4-72**).

Under Alternative D, this TPA would have more BLM acres of functional winter range (3,828 acres in low road density) compared to Alternative A (2,241 acres) but considerably less than Alternative B (4,945 acres) and Alternative C (6,245 acres) (**Table 4-72**). Alternative D would improve the quality and quantity of winter range in the Lewis and Clark TPA more than Alternative A but would have substantially fewer beneficial effects to winter range than Alternatives B and C.

Effects associated with snowmobile use under Alternative D would be the same as under Alternative B.

The amount of big game security habitat on BLM lands would be low under Alternative D with 701 acres, but more than under Alternative A which would have no functional acres of security habitat. Alternative D would have fewer acres of security habitat than any other action alternative (**Table 4-73**).

For all land ownerships in core and subcore habitat, Alternative D would have more acreage with low road density (66,988 acres) compared to Alternative A (65,283 acres). Alternative D, however, would have fewer acres with low road density compared to Alternative B (68,109 acres) and Alternative C (69,476). The acreage with moderate road density under Alternative D (39,136 acres) would be more than with Alternative A (37,754 acres), Alternative B (38,719 acres) and Alternative C (38,924 acres). Alternative D would have fewer acres (129,900) with high road density than Alternative A (132,987 acres) but would have more acres with high road density than Alternatives B (129,195) and Alternative C (127,624). Alternative D would improve core and subcore habitat across the landscape more than Alternative A but less than Alternatives B and C.

On BLM lands in core/subcore habitat, Alternative D would increase the acreage with low road density (2,706 acres) compared to Alternative A (1,244 acres), but would have considerably fewer acres with low road density than Alternative B (3,608 acres) and Alternative C (4,640 acres). Alternative D would have more acreage with moderate road density (3,192 acres) than Alternative A (2,419 acres), but less than either Alternative B or Alternative C. Alternative D would decrease the acreage with high road density to 6,452 acres compared to Alternative A (8,685 acres), but would have more acres with high road density than Alternative B (5,719 acres) and Alternative C (4,631 acres). Alternative D would improve core and subcore habitat on BLM lands in the TPA more than Alternative A but less than Alternatives B and C.

Effects of Alternative D on wildlife movement corridors would be the same as under Alternatives A and B.

Alternative D would protect and restore more riparian habitat than Alternative A by reducing the miles of open roads in riparian areas to 7.8 miles (from 19.6 under Alternative A). Alternative D would have more open roads in riparian areas than Alternative B (5.1 miles) and

Alternative C (4.1 miles). Alternative D would allow for more breeding, foraging and hiding habitat as well as improve more movement corridors for a wide variety of species than Alternative A but less than Alternatives B and C.

The actual road density, under Alternative D, in occupied grizzly bear habitat within the Lewis and Clark TPA would be 1.3 mi/mi² within the Decision Area. This would be above the maximum MFWP recommended road density in occupied grizzly bear habitat of 1 mi/mi².

Under Alternative D, the percent of total available grizzly bear habitat with low road density in the Lewis and Clark TPA would be 19 percent (1,976 acres) (**Table 4-74**). This would be a lower percentage compared to the percentage available at Planning Area scale (22 percent). Alternative D would have more acres in low road density in occupied grizzly bear habitat than Alternative A (665 acres), but substantially fewer acres than Alternative B (3,097 acres) and Alternative C (3,781 acres).

Alternative D would provide more acres of suitable habitat for grizzly bears than Alternative A but fewer acres of suitable habitat compared to Alternatives B and C.

Cumulative Effects on Wildlife

Wildlife habitat in the Lewis and Clark TPA has been affected by roads, historic and current mining, timber harvest, weed infestations, urbanization and development, recreation, powerline corridor development, and communication sites.

The majority of BLM managed routes for the Lewis and Clark TPA are located in and around the town of Marysville, located approximately 25 miles northwest of Helena. The Marysville area is experiencing increased residential development, but to a lesser extent than the central Helena Valley area. Much of the use in the Marysville area (especially winter use) comes from Helena Valley residents. The Helena Valley has been experiencing steady population growth. This trend is expected to continue, along with increased recreational use of this travel planning area. The remaining BLM-managed routes are located in 3 sub-planning areas: Stemple Pass, Sieben Ranch, and Lincoln.

Land that was traditionally used for ranching, forest products, or mining is now being converted to home sites around Marysville and throughout the rest of the TPA. Although these lands had historic human uses, they also provided quality wildlife habitat. These areas historically provided a diversity of habitats that contributed to; big game winter range, travel corridors, habitat for resident and migrating wildlife, as well as foraging, breeding and hiding habitat. Many of the areas currently experiencing residential development are in big game winter range. Because of the loss of winter range on private lands, it is critical that public and state lands maintain quality and secure winter range or improve the habitat in these areas.

For many plant and animal communities, native species richness decreases as housing density increases. Non-native species, however, tend to increase with development (Hansen et al. 2005). Wildlife populations, including carnivores, may be reduced even at very low levels of residential development due to; loss of habitat, an increase in human access (from roads) in areas that previously had low levels of disturbance, and an increase in hunting pressure. Residential development can also lead to an increase in noxious weed infestations that can reduce the quality and quantity of wildlife habitat.

Pets can also have a negative impact to native wildlife. Cats hunt and kill bird and small mammals. Dogs that are allowed to roam can chase, injure, or kill wildlife. This can result in areas becoming unavailable to wildlife.

Recreation use is well established in the TPA, especially for winter sports. Winter sport activities include: snowmobiling, downhill skiing (Great Divide Ski Area), backcountry skiing, ski racing, snowboarding, and snowshoeing. An extensive network of roads and trails support a wide range of off-season activities, including: camping, hunting, target practice, hiking, jogging, horseback riding, mountain bike riding, and motorized use (motorcyclists, OHV riders, and 4-wheel drive enthusiasts). As recreation use grows, conflicts between non-motorized and motorized recreation users could lead to increased public demands for either more, or less motorized use.

Since 1977, approximately 3,360 mining claims have been active throughout the Marysville area. Currently, only 40 claims are active, including the Bald Butte Mine, an open cut molybdenum mine. While currently a small scale operation (5 acres), there is a strong likelihood that Bald Butte will expand to approximately 30 acres in the future with roughly 5 acres on BLM lands. Activity began in 2006, and is anticipated to continue until at least 2015. Increases in mineral prices could lead to additional increased or renewed mining activity.

In the TPA, there are 17 powerlines and 4 pipelines. There are eight existing communication sites in the TPA but, in the future, communication sites on BLM lands will be restricted to existing sites. No future communication sites are expected in the TPA on BLM lands but they could occur on private or other public lands. There is the potential for future powerlines and pipelines to be built in this TPA.

There are approximately 44 rights-of-way (ROW) in the TPA and applications for ROW permits to access private property or for commercial development are likely to increase in the future. As a result, public access to BLM lands could increase. Fewer ROWs would be expected under Alternative A because more BLM roads would remain open under this alternative. Alternative B would be expected to have fewer ROWs than Alternative C but more than Alternatives A and D. Alternative C would be

expected to have the most ROWs and, of the action alternatives, Alternative D would have the fewest.

From 1981-2004 there have been 14 wildland fires that burned 83 acres of BLM lands (it is unknown how many acres burned in the entire TPA). Seven of the fires were identified as human-caused and these fires burned the majority of the BLM acres (75). Fuels reduction activities could occur around the town of Marysville. Timber harvest has occurred on approximately 130 acres of BLM lands in the TPA over the last 23 years and there have been approximately 70 acres of timber salvage. Vegetative treatments on BLM lands have had minor effects to wildlife habitat in the TPA. However, timber harvest, salvage, past mining activities and development on private lands have altered the landscape and may have caused a decline in the quality and quantity of wildlife habitat in the TPA.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the TPA. Motorized activities play a large role in the distribution of noxious weeds. The cumulative effects of the spread of noxious weeds from open roads would be greater under Alternative A than all other alternatives. Alternative A would result in more wildlife habitat being lost or degraded due to noxious weed infestations compared to the action alternatives. Alternative B would have fewer open roads than Alternatives A and D resulting in fewer infestations of noxious weeds. Alternative C would close the most roads and would have the fewest cumulative effects from loss of habitat due to noxious weeds of all alternatives. Open roads and development adjacent to BLM lands and the substantial amount of public use this area receives would still allow for the spread of noxious weeds.

Fragmentation of BLM lands in the TPA (only 4 percent in BLM ownership); open roads on BLM lands (about 68 miles), on private lands (about 900 miles) and other public lands (about 480 miles); as well as adjacent development has reduced the quality of wildlife habitat within the TPA. Large blocks of Forest Service lands (35 percent of TPA) are found in the TPA and do provide high quality wildlife habitat. However, open Forest Service roads as well as roads and development throughout the rest of the TPA cause disturbance to wildlife along with fragmentation and loss of habitat in the TPA. Roads are associated with nearly every type of activity that has the potential to occur in the TPA including vegetation treatments, timber salvage, mining, access to private lands (ROWs), fire suppression, powerline corridors, and recreation. Open roads in the Planning Area would likely increase due to development and management of private lands. Alternative A would have the greatest negative cumulative effects to wildlife and wildlife habitat from open roads with 64 miles of open roads. Alternative B would have fewer negative cumulative effects with 28 miles of open road than Alternatives

A and D (34 miles) but more than Alternative C (20 miles).

Of the action alternatives, Alternative C would have the most beneficial cumulative effects by reducing habitat fragmentation, restoring habitat and reducing disturbance. Alternative B would be more beneficial than Alternatives A and D but less than Alternative C.

Historic and recent timber cutting (mostly on private lands), timber salvage, past and present mining activity and firewood gathering in the TPA have reduced the amount of suitable snag habitat for cavity nesting species. Alternative A would allow a substantial amount of access to the area for firewood cutting. This could continue to prevent snag recruitment for snag dependant species and minimize the amount of down woody material. Alternative B would protect more snag and down wood habitat from loss due to firewood cutting than Alternatives A and D, but would protect less of this habitat type than Alternative C.

In the Lewis and Clark TPA high road densities in both the Decision and Planning Areas have prevented BLM lands from providing suitable security habitat for big game during the hunting seasons under Alternative A. Alternatives B and C would provide the most security habitat for big game on BLM lands (1,510 and 2,183 acres, respectively) and Alternative D would provide 701 acres. Security habitat would still be limited on private (unless closed to hunting) and other public lands. The reduction of open roads during the hunting season would help mitigate for the loss of security habitat on adjacent lands under Alternatives B and C.

Approximately 58 percent of the TPA is mapped as core and subcore habitat. All of the core and subcore habitat is in the western half of the TPA and is predominately Forest Service lands. Fragmentation of habitat due to development of private lands, open roads, and disturbance, has impacted the quality of core/subcore habitat and wildlife movement corridors in the TPA.

Habitat mapped as core and subcore habitat and wildlife movement corridors having high road densities would continue to be of lower value to wildlife under Alternative A. An increase in open roads in both the Decision and Planning Areas could result in a loss of core and subcore habitat under all alternatives but, especially, Alternative A. Although core/subcore habitat and wildlife movement corridors would continue to be impacted by development on private lands, Alternatives B and C would allow more BLM lands to function as core/subcore habitat and wildlife movement corridors. Alternatives B and C would have fewer negative cumulative effects to core/subcore and wildlife habitat than Alternatives A and D.

The cumulative effects of high road densities would continue to negatively affect wildlife species during the breeding season more under Alternative A than under the action alternatives. Alternatives B and C would have

the most beneficial cumulative effects to wildlife during the breeding season compared to Alternative D and, especially, Alternative A.

FISH

For the sake of this discussion, “open” roads include roads that are open with seasonal restrictions as well as roads that are open yearlong. Roads identified as “closed” within 300 feet of streams also include roads that would be “decommissioned” in these areas by alternative. Effects to water quality described in the Water Resources section would affect fish populations and fish habitat quality. Analyses described and tabulated in the Water Resources section are referred to in the context of effects to fish in the discussion below.

Effects of Alternative A

Under Alternative A, the Lewis and Clark TPA would have considerably more open roads (64 miles) compared to the action alternatives. Roads can have a wide range of effects on fish and fish habitat. These effects would include, but are not limited to, increased sedimentation from road construction and vehicle use, increased runoff, changes in surface water and drainage patterns from stream crossings, conduits for noxious weeds, loss of riparian vegetation, potential decreases in stream shading that could lead to water temperature increases, and changes in local fish populations when culverts are impassable and limit fish migration.

Watershed (or hydrologic) function can be used as an indicator of relative risk or impacts to fish habitat. Generally, watersheds with high road densities often have the largest negative effects on fish and aquatic resources. To determine the effects on watershed function, a moving windows analysis was conducted on BLM lands to look at the miles of roads that would be decommissioned and removed from the landscape for each alternative. During this analysis, it was assumed that even though closing roads would improve watershed function, closed roads would remain on the landscape and could still have negative impacts to water quality and prevent or impede the restoration of riparian vegetation. Under Alternative A, there would be 2,614 acres with low road density, 3,444 acres with moderate road density and 10,979 acres with high road density on BLM lands in the TPA (**Table 4-69**). Alternative A would have fewer acres with low road density and more acres with high road density than the action alternatives. This alternative would be expected to have greater overall negative effects to watershed function due to roads than the action alternatives.

For this discussion, road miles within 300 feet of fish bearing streams would be considered an indicator of direct effects to fish habitat and fish populations. Under Alternative A, there would be 0 miles of closed road and 7.4 miles of open road within 300 feet of fish bearing streams on BLM lands. Alternative A would have 2.1-

2.6 fewer miles of closed roads (and the same number more of open road miles) adjacent to fish bearing streams than the action alternatives. Of the 7.4 miles of open road adjacent to fish bearing streams under Alternative A, 4.6 miles are along streams with BLM special status fish species (bull trout and/or westslope cutthroat trout). Alternative A would have more long-term negative impacts to westslope cutthroat trout (the effects to bull trout would be the same for all alternatives) as well as to other fish species than the action alternatives.

Perennial non-fish bearing streams contribute to fish habitat indirectly by serving as conduits for watershed products (water, sediment, nutrients, contaminants, and in some cases woody material) to fish bearing streams. Under Alternative A, there would be 0.1 miles of closed road and 5.1 miles of open road within 300 feet of perennial non-fish bearing streams on BLM lands in the TPA. Alternative A would have substantially more miles of open road adjacent to perennial streams than Alternatives B (1.7 miles), C (1.4 miles) and D (2.5 miles).

This alternative would have the greatest negative impacts to fish and aquatic resources from open roads.

Effects of Alternative B

Under Alternative B, the Lewis and Clark TPA would have substantially fewer open roads (28 miles) compared to Alternative A (64 miles). Alternative B would have more open roads than Alternative C (20 miles) but less than Alternative D (34 miles).

In the context of watershed function, Alternative B would have approximately 461 more acres in the low road density category, 1,082 more acres in the moderate road density category, and 1,543 fewer acres in the high road density category on BLM lands than Alternative A (**Table 4-69**). Alternative B would contribute to improved watershed function more than Alternative A. This analysis does consider “decommissioned” roads, but does not consider “closed” roads as contributing to watershed function. Even though closed roads could still have adverse effects to aquatic habitats, these roads have more potential to become revegetated and lessen sedimentation and runoff, and restore riparian vegetation (thus contributing to improved fish habitat conditions) than open roads. Under Alternative B, there would be approximately 23 more miles of closed roads than under Alternative A, an additional indication that Alternative B would pose less of an impact to fish habitat than Alternative A. Alternatives B and D would have 2.1 miles of closed road and 5.3 miles of open road within 300 feet of fish bearing streams on BLM lands. Of the 5.3 miles of open roads, 3.2 miles would be adjacent to streams with special status species (westslope cutthroat trout and/or bull trout). Alternative B would reduce effects to fish bearing streams (including streams with special status species) more than Alternative A because all of these riparian roads would remain open under Alternative A. Alternative B would contribute fewer indirect effects to

fish habitat associated with roads within 300 feet of perennial non-fish bearing streams than Alternative A. Under Alternative B there would be 3.3 miles of closed road and 1.7 miles of open road in these riparian areas on BLM lands. This would pose less impact to these areas than under Alternative A where all 5.0 miles would be open.

Alternatives B would have fewer road-related adverse effects to fish and aquatic habitats than Alternative A.

Effects of Alternative C

Under Alternative C, the Lewis and Clark TPA would have substantially fewer open roads (20 miles) compared to Alternative A (64 miles). Alternative C would also have fewer open roads than Alternative B (28 miles) and Alternative D (34 miles).

In the context of watershed function, Alternative C would result in approximately 79 more acres in the low road density category, 632 more acres in the moderate road density category, and 711 fewer acres in the high road density category on BLM lands than Alternative A (**Table 4-69**). This alternative would have 382 fewer acres in the low road density category, 450 more acres in the moderate road density category, and 832 more acres in the high road density category than Alternative B. Under Alternative C there would be approximately 38 more miles of closed roads than under Alternative A, and about 15 more miles of closed roads than under Alternative B. Alternative C would lessen effects to fish habitat through improved watershed function more than Alternative A, but less than Alternative B.

Alternative C would have the most miles of closed roads (2.6) and the fewest miles of open roads (4.8) within 300 feet of fish bearing streams on BLM lands of all alternatives. Of the 4.8 miles of open roads, 2.9 miles would be adjacent to streams with special status species (westslope cutthroat trout and/or bull trout). In terms of direct effects from roads adjacent to fish bearing streams, Alternative C would have the most benefits to fish habitat of all alternatives.

Alternative C would contribute fewer indirect effects to fish habitat associated with roads within 300 feet of perennial non-fish bearing streams on BLM lands than all other alternatives. Under Alternative C there would be 3.6 miles of closed road and 1.4 miles of open road within 300 feet of perennial non-fish bearing streams on BLM lands in the TPA. This is a range of 0.3-3.6 more closed road miles in these areas than under the other alternatives.

Alternative C would provide more benefits to fish and aquatic habitats associated with roads in close proximity to streams than any other alternative. This alternative would provide less benefit to aquatic resources from improvements to hydrologic function than Alternative B, but more than Alternative A.

Effects of Alternative D

Under Alternative D, the Lewis and Clark TPA would have considerably fewer open roads (34 miles) compared to Alternative A (64 miles). Alternative D would have more open roads than Alternative B (28 miles) and Alternative C (20 miles).

In the context of watershed function, Alternative D would result in approximately 321 more acres in the low road density category, 1,002 more acres in the moderate road density category, and 1,324 fewer acres in the high road density category on BLM lands than Alternative A (Table 4-69). This alternative would have 140 fewer acres in the low road density category, 80 fewer acres in the moderate road density category, and 219 more acres in the high road density category than Alternative B. Under Alternative D there would be approximately 17 more miles of closed roads than under Alternative A, approximately 6 fewer miles of closed roads than under Alternative B, and approximately 21 fewer miles of closed roads than under Alternative C. Alternative D would lessen effects to fish habitat through improved watershed function more than Alternatives A and C, and to a similar degree as Alternative B.

Alternative D would have fewer miles of closed road (2.1) and more miles of open road (5.3) within 300 feet of fish bearing streams on BLM lands than Alternatives B and C. Of the 5.3 miles of open roads, 3.2 miles would be adjacent to streams with special status species (westslope cutthroat trout and/or bull trout). Alternative D would reduce direct effects to fish bearing streams (including streams with special status species) more than Alternative A but less than Alternatives B and C.

Alternative D would contribute more indirect effects to fish habitat associated with roads within 300 feet of perennial non-fish bearing streams on BLM lands than Alternatives B and C but less than Alternative A. Under Alternative D there would be 2.5 miles of closed road and 2.5 miles of open road within 300 feet of perennial non-fish bearing streams on BLM lands in the TPA. Alternative D would contribute fewer direct effects to aquatic habitats (fish bearing and non-fish bearing) from roads than Alternative A but more than Alternatives B and C.

Although Alternative D would contribute to improved fish habitat conditions from a hydrologic function standpoint to a similar degree as Alternative B, overall this alternative would have more adverse effects to fish and aquatic habitats than Alternatives B and C, but less than Alternative A.

Cumulative Effects on Fish

The Lewis and Clark TPA supports a variety of native and introduced fish species. One of the major human influences to fish in the TPA has been the introduction of non-native trout species including rainbow trout, brook trout, and brown trout throughout the TPA. Rain-

bow trout have hybridized with the native westslope cutthroat trout in many streams. Brook trout and brown trout have displaced the native cutthroats in other streams, especially those altered by sedimentation and increased water temperatures brought on by human activities.

Due to their life history requirements, bull trout are more sensitive to increased water temperatures, poor water quality, and low flow conditions than many other salmonids. Past and continuing land management activities have degraded stream habitat, especially along larger river systems and stream areas located in valley bottoms, to the point where bull trout can no longer survive or reproduce successfully across their range. Brook trout easily hybridize with bull trout producing sterile offspring. Brook trout also reproduce earlier and at a higher rate than bull trout. Hybridization with brown trout may also be a problem in some areas of the TPA.

The majority of BLM managed routes for the Lewis and Clark TPA are located in and around the town of Marysville. The Marysville area is experiencing increased residential development, but to a lesser extent than the central Helena Valley area. The remaining BLM managed routes are located in three sub-planning areas: Stemple Pass, Sieben Ranch, and Lincoln. Bull trout are only found in the Blackfoot watershed that would be impacted by travel planning in the Lincoln Area.

Recreation use is well established in the TPA, especially for winter sports. Winter sport activities include: snowmobiling, downhill skiing (Great Divide Ski Area), backcountry skiing, ski racing, snowboarding, and snowshoeing. An extensive network of roads and trails support a wide range of off-season activities, including: camping, hunting, target practice, hiking, jogging, horseback riding, mountain bike riding, and motorized use.

Agricultural activities from farming and ranching contribute increases in nutrients, sedimentation, and loss of aquatic habitats through direct stream channel alterations. Many streams in the TPA have been impacted by historic and ongoing livestock grazing that breaks down streambanks, widens channels, removes vegetative cover and causes an increase in fine sediment and nutrients.

Since 1977, approximately 3,357 mining claims have been active throughout the Marysville area. Today 40 claims remain active, including the Bald Butte Mine, an open cut molybdenum mine. Increases in mineral prices could lead to increased or renewed mining activity. Many watersheds in the TPA have been degraded by historic mining activities.

Aquatic habitats have been affected by stream channel alteration and heavy metal contamination associated with historic mining and abandoned mine lands in some portions of this TPA. See the Water Resources section for this TPA for more details.

Fires, floods, and drought have historically affected fish habitat in the TPA. These disturbances can cause a pulse of sediment or may temporarily reduce the quality of fish habitat in some watersheds while leaving other streams largely unaffected. Population recovery in disturbed streams may be facilitated by fish immigration from nearby drainages less affected by the catastrophic event. Some natural disturbances may have short-term adverse effects but long-term beneficial effects to fish habitat such as increasing large wood recruitment to streams and floodplains. From 1981-2004 there have been 14 wildland fires that burned 83 acres. Seven of the fires were identified as human-caused and these fires burned the majority of the acres (75). Fuels reduction activities could occur around the town of Marysville in the future. Effects to fish habitat from these activities would likely be minimal.

Timber harvest can alter the recruitment of large woody debris, reduce canopy closures and result in an increase in fine sediment to streams. Timber harvest along with associated roads can contribute substantially to the overall cumulative effects in forested watersheds. Timber harvest has occurred on approximately 130 acres of BLM lands in the TPA over the last 23 years and there have been approximately 70 acres of timber salvage. Vegetative treatments on BLM lands have had minor effects to aquatic habitats in the TPA. However, timber harvest, salvage and past mining activities on private lands have altered the landscape and may have caused a decline in the quality and quantity of aquatic habitat in the TPA. Roads are another major contributor of sediment to streams and a major problem with regards to cumulative watershed effects. Roads and trails can have localized effects on nearby stream segments or at stream crossing sites, especially fords. Cumulatively, roads degrade aquatic habitat due to sedimentation from road construction and vehicle use, increased runoff, changes in surface water and drainage patterns from stream crossings, loss of riparian vegetation, loss of large woody material and roads can cause changes in local fish populations when culverts are impassable and limit fish migration. Alternative A would have more negative cumulative effects to watersheds and individual streams due to roads than the action alternatives. Alternative B would have fewer negative cumulative effects than Alternatives A and D but more than Alternative C. Alternative B would improve overall watershed function as well as improve habitat in individual streams more than Alternatives A and D but less than C. Alternative C would have the greatest beneficial effects overall.

SPECIAL STATUS PLANTS

Effects Common to All Alternatives

Ground-disturbing activities from road construction and maintenance, as well as road use by vehicles can affect special status plant populations and habitat. These activities can reduce sensitive plant species through distur-

bance to individual populations, increasing competition from invasive species, and reducing habitat connectivity. Closure of roads and trails can improve or maintain sensitive plant populations or habitat by reducing avenues of noxious weed spread, maintaining habitat connectivity, and improving pollinator habitat. Road and trail restrictions have the same effects but to a lesser degree.

Effects of the Alternatives

Under Alternative A, 57.5 miles of BLM roads and trails would remain open, 6.7 miles of roads and trails would be open with seasonal restrictions, and 3.4 miles of roads and trails would be closed. On the open roads, effects would continue as described in the Effects Common to All Alternatives section. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators.

Under Alternative B, 13.8 miles of BLM roads and trails would remain open, 14.3 miles of roads and trails would be open with seasonal restrictions, 26.8 miles of roads and trails would be closed, and 10.9 miles would be decommissioned. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The restricted roads would reduce weed spread a limited amount. Because more road miles would be closed under this alternative, Alternative B would benefit and reduce risk to special status plants more than Alternative A.

Under Alternative C, 8 miles of BLM roads and trails would remain open, 11.7 miles of roads and trails would be open with seasonal restrictions, 41.6 miles of roads and trails would be closed, and 5.2 miles would be decommissioned. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The restricted roads would reduce weed spread a limited amount. Alternative C would benefit and reduce risk to special status plants more than any other alternative because it would eliminate disturbance, vehicular use, and spread of noxious weeds on the most road miles.

Under Alternative D, 19.6 miles of BLM roads and trails would remain open, 14.5 miles of roads and trails would be open with seasonal restrictions, 20.3 miles of roads and trails would be closed, and 8.8 miles would be decommissioned. On the open roads, effects would continue as described in the Effects Common to All Alternatives section. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The restricted roads would reduce weed spread a limited amount. Alternative D would benefit and reduce risk to special status plants more than Alternative A, but would pose more risk compared to Alternatives B and C.

Cumulative Effects on Special Status Plants

Under all alternatives there are a number of past, present, and reasonably foreseeable future actions that affect special status plant populations.

Livestock grazing will continue in the area and has the potential to impact sensitive plant populations and habitat. On public lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain sensitive species populations and habitat. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided. Conditions may improve or degrade as management changes.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, sensitive plants would benefit from the reduced competition. Use of herbicides for noxious weed control could cause mortality to special status plants if individual plants are inadvertently sprayed.

Recent and anticipated subdivision growth on private lands will lead to more road construction and maintenance. More roads and development will reduce sensitive plant species habitat and in some cases individual populations. Additionally, subdivisions have the potential to disrupt the connectivity of plant habitat and populations as well as disturbing or eliminating pollinators needed by sensitive species. Some sensitive species that require soil disturbance may benefit.

Timber sale activity disturbance can destroy or degrade sensitive plant habitat. On public lands, projects would be designed to avoid, mitigate, or enhance sensitive plant habitats. The disturbance associated with timber harvest activities does have the potential to increase noxious weed spread which degrades sensitive species habitat and individual plant populations.

A molybdenum mine was started on private land above Bald Butte. The mine may expand on other private and public lands in the future. Impacts are not expected from this activity, because no sensitive plant species or habitat have been identified in the area at this time. A survey would be conducted prior to any disturbance on public land.

At the scale of the entire Lewis and Clark County NW TPA (all land ownerships), the BLM travel plan alternatives would have slightly variable contributions to cumulative effects on special status plants. Under Alternative A less than 1 percent of all roads in the TPA would be closed. Under Alternative B adverse effects on special status plants would be slightly reduced compared to Alternative A because 2.6 percent of all roads in the TPA would be closed or decommissioned. Alternative C would provide the most benefits of all alternatives as 3.2 percent of all roads in the TPA would be closed or de-

commissioned. Alternative D would provide slightly more benefits than Alternative A but slightly fewer benefits than either Alternatives B or C as 2 percent of all roads in the TPA would be closed or decommissioned. Because BLM lands make up only 4.2 percent of all lands in the TPA, activities on non-BLM lands would play a greater role in determining the status of special status plants.

WILDLAND FIRE MANAGEMENT

Travel planning alternatives were analyzed to determine whether they could result in impact on wildland fire management, causing change to any of the following indicators:

- Fire regime condition class (FRCC)
- Firefighter and public safety
- Reducing threat to Wildland Urban Interface (WUI)

Effects Common to All Alternatives

Public road access during the fire season provides opportunities for human-caused fires either due to catalytic converters on vehicles igniting dry vegetation, or due to some types of human activities. Roads that are closed to public access reduce the risk of human-caused fire starts in those areas.

Decommissioned roads and roads that are closed and not regularly maintained for navigability reduce access for fire suppression. Closed roads may become impassible due to vegetation regrowth, downfall of trees, or severe erosion. Some roads may be closed with earthen berms or fallen trees and would need to be physically manipulated to make them useable for vehicles again. These roads would extend firefighting response time and have negative impacts on efforts to reduce wildland fire threat to WUI areas and firefighter and public safety. In an emergency fire suppression situation, any navigable closed roads needed for fire suppression would be used immediately. Non-navigable closed roads could also be used if deemed to be needed for fire suppression, after needed improvements are made to make those roads useable. Planning and implementation of fuels reduction treatments could occur in association with closed roads if variances for temporary road use were to be allowed. Variances would be subject to internal BLM review.

In the context of fuels reduction projects, availability of open roads is important to facilitating fuels project location as well as increasing project feasibility and decreasing costs. Open roads also facilitate spread of noxious weeds by transporting weed seed on vehicles and their tires. Presence of large noxious weed populations could delay or cause fuels projects to be cost-prohibitive due to the fact that the weeds may have to be treated before and/or after the fuels treatment. Also, some applications of fuel treatments (e.g., prescribed fire) may promote the

spread of some weeds. The presence of weeds and non-native species are indicators that FRCC has departed from historical conditions.

Noxious weeds and non-native invasive species are well established and spreading in the Lewis and Clark County NW TPA.

Effects of Alternative A

Under Alternative A, the majority of routes in the Lewis and Clark County NW TPA would be available for wheeled motorized use (57.5 miles open yearlong, 6.7 miles seasonally restricted), while 3.4 miles would continue to be closed. Alternative A would allow for the greatest flexibility between alternatives for access for suppression purposes. Fuels project feasibility would be highest under this alternative. However, public access during the fire season would be the greatest under this alternative and would provide the most opportunities for human-caused fire starts.

The distribution of noxious weeds could be the greatest in alternative A with the most open roads and noxious weeds already well established. This would contribute to reduced feasibility of fuels reduction projects more than under any other alternative.

Effects of Alternative B

Alternative B provides for separate use areas for wheeled motorized and non-motorized recreational opportunities. Under Alternative B, a total of 28.1 miles of routes would be available for motorized wheeled use (13.8 miles open yearlong, 14.3 miles seasonally restricted). The majority of routes located in the Stemple Pass and Lincoln areas would be closed, providing additional non-motorized opportunities. Alternative B would limit the flexibility for access for suppression purposes and fuels project feasibility would go down compared to Alternative A due to the fact that access would be limited to 28.1 miles of road. Of the 36.7 miles of closed roads, 10.9 miles would be decommissioned and would likely be unusable for fire suppression. The risk of human-caused fires associated with motorized use would be limited compared to Alternative A, due to a 49 percent decrease in miles of road open to motorized public travel compared to Alternative A.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because more roads would be closed under this alternative, Alternative B should help reduce the spread of noxious weeds and may make fuels treatments more feasible than under Alternative A, reducing FRCC departure.

Effects of Alternative C

Alternative C would provide the least amount of wheeled motorized opportunities with 8 miles of routes open yearlong, and an additional 11.7 miles seasonally restricted.

Alternative C would limit the flexibility for access for suppression purposes, and fuels project feasibility would go down compared to both Alternatives A and B, due to the fact that access would be limited to 19.7 miles of road. Of the 46.8 miles of closed roads, 5.2 miles would be decommissioned and would likely be unusable for fire suppression. The risk of human-caused fires associated with motorized use would be the lowest of all alternatives, due to a 64 percent decrease in miles of road open to public travel compared to Alternative A. However, this degree of reduced motorized access may promote more non motorized users to a concentrated area, increasing the chances for a human-caused fire to occur.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because more roads would be closed than under any other alternative, Alternative C should help reduce the spread of noxious weeds more than any other alternative, and may make fuels treatment more feasible, reducing FRCC departure.

Effects of Alternative D

Under Alternative D, 19.6 miles of open routes would be available yearlong for wheeled motorized use and an additional 14.5 miles would be seasonally restricted routes. Of the 29.1 miles of closed roads, 8.8 miles would be decommissioned and would likely be unusable for fire suppression. Alternative D would be more flexible than Alternatives B and C but would limit flexibility for access for suppression purposes, and fuels project feasibility would go down compared to Alternative A. The risk of human-caused fires associated with motorized vehicle use would be reduced compared to Alternative A, but would be greater than under Alternatives B and C, due to a 38 percent decrease in miles of road open to public travel compared to Alternative A.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because an intermediate number of road miles would be closed under this alternative, Alternative D should help reduce the spread of noxious weeds compared to Alternative A and may make fuels treatment more feasible, but would promote more weed spread and potentially make projects less feasible than Alternatives B and C.

Cumulative Effects on Wildland Fire Management

Effects on wildland fire management associated with any of the BLM travel plan alternatives would be overshadowed by reasonably foreseeable uncharacteristic fire, continued fire suppression made necessary by WUI and intermingled landownership, and large-scale forest insect infestations and disease outbreaks that would continue for the planning period. BLM lands make up about 4.2 percent of all lands while BLM roads make up about

4.7 percent of all roads in the Lewis and Clark County NW TPA.

Revision of the Helena National Forest Plan could result in more or less treatment of adjacent areas. Because no decision has been made, the effects are not known. Wildland fire management, particularly where wildland fire use (management of naturally ignited wildland fires to achieve resource objectives) may occur on USFS lands, will be determined in the plan decision. BLM would need to coordinate with USFS on all wildland fire use actions and events. Wildland fire use on USFS lands could affect FRCC on BLM lands. USFS lands make up 35 percent of all lands in the Lewis and Clark County NW TPA so activities there would likely have more influence on future fire characteristics than activities on BLM lands (4.2 percent of all lands in TPA).

Additionally, decisions to increase the level of wildland fire use, prescribed fire, or open burning by the public could impact the BLM's ability to use wildland fire and prescribed fire due to air quality concerns and requirements. This could postpone or eliminate BLM fuel reductions or treatments to improve FRCC.

Access is a critical component of wildland fire suppression. In some cases, access to public lands is being reduced by adjacent landowners gating or closing roads, which could hamper wildland fire suppression efforts and pose a risk to public and firefighter safety. Reducing access would also increase the potential for larger fires to occur due to an increase in time needed to access a fire and control it. Time needed to move in crews would be extended, and the ability to effectively apply and place resources (e.g., engines, water tenders, etc.) would be limited.

Effects on wildland fire management, including FRCC and firefighter and public safety due to management accomplished by other landowners may affect wildland fire management on public lands. When activity fuels (such as logging slash) are not treated adequately, fuel hazard could increase on adjacent lands which could affect fire intensity and severity on public lands. When adjacent owners treat fuels or implement fire mitigation plans in the WUI, fires are easier to suppress and firefighter safety is increased. In the Lewis and Clark County NW TPA, activities on private lands (53 percent of all lands in TPA) would have more influence on future fire characteristics in the area overall than activities on BLM lands (4.2 percent of all lands in TPA).

Human population increases and subsequent residential development are likely to expand the WUI and could alter forest management, taking the emphasis off restoring historic composition and structure and focusing more on fuel reduction.

CULTURAL AND PALEONTOLOGICAL

Effects Common to All Alternatives

Alternative-specific risks or impacts to cultural and paleontological resources are difficult to discern due to a lack of extensive site-specific knowledge about the presence of these resources in a given TPA. By designating open routes, limiting open-country travel, and closing some routes, inadvertent discovery of cultural and paleontological resources and vandalism to them is reduced. Higher road densities in a given area would allow greater access to more land on the average, but that does not imply greater amounts of vandalism, since the vehicles would remain on designated routes.

VISUAL RESOURCES

Effects Common to All Alternatives

Roads (temporary or permanent) may affect visual quality. Roads that remain open for public use may impact visual qualities where noticeable. The quantity of open roads would also influence sensitivity levels since with more open roads, more areas would generally be viewed by more members of the public. Closing or decommissioning roads would generally reduce effects to visual resources and reduce sensitivity levels because fewer members of the public would generally be accessing and viewing areas with closed roads.

Effects of the Alternatives

Under Alternative A, there would be 64.2 miles of open road (including roads open with seasonal restrictions), and 3.4 miles of closed roads. This alternative would have the greatest impacts to visual resources of all alternatives.

Under Alternative B there would be 28.1 miles of open road (including roads open with seasonal restrictions), 26.8 miles of closed road, and 10.9 miles of decommissioned road. Road closures and decommissioning under this alternative would reduce effects on visual resources compared to Alternative A.

Under Alternative C there would be 19.7 miles of open road (including roads open with seasonal restrictions), 41.6 miles of closed road, and 5.2 miles of decommissioned roads. Alternative C would have fewer adverse effects and would improve visual resources the most of all alternatives.

Under Alternative D there would be 35.1 miles of open road (including roads open with seasonal restrictions), 20.3 miles of closed road, and 8.8 miles of decommissioned road. Alternative D would improve visual resources compared to Alternative A, but would have more adverse effects than Alternatives B and C.

Cumulative Effects on Visual Resources

Under all alternatives, most activities on BLM lands would generally not adversely affect visual resources to unacceptable degrees because discretionary activities on BLM lands would be required to meet Visual Resource Management objectives within individual project areas. The Bald Butte Mine will continue to impact visual resources for the foreseeable future as the mine expands on both private and public lands. The Great Divide Ski Area reduces visual quality in some portions of the Marysville area and will continue to do so for the foreseeable future.

Activities on non-BLM lands, particularly activities near BLM lands associated with residential development, urbanization, or vegetation management, could have adverse cumulative effects on visual resources on BLM lands because BLM VRM objectives would obviously not apply to non-BLM activities.

LIVESTOCK GRAZING

Effects Common to All Alternatives

Roads and trails can potentially affect livestock grazing management. Roads and trails often act as avenues of noxious weed spread. Noxious and invasive weeds can reduce the quantity and quality of forage for livestock. Users of roads and trails can cause management problems for livestock permittees when they leave gates open at fences, vandalize range improvements, or harass livestock either purposely or unintentionally.

Closure of roads and trails can improve or maintain the forage base by reducing vectors of noxious weed spread. Additionally, road and trail closures can reduce management conflicts. On the other hand, closures may increase permittees' time requirements if and when work has to be conducted with horses or afoot. Permittees could minimize effects of closed roads on grazing management time by seeking variances from the BLM for temporary use of specific closed roads.

Effects of the Alternatives

Under Alternative A, 64.2 miles of roads and trails would remain open during grazing season, and 3.4 miles of roads and trails would be closed. The effects would continue as described in the Effects Common to All Alternatives section. All action alternatives would close or decommission more roads and trails than Alternative A. As more roads and trails are closed, noxious and invasive weed spread along with multiple user conflicts would be reduced. On the other hand, permittee management time may increase. Consequently, more effects as described under the Effects Common to All Alternatives section would occur under Alternative C (19.7 miles open during grazing season, 46.8 miles closed or decommissioned) than under any other alternative. Alternative B (28.1 miles open during grazing season, 37.7

miles closed or decommissioned) would produce fewer effects than Alternative C, but more than Alternative A or Alternative D (34.1 miles open during grazing season, 29.1 miles closed or decommissioned). Alternative D would have fewer effects than Alternatives B or C, but more than Alternative A.

Cumulative Effects on Livestock Grazing

A number of past, present, and reasonably foreseeable future actions affect livestock grazing at the scale of the entire Lewis and Clark County NW TPA. Livestock grazing will continue in the area and has the potential to impact forage quality and quantity. On public lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain forage quality and quantity. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, forage conditions would benefit.

A molybdenum mine was started on private land above Bald Butte. The mine may expand on other private and public lands in the future. Some forage base may be reduced in the Drumlummon-Skelly and Empire Creek allotments.

Because BLM lands make up only 4.2 percent of all lands in the Lewis and Clark County NW TPA, all of the BLM travel plan alternatives would have a minimal contribution to cumulative effects on livestock grazing at the scale of the entire TPA.

MINERALS

Effects Common to All Alternatives

Road closures and decommissioning could affect access to locatable minerals in areas of moderate or high mineral potential. Operators would be required to seek travel variances from the BLM to use motor vehicles to conduct mineral exploration on closed roads, or to conduct exploration on seasonally restricted routes during the season of closure. Decommissioned roads could not be used for motorized exploration. Travel management provisions that require a permit or variance could result in reducing access to mining claims or interfere with the ability to conduct exploration work for some operators. Historic knowledge of mineralized areas associated with "closed" roads may be lost after long periods of time if no exploration occurs there. Additional costs and time could be required for exploration and development of mining projects associated with closed or decommissioned roads. Impacts of road closures or decommissioning in areas with low mineral potential would not be substantial to mineral development.

Effects of the Alternatives

Effects of the alternatives for the Lewis and Clark County NW TPA on access to mineralized areas are summarized in **Table 4-75**. Alternative A would seasonally restrict access on 10 percent of the roads and would close an additional 5 percent of roads in high mineral potential areas; roads in moderate mineral potential areas would be left open.

Alternative B would seasonally restrict 17 percent of the roads, close 20 percent, and decommission 8 percent of the roads in high mineral potential areas. This same alternative would close 15 percent and decommission 8 percent of roads in the moderate mineral potential areas

Table 4-75				
Analysis of Access to Mineral Potential Areas Lewis and Clark County NW TPA				
Mineral Potential	Open Miles (%)	Seasonally Restricted Miles (%)	Closed Miles (%)	Decom Miles (%)
Alternative A				
High	30.0 (44%)	6.7 (10%)	3.4 (5%)	0.0 (0%)
Moderate	19.6 (29%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Low	8.0 (12%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Total Miles = 67.6				
Alternative B				
High	9.7 (14%)	11.2 (17%)	13.5 (20%)	5.6 (8%)
Moderate	4.1 (6%)	0.2 (0%)	9.9 (15%)	5.3 (8%)
Low to none	0.0 (0%)	4.6 (7%)	3.4 (5%)	0.0 (0%)
Total Miles = 67.6				
Alternative C				
High	5.6 (8%)	9.9 (15%)	22.6 (33%)	1.9 (3%)
Moderate	2.4 (4%)	0.4 (0%)	13.5 (20%)	3.3 (5%)
Low to none	0.0 (0%)	2.5 (4%)	5.5 (8%)	0.0 (0%)
Total Miles = 67.6				
Alternative D				
High	12.5 (18%)	12.6 (19%)	11.2 (17%)	4.0 (6%)
Moderate	5.8 (8%)	2.0 (3%)	7.0 (10%)	4.8 (7%)
Low to none	1.3 (2%)	4.6 (7%)	2.0 (3%)	0.0 (0%)
Total Miles = 67.9 (Includes Proposed New Construction)				

Mineral Potential areas have been delineated by the Montana Bureau of Mines and Geology (MBMG)

(**Table 4-75**). A total of 51 percent of the roads accessing mineralized areas in the Lewis and Clark County NW TPA would have either a seasonal restriction or closure on it under Alternative B.

Alternative C would close 33 percent and decommission 3 percent of the roads in high mineral potential areas. This same alternative would close 20 percent and decommission 5 percent of roads in areas with moderate mineral potential in this TPA (**Table 4-75**). A total of 61 percent of the roads accessing mineralized areas would be closed or decommissioned under Alternative C.

Alternative D would seasonally restrict 19 percent, close 17 percent, and decommission 6 percent of the roads in high mineral potential areas. This same alternative would seasonally restrict 3 percent, close 10 percent, and decommission 7 percent of roads in areas with moderate mineral potential. A total of 40 percent of the roads accessing mineralized areas would be either closed or decommissioned under Alternative D in the Lewis and Clark County NW TPA (**Table 4-75**).

Cumulative Effects on Access to Mineralized Areas

No other past, present, or reasonably foreseeable future actions in the Lewis and Clark County NW TPA would adversely affect mineral availability or access.

Overall, there is low potential for leasable fluid mineral development throughout federal mineral estate lands in the Butte Field Office. However, in this context, the Reasonably Foreseeable Development Scenario for the Butte RMP identified approximately 20,640 acres of federal mineral estate lands in this TPA where oil and gas development potential is slightly higher (low to moderate) and may potentially occur. Potential contribution of this activity to cumulative effects for other resources would be unknown until this activity is site-specifically planned.

RECREATION

Effects of travel plan alternatives on Recreation in the Lewis and Clark County NW TPA are described qualitatively below.

Effects of Alternative A

Alternative A would provide more motorized opportunities than non-motorized opportunities. Under Alternative A, the majority of routes in the Lewis and Clark County NW TPA would be available for wheeled motorized use (57.5 miles open yearlong, 6.7 miles seasonally restricted). Area wide snowmobile (cross-country travel) use would be available on 16,997 acres. The Continental Divide Trail would continue to be managed for both motorized and non-motorized uses which would result in user conflicts.

Effects of Alternative B

Alternative B would provide for separate use areas for wheeled motorized and non-motorized recreational opportunities. Under Alternative B, a total of 28.1 miles of routes would be available for motorized wheeled use (13.8 miles open yearlong, 14.3 seasonally restricted). The majority of routes located in the Stemple Pass and Lincoln areas would be closed, providing additional non-motorized opportunities. Opportunities for cross-country snowmobile travel would be reduced with the area identified in the northwest portion of the TPA (Marysville area) being restricted to designated routes only, during the season of use (12/2-5/15), conditions permitting. Winter use conflicts would be reduced under Alternative B, as cross-country skiers could use the area in the upper northwest portion of the Marysville area for non-motorized use as well as the Great Divide Ski Area.

Effects of Alternative C

Alternative C would provide the least amount of wheeled motorized opportunities: 8.0 miles of routes managed open yearlong, and 11.7 miles managed as seasonally restricted. Closure of the routes located in the northwest corner of the Marysville area would result in an enhancement of non-motorized opportunities. Opportunities for cross-country snowmobile travel would be eliminated. Snowmobiles would be restricted to designated routes only during the season of use (12/2-5/15), snow conditions permitting.

Effects of Alternative D

Alternative D would provide the highest level of wheeled motorized access of the action alternatives. Under this alternative, a total of 34.1 miles of routes (19.6 miles open yearlong, 14.5 miles seasonally restricted) would be available for motorized use. Opportunities for ATV riders and hunters would be enhanced through the addition of a yearlong ATV-Only route and a game retrieval route. Motorized users would also have more opportunities in the Lincoln and Stemple Pass areas. Cross-country snowmobile travel would be allowed throughout the TPA with 2 exceptions, the Great Divide Ski area and the northwest portion of the TPA. Travel in these areas would be restricted to existing routes only during the season of use (12/2-5/15), providing some dispersed recreation opportunities for non-motorized users.

Cumulative Effects on Recreation

Alternative A would provide the greatest opportunities for motorized uses especially in the Marysville area. Given the population growth trends in the nearby Helena Valley it is expected that visitation levels on BLM lands in the Marysville area will increase along with conflicts between non-motorized and motorized users, especially during the big game hunting season. In addition, poten-

tial impacts to the natural settings within this area are expected to increase given increasing mineral values, vegetative treatments, road improvements, noxious weed spread, residential home building, prescribed fires, and additional rights-of-way requests for access. Under this alternative no Recreation Opportunity Spectrum designations would be made to guide discretionary developments and impacts to non-motorized users would be most likely to increase at the greatest rate.

Under Alternative B about 55 percent of the BLM roads within the TPA would be closed. This action coupled with other existing and potential actions would enhance non-motorized Recreation Opportunity Spectrum settings and user opportunities, reduce conflicts between non-motorized and motorized users, and promote more retention of big-game species on BLM thus improving walk-in hunting opportunities. Designating Recreation Opportunity Spectrum settings would help to ensure that varied opportunities are provided throughout the TPA and that expected experiences are provided to the public.

Alternative C would impose the greatest impacts on motorized travel opportunities while opportunities for non-motorized experiences would be the most benefited. Recreation Opportunity Spectrum management and big game hunting opportunities within the TPA would be similar to Alternative B with the exception that no motorized routes would be open in the northwest extremity of the Marysville area and thus a Semi-Primitive Non-motorized setting would be a management objective.

Under Alternative D, cumulative effects of the travel management actions coupled with all other existing and reasonably foreseeable actions would be similar to Alternative A with the exception that fewer roads would be open to public use.

TRAVEL MANAGEMENT AND ACCESS

Effects of Alternative A

Most roads in the Lewis and Clark County NW TPA would continue to be managed as open yearlong (57.5 miles) (**Table-4-76**). This would be about 66 percent more routes open yearlong than under the action alternatives. When considering both open routes and routes with seasonal restrictions, 47 percent more routes would be open to motorized use than under the action alternatives. Non-motorized users would have a lower quality recreation experience compared to under the action alternatives.

Alternative A would allow the greatest snowmobile use of all alternatives, with area-wide cross-country use available on 16,997 acres. Outside the Great Divide Ski Area, cross-country snowmobile access would be allowed on approximately 25 percent more acres than under any of the action alternatives. Separate use areas for non-motorized winter sports enthusiasts would be less under Alternative A.

Proposed Management	Total Miles			
	Alt A	Alt B	Alt C	Alt D
Wheeled motorized routes				
Open Yearlong	57.5	13.8	8.0	19.6
Seasonally Restricted	6.7	14.3	11.7	14.5
Closed	3.4	26.8	41.6	20.3
Decommissioned	0	10.9	5.2	8.8
Non-motorized trails ¹	5.27	37.7	46.7	29.1

¹ Non-motorized trails include all existing trails, closed roads, and decommissioned roads.

User conflicts would be evident during the winter in the Lewis and Clark County NW TPA since cross-country snowmobile use would be allowed in all areas (except the Great Divide Ski Area), leaving no areas for dispersed cross-country ski opportunities.

The Continental Divide Trail would continue to be managed for both motorized and non-motorized uses which would result in user conflicts.

The extent of management activities and costs under Alternative A would be mixed. Less personnel time would be required to monitor travel compliance than under the action alternatives. However, more effort would be required for initial implementation (signing designated routes, installing bulletin boards) than under the action alternatives. Estimated costs for road/trail maintenance would be highest of all alternatives.

The need for BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be minimal under this alternative, given the availability of motorized access.

Effects Common to Action Alternatives

Re-routing the motorized portion of the Continental Divide Trail in the Lewis and Clark County NW TPA would enhance non-motorized opportunities and remove motorized conflicts.

Effects of Alternative B

Under Alternative B, the Lewis and Clark County NW TPA would provide four times fewer routes open yearlong to motorized access than under Alternative A (Table-4-76). Opportunities for motorized users would be less under Alternative B, than under Alternative A.

With 37.7 miles of non-motorized trails, there would be more opportunities for non-motorized users than under Alternative A. Closing most of the routes located in the Stemple Pass and Lincoln areas would provide additional non-motorized opportunities in these areas.

Compared to Alternative A, opportunities for cross-country snowmobile travel would be reduced with the area identified in the northwest portion of the TPA (Marysville area) restricted to designated routes only, during the season of use (12/2-5/15), conditions permitting.

Dispersed recreational opportunities would be created that allow motorized and non-motorized users to recreate separately. Winter use conflicts would also be reduced under Alternative B compared to Alternatives A and D, as cross-country skiers could use the area in the upper northwest portion of the Marysville area for non-motorized use as well as the Great Divide Ski Area.

The extent of management activities and costs under Alternative B would be mixed. Less personnel time would be required for initial implementation (signing designated routes, installing bulletin boards) than under Alternative A. However, more effort would be required for public education and compliance than under Alternative A. Estimated costs for road/trail maintenance would be less than under Alternative A.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would increase under Alternative B compared to Alternative A.

Effects of Alternative C

Alternative C would provide the least amount of wheeled motorized access in the Lewis and Clark County NW TPA of all the alternatives (19.7 miles) (Table-4-76) and therefore, fewer opportunities for motorized users would be available. Alternative C would provide 70 percent fewer motorized miles than Alternative A, and 30 percent fewer than Alternative B. Closure of routes in the northwest corner of the Marysville area under Alternative C would result in an enhancement of non-motorized opportunities in that area.

Closure and decommissioning of routes in the Lewis and Clark County NW TPA would result in an increase in non-motorized opportunities. Alternative C would have 43 percent more miles of non-motorized trails than Alternative A, and 19 percent more than Alternative B.

Opportunities for cross-country snowmobile travel would be eliminated. Snowmobiles would be restricted to designated routes only during the season of use (12/2-5/15), snow conditions permitting. Non-motorized winter sports opportunities would increase because of the restrictions.

The extent of management activities and costs under Alternative C would be mixed. Less personnel time would be required for initial implementation (signing designated routes, installing bulletin boards) than under any other alternative. However, more effort would be required for public education and compliance than under the other alternatives. Estimated costs for road/trail maintenance would be the lowest of the alternatives.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be the greatest under Alternative C than under any of the other alternatives.

Effects of Alternative D

Alternative D would have 34.1 miles of motorized routes (open and seasonally restricted) (**Table-4-76**) and would provide more motorized access than any of the other action alternatives. Motorized access under Alternative D would be about 47 percent less than under Alternative A, but 18 and 42 percent more than under Alternatives B and C, respectively.

Opportunities for ATV riders and hunters would be enhanced above all other alternatives through the addition of a yearlong ATV-Only route and a game retrieval route, respectively. Motorized users would also have more opportunities under Alternative D in the Lincoln and Stemple Pass area than under Alternatives B or C.

Allowing snowmobile access on closed routes would result in an increase in motorized winter opportunities compared to Alternatives B and C; however, cross-country snowmobile travel would be restricted to existing routes in the northwest portion of the TPA and Great Divide Ski Area during the season of use (12/2-5/15), similar to Alternative B. Snowmobile management would result in fewer dispersed opportunities for non-motorized winter user compared to Alternative C.

Restricting snowmobile access in the northwest portion of the TPA and Great Divide Ski Area would provide dispersed recreation opportunities and result in a decrease in winter use conflicts. These effects would be similar under Alternatives D and B, greater than under Alternative A, but less under Alternatives C.

The extent of management activities and costs under Alternative D would be mixed. Less personnel time would be required to monitor travel compliance than under Alternatives B and C, but more would be needed than under Alternative A. However, more effort would be required for initial implementation (signing designated routes, installing bulletin boards) than under the other action alternatives. Estimated costs for road/trail maintenance would be higher than under the other action alternatives, but less than under Alternative A.

Cumulative Effects on Travel Management and Access

Under all alternatives, there are a number of past, present, and reasonably foreseeable BLM and non-BLM actions and activities affecting travel management and access in the Lewis and Clark County NW TPA.

The majority of BLM-managed routes in the Lewis and Clark Northwest travel planning area is located in and around the town of Marysville, located approximately 25 miles northwest of Helena. Much of the use in the Ma-

rysville area (especially winter use) comes from Helena Valley residents. The Helena Valley has been experiencing steady population growth. This trend is expected to continue, along with increased recreational use of this travel planning area. These factors could lead to increased public pressure to accommodate either more, or less motorized use.

The remaining BLM managed routes are located in 3 sub-planning areas: Stemple Pass, Sieben Ranch, and Lincoln (west of the small town of Lincoln, Montana). There is some residential development adjacent to the Lincoln sub-planning area that could influence travel management as well.

The Marysville area is experiencing increased residential development, but to a lesser extent than the central Helena Valley area. Urbanization and increased recreational use may lead to increased social conflict; between area residents and recreation users, and among recreational users themselves (motorized/non-motorized). As a result, there may be increased public demands to alter the existing travel management to accommodate either more, or less motorized use.

Recreation use is well established in the TPA, especially for winter sports. Winter sport activities include: snowmobiling, downhill skiing, backcountry skiing, ski racing, snowboarding, and snowshoeing. An extensive network of roads and trails support a wide range of off-season activities, including: camping, hunting, target practice, hiking, jogging, horseback riding, mountain bike riding, and motorized use (motorcyclists, OHV riders, and 4-wheel drive enthusiasts). As recreation use grows, conflicts between non-motorized and motorized recreation users could lead to increased public demands for either more, or less motorized use.

The TPA (all land ownerships) includes a number of wildlife and aquatics/fisheries concerns. The western half of the TPA is a wildlife movement corridor between the Northern Continental Divide Ecosystem and the Greater Yellowstone Ecosystem, portions of the TPA are in the occupied range of grizzly bear range, and the entire TPA is within the former Northwest Montana Recovery Area for the gray wolf. Mule deer winter range is located along the eastern half of the TPA (158,140 acres) as well as near Lincoln (21,500 acres). Elk winter range is also located in the lower elevations along the eastern half of the TPA (193,800 acres) as well as around Lincoln (55,500 acres). Approximately 112,250 acres of cool, moist forest in the TPA provide habitat for the Canada lynx. Two BLM sensitive amphibians have been found within the Lewis and Clark County NW TPA, the boreal toad and the Northern leopard frog. Another BLM sensitive species, the wolverine, has also been documented west of the Continental Divide in the TPA. Over 66 fish-bearing streams are located in the Lewis and Clark County NW TPA with 61 providing habitat for westslope cutthroat trout, as well as for river

otter, beaver, and moose. Concerns could lead to demands to restrict motorized use.

The TPA contains a 3 mile long section of the Continental Divide Trail (road) that is currently shared by motorized vehicles and hikers. Rerouting the trail off this road would reduce use conflicts between motorized and non-motorized users.

In some site specific cases, visual resource management may affect or restrict new road construction.

Continuing residential development may lead to an increase in right-of-way permits to accommodate private property/development access. As a result, public access to BLM lands, via these rights-of-way, could increase as well.

Limits or reductions in the BLM's funding and ability to maintain designated routes could lead to an overall reduction of maintained motorized routes.

A variety of resource management projects, such as BLM initiated vegetation treatments, or wildland fire fuels reduction projects, could affect travel management. BLM forest management activities from 1984 to present include 48 acres of forest planting, 66 acres of timber salvage, and 132 acres of timber harvest. Future activities may include approximately 1,200 acres of forest and woodland treatment (thinning, selective harvest), although no planning is underway on these activities. Wildland fire management activities may include a future 1,500-3,000 acre mechanical and/or prescribed fire treatment for the Marysville area, focused on the urban interface areas. Depending on the type and scope of project, effects could vary from temporary, short-term area/route closures, to new opportunities (new routes) for motorized or non-motorized access.

Historical information indicates that since 1977, 3,357 claims have been active throughout the Marysville area. Today only 40 claims remain active, including the Bald Butte Mine, an open cut molybdenum mine. Increases in other mineral prices could lead to additional increased or renewed mining activity. Depending on the type and scope of mining activity, effects could vary from temporary, short-term area/route closures, to increased opportunities (new routes) for motorized or non-motorized access.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Motorized activities play a large role in the distribution of noxious weeds. Concerns over the spread of noxious weeds could influence travel management, and lead to fewer motorized opportunities.

Motorized use on dirt roads and trails is a major contributor to soil erosion and stream sedimentation. These concerns may influence travel management, and result in fewer motorized opportunities.

Most illegal activities (trash dumping, drug use, underage alcohol use, unattended camp fires, vandalism, etc.) are directly associated with motorized use. At present, illegal activities in this TPA pose less of an issue than for the Helena and East Helena TPAs. However, increased future motorized use activity is likely to lead to increased illegal activity, and could lead to fewer motorized opportunities.

For perspective, BLM managed lands represent approximately 4.2 percent of the total travel planning area (406,700 total acres, 17,037 BLM acres); while BLM managed routes represent approximately 4.7 percent of the total routes available (1,447.7 total miles, 67.6 miles BLM roads/trails). Future travel management (for all agencies, nationwide) is likely to lead to fewer opportunities for motorized recreational use than under current management (particularly for OHV use).

As a result, BLM routes available to motorized use (especially in the Marysville area) could experience increased use from displaced users, leading to more concentrated use, increased resource impacts, user conflicts, and pressure to reduce or increase motorized use.

Under Alternative A, overall increases in human population, urbanization, recreation use, user conflicts; and concerns for wildlife, fisheries, noxious weed spread, soil erosion/water quality, and illegal activities are likely to lead to increased demands to restrict motorized travel. Under Alternative B, these pressures would have less impact on travel management than under Alternatives A and D, due to the overall reduction in motorized opportunities and separation of motorized and non-motorized uses. Under Alternative C, these pressures would have the least impact on travel management than under the other alternatives, due to the reduction in motorized opportunities. Under Alternative D, these pressures may lead to increased demands to restrict motorized travel.

TRANSPORTATION FACILITIES

For the sake of this discussion, "open" roads include roads that are open yearlong as well as those that are open with seasonal restrictions.

Effects of Alternative A

Under Alternative A, the Lewis and Clark County NW TPA would have 64.2 miles of open roads and no motorized trails (**Table 4-77**). Estimated costs for annual maintenance and stabilization of roads under Alternative A would be much greater than under any of the action alternatives because of the highest level of open roads. Estimated annual costs for monitoring and compliance, and weed control would be higher for Alternative A than under the action alternatives.

Effects of Alternative B

Under Alternative B, the Lewis and Clark County NW TPA would have 28.1 miles of open roads and no motorized trails (**Table 4-77**).

Estimated costs for annual maintenance and stabilization of roads under Alternative B would be similar but slightly lower than under Alternative D, less than under Alternative A and more than under Alternative C. Estimated annual costs for monitoring, compliance, and weed control would also be less than under Alternative A, more than under Alternative C, and similar but slightly less than under Alternative D.

Closing the upper northwest portion of the Marysville area to motorized vehicles and to cross-country snowmobile travel would result in a slight increase in transportation facility costs for additional signage and sign maintenance.

Effects of Alternative C

Under Alternative C, the Lewis and Clark County NW TPA would have 19.7 miles of open roads and no motorized trails (**Table 4-77**). Estimated costs for annual maintenance and stabilization of roads under Alternative C would be the least of all the alternatives due to the least number of motorized routes. Estimated annual costs for monitoring, compliance and weed control would also be less than under the other alternatives.

Closing the entire northwest portion of the Marysville area to motorized vehicles and to cross-country snowmobile travel would result in a slight increase in transportation facility costs for additional signage and sign maintenance.

Effects of Alternative D

Under Alternative D, the Lewis and Clark County NW TPA would have 34.1 miles of open roads and one motorized trail (**Table 4-77**). Estimated costs for annual maintenance and periodic stabilization of roads under Alternative D would be greater than under Alternatives B and C, but less than under Alternative A. Alternative D is the only alternative with a motorized trail that would receive annual and periodic stabilization. Estimated annual costs for monitoring, compliance, and

weed control would be less under Alternative D than under Alternative A and more than under Alternatives B and C.

The addition of several routes in the Marysville area including an ATV-Only route and a game retrieval route would result in an increase in transportation facility costs due to new signage and sign maintenance.

Closing the northwest portion of the Marysville area to cross-country snowmobile travel would also result in an increase in transportation facility costs for additional signage and sign maintenance.

LANDS AND REALTY

Effects Common to All Alternatives

The Butte Field Office administers approximately 96 rights-of-way (ROW), 1 non-commercial occupancy lease, and 2 commercial occupancy leases within the boundaries of the Lewis and Clark TPA, which encumber approximately 1,961 acres of BLM land (**Table 4-78**). Various types of road rights-of-way are the most common type of grant, accounting for 46 percent, or just under half of the total. Other types of authorized uses include: oil and gas pipelines, lines for electrical distribution and telephone facilities, communication sites, ditches, railroads, and mineral material sites.

Type	Approximate Number	Approximate Acres
Roads	44	558
Power	17	101
Telephone	12	21
O&G Pipelines	4	59
Comm. Sites	8	4
2920 Leases	3	1,050
Other	11	168
Totals	99	1,961

Approximately four right-of-way applications for new facilities as well as amendments, assignments, renewals, or relinquishments of existing right-of-way grants are

Classification/Cost	Alt A	Alt B	Alt C	Alt D
Miles of Open/Restricted Roads	64.2	28.1	19.7	34.1
Motorized Trails	0	0	0	2.2
Annual Roads Maintenance	\$5,136	\$2,248	\$1,576	\$2,728
Annual Trails Maintenance	\$0	\$0	\$0	\$147
Periodic Road Stabilization	\$2,054	\$899	\$630	\$1,091
Periodic Trails Stabilization	\$0	\$0	\$0	\$29
Monitoring/Compliance	\$3,210	\$1,405	\$985	\$1,705
Weed Control	\$963	\$422	\$296	\$512

processed annually in the TPA. This would not vary by alternative.

The general trend of granting rights-of-way is expected to increase through the planning period as a result of increasing public demands. From a cumulative effects standpoint, development of adjacent federal, state, and private land, increased recreational use and the trend of homeownership away from urban areas, coupled with traditional on-going uses, are all expected to require more guaranteed access involving public land, including BLM lands.

SPECIAL DESIGNATIONS

Effects of the Alternatives

BLM currently manages a three-mile segment of the Continental Divide Scenic Trail in cooperation with the Forest Service in this TPA. This trail segment is subject to increasing impacts from numerous resource uses including motorized travel, rights-of ways, private home developments, and grazing improvements. Under Alternative A, current travel management direction is not providing protection of the trail corridor and user experience levels are impacted by conflicting intrusions. The Continental Divide Trail would continue to be managed for both motorized and non-motorized uses which would result in continued user conflicts.

Under Alternative B, travel management prescriptions would not remove motorized conflicts on the Continental Divide Scenic Trails as the trail would continue to follow an open motorized travel route. Under this alternative, alternate trail routes would be evaluated with the Forest Service to minimize conflicts, enhance hiker experiences, reduce human intrusions, and decrease the need for easement acquisitions.

Under Alternative C, effects would be similar to Alternative B although some additional secondary roads in close proximity to the Continental Divide Scenic Trails would be closed.

Under Alternative D, effects on the Continental Divide Trail would be similar to Alternative B although more intersecting secondary roads would remain open to public use and therefore motorized use conflicts would be slightly higher.

Cumulative Effects on Special Designations

No other past, present, or reasonably foreseeable future actions in the Lewis and Clark County NW TPA would adversely affect Special Designations.

BOULDER/JEFFERSON CITY TPA

The 60,418-acre Boulder/Jefferson City TPA contains approximately 14,487 acres of BLM lands. There are approximately 61 miles of BLM roads, making up about 15.6 percent of the approximate total of 392 road miles

in the TPA. The majority of roads (212 miles) lie on private lands.

AIR QUALITY

Effects Common to All Alternatives

Motorized recreation use is expected to continue to increase, resulting in higher levels of vehicle emissions.

Motorized travel across dry unpaved routes or trails would continue to produce airborne dust.

There could be areas with localized air pollution as a result of higher use numbers, and more concentrated use on fewer miles of available routes.

Drier climate conditions could make soils more susceptible to the effects of motorized travel, resulting in higher levels of airborne dust.

Impacts to air quality vary by alternative and travel plan area. In general, alternatives that reduce the level of motorized use (have fewer available miles) could have a positive impact on air quality; while alternatives that maintain or increase the level of motorized use, could lead to increased air quality impacts. This would not necessarily be a direct relationship, however, because reduction in available road miles for motorized use could redistribute use or focus more use on remaining open routes.

Under all alternatives, impacts from airborne dust could be reduced through mitigation such as hardening native surface roads with gravel or periodically spraying them with water trucks during the dry season. During BLM project work, in addition to watering native surface roadbeds, speed limits could be reduced to further minimize dust emissions.

Effects of the Alternatives

Under Alternative A (present management), adverse impacts to air quality would be expected to continue, and likely increase, concurrent with higher levels of motorized recreational use. Each of the proposed Action Alternatives, however, would provide fewer available motorized routes. Alternatives B and C would provide 52 percent and 61 percent fewer open motorized routes, respectively, than Alternative A, while Alternative D would provide 37 percent fewer routes than Alternative A. As a result, airborne dust and vehicle emissions would be taking place on fewer BLM routes and could be reduced.

It should be noted that even without motorized use, airborne dust, resulting from wind erosion of exposed native surface roads will continue. Therefore, travel plans with more miles of native surface roads will result in more airborne dust.

Under all alternatives, mitigation measures, such as graveling and/or watering native surface roads, could reduce dust emissions even further, and/or help offset

the effects of increased or concentrated use on the remaining open routes.

Cumulative Effects on Air Quality

Under all alternatives, the cumulative effects to air quality from travel management in the Boulder Jefferson City TPA would arise from a number of past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands.

For perspective, BLM managed lands in the Boulder Jefferson City TPA area represent approximately 24 percent of the total travel planning area (60,418 total acres; 14,487 BLM acres). Under present management (Alternative A) BLM managed routes represent approximately 15.4 percent, of the total routes available (392 total miles; 60.5 miles BLM roads/trails under Alternative A). Potential air quality impacts associated with activities on non-BLM lands and roads would be a greater contributor to cumulative effects to air quality than activities on BLM lands and roads.

In the past, prior to the 2003 Statewide OHV ROD, BLM management allowed unrestricted cross country travel by all forms of wheeled motorized use. Under present management, in the absence of other existing travel plan direction, all motorized wheeled travel is restricted to existing roads and trails. Under current management, all existing BLM routes are available for motorized use yearlong. This mileage available for use would be reduced under the action alternatives as described above with associated potential differences in effects to air quality.

Under all alternatives, cumulative increases in human population, urbanization, recreation use, user conflicts; and concerns for wildlife, noxious weed spread, soil erosion, air/water quality, and illegal activities may lead to increased demands to restrict motorized travel.

SOILS

Effects Common to All Alternatives

Road construction, use, and maintenance affect soils in a number of ways. Soils are often compacted by these activities. Soil compaction can lessen the amount of precipitation that can infiltrate into soil and increase runoff, erosion, and sedimentation – in turn decreasing soil/site stability and hydrologic function, as well as soil productivity and plant vigor and diversity.

Ground disturbance associated with road construction, use, and maintenance can result in erosion. Erosion affects soil/site stability and hydrologic function. Erosion and sedimentation can destabilize the surface and sub-surface cohesion of the soil, resulting in soil loss from erosion sites. Loss of soil can impede or prevent establishment and development of vegetation communities.

Closing or decommissioning roads often leads to beneficial effects to soils through decreased site disturbance

and re-establishment of vegetative cover on road surfaces. This tends to reduce soil erosion and stabilize soils. Decommissioning roads may in some cases entail ripping road surfaces to de-compact them, thus improving water infiltration, hydrologic function, and the ability of the treated area to revegetate more successfully.

Impacts to soils associated with site-specific travel plan alternatives were assessed based on the potential for soil erosion using the following erosion risk criteria:

- High – the area a route travels through has slopes greater than 30 percent gradient.
- Moderate – the area a route travels through has slopes ranging from 15 to 30 percent gradient; or, for granitic soils, slopes ranging from 0 to 30 percent gradient.
- Low – the area a route travels through has slopes ranging from zero to 15 percent gradient and soils are not granitic in origin.
- Unrated – road mapping not available at time of erosion impact rating.

Effects of the Alternatives

The distribution of road miles by erosion risk category and by proposed road management category for all alternatives is shown for the Boulder/Jefferson City TPA in **Table 4-79**. Roads in the “unrated” category were excluded from detailed consideration and are shown for the purpose of displaying the extent of lacking information.

The table shows that under current conditions (Alternative A) approximately 27.7 miles of BLM roads are located in areas with high erosion risk, and 23.1 miles are in moderate erosion areas. Soil erosion would be reduced under Alternative B because this alternative would reduce those mileages to 13.7 miles and 12 miles, respectively. Approximately 23.2 miles of road in the high and moderate classes would be closed under Alternative B. This should allow soil stabilization and/or vegetative recovery on these areas and further reduce soil erosion.

Soil erosion from roads would be reduced more under Alternative C than under any other alternative because the lowest mileage of roads in the high and moderate erosion risk categories would be left open (21.1 miles combined), while the greatest mileage in these categories would be closed (27.5 miles) of all alternatives.

Soil erosion associated with roads would be reduced under Alternative D compared to Alternative A, but would still be higher than under either Alternative B or C. This is because 34.9 miles of road in the moderate and high erosion risk categories combined would be open under Alternative D, while only about 11.8 miles in these categories would be closed under this alternative.

Proposed Road Management	Erosion Risk Category	Alternative A	Alternative B	Alternative C	Alternative D
Open Road Miles (including Open w/restrictions)	High	27.7	13.7	11.9	19.9
	Moderate	23.1	12.0	9.2	15.0
	Low	0.3	0.6	0.6	0.6
	Unrated	8.7	0.8	1.0	2.4
Closed Road Miles	High	0	12.6	14.3	6.3
	Moderate	0	10.6	13.2	5.5
	Low	0	0.7	0.7	0.7
	Unrated	0	7.1	6.7	7.3
Decommissioned Road Miles	High	0	1.4	1.4	1.4
	Moderate	0	0.6	0.6	0.6
	Low	0	0	0	0
	Unrated	0	0.7	0.7	0.7

Note: Open roads include seasonally open roads as well as roads open yearlong.

Cumulative Effects on Soils

Cumulative effects to soils in the Boulder/Jefferson City TPA would arise from many past, present, and foreseeable future actions on BLM lands as well as non-BLM lands. Within this 60,418-acre TPA, BLM lands make up 14,487 acres or 24 percent of lands. The approximately 60 miles of BLM roads make up about 15 percent of the approximately 392 road miles in the entire TPA. Therefore road-related effects to soils described by alternative above would affect about 15 percent of all roads in the TPA. Remaining roads are managed by Jefferson County, the Forest Service, state, and private landowners.

Reclamation of abandoned mine lands has contributed to improved revegetation and subsequent stabilization of soils at a number of locations throughout this TPA. Riparian areas along about 3.7 miles of High Ore Creek underwent removal of contaminated tailings and waste rock and subsequent revegetation in 1999-2000. Riparian areas along Big Limber Gulch (tributary to Cataract Creek) and Spring Creek (tributary to Prickly Pear Creek in Upper Missouri River watershed) have also undergone recent reclamation and revegetation work that has improved soil stability and reduced erosion.

Ongoing ground disturbing activity associated with mining for lead, zinc, gold, and silver from an open pit mine (Montana Tunnels Mine) near Jefferson City is likely to continue through approximately 2008. The permitted mine area is approximately 1,500 acres in size with 130 of those acres on BLM land. Varying degrees of soil stability exist at the site with some removal of topsoil, erosion, and compaction mixed with undisturbed, vegetated areas within the permitted boundary.

Approximately 2,051 acres of BLM lands are permitted for various rights-of-way and leases. Approximately 1,256 of these acres are for road rights-of-way. The remaining 795 acres are associated with powerlines, communication sites, and other utility facilities. Impacts to soils range from compaction and occupation of ground with buildings and facilities to revegetation and ground cover being re-established to stabilize soils. Of this total area, approximately 682 acres are associated with powerlines and have substantial vegetative ground cover over much of the ground to stabilize soils.

Selective timber harvest has occurred on approximately 259 acres of BLM lands in the TPA from 1984 to 1995. From 1995 to the present timber harvest occurred on 7 BLM acres while post-wildland fire timber salvage occurred on about 559 BLM acres as well as an unknown amount of private land. These activities have generally had relatively minor adverse effects on soils causing some localized erosion and compaction but generally allowing for revegetation post-timber harvest. Timber harvest has also occurred on private and Forest Service lands, will likely continue, and will have localized impacts on soils for the foreseeable future.

In 2000, a wildland fire burned approximately 10,800 acres in this TPA, approximately 4,670 of which were BLM lands. The fire burned with variable severity creating a mosaic of effects to soils. More severely burned areas underwent more severe erosion than areas burned less severely. Fire rehabilitation activities such as re-seeding with grasses/herbaceous species, waterbarring of firelines, and post-fire noxious weed treatments helped minimize soil loss due to post-fire erosion. Tree planting on approximately 690 BLM acres of this burned area have contributed to longer term soil stabilization.

Deliberate fuels treatments conducted on private and Forest Service lands will also likely occur for the foreseeable future with variable effects to soils. Reducing fuels under the controlled conditions of deliberate treatments may benefit soils in the long-term by reducing the risk of high severity fires in treated areas.

Livestock grazing on public and private lands throughout much of the TPA has created areas of localized soil erosion and compaction throughout the TPA. This will continue to occur for the foreseeable future.

Increasing residential development will likely continue for the foreseeable future. Erosion, compaction, and covering of soils would occur due to additional road construction, clearing/leveling for home sites, and establishment of utility infrastructure for residential developments.

Under Alternative A, the contribution to cumulative effects on soils from BLM road management would continue as it occurs today. Retaining approximately 60 miles of road open yearlong would allow for the same level of compaction and erosion impacts that currently exist.

From a BLM road management perspective, all action alternatives would benefit soil resources compared to Alternative A. Alternative B would provide for a reduced contribution to adverse cumulative effects on soils than would Alternative A because about 55 percent of BLM roads would be closed or decommissioned under Alternative B. Of the remaining approximately 27 miles of open road, most of them (about 23 miles) would be seasonally restricted to exclude motorized vehicle use between 12/2 to 5/15 each year. This would prevent motorized use during the wet spring snowmelt/runoff period and would therefore reduce erosion from BLM roads.

Alternative C would provide for the least contribution to adverse cumulative effects on soils of all alternatives. This alternative would provide for closure or decommissioning of about 62 percent of BLM roads in the TPA, thus allowing these areas to vegetatively recover and stabilize soils. The majority of open roads under this alternative (approximately 20 out of 23 miles) would be seasonally restricted to exclude motorized use between 12/2 to 5/15 each year. As with Alternative B, this seasonal closure would prevent motorized use during the wet spring snowmelt/runoff period and would therefore reduce soil erosion.

Alternative D would provide for the greatest contribution to adverse cumulative effects on soils of the action alternatives, but would still provide for greater long-term benefits to soils than Alternative A. Alternative D would provide for closure or decommissioning (and therefore vegetative recovery and soil stabilization) of about 40 percent of BLM roads in the TPA. As with Alternatives B and C, the majority of open BLM roads (about 33 out of 38 miles) would be seasonally restricted to exclude motorized use between 12/2 to 5/15 each year. This

would allow for the same types of beneficial effects to soils described above for Alternatives B and C.

Due to the scattered distribution and relatively small proportion of BLM lands (24 percent) and roads (15 percent) relative to the total quantities of lands and roads in the TPA, none of the BLM alternatives would substantially contribute to cumulative effects on soils at the scale of the Boulder/Jefferson City TPA.

WATER RESOURCES

Effects Common to All Alternatives

There are a number of key concepts that are critical to understanding road effects to water resources.

Hydrologic function is an interaction between soil, water, and vegetation and reflects the capacity of a site to:

- Capture, store, and safely release water from rainfall, runoff, and snowmelt;
- Resist a reduction in this capacity; and
- Recover this capacity following degradation.

Interception of precipitation results when precipitation falls on vegetation. When vegetation is removed, precipitation falls directly on the soil. This can increase surface erosion and sedimentation, and decrease the amount of time between initial precipitation arrival and peak surface runoff – in turn decreasing soil/site stability and hydrologic function. Roads remove vegetation and therefore decrease interception of precipitation.

Infiltration is the process of precipitation entering and traveling through soil. Infiltration reduces the peak runoff during precipitation events by extending the period of runoff after a precipitation event. Infiltration also filters precipitation and reduces erosion and sedimentation. If infiltration is reduced, runoff and erosion will increase and hydrologic function will decrease. Generally, roads are compacted surfaces that have decreased infiltration, thus increasing runoff and potentially increasing erosion.

Runoff can affect the amount of erosion and sedimentation, as well as flooding – both onsite and offsite. If runoff is increased, all of these effects can increase with a result that water quality and hydrologic function will decrease.

Increased sediment entering waterbodies increases turbidity, increases width-to-depth ratios, and consequently increases temperature and dissolved oxygen saturation levels, and creates adverse habitat for aquatic animals and plants.

Alteration of flow routing can also affect water resources. For example, roadcuts into areas with relatively shallow groundwater can intercept groundwater, bring it to the surface, and transport it some distance (i.e. in a roadside ditch) before delivering it to a stream. This can lead to erosion of road ditchlines and subsequent sedimentation of streams during runoff periods, or increased

thermal loading of water before delivery to a stream during summer periods.

Closure and decommissioning of roads tend to reduce erosion and sedimentation effects stemming from roads on water quality. On an equivalent road mile basis, decommissioning roads would benefit water quality to a greater degree than closing roads because the decommissioning process would often entail implementing measures to restore hydrologic function. During road decommissioning items such as compaction, drainage, stream crossing culverts, and ground cover are often addressed in a manner that markedly improves hydrologic function. These features are not fully addressed on roads that are merely “closed”. However, the reduced disturbance on newly closed roads combined with the tendency for revegetation to re-establish ground cover on them would reduce erosion and subsequent sedimentation effects to water quality.

Effects of the Alternatives

Generally, road density is an indicator of overall watershed health and function. Watersheds with higher road densities tend to have lower water quality due to greater disruption of hydrologic function (described above), and potential for erosion and subsequent sedimentation. Road density also is related to the distribution and spread of noxious weeds. **Table 4-80** shows acres of BLM land in three road density categories by alternative for the Boulder/Jefferson City TPA. These data reflect any differences between alternatives based on roads proposed for “decommissioning” by alternative. While many “closed” roads would gradually contribute to increased hydrologic function over time, decommissioned roads would more directly contribute to hydrologic function because measures aimed at restoring hydrologic function would likely be part of the treatment during decommissioning.

Alternative A would have the greatest amount of BLM land with “high” road densities of greater than 2 mi/mi². Alternatives B, C, and D would all have the same acreage in each road density category, reflecting that each of these alternatives provides for the same mileage (2.7 miles) of road decommissioning. By this measure, each of the action alternatives would benefit hydrologic

TPA Alternative	Road Density Category		
	Low (<1 mi/mi ²)	Moderate (1 to 2 mi/mi ²)	High (> 2 mi/mi ²)
Alt. A	472	2,353	11,662
Alt. B	863	2,377	11,247
Alt. C	863	2,377	11,247
Alt. D	863	2,377	11,247

function equally. All action alternatives would improve hydrologic function compared to Alternative A.

Motorized routes within 300 feet of streams generally have greater potential to directly impact water quality through erosion and sedimentation, increased water temperatures (due to loss of shading vegetation), and direct alteration of stream channel morphology than those farther away. **Table 4-81** shows the miles of open and closed roads on BLM lands within 300 feet of streams by alternative. Under Alternative A there are about 2.5 miles of open road within 300 feet of fish bearing streams and 7.7 road miles within 300 feet of perennial non-fish bearing streams. Alternatives B and C would improve water quality to the same degree by closing or decommissioning the same mileage of roads in close proximity to perennial streams (total of 3.7 miles).

Alternative D would close or decommission 2.9 road miles in these areas and would therefore have greater improvements to water resources than Alternative A, but fewer improvements than Alternatives B and C. Each action alternative would improve water resources to some degree compared to Alternative A.

Cumulative Effects on Water Resources

Cumulative effects to water resources in the Boulder/Jefferson City TPA would arise from many past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands. Within this 60,418-acre TPA, BLM lands make up 14,487 acres or 24 percent of lands. The approximately 60 miles of BLM roads make up about 15 percent of the approx-

	Perennial Fish-Bearing Streams		Perennial Non-Fish-Bearing Streams	
	# Open Road Miles	# Closed Road Miles	# Open Road Miles	# Closed Road Miles
Alt. A	2.5	0	7.7	0
Alt. B	2.0	0.5	4.5	3.2
Alt. C	2.0	0.5	4.5	3.2
Alt. D	2.0	0.5	5.3	2.4

Note: Open roads include seasonally open roads as well as roads open yearlong. Closed roads include decommissioned roads.

imately 392 road miles in the entire TPA. Therefore road-related effects to water resources described by alternative would be related to about 15 percent of all roads in the TPA. There are about 32 miles of fish bearing stream and an additional 81 miles of perennial non-fish bearing stream in the TPA. On BLM lands there are about 4 miles of fish bearing stream and an additional 13.5 miles of perennial non-fish bearing stream. The majority of lands and roads (about 50 percent of each) within the TPA boundary are private property. Remaining roads are managed by Jefferson County, the Forest Service, state, and private landowners.

Some of the main access roads (non-BLM) follow valley bottoms and parallel streams. Many of these roads are directly affecting stream channel or floodplain function by filling or impinging on stream channels or floodplains, precluding the presence of riparian vegetation (including large woody material in forested locations), producing sedimentation in streams (from road surfaces, ditchlines, winter "road sanding" operations) and potentially increasing thermal loading by lessening streamside shade. These effects are dominant in shaping stream channel and water quality conditions in many areas and will continue into the foreseeable future.

Reclamation of abandoned mine lands has contributed to improved water quality at a number of locations throughout this TPA. Riparian areas along about 3.7 miles of High Ore Creek underwent removal of contaminated tailings and waste rock and subsequent revegetation in 1999-2000. Big Limber Gulch (tributary to Cataract Creek) and Spring Creek (tributary to Prickly Pear Creek in Upper Missouri River watershed) have also undergone recent reclamation to reduce heavy metal contamination from mine waste dumps and a smelter site near the community of Wickes. Another site near Wickes is also being reclaimed to address potential acid mine drainage that could lead to heavy metal and other water quality concerns.

Ongoing ground disturbing activity associated with mining for lead, zinc, gold, and silver from an open pit mine (Montana Tunnels Mine) near Jefferson City is likely to continue through approximately 2008. The permitted mine is approximately 1,500 acres in size with 130 of those acres on BLM land. This mine is likely to be expanded in the near future in a manner that will eliminate approximately 0.5 mile of fish-bearing aquatic habitat in Clancy Creek.

Approximately 2,051 acres of BLM lands are permitted for various rights-of-way and leases. Approximately 1,256 of these acres are for road rights-of-way. The remaining 795 acres are associated with powerlines, communication sites, and other utility facilities. Of these acres, approximately 682 acres are associated with powerlines and have substantial vegetative ground cover over most areas to prevent erosion/sedimentation effects to water resources. Impacts to water resources are generally minor with some localized erosion and sedimenta-

tion and some contribution to decreased hydrologic function (decreased infiltration, increased runoff) due to compaction.

Selective timber harvest has occurred on approximately 259 acres of BLM lands in the TPA from 1984 to 1995. From 1995 to the present timber harvest occurred on 7 BLM acres while post-wildland fire timber salvage occurred on about 559 BLM acres as well as an unknown amount of private land. Adverse effects on water resources were minor from this activity. Timber harvest has also occurred on private and Forest Service lands and will likely continue to have variable effects on water resources for the foreseeable future. Ground disturbance from these activities will have localized impacts to water resources including some sedimentation, loss of woody material recruitment for streams, and potential water temperature increases due to shade loss.

In 2000, a wildland fire burned approximately 10,800 acres in this TPA, approximately 4,670 of which were BLM lands. Tree planting on approximately 690 BLM acres of this burned area have contributed to longer term soil stabilization. The fire burned with variable intensity and severity creating a range of effects to water resources. In burned areas, nutrient inputs to streams increased, perhaps for several years. Streams in more severely burned areas underwent more severe erosion and sedimentation than those in areas burned less severely. Water temperatures in some streams may have increased due to loss of stream-side shade from the fires. Wood recruitment to streams in areas of high burn intensity may be increasing due to riparian tree mortality from fires. Stream flows may increase in some streams for several years. Peak flows may increase due to reduced snow interception by vegetation resulting in greater snow accumulations available for snowmelt in warmer periods. Summer flows may increase due a lack of live vegetation to conduct evapotranspiration of water so more groundwater may reach stream channels. Fire rehabilitation activities such as reseeding burnt ground with grasses/herbaceous species, waterbarring of firelines, and post-fire noxious weed treatments helped stabilize soils and minimize sedimentation effects to streams due to post-fire erosion. Tree planting on approximately 690 BLM acres of this burned area have contributed to longer term soil stabilization and subsequent reduction of stream sedimentation.

Fuels treatments conducted on private and Forest Service lands will likely occur for the foreseeable future with variable effects to soils. Reducing fuels under the controlled conditions of deliberate treatments may benefit water resources in the long-term by reducing the risk of high severity fires that could have severe adverse water quality effects in treated areas.

Increasing residential development will likely continue for the foreseeable future to variable degrees within the TPA. Erosion, soil compaction, and runoff would likely increase due to additional road construction, clear-

ing/leveling for home sites, and establishment of utility infrastructure for residential developments. Nutrient, chemical pollutant, and pathogen inputs to streams would also likely increase due to leaching from septic systems, urban runoff (fertilizer, chemicals, and petroleum pollutants), and waste from livestock.

Livestock grazing on public and private lands throughout much of the Boulder/Jefferson City TPA has created areas of localized streambank trampling, soil erosion and compaction, and nutrient inputs to streams. In severe cases stream channel morphology may be altered due to severe loss of riparian vegetation, loss of streambank integrity, channel widening and shallowing, and substantial sediment inputs. These effects to water quality will continue to occur for the foreseeable future.

Several streams listed as impaired by MDEQ flow through BLM lands in this TPA. Boulder River (0.9 mile on BLM lands) is affected by heavy metal contamination due to acid mine drainage and abandoned mine lands, as well as direct habitat alteration due to highways, bridges, and impacts from historic mining. Big Limber Gulch (1.6 miles on BLM) is still listed as impaired due to heavy metal contamination from acid mine drainage and abandoned mine lands. High Ore Creek (2.1 miles on BLM) remains listed as impaired for heavy metal contamination, sedimentation, alteration of aquatic habitat, water temperature, and total suspended solids impairments. Probable causes of impairments include acid mine drainage, abandoned mine lands, rangeland grazing, roads (most notably a non-BLM valley bottom road), and timber harvest. Cataract Creek (0.4 mile on BLM) is impaired by heavy metal contamination from acid mine drainage and abandoned mine lands. Clancy Creek (0.2 mile on BLM) is impaired by aquatic habitat alteration, sedimentation, and heavy metal contamination. Probable causes of impairments include abandoned mine lands, acid mine drainage, animal feeding operations, riparian grazing, and road impacts (a non-BLM valley bottom road). These impairments will continue for the foreseeable future. In the case of each of these impaired streams, BLM roads are not located in such a manner and are not a great enough proportion of ongoing activities as to play a substantial role in affecting water resource conditions. In each case where roads are listed as probable causes of impairment, there is a non-BLM valley bottom road paralleling the stream.

Under Alternative A for the Boulder/Jefferson City TPA, the contribution to cumulative effects on water resources from BLM road management would continue as it occurs today. Retaining approximately 60 miles of road open yearlong would allow for the same level of effects to water resources that currently exists.

From a BLM road management perspective, all action alternatives would benefit water resources compared to Alternative A. Alternative B would benefit water resources by providing for a reduced contribution to adverse cumulative effects than would Alternative A be-

cause about 55 percent of BLM roads would be closed or decommissioned under Alternative B. Of the approximately 27 miles of open road under Alternative B, most of them (23 miles) would be seasonally restricted to exclude motorized vehicle use in the wet spring runoff period each year. This would reduce erosion from these roads and further benefit water resources.

Although the action alternatives provide for the same degree of road decommissioning overall and road closure/decommissioning within 300 feet of streams, Alternative C would provide for the least contribution to adverse cumulative effects (greatest benefits) on water resources of all alternatives. This alternative would provide for closure or decommissioning of about 62 percent of BLM roads in the TPA, thus allowing these areas to vegetatively recover, stabilize soils, and reduce erosional outputs to streams. The majority of open roads under this alternative (approximately 20 out of 23 miles) would be seasonally restricted to exclude motorized use between 12/2 to 5/15 each year. As with Alternative B, this seasonal closure would prevent motorized use during the wet spring snowmelt/runoff period and would therefore reduce soil erosion and subsequent sedimentation effects to streams.

Of the action alternatives, Alternative D would provide for the greatest contribution to adverse cumulative effects on water resources, but would still provide for greater long-term benefits than Alternative A. Alternative D would provide for closure or decommissioning of about 40 percent of BLM roads in the TPA. As with Alternatives B and C, the majority of open BLM roads (about 33 out of 38 miles) would be seasonally restricted to exclude motorized use between 12/2 to 5/15 each year. This would allow for the same type of beneficial effects to soils described above for Alternatives B and C though to a slightly lesser degree because more roads would remain open under Alternative D.

Due to the scattered distribution and relatively small proportion of BLM lands (24 percent) and roads (15 percent) relative to the total quantities of land and roads in the TPA, none of the BLM alternatives would substantially contribute to cumulative effects on water resources in the Boulder/Jefferson City TPA.

VEGETATIVE COMMUNITIES – FOREST RESOURCES AND FOREST AND WOODLAND PRODUCTS

Effects of the Alternatives

Under all alternatives, existing roads and roads built to access timber and forest product sales on BLM lands may encourage timber harvest and forest product sales on adjacent lands, particularly where landowners and other agencies are looking to improve economic efficiency or opportunities in the management on their lands.

In general, vegetative treatment contractors tend to bid more readily on projects in areas with vehicle access or valuable products. BLM often prioritizes forest vegetation management activities such as forest products and forest protection activities (e.g. wildfire suppression and forest insect and disease control) in similar areas.

Rehabilitation of roads (decommissioning and in some cases road closure) would revegetate currently unvegetated roadbeds, which would increase vegetation biomass production on the landscape through colonization of sites with grasses, forbs, shrubs, and trees. Increases in revegetated area would occur at a rate of approximately 1.5 to 3 acres per mile of rehabilitated road. Eventually rehabilitated roads would support plant communities consistent with site potentials which would help resist weed invasions. However, road closures and removals could make vegetation management treatments more difficult and costly, thereby inhibiting proposed treatments, reducing public access for product use and removal, and potentially slowing fire detection and suppression.

Under Alternative A there would be no increase in project analysis and implementation costs. However, under Alternative B approximately 55 percent of BLM roads would be closed. Under Alternative C about 61 percent of roads would be closed, while under Alternative D about 38 percent of these roads would be closed. These closures would result in commensurate potential increases in vegetative analysis and treatment costs by alternative. These potential cost increases would be considered on a case by case basis by the BLM during project feasibility determinations, and additional funding may be needed to analyze and implement the projects that would remain feasible. Road closures could also result in potential decreases in quantities of forest products removed. Temporary roads have been commonly built in the Boulder/Jefferson TPA to access forest treatment areas and probably will continue to be used in the future. In the Boulder/Jefferson TPA forest product values are typically low, contributing to reduced feasibility of some projects in areas with closed roads. The extent of the effects described above would be minimized because BLM would likely still be able to plan and implement projects in many areas on closed roads through the variance process for temporary road use. Road-related effects would be greatest under Alternative C, followed in sequence by Alternative B, then Alternative D.

Roaded access to forested areas would also affect the gathering of firewood and other forest products by the general public. Most public parties prefer to drive close to areas of product removal so they do not have to carry products over long distances to their vehicles. Alternative A would have the greatest opportunity for firewood and other product removal with 60.5 miles of BLM road open yearlong. Alternative B would provide fewer opportunities than Alternative A with 27.3 miles of open

road. Alternative C would provide the fewest opportunities of all alternatives with 23.5 miles of open road. Alternative D (38.1 open road miles) would provide more opportunities than Alternatives B and C, but fewer than Alternative A. Winter seasonal closures on many roads (closed 12/2-5/15) could affect firewood and Christmas tree harvest in the Boulder/Jefferson TPA under the action alternatives. Alternatives B, C, and D contain winter closures that affect from one third (20.6 miles) to more than one half (34.2 miles) of total open BLM roads in the TPA. For the Boulder/Jefferson City TPA, Alternative A would retain the most public opportunities for these activities, followed in sequence of decreasing opportunities by Alternative D, Alternative B, and then Alternative C.

Cumulative Effects on Forest and Woodland Resources and Products

Forested vegetation in the Boulder/Jefferson TPA was greatly impacted by a large wildfire during the summer of 2000. The resulting forest condition includes widespread tree mortality with burned understory vegetation on 32 percent of BLM lands within the TPA. In the BLM burned area, 690 acres were salvage logged, followed by restoration tree planting. Adjacent areas of private ownership were also salvage logged following the wildfire. Since 1984, timber harvest has also occurred on 266 acres of green forest. These activities resulted in the removal of forest products and the associated forest restoration, resulting in open stands with more diverse understories. Approximately 500 forested acres have also been prescribe burned, resulting in some tree mortality, short-term erosion, and more open stand conditions in forested areas. Current planning includes additional treatment of 650 acres in the Boulder/Jefferson TPA.

Currently, western spruce budworm and Douglas-fir beetle are present in forests within the Boulder/Jefferson TPA. These insects have been present at similar levels in the past and are expected to remain in the future. These species can reduce forest health and individual tree vigor, sometimes resulting in mortality. Because 32 percent of BLM land in the TPA was burned with 690 acres subsequently replanted, many stands in the central portion of the TPA are in early successional stages and therefore are not at risk for insect infestation. Differences between travel planning alternatives would be negligible in regard to effects on or from the insect populations.

Road decommissioning (2.7 road miles) and associated rehabilitation proposed under all action alternatives would not have major cumulative effects on forest resources or forest products in the Boulder/Jefferson TPA. Approximately 6 acres of road could be colonized by trees under the action alternatives, while no roads would be decommissioned under Alternative A.

Forested vegetation in the Boulder/Jefferson TPA will also be affected by approximately 2,051 acres of rights-of-way and leases on BLM land. Large trees in these areas will generally be harvested for product to accommodate the necessary access or facilities. Forest vegetation removal would occur on new authorizations in the future and would occur as necessary to maintain sight distances and safety clearances associated with roads and facilities.

Urbanization is expected to continue on the 31,705 acres of private land (52 percent of all lands) within the Boulder/Jefferson TPA. Forest products are commonly removed from these areas prior to permanent construction. Urbanization is likely to continue in the future and will affect forested vegetation at an unknown rate. Due to the preponderance of private lands in the TPA, urbanization and activities on open roads in the vicinity may have more cumulative effects on forested vegetation in the TPA than BLM decisions regarding miles of open and closed road.

Risk to forests from human-caused wildfires is commonly associated with open roads. Risk to forests from wildfire is greatest under Alternative A with 60.5 miles of road open during the summer (and yearlong). Alternative B would have less risk of human-caused fire starts with 27.3 miles of road open during summer. Alternative C would have the least risk to forests with only 23.5 miles of road open during summer months. Alternative D (38.1 miles of open road during summer) would have more risk than either Alternatives B or C, but less risk than Alternative A. Since a high percentage of the forested acreage in the central portion of this TPA has already burned, fewer acres are anticipated to be affected by wildfire in the foreseeable future. Given that the majority of roads in the TPA (84.6 percent) are non-BLM roads, this contribution to reduced fire risk from BLM roads in the action alternatives is relatively small in the context of the entire TPA.

Since BLM roads constitute only 15.4 percent of all roads in this TPA, and BLM lands make up only 24 percent of all lands in the TPA, urbanization and activities on open non-BLM roads in the vicinity may have more cumulative effects on forested vegetation in the TPA than BLM decisions regarding miles of open and closed road.

VEGETATIVE COMMUNITIES -NOXIOUS WEEDS

Under all alternatives, any snowmobile use would have negligible effects on noxious weed spread and populations. Invasive noxious weeds and non-native species are degrading wildland health. These are aggressive plants that can outcompete many native plants, as they have few natural enemies to keep them from dominating an ecosystem. These plant species are spread by many means. However, any land disturbing activity in the TPA has the most potential to introduce and spread weed spe-

cies. Motorized vehicles are one vector for noxious weed spread as weed seed becomes attached to vehicles and their tires, and are transported from one area to another where seeds become detached and germinate to inhabit new areas.

Effects of Alternative A

Under Alternative A all BLM managed routes in the Boulder/Jefferson City TPA would continue to be managed as open yearlong (60.5 miles, 0 miles seasonally restricted or closed). No non-motorized routes or trails are available under this alternative. Snowmobile use would continue to be managed as open to area-wide cross country travel as well as travel on all existing routes (during the season of use, 12/2-5/15, conditions permitting). Alternative A would have the most roads open and in turn would promote the greatest amount of weeds and other undesirable plant spread and production. More herbicide control would be needed to control weeds in Alternative A than the other alternatives. Under Alternative A the open BLM roads would represent about 15.4 percent of all open roads in the Boulder/Jefferson City TPA.

Effects of Alternative B

Under Alternative B, 28.8 miles of routes would be available for wheeled motorized use (3.7 miles open yearlong, 25.1 miles seasonally restricted). Closure and decommissioning of routes in the southwest corner of the TPA would help create a non-motorized use area and reduce weed spread related to motorized use. This alternative would close 29.0 miles of road leaving 3.7 miles open yearlong as compared to 60.5 miles of road open yearlong for Alternative A. This would prevent weed spread caused by motorized vehicles on these closed routes, but would increase weed spread on the open routes because of the more concentrated use of these routes. Overall Alternative B would reduce weed spread, but would increase weed treatment costs per road mile on the remaining open roads compared to Alternative A. Under Alternative B, the 28.8 open road miles (including seasonally restricted routes) would make up about 7 percent of all open roads in the Boulder/Jefferson City TPA.

Effects of Alternative C

Under Alternative C, 23.5 miles of routes would be available for wheeled motorized use (3.0 miles open yearlong, 20.5 miles seasonally restricted). Closure and decommissioning of routes in the southwest corner of the TPA would help create a non-motorized use area and reduce weed spread related to motorized use in this area. This alternative would close 34.2 miles of road leaving 3.0 miles open yearlong as compared to 60.5 miles of road open yearlong for Alternative A. This would prevent weed spread caused by motorized vehicles on these closed routes, but would increase spread on the open routes because of the more concentrated use of these

routes. Overall Alternative C would reduce weed spread more than any other alternative, but would increase weed treatment costs per road mile on the remaining open road miles compared to Alternative A. Under Alternative C the 23.5 miles of open BLM road would make up about 6 percent of all open roads in the TPA.

Effects of Alternative D

Under Alternative D, 38.1 miles of routes would be available for wheeled motorized use (5.3 miles open yearlong, 20.5 miles seasonally restricted). This alternative would close 20.6 miles of road leaving 5.3 miles open yearlong as compared to 60.5 miles of road open yearlong for Alternative A. This would prevent weed spread caused by motorized vehicles on the closed routes, but would increase spread on the open routes because of the more concentrated use of these routes. Over Alternative D would reduce weed spread more than Alternative A but less than Alternatives B and C, but would increase weed treatment costs per road miles on the remaining open roads miles compared to Alternative A. Under Alternative D, the 38.1 miles of open BLM road would make up about 9.7 percent of all open road miles in the Boulder/Jefferson TPA.

Cumulative Effects on Noxious Weeds

Under all alternatives, other past, present and reasonably foreseeable future BLM and non-BLM actions affect noxious weeds.

Recreational activities for this TPA include big game hunting, motorized OHV travel (motorcycles, ATVs, snowmobiles), and to a lesser extent, non-motorized uses (hiking, horseback riding, and mountain biking). Motorized recreation uses are one of the leading causes of introduction and spread of noxious weeds and non native species. Weed seeds are transported by many recreational vectors i.e. motorized vehicles including their tires, non-motorized vehicles including their tires, pack animals, and humans. Applications for right-of-way permits on public lands to access private property or for commercial development are likely to increase in the future as urban development increases. As a result, soil disturbing activities (i.e. roads, powerlines, telephone lines, etc.), will likely increase, causing weeds to increase.

A variety of resource management projects, such as BLM initiated vegetation treatments, or wildland fire fuel reduction projects, could affect the TPA. There have been no fuels treatments in this area in the last 10 years and there are none planned on BLM lands for the foreseeable future. Any project creating soil disturbance has the capability to increase weedy plant species. Prescribed burning projects give the ground surface a fertilization effect and eliminate some plant competition for weedy species giving them a niche for establishment and expansion in some areas. Ground disturbing equipment could also transport noxious weed seed to these project sites. BLM implements weed control measures in the

aftermath of such ground-disturbing activities so as to minimize noxious weed spread.

Wildland fires create good seed beds and supply nutrients for weed species introduction and production. From 1981 to 2004 there has been one wildland fire (the 2000 High Ore Fire) that burned approximately 4,600 acres of BLM land. This fire has promoted and increased noxious weed production in this TPA. BLM implemented weed control measures as part of the fire rehabilitation work associated with this fire.

The TPA has a rich history of mining for lead, zinc, gold, copper, and silver. With the exception of the Montana Tunnels Mine, the remaining mines are no longer active; many have been reclaimed by either the BLM or state of Montana. The Montana Tunnels Mine continues to produce lead and zinc with associated gold and silver from an open pit. The mine is located near Jefferson City, and is approx. 1,500 acres in size (including 130 acres of BLM land). Increases in mineral prices could lead to additional increased or renewed mining activity. Mining is a land disturbing activity and the activity itself and weed seed contaminated equipment that is used could promote weeds in the area. Abandoned mine reclamation work conducted by BLM can also contribute to increased weed spread. BLM implements weed control measures associated with these projects to minimize this impact.

Noxious weeds and non-native invasive species are well established and spreading in the area. Weed control activities by BLM and other entities, while often effective at reducing or minimizing weed spread and weed populations, can also lead to some weed spread. Herbicide spray equipment is driven through weed infestations and weed seeds as well as other weed vegetative parts are spread to other lands during and following treatment. The High Ore Wildfire area received ground and aerial herbicide treatments of about 300 to 400 acres in size following the fire. In recent years, treatments using herbicide (ground) and biological controls have been accomplished on approximately 250 acres. These weed treatments have varying success in killing undesirable plants, depending on many environmental parameters. Timber sales have built-in stipulations for mitigating weed production and spread. However, with ground disturbance the potential exists for weed introduction to occur on these sites. Since 1995 there have been 559 acres of timber salvage and 7 acres of timber harvest and 690 acres of forest planting (replanted in 2002). Vehicular access for tree plantings could contribute to the spread of existing weeds on site. Herbicide treatment of existing weeds is coordinated with tree seedling planting locations and timing, so as to minimize potential exacerbation of weed spread.

Future travel management (for all agencies, nationwide) is likely to lead to fewer opportunities for motorized recreational use than under current management (particularly for OHV use). As a result, BLM routes available

to motorized use could experience increased use from displaced users, leading to more concentrated use, increased resource impacts, and user conflicts.

The TPA mainly provides habitat for big game. The entire area is considered winter range for elk while the lower elevations along the eastern half of the travel plan are winter range for mule deer. Noxious weed seeds are transported and spread by wildlife through their digestive system and by attaching to the animals themselves and then being released at a later time.

Livestock grazing on and off BLM lands also contributes to weed spread either through seed being spread or introduced by livestock themselves, or through vehicular uses needed to manage grazing operations.

The Boulder-Jefferson City TPA is located adjacent to the upper Boulder Valley. Human population growth for the upper Boulder Valley (Boulder town statistics) is approximately 2 percent per year. This rate of growth is expected to continue, along with increased recreational use from local residents and area users (residents of Helena and Butte). The increasing population in the Butte and Helena area will in turn lead to an increase in use of this TPA creating more opportunities for weed spread and production.

The small towns of Boulder (population 1,436) and Jefferson City (population 295) are located adjacent to the TPA. The present rate of growth is approximately 2 percent per year, but could increase as Helena Valley area development begins to branch out. The residential development between Jefferson City and Boulder is increasing. Use of the TPA by the residents living adjacent to or within this area will lead to an increase in weed spread and propagation.

About 15.4 percent of all the travel routes in the Boulder/Jefferson City TPA are located on BLM managed lands (under Alternative A). Lands near roads and away from roads in the TPA are infested with weeds. The travel on these roads is spreading weeds and weeds off these roads are being spread by the weed plants themselves and other natural means. Because the majority of roads (85 percent) and lands (76 percent) in the TPA are non-BLM, activities in these areas play a stronger role than activities on BLM lands in determining the status of weed spread and weed populations overall at the scale of the entire TPA.

VEGETATIVE COMMUNITIES -RIPARIAN VEGETATION

Effects Common to All Alternatives

This section focuses on effects to riparian vegetation. For additional discussion of effects to water quality and stream channels, see the Water Resources and Fish sections.

Roads in riparian areas constitute ground disturbance that can eliminate or preclude presence of native riparian vegetation. This ground disturbance and loss of riparian vegetation may facilitate erosion and sedimentation of streams. Roads may also interfere with natural stream channel functions by occupying floodplains or active stream channel margins (see Water Resources section for more discussion). Noxious weeds may dominate riparian vegetation communities after some type of disturbance (such as roads, livestock grazing, mining, etc.) has reduced native vegetation. Noxious weed seed can be spread into riparian areas by motor vehicles via open roads. Closure of roads and trails can improve or maintain riparian condition by reducing avenues of noxious weed spread, as well as allowing for bare area revegetation which filters sediment in addition to stabilizing banks in some areas. Road and trail restrictions have the same effects but to a lesser degree, because some traffic will inhibit vegetation growth and recovery.

Effects of the Alternatives

As a means of comparing alternatives, **Table 4-82** depicts the miles of wheeled motorized routes that cross or are within 300 feet of streams or wet areas on BLM lands in the Boulder/Jefferson City TPA.

Miles of Wheeled Motorized Routes	ALT A	ALT B	ALT C	ALT D
Open	21.7	9.4	9.4	9.5
Restricted	0	4.6	4.5	7.7
Closed	0	7.7	7.8	4.5

Under Alternative A, 21.7 miles of BLM roads and trails would remain open that cross or are within 300 feet of streams or wet areas on BLM lands. The noxious weed spread, streambank, and sediment delivery effects would continue as described in the Effects Common to All Alternatives section. The BLM roads and trails most affecting riparian conditions along Kady Gulch, Boomerang Gulch, Black Jim Gulch, Stagecoach Gulch, and Big Limber Gulch would remain open. Alternative A would pose the greatest adverse effects to riparian vegetation of all alternatives.

Under Alternative B, 9.4 miles of roads and trails would remain open that cross or are within 300 feet of streams or wet areas, 4.6 miles of roads and trails would have seasonal restrictions, and 7.7 miles of roads and trails would be closed. The noxious weed spread, streambank, and sediment delivery effects would be reduced in comparison to Alternative A. Big Limber Gulch, High Ore Creek and Spring Creek roads and trails which impact

riparian areas would remain open because these roads provide access to private lands. Riparian impacted roads and trails along Spencer Creek, Stagecoach Gulch, Black Jim Gulch, and Lower Boomerang Gulch would be closed. Roads and trails along Peters Gulch, the west fork of Boomerang Gulch, and Kady Gulch would have seasonal restrictions on use (closed 12/2-5/15).

Under Alternative C, 9.4 miles of roads and trails would remain open that cross or are within 300 feet of riparian areas, 4.5 miles of roads and trails would have restrictions, and 7.8 miles of roads and trails would be closed. The noxious weed spread, streambank, and sediment delivery effects would be reduced in comparison to Alternative A to the same degree as under Alternative B. Big Limber Gulch, High Ore Creek and Spring Creek roads and trails which impact riparian areas would remain open because these roads provide access to private lands. Riparian impacted roads and trails along Spencer Creek, Stagecoach Gulch, Black Jim Gulch, and Lower Boomerang Gulch would be closed. Roads and trails along Peters Gulch, the west fork of Boomerang Gulch, and Kady Gulch would have seasonal restrictions on use (closed 12/2-5/15).

Under Alternative D, 9.5 miles of roads and trails would remain open that cross or are within 300 feet of riparian areas, 7.7 miles of roads and trails would have restrictions, and 4.5 miles of roads and trails would be closed. The noxious weed spread, streambank, and sediment delivery effects would be reduced in comparison to Alternative A, but would be greater than under Alternatives B or C. As with all other alternatives, Big Limber Gulch, High Ore Creek and Spring Creek roads and trails which impact riparian areas would remain open because these roads provide access to private lands. Riparian impacted trails along Stagecoach Gulch, Black Jim Gulch, and Lower Boomerang Gulch would be closed. Also as with Alternatives B and C, roads and trails along Peters Gulch, Spencer Creek, the west fork of Boomerang Gulch, and Kady Gulch would have seasonal restrictions on use (closed 12/2-5/15).

Cumulative Effects on Riparian Vegetation

Noxious weed spread, mining, roads and trails, logging operations, and livestock grazing have affected riparian resource conditions in all TPAs, including the Boulder/Jefferson City TPA. Some of these factors continue to cause riparian area degradation primarily through direct disturbance or loss of riparian vegetation. Ground disturbance and loss of riparian vegetation facilitate erosion and sedimentation of streams. In the case of noxious weeds, they usually dominate riparian vegetation communities after some type of disturbance (such as roads, livestock grazing, mining, etc.) has reduced native vegetation.

Anticipated subdivision growth on private lands will lead to more road construction and maintenance. More

roads and development will increase severity of runoff events which in turn will cause more sediment delivery to creeks and streams. The additional sediment is likely to affect the functioning condition of some riparian areas by causing streambeds to aggrade at unnatural rates. Streambanks may also be affected if road placements do not allow for natural stream movements or meanders.

Logging and forestry practices on public and private lands are subject to streamside management zone (SMZ) requirements designed to maintain water quality and riparian vegetation. The proposed Riparian Management Zones under Butte RMP Alternatives B and C would be wider than SMZs and activities in these areas would be designed to benefit riparian resources, thus providing more riparian protection and more targeted management of riparian vegetation in both forested and non-forested areas than under RMP Alternatives A and D. The disturbance associated with timber activities does have the potential to increase noxious weed spread which degrades riparian area function and health. On public lands noxious weed control is a standard feature of any ground disturbing activities whereas on private lands noxious weed control is variable.

Livestock grazing will continue in the area and has the potential to impact riparian resource conditions. On BLM lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain riparian vegetation health and vigor. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided. Riparian conditions may improve or degrade as management changes.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, riparian conditions would improve because of the streambank protection gained from shrubby root systems and filtering capability of native riparian sedge and rush species.

Reclamation of abandoned mine lands along Big Limber Gulch, High Ore Creek, Clancy Creek and Spring Creek near Wickes have improved riparian function and health in these watersheds. The removal of contaminated soil and improvement in water quality has caused riparian vegetation to recover and thrive. The future reclamation of the Montana Tunnels mine would ensure a consistent base flow of acceptable water quality to the headwaters of Clancy Creek.

The Boulder complex fires of 2000 burned parts of the High Ore, Boomerang, Spring Creek, and Amazon watersheds. Before the vegetation could recover, subsequent storm events caused streambank scouring to occur on parts of several streams in these watersheds. The fire was of sufficient size to allow several colonies of aspen along riparian reaches and uplands to regenerate. Because a large acreage burned, post-fire use by herbivores

and ungulates was dispersed enough that it did not suppress young aspen suckers.

Cumulative effects under all the action alternatives would be similar to Alternative A at the scale of the entire TPA. The additional road and trail closures and seasonal restrictions on BLM roads in the action alternatives may slightly offset the cumulative road and trail impacts associated with subdivision development and other lands uses as compared to Alternative A. Alternative D would contribute less to riparian vegetation benefits than Alternatives B and C, but would contribute more benefits than Alternative A.

Overall, because BLM roads make up only 15.4 percent of all roads in the TPA (under Alternative A), and BLM lands make up 24 percent of all lands in the TPA, the contributions to riparian vegetation benefits associated with closing riparian roads on BLM lands under the action alternatives, while potentially substantial at the site scale, could be masked by activities on other lands at the scale of the entire Boulder/Jefferson City TPA. Activities on private lands (52 percent of total acreage in TPA) and USFS lands (23 percent of total acreage in TPA) would play a substantial role in determining riparian conditions at the scale of the entire TPA.

WILDLIFE

Effects of Alternative A

Under Alternative A, the Boulder/Jefferson City TPA would have substantially more open roads (60.5 miles) compared to the action alternatives and would have the highest actual road density, 3.3 mi/mi² (Table 4-83) of all alternatives. Open roads typically increase the level of recreation adjacent to roads which can result in additional disturbance and displacement of wildlife species. Roads can also encourage the public to recreate in areas that had formerly been secluded. Roads can cause direct mortality to wildlife through road kill, prevent wildlife movement, create disturbance to wildlife via vehicular use, cause the spread of noxious weeds, reduce habitat and cause habitat fragmentation on the landscape (Joslin et al. 1999). Open road miles that are greater than 3.0 mi/mi² have also been found to provide less than 40 percent of functional habitat for elk (Christensen et al. 1993). Permanent and temporary roads could negatively impact wildlife including special status species, particularly if roads are open during critical periods such as wintering or during the breeding season.

High open road densities under Alternative A could result in the loss of year-round habitat and migration corridors, disturbance and displacement of wildlife, road kill and fragmentation of habitat. Wildlife, including special status species, that are especially sensitive to roads in the TPA include (but are not limited to) elk and northern goshawk. The detrimental effects of open road densities to all wildlife species found in this TPA under Alternative A could be minor to major and long-term.

This alternative would have the greatest negative impacts to wildlife including special status species from open roads.

This TPA would also have substantially fewer acres of functional big game winter range (approximately 483 acres with low road density) compared to the action alternatives (Table 4-83). Functional winter range is similar under the action alternatives with 3,985 acres under Alternative B, 4,035 acres under Alternative C and 3,938 acres under Alternative D.

	Actual Road Density	Acres of Low Road Density	Acres of Moderate Road Density	Acres of High Road Density
Alt. A	3.3	483	2,341	11,662
Alt. B	0.8	3,985	5,304	5,198
Alt. C	0.8	4,035	5,571	4,881
Alt. D	0.9	3,938	4,967	5,582

Low Density = 0-1 mi/mi², Moderate Density = 1-2 mi/mi², High Density = >2 mi/mi²

With Alternatives A, B and D, the TPA would be open to cross country snowmobile use. BLM lands in this TPA, however, do not often get favorable snow conditions for snowmobile use. Due to snow conditions, the use of snowmobiles would be limited and the effects to wintering big game and other wildlife species would be expected to be minimal the majority of the time. However, when snow conditions do become favorable, snowmobile use of the TPA could have considerable negative effects to big game and other wildlife species. The negative effects due to cross-country snowmobile use could include harassment of big game during the high stress winter season (Joslin et al. 1999). This could cause individuals to leave an area (temporarily or permanently) and/or increase stress that could lead to mortality.

In evaluating impacts of travel planning on elk and other big game species, it is important to consider impacts on security habitat. Elk security is the inherent protection allowing elk to remain in an area despite increases in stress or disturbance associated with the hunting season or other human activities. Security habitat includes blocks of nonlinear forested habitats greater than 250 acres in size that are at least 0.5 mile from an open road (Hillis et al. 1991). Security habitat should also consist of larger trees (greater than 8 inches DBH) with vegetation dense enough to hide an adult elk (Thomas et al. 2002). Due to the fragmentation of BLM lands and high road densities adjacent to BLM lands, none of the alter-

natives would provide big game security habitat in the Boulder/Jefferson TPA.

Core areas are areas large enough for wildlife (especially animals with large home ranges such as carnivores and big game) to forage and reproduce. Subcore areas are areas that could act as stepping stones for wildlife as they move through the region (Craighead et al. 2002). Within all lands of the Boulder/Jefferson City TPA there are approximately 20,631 acres identified as “core/subcore” habitat. Under Alternative A, there would be 1,113 acres of core/subcore habitat with low road density (less than the action alternatives), 4,015 acres with moderate road density and 15,503 acres with high road density (more than all action alternatives) for all land ownerships.

On BLM lands, there are 2,958 acres in core/subcore habitat. Within the Boulder/Jefferson City TPA, all but 20 acres would have high road densities in core and subcore habitat under Alternative A.

Wildlife corridors are areas of predicted movement within or between core and subcore areas. Within the TPA, there are approximately 13,180 acres identified as “high quality” wildlife movement corridors under all land ownerships. All alternatives would have a similar number of acres with low road densities (677 acres) in movement corridors. Alternative A, however, would have fewer acres with moderate road density (3,556 acres) than the action alternatives and the majority of acres under this alternative (8,948 acres) would have high road densities. Although these areas have been mapped as “high quality” movement corridors, the presence of high road densities could reduce or limit the quality of habitat available to wildlife.

On BLM lands in the TPA, there are 6,659 acres mapped as high quality movement corridors. Under Alternative A, the majority of habitat in mapped high quality movement corridors would have high road densities (4,264 acres) with 1,944 acres in moderate road densities and only 450 acres with low road densities. Alternative A would provide the lowest quality habitat in wildlife movement corridors compared to all other alternatives.

Riparian areas provide crucial habitat and critical travel corridors for wildlife including special status species. Riparian areas also provide a refuge for native plants and animals in times of stress such as drought or fire. Roads in riparian areas can prevent use of these crucial areas by wildlife, limit use, or cause loss of habitat (Wisdom et al. 2000). Under Alternative A, there would be 21.7 miles of open roads in riparian areas.

Effects of Alternative B

Under Alternative B, the Boulder/Jefferson City TPA would have substantially fewer open roads (27 miles) compared to Alternative A (60.5 miles). Of the 27 miles of open roads, only 3.7 miles would be open year-round and the remaining 23.6 miles would be seasonally re-

stricted. Alternative B would have more open roads than Alternative C (23.5 miles) but less than Alternative D (38 miles). Alternative B would decrease harassment to wildlife during all seasons of use, especially during the winter and spring, over Alternatives A and D. This alternative would improve habitat and reduce fragmentation more than Alternatives A and D but less than Alternative C.

Under Alternative B, the actual road density in elk winter range would be 0.8 mi/mi², below the maximum of 1 mi/mi² recommended by MFWP in big game winter range (Table 4-83). This is substantially lower than the road density under Alternative A (3.3 mi/mi²), the same as under Alternative C and similar to Alternative D (0.9 mi/mi²). Christensen et al. (1993) found that reducing open road miles to less than 1.0 mi/mi² increases the amount of functional elk habitat by over 60 percent.

Under Alternative B there would be substantially more acres of functional winter range (3,985 acres in low road density) compared to Alternative A (483 acres) but this alternative would have a similar number of acres compared to Alternatives C and D (4,035 and 3,938 acres respectively) (Table 4-83).

Like Alternatives A and D, the entire Boulder/Jefferson City TPA would be open for cross country snowmobile use with Alternative B. The effects would be the same as described under Alternative A.

Under all land ownerships in core and subcore habitat, Alternative B would have the same acres in low road densities as Alternatives C and D (1,704 acres) which would be more than under Alternative A (1,113 acres). Alternative B would also have the same or similar acres in moderate (5,685 acres) and high (13,242 acres) road densities as Alternatives C and D. These acreages are higher than the moderate road density acreage (4,015 acres), and lower than the high road density acreage (15,503 acres) of Alternative A.

On BLM lands, there are approximately 2,958 acres in core/subcore habitat. Under Alternative A, all but 20 acres would have high road densities in core and subcore habitat on BLM lands. Although core and subcore habitat on BLM lands under the action alternatives would still be primarily in high road density (1,550 acres) there would also be 440 acres in low road density areas and 966 acres in moderate road density areas. Although the amount of functional core and subcore habitat would remain extremely low in this TPA, the action alternatives would improve the quality of core and subcore habitat compared to Alternative A.

In high quality wildlife movement corridors for all land ownerships, Alternative B would substantially increase the acreage with low road density (approximately 3,770 acres) compared to Alternative A (677 acres). Alternatives B would also increase the acreage with moderate road density (5,235 acres) over Alternative A and would substantially lower the acreage with high road density to

4,170 acres compared to Alternative A (8,948 acres). All action alternatives would greatly improve habitat in high quality movement corridors over Alternative A but Alternatives B and C would have more beneficial effects than Alternative D. Even though the action alternatives would improve movement corridors, the amount of quality corridors would remain extremely low due to fragmentation of public lands and high road densities on adjacent lands.

The quality of BLM lands mapped as high quality movement corridors would improve under Alternative B compared to Alternative A. All action alternatives would increase the acreage in low road density to (approximately 3,200 acres) compared to Alternative A (450 acres). Alternatives B and C would also increase the acreage with moderate road densities to (about 2,550 acres) compared to Alternative A (1,944 acres), and decrease the number of acres in high road densities to approximately 865 acres compared to 4,170 acres under Alternative A. All action alternatives would improve habitat in high quality movement corridors on BLM lands over Alternative A but Alternatives B and C would have more beneficial effects than Alternative D.

All action alternatives would protect and restore more riparian habitat than Alternative A by reducing the miles of open roads in riparian areas to 9.5 miles (from 21.7 under Alternative A). Reducing roads in riparian habitats under the action alternatives would allow for more breeding, foraging, and hiding habitat as well as improved movement corridors for a wide variety of species.

Effects of Alternative C

Under Alternative C, the Boulder/Jefferson City TPA would have substantially fewer open roads (23.5 miles) compared to Alternative A (60.5 miles). Of the 23.5 miles of open roads, only 3.0 miles would be open year-round and the remaining 20.5 miles would be seasonally restricted. Alternative C also would have fewer open roads than Alternative B (27.3 miles) and Alternative D (38 miles). Alternative C would decrease harassment to wildlife during all seasons of use, especially during the winter and spring, over all alternatives. This alternative would also improve habitat and reduce fragmentation more than all other alternatives.

Under Alternative C, the actual road density in elk winter range would be 0.8 mi/mi², below the maximum of 1 mi/mi² recommended by MFWP in big game winter range. This is substantially lower than the road density under Alternative A (3.3 mi/mi²), the same as under Alternative B, and similar to Alternative D (0.9 mi/mi²) (Table 4-83).

Under Alternative C there would be substantially more acres of functional winter range (4,035 acres in low road density) compared to Alternative A (483 acres), but this alternative would have a similar amount of acres com-

pared to Alternatives B and D (3,985 and 3,938 acres, respectively) (Table 4-83).

Alternative C would limit snowmobile use in the entire Boulder/Jefferson City TPA to open roads only (3 miles). This would substantially reduce the negative effects to wildlife from snowmobile use and be the most protective of all alternatives.

There would be no big game security habitat provided on BLM lands under Alternative C.

Effects associated with core and subcore habitat under Alternative C would be the same as under Alternative B. In high quality movement corridors for all land ownerships, Alternative C would substantially increase the acreage with low road density (approximately 3,770 acres) compared to Alternative A (677 acres). Alternative C would also increase the acreage with moderate road density (5,282 acres) over Alternative A (3,556 acres), and would lower the acreage with high road density to 4,113 acres compared to 8,948 acres under Alternative A. All action alternatives would improve habitat in high quality movement corridors over Alternative A but Alternatives C and B would have more beneficial effects than Alternative D.

The quality of BLM lands mapped as high quality movement corridors would improve under Alternative C compared to Alternative A. All action alternatives would increase the acres in low road density (approximately 3,200) compared to Alternative A (450 acres). Alternatives C and B would also increase the acreage with moderate road density to about 2,550 acres, compared to Alternative A (1,944 acres). Alternative C would decrease the number of acres in high road density to approximately 865 acres, compared to 4,170 acres under Alternative A. All action alternatives would improve habitat in high quality movement corridors on BLM lands over Alternative A but Alternatives B and C would have more beneficial effects than Alternative D.

Effects associated with roads in riparian areas under Alternative C would be the same as under Alternative B.

Effects of Alternative D

Under Alternative D, the Boulder/Jefferson City TPA would have substantially fewer open roads (38 miles) compared to Alternative A (60.5 miles). Of the 38 miles of open roads, 5.3 miles would be open year-round and the remaining 32.8 miles would be seasonally restricted. Alternative D would have considerably more open roads than Alternative B (27 miles) and Alternative C (23.5 miles). Alternative D would decrease harassment to wildlife during all seasons of use, especially during the winter and spring, more than Alternative A but less than Alternatives B and C. This alternative would also improve habitat and reduce fragmentation more than Alternative A but less than Alternatives B and C.

Under Alternative D, the actual road density in elk winter range would be 0.9 mi/mi², below the maximum of 1

mi/mi² recommended by MFWP in big game winter range. This is substantially lower than the road density under Alternative A (3.3 mi/mi²) and slightly higher than Alternatives B and C (0.8 mi/mi²) (**Table 4-83**).

Under Alternative D, there would be substantially more acres of functional winter range (3,938 acres in low road density) compared to Alternative A (483 acres). This alternative would have a similar amount of acres in functional winter range compared to Alternatives B and C (3,985 and 4,035 acres, respectively) (**Table 4-83**).

Like Alternatives A and B, the entire Boulder/Jefferson City TPA would be open for cross country snowmobile use with Alternative D. The effects would be the same as described under Alternative A.

There would be no big game security habitat on BLM lands under Alternative D.

Under all land ownerships in core and subcore habitat, Alternative D would have the same acres in low road density as Alternatives B and C (1,704 acres) which would be more compared to Alternative A (1,113). Alternative D would also have nearly the same acreages in moderate (5,663 acres) and high (13,264) road densities as Alternatives B and C. These values would be more acres in moderate road density and fewer acres in high road density compared to Alternative A (4,015 and 15,503 acres, respectively).

Effects of Alternative D on core and subcore habitat on BLM lands would be the same as under Alternatives B and C.

In high quality movement corridors for all land ownerships, Alternative D would substantially increase the acreage with low road density to 3,772 acres compared to Alternative A (677 acres). This would be similar to Alternatives B and C. Alternative D would also increase the acreage with moderate road density to 4,966 acres, compared to Alternative A (3,556 acres), but this would be less than Alternatives B and C (5,282 acres). Alternative D would also have slightly more acres with high road density (4,443 acres) compared to Alternatives B and C (4,113 acres), but would have fewer acres with high road density than Alternative A (8,948 acres). All action alternatives would improve habitat in high quality movement corridors over Alternative A but Alternative D would have fewer beneficial effects than Alternatives B and C.

In high quality movement corridors on BLM lands, Alternative D would have a similar acreage (3,203 acres) in low road density as Alternatives B and C but would have more than Alternative A (450 acres). Alternative D would have slightly fewer acres in moderate road density compared to Alternatives B and C (2,532 acres) but would have more when compared to Alternative A (1,944 acres). Alternative D would decrease the number of acres with high road density to 1,019 compared to Alternative A (4,170 acres), but would have more acres

with high road density than Alternatives B and C (810 acres). All action alternatives would improve habitat in high quality movement corridors on BLM lands over Alternative A but Alternative D would have fewer beneficial effects than Alternatives B and C.

Effects associated with roads in riparian areas would be the same as under Alternatives B and C.

Cumulative Effects on Wildlife

Wildlife habitat in the Boulder/Jefferson City TPA has been affected by roads, historic and current mining, timber harvest and salvage, weed infestations, urbanization and development, recreation, powerline corridor development and communication sites.

Human population growth for the upper Boulder Valley is approximately 2 percent per year. This rate of growth is expected to continue, along with increased recreational use from local residents and area users (residents of Helena and Butte). Recreational activities in the Boulder/Jefferson City TPA include hunting, motorized OHV travel (motorcycles, ATVs, snowmobiles), and to a lesser extent, non-motorized uses (hiking, horseback riding, and mountain biking).

Land that was traditionally used for ranching, forest products, or mining is now being converted to home sites in the Boulder/Jefferson City TPA. Although these lands had historic human uses, they also provided quality wildlife habitat. These areas historically provided a diversity of habitats that contributed to; big game winter range, travel corridors, habitat for resident and migrating wildlife, as well as foraging, breeding and hiding habitat.

For many plant and animal communities, native species richness decreases as housing density increases. Non-native species, however, tend to increase with development (Hansen et al. 2005). Wildlife populations, including carnivores, may be reduced even at very low levels of residential development due to; loss of habitat, an increase in human access (from roads) in areas that previously had low levels of disturbance, and an increase in hunting pressure. Residential development can also lead to an increase in noxious weed infestations that can reduce the quality and quantity of wildlife habitat.

Pets can also have a negative impact to native wildlife. Cats hunt and kill bird and small mammals. Dogs that are allowed to roam can chase, injure, or kill wildlife. This can result in areas becoming unavailable to wildlife.

The Boulder/Jefferson City TPA is within an area that was heavily affected by historic mining. There are five large mines which are no longer active and have had some level of reclamation by either the BLM or the State of Montana. Montana Tunnels is the only active mine and continues to produce lead and zinc with associated gold and silver from an open pit. The mine is located near Jefferson City, and is approximately 1,500 acres in size (including 130 acres of BLM land). It is expected

that exploration for minerals would continue in the future. Mineral activity along with associate road construction and development on both private and public lands could add substantially to the negative cumulative effects to wildlife and wildlife habitats in this TPA.

In the TPA, there are 11 powerlines, two pipelines and seven communication sites. In the future, communication sites on BLM lands will be restricted to existing sites. There is the potential for future powerlines and pipelines to be built in this TPA and for additional communication sites to be built on private and other public lands.

There are approximately 26 rights-of-way (ROW) in the TPA and applications for ROW permits to access private property or for commercial development are likely to increase in the future. As a result, public access to BLM lands could increase. Fewer ROWs would be expected under Alternative A because all BLM roads would remain open under this alternative. Alternative B would be expected to have fewer ROWs than Alternative C but more than Alternatives A and D. Alternative C would be expected to have the most ROWs and, of the action alternatives, Alternative D would have the fewest.

Between 1984 and 1995 only 260 acres of timber harvest occurred on BLM lands in the TPA although more occurred on adjacent private lands. In 2000, the Boulder Fire burned approximately 10,800 acres of the entire TPA and approximately 4,670 acres in the Decision Area. After the fire, approximately 560 acres of timber salvage occurred on BLM lands and a substantial amount of acres on private lands were also heavily salvaged. Approximately 700 acres of BLM lands have been replanted. Since private lands were heavily salvaged after the fire, it is not expected that timber harvest would occur on these lands for the next 20-40 years. Additional timber harvest or vegetation restoration may occur on BLM lands in the future, especially within meadows that were not burned and are experiencing conifer encroachment. Forest and fuels reduction treatments would be expected to be less under Alternatives A and C than under Alternatives B and D. Overall, vegetative treatments on BLM lands have had minor effects to wildlife habitat in the TPA. However, timber salvage on BLM lands has substantially reduced the distribution and amount of snag habitat for snag dependant species in the salvage units. Timber harvest and salvage on private lands has altered the landscape and caused a decline in the quality and quantity of wildlife habitat in the TPA.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the TPA. Motorized activities play a large role in the distribution of noxious weeds. The cumulative effects of the spread of noxious weeds from open roads would be greater under Alternative A than all other alternatives. Alternative A would result in more wildlife habitat being lost or degraded due to noxious weed infestations compared to the action alternatives. Alternative B would have fewer open roads

than Alternatives A and D resulting in fewer infestations of noxious weeds. Alternative C would close the most roads and would have the fewest cumulative effects from loss of habitat due to noxious weeds of all alternatives. Open roads adjacent to BLM land would still be a conduit for the spread of noxious weeds.

Fragmentation of BLM lands in the TPA (only 24 percent of the TPA is in BLM ownership) and open roads on BLM lands (about 60.5 miles), on private lands (about 283 miles), and other public lands (about 48 miles) have reduced the quality of wildlife habitat within the TPA. Roads within the TPA cause disturbance to wildlife along with fragmentation and loss of habitat. Roads are associated with nearly every type of activity that has the potential to occur in the TPA including vegetation treatments, timber salvage, mining, access to private lands (ROWs), fire suppression, powerline corridors, and recreation. Open roads in the Planning Area would likely increase due to development and management of private lands. Alternative A would have the greatest negative cumulative effects to wildlife and wildlife habitat from open roads with 60.5 miles of open roads. Alternative B would have fewer negative cumulative effects with 27 miles of open road than Alternatives A and D (38 open miles) but more than Alternative C (23.5 miles).

Alternative A would have the greatest negative cumulative effects from open roads to wildlife and wildlife habitat of all alternatives. Under Alternative A, habitat on BLM lands would not be restored and would continue to be degraded over time. Disturbance to wildlife from open roads would continue to impact the distribution and use of the TPA by wildlife under Alternative A. Alternatives B and C would have greater beneficial cumulative effects to wildlife and wildlife habitats from closing roads than Alternatives A and D.

Historic and recent timber cutting, salvage harvest, past mining activity and firewood gathering in the TPA may have reduced the amount of suitable snag habitat for cavity nesting species as well as down woody material. Alternative A would allow continued access to the area for firewood cutting. This could continue to prevent snag recruitment for snag dependant species and minimize the amount of down woody material. Alternative B would protect more snag and down wood habitat from loss due to firewood cutting than Alternatives A and D but would protect less of this habitat type than Alternative C.

High road densities in both the Decision and Planning Areas have prevented BLM lands from providing suitable security habitat for big game during the hunting seasons under any alternative. Lack of security habitat in this TPA would continue to be an issue with all alternatives although Alternatives B and C would slightly increase the amount of security habitat.

Habitat mapped as core and subcore habitat, and wildlife movement corridors having high road densities would

continue to be of low value to wildlife under Alternative A. An increase in open roads in both the Decision and Planning Areas could result in a loss of core and subcore habitat under all alternatives but, especially, Alternative A. However, the cumulative effects to core and subcore habitat and wildlife movement corridors would be beneficial under the action alternatives, especially Alternatives B and C.

The cumulative effects of high road densities would continue to negatively affect wildlife species during the breeding season more with Alternative A than under the action alternatives. Alternatives B and C would have the most beneficial cumulative effects to wildlife during the breeding season compared to Alternative D and Alternative A.

FISH

For the sake of this discussion, “open” roads include roads that are open with seasonal restrictions as well as roads that are open yearlong. Roads identified as “closed” within 300 feet of streams also include roads that would be “decommissioned” in these areas by alternative. Effects to water quality described in the Water Resources section would affect fish populations and fish habitat quality. Analyses described and tabulated in the Water Resources section are referred to in the context of effects to fish in the discussion below.

Effects of Alternative A

Under Alternative A, the Boulder/Jefferson City TPA would have substantially more open roads (60.5 miles) compared to the action alternatives. Generally, watersheds with high road densities often have the largest negative effects on fish and aquatic resources. Roads can have a wide range of effects on fish and fish habitat. These effects would include, but are not limited to, increased sedimentation from road construction and vehicle use, increased runoff, changes in surface water and drainage patterns from stream crossings, conduits for noxious weeds, loss of riparian vegetation, potential decreases in stream shading that could lead to water temperature increases, loss of instream habitats and changes in local fish populations when culverts are impassable and limit fish migration.

Watershed (or hydrologic) function can be used as an indicator of relative risk or impacts to fish habitat. To determine the effects on watershed functions, a moving windows analysis was conducted on BLM lands to look at the miles of roads that would be decommissioned and removed from the landscape for each alternative. During this analysis, it was assumed that even though closing roads would improve watershed function, closed roads would remain on the landscape and could still have negative impacts to water quality and prevent or impede the restoration of riparian vegetation. Under Alternative A, there would be 472 acres with low road density (based on open and closed roads), 2,353 acres with moderate

road density and 11,662 acres with high road density on BLM lands in this TPA (**Table 4-80**). Alternative A would have fewer acres with low road density and more acres with high road density than the action alternatives and this alternative would be expected to have more overall negative effects to watershed function due to roads than the other alternatives.

For this discussion, road miles within 300 feet of fish bearing streams would be considered an indicator of direct effects to fish habitat and fish populations. Under Alternative A, there would be 0 miles of closed road and 2.5 miles of open road within 300 feet of fish bearing streams on BLM lands. Under the action alternatives, there would be 0.5 mile of closed road and 2 miles of open road adjacent to fish bearing streams. Of the 2.5 miles of open roads adjacent to fish bearing streams under Alternative A, 2.1 miles would be adjacent to streams with westslope cutthroat trout (BLM sensitive species). In this context, Alternative A would have more potential long-term negative impacts to westslope cutthroat trout as well as to all fish species compared to the action alternatives.

Perennial non-fish bearing streams contribute to fish habitat indirectly by serving as conduits for watershed products (water, sediment, nutrients, contaminants, and in some cases woody material) to fish bearing streams. Under Alternative A, there would be 0 miles of closed road and 7.7 miles of open road within 300 feet of non-fish bearing streams on BLM lands in the TPA. Under all action alternatives there would be 3.2 miles of closed road and 4.5 miles of open road in these areas. Alternative A would have more miles of open roads adjacent to perennial streams and would have more adverse effects to fish and aquatic habitat than the action alternatives.

This alternative would have the greatest negative impacts to fish and aquatic resources from open roads.

Effects of Alternative B

Under Alternative B, the Boulder/Jefferson City TPA would have substantially fewer open roads (27 miles) compared to Alternative A (60.5 miles). Alternative B would have more open roads than Alternative C (23.5 open miles) but less than Alternative D (38 open miles). In the context of watershed function, Alternative B would have approximately 863 acres in the low road density category, 2,377 acres in the moderate road density category, and 11,247 acres in the high road density category on BLM lands (**Table 4-80**). This would be 391 more acres in low road density, 24 acres more in moderate road density, and 415 acres less in high road density than Alternative A. These acreages would be the same for Alternatives C and D. This analysis does consider “decommissioned” roads, but does not consider “closed” roads as contributing to watershed function. Even though closed roads could still have adverse effects to aquatic habitats, these roads have more potential to become revegetated and lessen sedimentation and

runoff, and restore riparian vegetation (thus contributing to improved fish habitat conditions) than open roads. Under Alternative B there would be approximately 30 miles of closed roads that would remain open under Alternative A, an additional indication that Alternative B would pose less of an impact to fish habitat than Alternative A. Under Alternative B (and all action alternatives), there would be 0.5 mile of closed road and 2 miles of open road adjacent to fish bearing streams on BLM lands. Of the 2 miles of open roads adjacent to fish bearing streams, 1.6 miles would be adjacent to streams with westslope cutthroat trout (BLM sensitive species). Alternative B would have 0.5 fewer miles of open road adjacent to fish bearing streams including streams with westslope cutthroat trout than Alternative A. This alternative would have fewer direct and indirect long-term negative effects to westslope cutthroat trout as well as other fish species than Alternative A.

Alternative B would also have fewer indirect effects to fish habitat associated with roads within 300 feet of perennial non-fish bearing streams compared to Alternative A. Under Alternative B there would be 3.2 miles of closed road and 4.5 miles of open road within 300 feet of perennial non-fish bearing streams on BLM lands in the TPA. All 7.7 of these road miles would remain open under Alternative A so Alternative B would have fewer impacts to fish and aquatic habitat than Alternative A from these roads.

This alternative would have fewer negative effects to fish (including special status species) and aquatic resources from open roads than Alternative A.

Effects of Alternative C

Under Alternative C, the Boulder/Jefferson City TPA would have substantially fewer open roads (23.5 miles) compared to Alternative A (60.5 miles) and Alternative D (38 miles). Alternative C also would have fewer miles of open roads than Alternative B (27.3 open miles).

In the context of watershed function, Alternative C would have the same acreages in the low, moderate and high road density categories on BLM lands as Alternative B (Table 4-80). This analysis does consider “decommissioned” roads, but does not consider “closed” roads as contributing to watershed function. Even though closed roads could still have adverse effects to aquatic habitats, these roads have more potential to become revegetated and lessen sedimentation and runoff, and restore riparian vegetation (thus contributing to improved fish habitat conditions) than open roads. Under Alternative C there would be approximately 34 miles of closed roads that would remain open under Alternative A, and approximately 4 more miles of closed road than under Alternative B. Alternative C **could have** slightly less impact to fish habitat than Alternative B, and would provide the greatest improvement to watershed function of all the alternatives. Effects associated with roads within 300 feet of fish bearing streams on BLM lands

under Alternative C would be the same as under Alternative B. Effects associated with roads within 300 feet of perennial non-fish bearing streams on BLM lands would be the same under Alternative C as under Alternative B. Alternative C would provide the greatest benefit to fish and aquatic habitats of all alternatives, having slightly greater benefits than Alternative B.

Effects of Alternative D

Under Alternative D, the Boulder/Jefferson City TPA would have substantially fewer open roads (38 miles) compared to Alternative A (60.5 miles). Alternative D, however, would have considerably more open road than Alternative B (27 open miles) and Alternative C (23.5 open miles).

In the context of watershed function, Alternative D would have the same acreages in the low, moderate and high road density categories on BLM lands as Alternatives B and C (Table 4-80). This analysis does consider “decommissioned” roads, but does not consider “closed” roads as contributing to watershed function. Even though closed roads could still have adverse effects to aquatic habitats, these roads have more potential to become revegetated and lessen sedimentation and runoff, and restore riparian vegetation (thus contributing to improved fish habitat conditions) than open roads. Under Alternative D there would be approximately 21 miles of closed roads that would remain open under Alternative A.

All action alternatives would have more acres with low road density (863) (based on open and closed roads), slightly more acres with moderate road density (2,377) and fewer acres with high road density (11,247) than Alternative A. The action alternatives would be expected to have fewer overall negative effects to watershed function due to roads than Alternative A. Because Alternative D would close fewer roads, this alternative would be expected to have more negative watershed effects than Alternatives B and C. Alternative D would have more negative effects from roads on overall watershed function than Alternatives B and C but less than Alternative A.

Effects associated with roads within 300 feet of fish bearing streams on BLM lands under Alternative D would be the same as under Alternatives B and C. Alternative D would have more indirect effects to fish habitat associated with roads within 300 feet of perennial non-fish bearing streams on BLM lands than Alternatives B and C, but less than Alternative A. Under Alternative D, there would be 2.4 miles of closed road and 5.3 miles of open road in these areas.

This alternative would have more negative direct and indirect effects to fish and aquatic habitats and overall watershed function from open roads than Alternatives B and C. Alternative D would provide more benefits to fish and aquatic habitats than Alternative A.

Cumulative Effects on Fish

The Boulder/Jefferson City TPA supports a variety of native and introduced fish species. One of the major human influences to fish in the TPA has been the introduction of non-native trout species including rainbow trout, brook trout, and brown trout throughout the TPA and also Yellowstone cutthroat trout into Cataract Creek. Rainbow trout have hybridized with the native westslope cutthroat trout in many streams, and brook trout and brown trout have displaced the native cutthroats in other streams, especially those altered by sedimentation and increased water temperatures brought on by human activities.

Human population growth for the upper Boulder Valley is approximately 2 percent per year. This rate of growth is expected to continue, along with increased recreational use from local residents and area users (residents of Helena and Butte). Recreational activities in the Boulder/Jefferson City TPA include hunting, motorized OHV travel (motorcycles, ATVs, snowmobiles), and to a lesser extent, non-motorized uses (hiking, horseback riding, and mountain biking).

Development and urbanization can have substantial impacts to fish habitat and may pose the greatest threats to watershed function.

Agricultural activities from farming and ranching also contribute increases in nutrients, sedimentation and cause loss of aquatic habitats. Many streams in the TPA have been impacted by historic and on-going livestock grazing that breaks down streambanks, widens channels, removes vegetative cover, and causes an increase in fine sediment and nutrients.

The Boulder/Jefferson City TPA is within an area that was heavily impacted by historic mining and numerous drainages have been degraded by historic mining activities. See the Cumulative Effects discussion in the Water Resources section for a description of streams impacted by heavy metal contamination related to historic mining. There are five large mines which are no longer active and have had some level of reclamation by either the BLM or the State of Montana. These activities should gradually improve water quality and allow further recovery of fish populations, but full restoration could take decades to achieve. Montana Tunnels is the only active mine and continues to produce lead and zinc with associated gold and silver from an open pit. The mine is located near Jefferson City, and is approximately 1,500 acres in size (including 130 acres of BLM land). It is expected that exploration for minerals would continue in the future. Montana Tunnels is currently planning an expansion of the mine which would remove or degrade approximately 0.5 mile of Clancy Creek, a westslope cutthroat trout stream. Expansion of Montana Tunnels would create a barrier to westslope cutthroat trout in Clancy Creek as well as result in the loss of aquatic habitat.

Fires, floods, and drought have historically affected fish habitat in the TPA. These disturbances can cause a pulse of sediment or may temporarily reduce the quality of fish habitat in some watersheds while leaving other streams largely unaffected. Natural disturbances are typically followed by periods of stability during which fish habitats and populations recover. Population recovery in disturbed streams may be facilitated by fish immigration from nearby drainages less affected by the catastrophic event. In 2000, the Boulder Fire burned approximately 10,800 acres of the entire TPA and approximately 4,670 acres in the Decision Area. The fire did cause runoff and sedimentation as well as the loss of riparian vegetation to some streams.

After the 2000 Boulder Fire, approximately 560 acres of timber salvage occurred on BLM lands and a substantial amount of acres on private lands were also heavily salvaged. This may have had substantial negative effects on riparian and aquatic habitats in the TPA. Additional timber harvest or vegetation restoration may occur on BLM lands in the future, especially within meadows that were not burned and are experiencing conifer encroachment. Vegetative treatments would be expected to be less under Alternatives A and C than Alternatives B and D.

Timber harvest can alter the recruitment of large woody debris, reduce canopy closures, and result in an increase in fine sediment to streams. Timber harvest along with associated roads can contribute substantially to the overall cumulative effects in forested watersheds. Between 1984 and 1995 only 260 acres of timber harvest occurred on BLM lands in the TPA although more occurred on adjacent private lands.

Roads are another major contributor of sediment to streams and a major problem with regards to cumulative watershed effects. Roads and trails can have localized effects on nearby stream segments or at stream crossing sites, especially fords. In some cases, effects are more extensive and may impair fish habitat for longer reaches of streams. Cumulatively, roads degrade aquatic habitat due to sedimentation from road construction and vehicle use, increased runoff, changes in surface water and drainage patterns from stream crossings, loss of riparian vegetation, loss of large woody material and roads can cause changes in local fish populations when culverts are impassable and limit fish migration. Alternative A would have more negative cumulative effects to watersheds and individual streams due to roads than the action alternatives. Alternative B would have fewer negative cumulative effects than Alternatives A and D but more than Alternative C. Alternative B would improve overall watershed functions as well as improve habitat in individual streams more than Alternatives A and D but less than C. Alternative C would have the greatest beneficial cumulative effects.

SPECIAL STATUS PLANTS

Effects Common to All Alternatives

Ground-disturbing activities from road construction and maintenance, as well as road use by vehicles can affect special status plant populations and habitat. These activities can reduce sensitive plant species through disturbance to individual populations, increasing competition from invasive species, and reducing habitat connectivity. Closure of roads and trails can improve or maintain sensitive plant populations or habitat by reducing avenues of noxious weed spread, maintaining habitat connectivity, and improving pollinator habitat. Road and trail restrictions have the same effects but to a lesser degree.

Effects of the Alternatives

Under Alternative A, 60.5 miles of BLM roads and trails would remain open. The effects of these open routes would continue as described above in the Effects Common to All Alternatives section.

Under Alternative B, 3.7 miles of BLM roads and trails would remain open, 25.1 miles of roads and trails would be open with seasonal restrictions, 29.0 miles of roads and trails would be closed, and 2.7 miles of roads would be decommissioned. On the closed and decommissioned routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The restricted roads would reduce weed spread a limited amount. Alternative B would benefit and reduce risk to special status plants compared to Alternative A.

Under Alternative C, 3.0 miles of BLM roads and trails would remain open, 20.5 miles of roads and trails would be open with seasonal restrictions, 34.2 miles of roads and trails would be closed, and 2.7 miles of roads would be decommissioned. On the closed and decommissioned routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The restricted roads would reduce weed spread a limited amount. Alternative C would benefit and reduce risk to special status plants more than any other alternative because it would eliminate disturbance, vehicular use, and spread of noxious weeds on the most road miles.

Under Alternative D, 5.3 miles of BLM roads and trails would remain open, 32.8 miles of roads and trails would be open with seasonal restrictions, 20.6 miles of roads and trails would be closed, and 2.7 miles of roads would be decommissioned. On the open roads, effects would continue as described in the Effects Common to All Alternatives section above. On the closed and decommissioned routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The restricted roads would reduce weed spread a limited amount. Alternative D would benefit and reduce risk to

special status plants more than Alternative A, but would pose more risk than Alternatives B and C.

Cumulative Effects on Special Status Plants

Under all alternatives there are a number of past, present, and reasonably foreseeable future actions that affect special status plant populations.

Livestock grazing will continue in the area and has the potential to impact sensitive plant populations and habitat. On public lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain sensitive species populations and habitat. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided. Conditions may improve or degrade as management changes.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, sensitive plants would benefit from the reduced competition. Use of herbicides for noxious weed control could cause mortality to special status plants if individual plants are inadvertently sprayed.

Recent and anticipated subdivision growth on private lands will lead to more road construction and maintenance. More roads and development will reduce sensitive plant species habitat and in some cases individual populations. Additionally, subdivisions have the potential to disrupt the connectivity of plant habitat and populations as well as disturbing or eliminating pollinators needed by sensitive species. Some sensitive species that require soil disturbance may benefit.

Timber sale activity disturbance can destroy or degrade sensitive plant habitat. On public lands, projects would be designed to avoid, mitigate, or enhance sensitive plant habitats. The disturbance associated with timber harvest activities does have the potential to increase noxious weed spread which degrades sensitive species habitat and individual plant populations.

The Boulder complex fires of 2000 burned parts of the High Ore, Boomerang, Spring Creek, and Amazon watersheds. The burn encouraged noxious and invasive weed spread in some areas. On the other hand, potential habitat for special status plants that was being overtopped by conifers was opened up and improved by the fire.

At the scale of the entire Boulder/Jefferson City TPA (all land ownerships), the BLM travel plan alternatives would have slightly variable contributions to cumulative effects on special status plants. Under Alternative A none of the roads in the TPA would be closed. Under Alternative B adverse effects on special status plants would be slightly reduced compared to Alternative A because 8.5 percent of all roads in the TPA would be

closed or decommissioned. Alternative C would provide the most benefits of all alternatives as 9.4 percent of all roads in the TPA would be closed or decommissioned. Alternative D would provide slightly more benefits than Alternative A but slightly fewer benefits than either Alternatives B or C as 5.9 percent of all roads in the TPA would be closed or decommissioned. Because BLM lands make up only 24 percent of all lands in the TPA, activities on non-BLM lands would play a dominant role in determining status of special status plants.

WILDLAND FIRE MANAGEMENT

Travel planning alternatives were analyzed to determine whether they could result in impact on wildland fire management, causing change to any of the following indicators:

- Fire regime condition class (FRCC)
- Firefighter and public safety
- Reducing threat to Wildland Urban Interface (WUI)

Effects Common to All Alternatives

Public road access during the fire season provides opportunities for human-caused fires either due to catalytic converters on vehicles igniting dry vegetation, or due to some types of human activities. Roads that are closed to public access reduce the risk of human-caused fire starts in those areas.

Decommissioned roads and roads that are closed and not regularly maintained for navigability reduce access for fire suppression. Closed roads may become impassible due to vegetation regrowth, downfall of trees, or severe erosion. Some roads may be closed with earthen berms or fallen trees and would need to be physically manipulated to make them useable for vehicles again. These roads would extend firefighting response time and have negative impacts on efforts to reduce wildland fire threat to WUI areas and firefighter and public safety. In an emergency fire suppression situation, any navigable closed roads needed for fire suppression would be used immediately. Non-navigable closed roads could also be used if deemed to be needed for fire suppression, after needed improvements are made to make those roads useable. Planning and implementation of fuels reduction treatments could occur in association with closed roads if variances for temporary road use were to be allowed. Variances would be subject to internal BLM review.

In the context of fuels reduction projects, availability of open roads is important to facilitating fuels project location as well as increasing project feasibility and decreasing costs. Open roads also facilitate spread of noxious weeds by transporting weed seed on vehicles and their tires. Presence of large noxious weed populations could delay or cause fuels projects to be cost-prohibitive due to the fact that the weeds may have to be treated before and/or after the fuels treatment. Also, some applications

of fuel treatments (e.g., prescribed fire) may promote the spread of some weeds. The presence of weeds and non-native species are indicators that FRCC has departed from historical conditions.

Noxious weeds and non-native invasive species are well established and spreading in the Boulder/Jefferson City TPA.

Effects of Alternative A

Under Alternative A, all BLM managed routes in the Boulder-Jefferson City travel planning area would continue to be managed as open yearlong (60.5 miles). Alternative A would allow for the greatest flexibility between alternatives for access for suppression purposes. Fuels project feasibility would be highest under this alternative. However, public access during the fire season would be the greatest under this alternative and would provide the most opportunities for human-caused fire starts.

The distribution of noxious weeds could be the greatest under Alternative A with the most open roads and noxious weeds already well established. This would contribute to reduced feasibility of fuels reduction projects more than under any other alternative.

Effects of Alternative B

Alternative B provides a more balanced approach towards travel management and should help reduce user conflicts. Under Alternative B, 27.3 miles of routes (3.7 miles open yearlong, 23.6 miles seasonally restricted) would be available for wheeled motorized use. Alternative B would limit the flexibility for access for suppression purposes, and fuels project feasibility would go down compared to Alternative A due to the fact that access would be limited to 27.3 miles of road. Of the 33.2 miles of closed roads, 2.7 miles would be decommissioned and would likely be unusable for fire suppression. The risk of human-caused fires associated with motorized use would be limited compared to Alternative A, due to a 55 percent decrease in miles of road open to motorized public travel.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because more roads would be closed under this alternative, Alternative B should help reduce the spread of noxious weeds and may make fuels treatment more feasible than under Alternative A, reducing FRCC departure.

Effects of Alternative C

Alternative C would provide the least amount of motorized wheeled access among the action alternatives. Under Alternative C, 23.5 miles of routes would be available for wheeled motorized use (3.0 miles open yearlong, 20.5 miles seasonally restricted).

Alternative C would limit the flexibility for access for suppression purposes, and fuels project feasibility would

go down compared to both Alternatives A and B, due to the fact that access would be limited to 23.5 miles of road. Of the 37 miles of closed roads, 2.7 miles would be decommissioned and would likely be unusable for fire suppression. The risk of human-caused fires associated with motorized use would be the lowest of all alternatives, due to a 61 percent decrease in miles of road open to motorized public travel compared to Alternative A. Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because more roads would be closed than under any other alternative, Alternative C should help reduce the spread of noxious weeds more than any other alternative, and may make fuels treatment more feasible, reducing FRCC departure.

Effects of Alternative D

Under alternative D, 5.3 miles of open routes would be available yearlong for wheeled motorized use and an additional 32.8 miles would be seasonally restricted routes. Of the 22.4 miles of closed roads, 2.7 miles would be decommissioned and would likely be unusable for fire suppression. Alternative D would be more flexible than Alternatives B and C, but would limit flexibility for access for suppression purposes, and fuels project feasibility would go down compared to Alternative A. The risk of human-caused fires associated with motorized vehicle use would be reduced compared to Alternative A, but would be greater than under Alternatives B and C, due to a 37 percent decrease in open roads compared to Alternative A.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because an intermediate number of road miles would be closed under this alternative, Alternative D should help reduce the spread of noxious weeds and may make fuels treatments more feasible than Alternative A, but would promote more weed spread and potentially make projects less feasible than Alternatives B and C.

Cumulative Effects on Wildland Fire Management

Effects on wildland fire management associated with any of the BLM travel plan alternatives would be overshadowed by reasonably foreseeable uncharacteristic fire, continued fire suppression made necessary by WUI and intermingled landownership, and large-scale forest insect infestations and disease outbreaks that would continue for the planning period. BLM lands make up about 24 percent of all lands while BLM roads make up about 15.4 percent of all roads in the Boulder/Jefferson City TPA.

Revision of the Helena and Beaverhead-Deerlodge National Forest Plans could result in more or less treatment of adjacent areas. Because no decision has been made, the effects are not known. Wildland fire management, particularly where wildland fire use (management of

naturally ignited wildland fires to achieve resource objectives) may occur on USFS lands, will be determined in the plan decision. BLM would need to coordinate with USFS on all wildland fire use actions and events. Wildland fire use on USFS lands could affect FRCC on BLM lands. USFS lands make up 23 percent of all lands in the Boulder/Jefferson City TPA so activities there would likely have a similar degree of influence on future fire characteristics as activities on BLM lands (24 percent of all lands in TPA).

Decisions to increase the level of wildland fire use, prescribed fire, or open burning by the public could impact the BLM's ability to use wildland fire and prescribed fire due to air quality concerns and requirements. This could postpone or eliminate BLM fuel reductions or treatments to improve FRCC.

Access is a critical component of wildland fire suppression. In some cases, access to public lands is being reduced by adjacent landowners gating or closing roads, which could hamper wildland fire suppression efforts and pose a risk to public and firefighter safety. Reducing access would also increase the potential for larger fires to occur due to an increase in time needed to access a fire and control it. Time needed to move in crews would be extended, and the ability to effectively apply and place resources (e.g., engines, water tenders, etc.) would be limited.

Effects on wildland fire management, including FRCC and firefighter and public safety due to management accomplished by other landowners may affect wildland fire management on public lands. When activity fuels (such as logging slash) are not treated adequately, fuel hazard could increase on adjacent lands which could affect fire intensity and severity on public lands. When adjacent owners treat fuels or implement fire mitigation plans in the WUI, fires are easier to suppress and firefighter safety is increased. In the Boulder/Jefferson City TPA, activities on private lands (53 percent of all lands in TPA) would have more influence on future fire characteristics in the area overall than activities on BLM lands (24 percent of all lands in TPA).

Human population increases and subsequent residential development are likely to expand the WUI and could alter forest management, taking the emphasis off restoring historic composition and structure and focusing more on fuel reduction.

CULTURAL AND PALEONTOLOGICAL RESOURCES

Effects Common to All Alternatives

Alternative-specific risks or impacts to cultural and paleontological resources are difficult to discern due to a lack of extensive site-specific knowledge about the presence of these resources in a given TPA. By designating open routes, limiting open-country travel, and closing

some routes, inadvertent discovery of cultural and paleontological resources and vandalism to them is reduced. Higher road densities in a given area would allow greater access to more land on the average, but that does not imply greater amounts of vandalism, since the vehicles would remain on designated routes.

VISUAL RESOURCES

Effects Common to All Alternatives

Roads (temporary or permanent) may affect visual quality. Roads that remain open for public use may impact visual qualities where noticeable. The quantity of open roads would also influence sensitivity levels since with more open roads, more areas would generally be viewed by more members of the public. Closing or decommissioning roads would generally reduce effects to visual resources and reduce sensitivity levels because fewer members of the public would generally be accessing and viewing areas with closed roads.

Effects of the Alternatives

Under Alternative A, all 60.5 miles of BLM road would remain open, thereby providing for the greatest level of impact to visual resources of all alternatives.

Under Alternative B, there would be 28.8 miles of open road (including open with seasonal restrictions), 29.0 miles of closed road, and 2.7 miles of decommissioned road. Road closures and decommissioning under this alternative would reduce effects on visual resources compared to Alternative A.

Under Alternative C there would be 23.5 miles of open road, 34.2 miles of closed road, and 2.7 miles of decommissioned road. Alternative C would have fewer adverse effects and would improve visual resources the most of all alternatives.

Under Alternative D, there would be 38.1 miles of open road, 20.6 miles of closed road, and 2.7 miles of decommissioned road. Alternative D would improve visual resources compared to Alternative A, but would have more adverse effects than Alternatives B and C.

Cumulative Effects on Visual Resources

Under all alternatives, most activities on BLM lands would generally not adversely affect visual resources to unacceptable degrees because discretionary activities on BLM lands would be required to meet Visual Resource Management objectives within individual project areas.

As the entire Boulder/Jefferson City TPA is highly mineralized and has seen extensive mining activity in the past, this activity is likely to continue for the foreseeable future. Mining activity often has visually intrusive effects on the landscape. On BLM lands, the Montana Tunnels Mine near Jefferson City has adversely affected visual resources and will continue to do so for the foreseeable future. The permitted area for this mine is ap-

proximately 1,500 acres with 130 of those acres on BLM lands, but intrusive modification of the landscape has only occurred on a subset of these acres.

Activities on non-BLM lands, particularly activities near BLM lands associated with residential development, urbanization, additional mining, or vegetation management, could have adverse cumulative effects on visual resources on BLM lands because BLM VRM objectives would obviously not apply to non-BLM activities.

LIVESTOCK GRAZING

Effects Common to All Alternatives

Roads and trails can potentially affect livestock grazing management. Roads and trails often act as avenues of noxious weed spread. Noxious and invasive weeds can reduce the quantity and quality of forage. Users of roads and trails can cause management problems for livestock permittees when they leave gates open at fences, vandalize range improvements, or harass livestock, either purposely or unintentionally.

Closure of roads and trails can improve or maintain the forage base by reducing vectors of noxious weed spread. Additionally, road and trail closures can reduce management conflicts. On the other hand, closures may increase permittees' time requirements if and when work has to be conducted with horses or afoot. Permittees could minimize effects of closed roads on grazing management time by seeking variances from the BLM for temporary use of specific closed roads.

Effects of the Alternatives

Under Alternative A, 60.5 miles of roads and trails would remain open. The effects would continue as described above.

All action alternatives would close or decommission more roads and trails than Alternative A. As more roads and trails are closed, noxious and invasive weed spread along with multiple user conflicts would be reduced. On the other hand, permittee management time may increase. Consequently, more effects as described under the Effects Common to All Alternatives section would occur under Alternative C (23.5 miles open during grazing season, 36.9 miles closed or decommissioned) than under any other alternative. Alternative B (28.8 miles open during grazing season, 31.7 miles closed or decommissioned) would produce fewer effects than Alternative C, but more than Alternative A or Alternative D (38.1 miles open during grazing season, 23.3 miles closed or decommissioned). Alternative D would have fewer effects than Alternatives B or C, but more than Alternative A.

Cumulative Effects on Livestock Grazing

Livestock grazing will continue in the area and has the potential to impact forage quality and quantity. On public lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain forage quality and quantity. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, forage conditions would benefit.

The Boulder complex fires of 2000 burned parts of the High Ore, Boomerang, Spring Creek, and Amazon watersheds. The burn encouraged noxious and invasive weed spread in some areas. On the other hand, many grasslands were improved with the reduction of conifers. Forage production (for livestock and wildlife) increased substantially.

Because BLM lands make up only 24 percent of all lands in the Boulder/Jefferson City TPA, all of the BLM travel plan alternatives would have a minor contribution to cumulative effects on livestock grazing at the scale of the entire TPA.

MINERALS

Effects Common to All Alternatives

Road closures and decommissioning could affect access to locatable minerals in areas of moderate or high mineral potential. Operators would be required to seek travel variances from the BLM to use motor vehicles to conduct mineral exploration on closed roads, or to conduct exploration on seasonally restricted routes during the season of closure. Decommissioned roads could not be used for motorized exploration. Travel management provisions that require a permit or variance could result in reducing access to mining claims or interfere with the ability to conduct exploration work for some operators. Historic knowledge of mineralized areas associated with “closed” roads may be lost after long periods of time if no exploration occurs there. Additional costs and time could be required for exploration and development of mining projects associated with closed or decommissioned roads. Impacts of road closures or decommissioning in areas with low mineral potential would not be substantial to mineral development.

Effects of the Alternatives

All of the roads in the Boulder/Jefferson City TPA are located in areas rated as having high mineral potential by the Montana Bureau of Mines and Geology.

Effects of the alternatives for the Boulder/Jefferson City TPA on access to mineralized areas are summarized in

Table 4-84. Alternative A for the Boulder/Jefferson City TPA would not impact roads in mineralized areas as all roads would remain open yearlong under this alternative.

Table 4-84 Analysis of Access to Mineral Potential Areas Boulder/Jefferson City TPA				
Mineral Potential	Open Miles (%)	Seasonally Restricted Miles (%)	Closed Miles (%)	Decom Miles (%)
Alternative A				
High	60.5 (100%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Moderate	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Low	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Total Miles = 60.5				
Alternative B				
High	3.7 (6%)	25.1 (41%)	29.0 (48%)	2.7 (5%)
Moderate	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Low to none	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Total Miles = 60.5				
Alternative C				
High	3.0 (5%)	20.5 (34%)	34.2 (56%)	2.7 (5%)
Moderate	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Low to none	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Total Miles = 60.5				
Alternative D				
High	5.3 (9%)	31.8 (53%)	20.6 (34%)	2.7 (4%)
Moderate	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Low to none	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
Total Miles = 60.5				
Mineral Potential areas have been delineated by the Montana Bureau of Mines and Geology (MBMG)				

Alternative B would seasonally restrict access to 39 percent of these roads, close 50 percent of them, and decommission an additional 5 percent (**Table 4-84**). Alternative B would have more impacts than Alternative A.

Alternative C would seasonally restrict access to 34 percent of these roads, close 56 percent of them, and decommission an additional 5 percent (**Table 4-84**). Alternative C would have the most potential to affect access to mineralized areas than any of the other alternatives.

Alternative D would seasonally restrict access to 53 percent of these roads, close 34 percent of them, and de-

commission an additional 4 percent (**Table 4-84**). Alternative D would have more impacts than Alternative A, but less than Alternatives B and C.

Cumulative Effects on Access to Mineralized Areas

No other past, present, or reasonably foreseeable future actions in the Boulder/Jefferson City TPA would adversely affect mineral availability or access.

RECREATION

Effects of travel plan alternatives on Recreation in the Boulder/Jefferson City TPA are described qualitatively below.

Effects of Alternative A

Under Alternative A, all BLM managed routes in the Boulder-Jefferson City travel planning area would continue to be managed as open yearlong (60.5 miles). No non-motorized routes or trails would be available under this alternative. Snowmobile use would continue to be managed as open to area-wide cross country travel as well as travel on all existing routes (during the season of use, 12/2-5/15, conditions permitting).

Effects of Alternative B

Alternative B would provide a more balanced approach towards travel management, and should help reduce user conflicts compared to Alternative A. Under Alternative B, 28.8 miles of routes (3.7 miles open yearlong, 25.1 miles seasonally restricted) would be available for wheeled motorized use.

Area-wide cross-country snowmobile use would be allowed, as well as travel on all existing routes during the season of use, 12/2-5/15, conditions permitting. Conflicts between cross-country skiers, snowshoers, and snowmobilers would be expected to continue or increase as a result.

Effects of Alternative C

Alternative C would provide the least amount of motorized wheeled access among the action alternatives. Under Alternative C, 23.5 miles of routes would be available for wheeled motorized use (3.0 open yearlong, 20.5 miles seasonally restricted). Closure and decommissioning of routes in the southwest corner of the TPA would help create a non-motorized use area. Snowmobile use would be restricted to designated routes only, during the season of use (12/2-5/15), snow conditions permitting; reducing conflicts between motorized and non-motorized winter users.

Effects of Alternative D

Alternative D would provide the highest level of motorized wheeled access among the action alternatives. Under Alternative D, 38.1 miles of routes would be availa-

ble for wheeled motorized use (5.3 open yearlong, 20.5 miles seasonally restricted). Area wide cross-country snowmobile use would continue to be allowed, as well as travel on all existing routes during the season of use (12/2-5/15), snow conditions permitting.

Cumulative Effects on Recreation

This area presents management challenges given the fragmented BLM ownership pattern and the lack legal access roads. Many of the currently open roads result from historic mining activities and are dead-end segments that do not provide loop riding opportunities. Alternative A would provide the greatest opportunities for motorized recreation given the miles of routes available to wheeled vehicles and that the entire area would remain open to snowmobile use during the winter season. Conflicts between motorized and non-motorized users especially during the hunting season would continue.

Alternative B would reduce wheeled motorized riding opportunities on BLM lands by about 55 percent while snowmobile uses would continue unaffected. These additional travel plan restrictions would help reduce recreation use conflicts and should improve non-motorized opportunities for hunting, horseback riding, mountain biking and hiking. Many of the roads proposed for closure under this alternative are primitive, not maintained, have no legal access through private lands, and are duplicative of other roads left open. Increased trends in resource uses such as greater mining activities and vegetative treatments would increase impacts on the natural qualities of the Recreation Opportunity Spectrum settings which are primarily roaded natural and roaded modified.

Alternative C would promote non-motorized opportunities to the greatest extent of all alternatives given the added road closures from travel management, Recreation Opportunity Spectrum settings, and mineral related stipulations. Big-game hunting opportunities for non-motorized users could be enhanced as conditions would be more favorable for elk retention on public lands.

Alternative D would provide the highest level of motorized wheeled access among the action alternatives. Potential for conflicts between motorized and non-motorized users especially during the hunting season would be higher than under Alternatives B and C.

TRAVEL MANAGEMENT AND ACCESS

Effects of Alternative A

Under Alternative A all BLM roads in the Boulder-Jefferson City TPA would continue to be managed as open yearlong (60.5 miles) (**Table 4-85**). This is about 90 percent more routes open yearlong than under the action alternatives and 37 percent more routes open to motorized use when considering both open routes and routes with seasonally restricted access. Non-motorized

trails are not available, which would result in fewer recreation opportunities for non-motorized users.

Snowmobile use would continue to be managed as open to area-wide cross country use as well as use on all existing routes (during the season of use, 12/2-5/15, conditions permitting); providing the greatest opportunity for motorized winter use while providing the fewest opportunities for non-motorized winter recreation of all alternatives.

The extent of management activities and costs under Alternative A would be mixed. Less personnel time would be required to monitor travel compliance than under the action alternatives. However, more effort would be required for initial implementation (signing designated routes, installing bulletin boards) than under the action alternatives. Estimated costs for road/trail maintenance would be highest of all alternatives.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be minimal under this alternative, given the availability of motorized access.

Effects of Alternative B

Less than half the wheeled motorized routes would be open yearlong or seasonally restricted than are currently available in the Boulder-Jefferson City TPA (Table 4-85). With 31.7 miles of non-motorized trails, Alternative B would provide more opportunities for non-motorized users than Alternative A. The majority of open routes under Alternative B would be seasonally restricted with a 12/2-5/15 closure.

Table 4-85 Boulder-Jefferson City TPA Route Management Summary				
Proposed Management	Total Miles			
	Alt A	Alt B	Alt C	Alt D
Wheeled motorized routes				
Open Yearlong	60.5	3.7	3.0	5.3
Seasonally Restricted	0	25.1	20.5	32.8
Closed	0	29.0	34.2	20.6
Decommissioned	0	2.7	2.7	2.7
Non-motorized trails ¹	0	31.7	36.9	2.4

¹ Non-motorized trails include all existing trails, closed roads, and decommissioned roads.

Area-wide cross-country snowmobile use, as well as travel on all existing routes during the season of use (12/2-5/15), conditions permitting would continue to be allowed in all the action alternatives. Conflicts between non-motorized users (cross-country skiers, snowshoers) and snowmobilers would be expected to continue or increase as a result.

The extent of management activities and costs under Alternative B would be mixed. Less personnel time would be required for initial implementation (signing designated routes, installing bulletin boards) than under Alternative A. However, more effort would be required for public education and compliance than under Alternative A. Estimated costs for road/trail maintenance would be less than under Alternative A.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would increase under Alternative B compared to Alternative A.

Effects of Alternative C

Alternative C would have the least number of wheeled motorized routes open yearlong or seasonally restricted of all alternatives in the Boulder-Jefferson City TPA (Table 4-85) which would result in fewer opportunities for motorized users. Alternative C would have 61 percent fewer motorized miles than Alternative A, and 18 percent fewer miles than Alternative B.

Snowmobile use would be restricted to designated routes only, during the season of use (12/2-5/15), snow conditions permitting. This would likely reduce conflicts with non-motorized winter users (cross-country skiing, snowshoeing).

Closure and decommissioning of routes in the southwest corner of the Boulder-Jefferson City TPA would result in an increase in non-motorized opportunities under Alternative C. Alternative C would have 12 percent more miles of non-motorized trails than Alternative B. No non-motorized trails would exist under Alternative A.

The extent of management activities and costs under Alternative C would be mixed. Less personnel time would be required for initial implementation (signing designated routes, installing bulletin boards) than under any other alternative. However, more effort would be required for public education and compliance than under the other alternatives. Estimated costs for road/trail maintenance would be the lowest of the alternatives.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be the greatest under Alternative C of all the alternatives.

Effects of Alternative D

Alternative D would provide the highest level of motorized access of the action alternatives with 38.1 miles of open and seasonally restricted routes (Table 4-85). This would be 61 percent less than under Alternative A, but 24 and 38 percent more than under Alternatives B and C, respectively. Opportunities for motorized users in the Boulder-Jefferson City TPA would be greater under Alternative D than under Alternatives B and C, but less than under Alternative A.

Area-wide cross-country snowmobile use would continue to be allowed, as well as travel on all existing routes during the season of use (12/2-5/15) conditions permitting.

The extent of management activities and costs under Alternative D would be mixed. Less personnel time would be required to monitor travel compliance than under Alternatives B and D, but more would be needed than under Alternative A. However, more effort would be required for initial implementation (signing designated routes, installing bulletin boards) than under Alternatives B and D, but less effort would be needed than under Alternative A. Estimated costs for road/trail maintenance would be higher than under the other action alternatives, but less than under Alternative A.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be greater under Alternative D than under Alternative A, but less than under Alternatives B and C.

Cumulative Effects on Travel Management and Access

Under all alternatives, there are a number of past, present, and reasonably foreseeable future BLM and non-BLM actions that could affect travel management and access in the Boulder/Jefferson City TPA.

The Boulder-Jefferson City TPA is located adjacent to the upper Boulder Valley. Human population growth for the upper Boulder Valley (Boulder town statistics) is approximately 2 percent per year. This rate of growth is expected to continue, along with increased recreational use from local residents as well as area users (residents of Helena, Townsend, Butte, etc.).

The small towns of Boulder (population 1,436) and Jefferson City (population 295) are located adjacent to the TPA. Although the rate of growth is low, increased urbanization and recreational use could lead to increased social conflict; between area residents and recreation users, and among recreational users themselves (motorized/non-motorized). These factors could lead to increased public demands to alter travel management to accommodate more, or less motorized use.

Recreational activities for this TPA include big game hunting, motorized OHV travel (motorcycles, ATVs, snowmobiles), and to a lesser extent, non-motorized uses (hiking, horseback riding, and mountain biking). Conflicts between non-motorized and motorized users could lead to increased public demands for either more, or less motorized use.

The TPA mainly provides habitat for big game. The entire area is considered winter range for elk while the lower elevations along the eastern half of the travel plan are winter range for mule deer. Concerns could lead to the need to restrict motorized use.

In some site specific cases, visual resource management may affect or restrict new road/trail construction.

Applications for right-of-way permits to access private property or for commercial development are likely to increase in the future. As a result, public access to BLM lands, via the rights-of-way, could increase as well.

Limits or reductions in the BLM's funding and ability to maintain designated routes could lead to an overall reduction in maintained open road miles.

A variety of resource management projects, such as BLM initiated vegetation treatments, or wildland fire fuels reduction projects, could affect travel management. BLM forest management activities from 1984 to present include 690 acres of fire replanting, 559 acres of timber salvage, and 266 acres of timber harvest. Future activities may include approximately 650 acres of forest and woodland treatment (thinning, selective harvest). There are no wildland fire fuels reduction activities planned for this area at this time. Depending on the type and scope of project, effects could vary from temporary, short-term area/route closures, to new opportunities (new routes) for motorized or non-motorized access.

The TPA has a rich history of mining for lead, zinc, gold, copper, and silver. With the exception of the Montana Tunnels Mine, the remaining mines are no longer active. The Montana Tunnels Mine (located near Jefferson City) continues to produce lead and zinc with associated gold and silver from an open pit. Increases in mineral prices could lead to additional increased or renewed mining activity. Depending on the type and scope of mining activity, effects could vary from temporary, short-term area/route closures, to increased opportunities (new routes) for motorized or non-motorized access.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the TPA. Motorized activities play a large role in the distribution of noxious weeds. Concerns over the spread of noxious weeds may lead to public demands to impose motorized travel restrictions.

Motorized use on dirt roads and trails is a major contributor to soil erosion and stream sedimentation. These concerns may influence travel management, and result in fewer motorized opportunities.

Most illegal activities (trash dumping, drug use, underage alcohol use, unattended camp fires, vandalism, etc.) are directly associated with motorized use. Increases in illegal activity may lead to public demands to alter travel management and impose motorized travel or other restrictions (site specific management).

For perspective, BLM managed lands represent approximately 24 percent of the total travel planning area (60,418 total acres, 14,487 BLM acres); while BLM managed routes represent approximately 15.4 percent of the total routes available (392 total miles, 60.5 miles BLM roads/trails under Alternative A). Future travel

management (for all agencies, nationwide) is likely to lead to fewer opportunities for motorized recreational use than under current management (particularly for OHV use). As a result, BLM routes available to motorized use in this TPA could experience increased use from displaced users, eventually leading to more concentrated use, increased resource impacts, and user conflicts. These impacts could lead to demands from motorized users for additional routes, and conversely, demands from non-motorized users for fewer routes.

Under all alternatives, increases in human population, urbanization, recreation use, user conflicts; and concerns for wildlife, noxious weed spread, soil erosion/water quality, and illegal activities may lead to increased demands to restrict motorized travel, particularly in the areas adjacent to Boulder and Jefferson City. Under Alternative A, these conflicts would likely increase. Under Alternative B these pressures would have less impact on travel management than under Alternatives A and D, due to the overall reduction in motorized opportunities and separation of motorized and non-motorized uses. Under Alternative C these pressures would have the least impact on travel management than under the other alternatives, due to the reduction in motorized opportunities. Alternative D would lessen conflicts associated with these pressures compared to Alternative A, but not as much as Alternatives B and C.

TRANSPORTATION FACILITIES

For the sake of this discussion, “open” roads include roads that are open yearlong as well as those that are open with seasonal restrictions.

Effects of Alternative A

Under Alternative A, the Boulder/Jefferson City TPA would have 60.5 miles of open roads and no motorized trails (see **Table 4-86** on page 624).

Estimated costs for annual maintenance and stabilization of roads under Alternative A would be higher than under the action alternatives because of the increased number of roads. Estimated annual costs for monitoring and compliance, and weed control would also be higher under Alternative A than under the action alternatives.

Effects of Alternative B

Under Alternative B, the Boulder/Jefferson City TPA would have 28.5 miles of open roads and no motorized trails (**Table 4-86**). Estimated costs for annual maintenance and stabilization of roads under Alternative B would be less than under Alternatives A and D and more than under Alternative C due to the reduction in motorized access. Estimated annual costs for monitoring, compliance, and weed control would also be less than under Alternative A, and similar to Alternatives C and D.

Classification/ Cost	Alt A	Alt B	Alt C	Alt D
Miles of Open/ Restricted Roads	60.5	28.5	23.5	38.1
Motorized Trails	0	0	0	0
Annual Roads Maintenance	\$4,840	\$2,184	\$1,880	\$3,048
Annual Trails Maintenance	\$0	\$0	\$0	\$0
Periodic Road Stabilization	\$1,936	\$874	\$752	\$1,219
Periodic Trails Stabilization	\$0	\$0	\$0	\$0
Monitoring/ Compliance	\$3,025	\$1,365	\$1,175	\$1,905
Weed Control	\$908	\$410	\$353	\$572

Effects of Alternative C

Under Alternative C, the Boulder/Jefferson City TPA would have 23.5 miles of open roads and no motorized trails (**Table 4-86**). Estimated costs for annual maintenance and stabilization of roads under Alternative C would be the least of all the alternatives due to the least number of motorized routes. Estimated annual costs for monitoring, compliance, and weed control would also be less than under the other alternatives.

Closing the southwest corner of the Boulder/Jefferson City TPA to motorized use and the entire TPA to cross-country snowmobile travel would result in an increase in transportation facility costs for additional signage and sign maintenance.

Effects of Alternative D

Under Alternative D, the Boulder/Jefferson City TPA would have 38.1 miles of open roads and no motorized trails (**Table 4-86**). Estimated costs for annual maintenance and periodic stabilization of roads under Alternative D would be greater than under Alternatives B and C, but less than under Alternative A. Estimated annual costs for monitoring, compliance and weed control would also be less under Alternative D than under Alternative A and more than under Alternatives B and C.

LANDS AND REALTY

Effects Common to All Alternatives

The Butte Field Office administers approximately 62 rights-of-way (ROW), and one Recreation and Public Purpose (R&PP) Lease within the boundaries of the Boulder/Jefferson City TPA, which encumber approximately 2,036 acres of BLM land (**Table 4-87**). Various types of road rights-of-way are the most common type of grant, accounting for 42 percent, or just under half of the

total. Other types of authorized uses include: oil and gas pipelines, lines for electrical distribution and telephone facilities, communication sites, ditches, railroads, and mineral material sites.

Type	Approximate Number	Approximate Acres
Roads	26	1,256
Power	11	682
Telephone	9	40
O&G Pipelines	2	7
Comm. Sites	7	5
R&PP Lease	1	39
Other	7	7
Totals	63	2,036

Approximately three right-of-way applications for new facilities as well as amendments, assignments, renewals, or relinquishments of existing right-of-way grants are processed annually in the TPA. This would not vary by alternative.

The general trend of granting rights-of-way is expected to increase through the planning period as a result of increasing public demands. From a cumulative effects standpoint, development of adjacent federal, state and private land, increased recreational use and the trend of homeownership away from urban areas, coupled with traditional on-going uses, are all expected to require more guaranteed access involving public land, including BLM lands.

SPECIAL DESIGNATIONS

There would be no effects to any special designation areas such as Wild and Scenic Rivers, Wilderness Study Areas, or Areas of Critical Environmental Concern under any of the travel plan alternatives for the Boulder/Jefferson TPA.

UPPER BIG HOLE RIVER TPA

The Upper Big Hole River TPA is a relatively long, narrow shaped area (approximately 60 by 18 miles) located in the southwest portion of the Butte Field Office. This 357,275-acre TPA contains approximately 63,108 acres of BLM land. It includes BLM lands located along the north and south banks of the Upper Big Hole River as well as a large contiguous section located east of Interstate-15, near the town of Divide. A large contiguous section extends south from Divide to the town of Melrose and includes the Humbug Spires Primitive Area. There are approximately 165 miles of BLM roads, making up about 12.6 percent of the approximate total of 1,309 road miles in the TPA. The majority of roads lie on private (540 miles) and Forest Service (459 miles) lands.

AIR QUALITY

Effects Common to All Alternatives

Motorized recreation use is expected to continue to increase, resulting in higher levels of vehicle emissions.

Motorized travel across dry unpaved routes or trails would continue to produce airborne dust.

There could be areas with localized air pollution as a result of higher use numbers, and more concentrated use on fewer miles of available routes.

Drier climate conditions could make soils more susceptible to the effects of motorized travel, resulting in higher levels of airborne dust.

Impacts to air quality vary by alternative and travel plan area. In general, alternatives that reduce the level of motorized use (have fewer available miles) could have a positive impact on air quality; while alternatives that maintain or increase the level of motorized use, could lead to increased air quality impacts. This would not necessarily be a direct relationship, however, because reduction in available road miles for motorized use could redistribute use or focus more use on remaining open routes.

Under all alternatives, impacts from airborne dust could be reduced through mitigation such as hardening native surface roads with gravel or periodically spraying them with water trucks during the dry season. During BLM project work, in addition to watering native surface roadbeds, speed limits could be reduced to further minimize dust emissions.

Effects of the Alternatives

Under Alternative A (present management), adverse impacts to air quality would be expected to continue, and likely increase, concurrent with higher levels of motorized recreational use. Each of the action alternatives, however, would provide fewer available motorized routes. Alternatives B and C would provide 47 percent and 62 percent fewer motorized routes, respectively, than Alternative A, while Alternative D would provide 39 percent fewer routes than Alternative A. As a result, airborne dust and vehicle emissions would be taking place on fewer BLM routes and could be reduced.

It should be noted that even without motorized use, airborne dust, resulting from wind erosion of exposed dirt surface roads will continue. Therefore, travel plans with more miles of native surface roads will result in more airborne dust.

Under all alternatives, mitigation measures, such as graveling and/or watering native surface roads, could reduce dust emissions even further, and/or help offset the effects of increased or concentrated use on the remaining open routes.

Cumulative Effects on Air Quality

Under all alternatives, the cumulative effects to air quality from travel management in the Upper Big Hole TPA would arise from a number of past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands.

For perspective, BLM managed lands in the Upper Big Hole TPA area represent approximately 17.7 percent of the total travel planning area (357,275 total acres; 63,108 BLM acres). Under present management (Alternative A) BLM managed routes represent approximately 17.7 percent, of the total routes available (1,309 total miles; 165 miles of BLM roads/trails). Potential air quality impacts associated with activities on non-BLM lands and roads would be a greater contributor to cumulative effects to air quality than activities on BLM lands and roads.

In the past, prior to the 2003 Statewide OHV ROD, BLM management allowed unrestricted cross country travel by all forms of wheeled motorized use. Under present management, in the absence of other existing travel plan direction, all motorized wheeled travel is restricted to existing roads and trails. Under current management, approximately 158 miles of the existing BLM routes are available for motorized use. This mileage available for use would be reduced under the action alternatives as described above with associated potential differences in effects to air quality.

Under all alternatives, cumulative increases in human population, urbanization, recreation use, user conflicts; and concerns for wildlife, noxious weed spread, soil erosion, air/water quality, and illegal activities may lead to increased demands to restrict motorized travel.

SOILS

Effects Common to All Alternatives

Road construction, use, and maintenance affect soils in a number of ways. Soils are often compacted by these activities. Soil compaction can lessen the amount of precipitation that can infiltrate into soil and increase runoff, erosion, and sedimentation – in turn decreasing soil/site stability and hydrologic function, as well as soil productivity and plant vigor and diversity.

Ground disturbance associated with road construction, use, and maintenance can result in erosion. Erosion affects soil/site stability and hydrologic function. Erosion and sedimentation can destabilize the surface and sub-surface cohesion of the soil, resulting in soil loss from erosion sites. Loss of soil can impede or prevent establishment and development of vegetation communities.

Closing or decommissioning roads often leads to beneficial effects to soils through decreased site disturbance and re-establishment of vegetative cover on road surfaces. This tends to reduce soil erosion and stabilize soils.

Decommissioning roads may in some cases entail ripping road surfaces to de-compact them, thus improving water infiltration, hydrologic function, and the ability of the treated area to revegetate more successfully.

Impacts to soils associated with site-specific travel plan alternatives were assessed based on the potential for soil erosion using the following erosion risk criteria:

- High – the area a route travels through has slopes greater than 30 percent gradient.
- Moderate – the area a route travels through has slopes ranging from 15 to 30 percent gradient; or, for granitic soils, slopes ranging from 0 to 30 percent gradient.
- Low – the area a route travels through has slopes ranging from zero to 15 percent gradient and soils are not granitic in origin.
- Unrated – road mapping not available at time of erosion impact rating.

Effects of the Alternatives

The distribution of road miles by erosion risk category and by proposed road management category for all the alternatives is shown for the Upper Big Hole River TPA in **Table 4-88**. Roads in the “unrated” category were excluded from detailed consideration and are shown for the purpose of displaying the extent of lacking information.

Because much of the terrain in this TPA is gentle to moderate in slope, most of the BLM roads are in either the low or moderate erosion categories. Under current conditions (Alternative A) approximately 5.6 miles of open BLM roads are located in areas with high erosion risk, and 60.7 miles are in moderate erosion areas. Soil erosion would be reduced under Alternative B because this alternative would reduce those mileages in the high and moderate erosion categories to 2.4 miles and 25.2 miles, respectively. Approximately 26.7 miles of road in the high and moderate classes combined would be closed under Alternative B with an additional 14.4 miles in these categories being decommissioned. Vegetative recovery should occur to varying degrees on closed and decommissioned roads, with a beneficial effect on soils of reducing erosion from these areas.

Soil erosion would be reduced under Alternative C more than under any other alternative because the lowest mileage of roads in the high and moderate erosion categories would be left open (17.0 miles combined), while the greatest mileage in these categories would be closed (32.9 miles combined) of all alternatives. An additional 16.9 miles in these categories would be decommissioned under Alternative C, more than under any other alternative.

Soil erosion associated with roads would be reduced under Alternative D compared to Alternative A, but

Table 4-88
BLM Road Miles in Soil Erosion Impact Categories by Alternative for the Upper Big Hole River TPA
(mileages are GIS-generated estimates)

Proposed Road Management	Erosion Risk Category	Alternative A	Alternative B	Alternative C	Alternative D
Open Road Miles (incl. Open w/restrictions)	High	5.6	2.4	2.4	2.4
	Moderate	60.7	25.2	14.6	38.1
	Low	81.4	50.2	40.8	60.3
	Other	10.2	3.1	3.2	3.0
Closed Road Miles	High	0	2.9	2.9	2.9
	Moderate	3.3	23.8	30.0	13.0
	Low	1.2	14.9	25.7	7.5
	Other	2.9	9.9	10.6	9.8
Decommissioned Road Miles	High	0	0.2	0.2	0.2
	Moderate	0	14.2	16.7	12.9
	Low	0	14.0	16.5	12.4
	Other	0	0.1	0.1	0.1

Note: Open roads include seasonally open roads as well as roads open yearlong.

would still be higher than under either Alternative B or C. Approximately 40.5 miles of BLM road in the moderate and high erosion categories combined would remain open under Alternative D, while about 15.9 miles in these categories would be closed and 13.1 miles would be decommissioned under this alternative.

Cumulative Effects on Soils

Cumulative effects to soils in the Upper Big Hole River TPA would arise from a number of past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands. Within this 357,275-acre TPA, BLM lands comprise about 63,108 acres or 18 percent of total lands. The approximately 165 miles of BLM roads make up about 13 percent of the approximately 1,309 road miles in the TPA. Therefore road-related effects to soils described by alternative for BLM roads would affect about 13 percent of all roads in the TPA. The majority of lands (and roads) within the TPA boundary are either private property or public lands administered by the Forest Service. Non-BLM roads are managed by the county, Forest Service, state, and private landowners.

Approximately 6,805 BLM acres are permitted for various rights-of-way and leases. About 2,907 of these acres are for specific road rights-of-way primarily to private landowners. An additional 2,986 acres are associated with railroads and road rights-of-way to the Forest Service. The remainders are associated with powerlines, waterlines, communication sites, oil and gas pipelines, and other utility facilities. Impacts to soils range from compaction and occupation of ground with buildings, roadbeds, and other facilities, to revegetation and ground cover being re-established to stabilize soils.

From 1984 to 1995, timber harvest occurred on approximately 57 acres of BLM lands in this TPA. An addition

189 BLM acres have undergone timber harvest from 1995 to the present. Most of this activity has been selective harvest. Adverse effects on soils from these treatments were generally minor with treated areas having undergone revegetation and soil stabilization since treatment.

Approximately 430 acres of selective timber harvest is foreseeable on BLM lands over the next several years. This harvest would be located in Wildland Urban Interface areas where a mountain pine beetle epidemic is killing many lodgepole pine trees. Effects to soils from this project would likely be minor, possibly with localized areas of erosion or compaction. Timber harvest has also occurred on private and Forest Service lands and will likely continue for the foreseeable future, having localized compaction and erosion effects on soils.

From 1981 to 2004, wildland fire has burned across approximately 230 acres in the Upper Big Hole River TPA, having a range of soil effects with more severely burned areas experiencing localized erosion while less severely burned areas underwent relatively little effect to soils.

Over the past 10 years, approximately 474 acres of BLM land have undergone prescribed fire treatments while an additional 141 acres have undergone mechanical treatments. These treatments occurred in the Jerry Creek and Dickie Hills areas. Overall these projects generally had minor adverse effects on soils as treatment areas have revegetated and soils have stabilized. Within the next several years, BLM plans to implement 2,087 acres of mechanical treatment and 2,659 acres of prescribed fire with the Highland Mountain project in this TPA. BLM is currently planning an additional project to reduce fuels and restore vegetation communities on 500 to 2,000 acres with a combination of mechanical treatments and

prescribed fire. These treatments would generally have minor adverse effects on soils. Prescribed burning would occur under conditions where fire severity and intensity would be low, thereby minimizing adverse effects to soils. All treatments would minimize compaction so as to promote vegetative recovery. Fuels treatments conducted on private and Forest Service lands will likely occur for the foreseeable future with variable effects to soils. Reducing fuels under the controlled conditions of deliberate treatments may benefit soils in the long-term by reducing the risk of high severity fires in treated areas.

Livestock grazing on public and private lands throughout much of the TPA has created areas of localized soil erosion and compaction, particularly in grassland and shrubland areas. This will continue to occur for the foreseeable future.

Increasing residential development will likely continue for the foreseeable future to variable degrees within the TPA. Erosion, compaction, and covering of soils would occur due to additional road construction, clearing/leveling for home sites, and establishment of utility infrastructure for residential developments.

Under Alternative A, the contribution to cumulative effects on soils from BLM road management would continue as it occurs today. Retaining approximately 70 miles of road open yearlong and an additional 88 miles open with various seasonal restrictions would allow for the same level of compaction and erosion impacts that currently exist.

From a BLM road management perspective, all action alternatives would benefit soil resources compared to Alternative A. Alternative B would benefit soils by providing for a reduced contribution to adverse cumulative effects than would Alternative A because about 48 percent of BLM roads would be closed or decommissioned under Alternative B (compared to about 4 percent under Alternative A). Erosion should be reduced on these closed/decommissioned roads as disturbance is eliminated and soils stabilize.

Alternative C would benefit soils the most and provide for the least contribution to adverse cumulative effects on soils of all alternatives. This alternative would provide for closure or decommissioning of about 62 percent of BLM roads in the TPA, thus allowing these areas to vegetatively recover and stabilize soils.

Alternative D would provide for the greatest contribution to adverse cumulative effects on soils of the action alternatives, but would still provide for greater long-term benefits to soils than Alternative A. Alternative D would provide for closure or decommissioning (and therefore vegetative recovery and soil stabilization) of about 36 percent of BLM roads in the TPA, compared to 4 percent for Alternative A, 48 percent for Alternative B, and 62 percent for Alternative C.

Overall, due to the scattered distribution and relatively small proportion of BLM lands (18 percent) and roads (13 percent) relative to the total quantities of lands and roads in the TPA, none of the BLM alternatives would substantially contribute to cumulative effects on soils at the scale of the Upper Big Hole River TPA.

WATER RESOURCES

Effects Common to All Alternatives

There are a number of key concepts that are critical to understanding road effects to water resources.

Hydrologic function is an interaction between soil, water, and vegetation, and reflects the capacity of a site to:

- Capture, store, and safely release water from rainfall, runoff, and snowmelt;
- Resist a reduction in this capacity; and
- Recover this capacity following degradation.

Interception of precipitation results when precipitation falls on vegetation. When vegetation is removed, precipitation falls directly on the soil. This can increase surface erosion and sedimentation, and decrease the amount of time between initial precipitation arrival and peak surface runoff – in turn decreasing soil/site stability and hydrologic function. Roads remove vegetation and therefore decrease interception of precipitation.

Infiltration is the process of precipitation entering and traveling through soil. Infiltration reduces the peak runoff during precipitation events by extending the period of runoff after a precipitation event. Infiltration also filters precipitation and reduces erosion and sedimentation. If infiltration is reduced, runoff and erosion will increase and hydrologic function will decrease. Generally, roads are compacted surfaces that have decreased infiltration, thus increasing runoff and potentially increasing erosion.

Runoff can affect the amount of erosion and sedimentation, as well as flooding – both onsite and offsite. If runoff is increased, all of these effects can increase with a result that water quality and hydrologic function will decrease.

Increased sediment entering waterbodies increases turbidity, increases width-to-depth ratios, and consequently increases temperature and dissolved oxygen saturation levels, and creates adverse habitat for aquatic animals and plants.

Alteration of flow routing can also affect water resources. For example, roadcuts into areas with relatively shallow groundwater can intercept groundwater, bring it to the surface, and transport it some distance (i.e. in a roadside ditch) before delivering it to a stream. This can lead to erosion of road ditchlines and subsequent sedimentation of streams during runoff periods, or increased thermal loading of water before delivery to streams during summer periods.

Closure and decommissioning of roads tend to reduce erosion and sedimentation effects stemming from roads on water quality. During road decommissioning, items such as compaction, drainage, stream crossing culverts, and ground cover are often addressed in a manner that markedly improves hydrologic function. These features are not fully addressed on roads that are merely “closed”, but closed roads often gradually revegetate so as to reduce erosion and sedimentation effects to water quality.

Effects of the Alternatives

Generally, road density is an indicator of overall watershed health and function. Watersheds with higher road densities tend to have lower water quality due to greater disruption of hydrologic function (described above), and potential for erosion and subsequent sedimentation. Road density also is related to the distribution and spread of noxious weeds. **Table 4-89** shows acres of BLM land in three road density categories by alternative for the Upper Big Hole River TPA.

TPA Alternative	Road Density Category		
	Low (<1 mi/mi ²)	Moderate (1 - 2 mi/mi ²)	High (> 2 mi/mi ²)
Alternative A	19,646	18,204	25,357
Alternative B	20,592	19,534	23,080
Alternative C	21,461	19,506	22,245
Alternative D	20,579	19,353	23,276

These data reflect any differences between alternatives based on roads proposed for “decommissioning” by alternative. While many “closed” roads would gradually contribute to increased hydrologic function over time, decommissioned roads would more directly contribute to hydrologic function because measures aimed at restoring hydrologic function would likely be part of the treatment during decommissioning. Alternative A would have the greatest amount of BLM land (25,357 acres) with “high” road densities of greater than 2 mi/mi². Alternative C

would provide for the lowest acreage in the “high” category and the highest acreage in the “low” category of all alternatives. By this measure, Alternative C would benefit hydrologic function more than any other alternative, followed in sequence by Alternative B, then Alternative D. All action alternatives would improve hydrologic function compared to Alternative A.

Motorized routes within 300 feet of streams generally have greater potential to directly impact water quality through erosion and sedimentation, increased water temperatures (due to loss of shading vegetation), and direct alteration of stream channel morphology than those farther away. **Table 4-90** shows the miles of open and closed roads on BLM lands within 300 feet of streams by alternative. Under Alternative A there are about 7.9 miles of open road within 300 feet of fish bearing streams and 29.6 road miles within 300 feet of perennial non-fish bearing streams. Alternative C would provide for the greatest number of closed or decommissioned roads within 300 feet of streams of all the alternatives (total of 10.7 miles). Alternative B would provide for the next greatest mileage (8.5 miles), followed by Alternative D (6.7 miles). By this measure, Alternative C would provide the greatest benefit to water resources of all the alternatives followed by Alternative B, then Alternative D. Each action alternative would reduce effects from roads in close proximity to streams and improve water resources compared to Alternative A.

There is a specific route that fords the Big Hole River to access the Sawlog Gulch area. Under Alternative A, continual unrestricted year-long motorized use of this route would cause the most water quality impacts of erosion and disturbance to the river bed at this site relative to any other alternative. These effects would be localized to tens to feet of river length. Under Alternative B this route would only be open for game retrieval during hunting season. This would reduce its usage and would reduce water quality and river bed disturbance effects at that site. Under Alternative C, this route would be closed yearlong thus eliminating water resource effects altogether. Under Alternative D the route would be closed from 12/2 to 7/15 to avoid use during winter and subsequent spring runoff periods. Alternative D would pose the greatest effects to water resources at this site of any of the action alternatives.

	Perennial Fish-Bearing Streams		Perennial Non-Fish-Bearing Streams	
	Number of Open Road Miles	Number of Closed Road Miles	Number of Open Road Miles	Number of Closed Road Miles
Alternative A	7.9	0.1	29.6	0.8
Alternative B	7.6	0.4	21.6	8.1
Alternative C	6.7	1.3	21.0	9.4
Alternative D	7.6	0.4	24.1	6.3

Note: Open roads include seasonally open roads as well as roads open yearlong. Closed roads include decommissioned roads.

Cumulative Effects on Water Resources

Cumulative effects to soils in the Upper Big Hole River TPA would arise from a number of past, present, and reasonably foreseeable future actions on BLM lands as well as non-BLM lands. Within this 357,275-acre TPA, BLM lands comprise about 63,108 acres or 18 percent of total lands. The approximately 165 miles of BLM roads make up about 13 percent of the approximately 1,309 road miles in the TPA. Therefore road-related effects to water resources described by alternative for BLM roads would relate to effects associated with about 13 percent of all roads in the TPA. There are approximately 276 miles of fish bearing stream and an additional 223 miles of perennial non-fish bearing stream in the TPA. On BLM lands there are about 19 miles of fish bearing stream and 41 miles of perennial non-fish bearing stream. The majority of lands (and roads) within the TPA boundary are either private property or public lands administered by the Forest Service. Non-BLM roads are managed by the county, Forest Service, state, and private landowners.

A number of the main access roads (non-BLM) in the TPA follow valley bottoms and parallel streams. State Highway 43 along the Big Hole River proper is among these valley bottom roads. Many of these roads are directly affecting stream channel or floodplain function by filling or impinging on stream channels or floodplains, precluding the presence of riparian vegetation (including large woody material in forested locations), producing sedimentation in streams (from road surfaces, ditchlines, winter "road sanding" operations) and potentially increasing thermal loading by lessening streamside shade. In smaller streams these effects are dominant in shaping stream channel and water quality conditions in many areas and will continue into the foreseeable future. Effects of Highway 43 on the Big Hole River are more localized and generally less severe than effects of valley bottom roads on smaller streams.

Approximately 6,805 BLM acres are permitted for various rights-of-way and leases. About 2,907 of these acres are for specific road rights-of-way primarily to private landowners. An additional 2,986 acres are associated with railroads and road rights-of-way to the Forest Service. The remainders are associated with powerlines, waterlines, communication sites, oil and gas pipelines, and other utility facilities. Impacts to water resources are generally minor with some localized erosion and sedimentation and some contribution to decreased hydrologic function (decreased infiltration, increased runoff) due to compaction.

From 1984 to 1995, timber harvest occurred on approximately 57 acres of BLM lands in this TPA. An additional 189 BLM acres have undergone timber harvest from 1995 to the present. Most of this activity has been selective harvest. Adverse effects on water resources were minor from this activity. Approximately 430 acres of selective timber harvest is foreseeable on BLM lands

over the next several years. This harvest would be located in Wildland Urban Interface areas where a mountain pine beetle epidemic is killing many lodgepole pine trees. Effects to water resources from this project would likely be minor, possibly with localized areas of erosion and sedimentation.

Timber harvest has also occurred on private and Forest Service lands and will likely continue to have variable effects on water resources for the foreseeable future. Ground disturbance from these activities will have localized impacts to water resources including some sedimentation, loss of woody material recruitment for streams, and potential water temperature increases due to riparian shade loss.

From 1981 to 2004, wildland fire has burned across approximately 230 acres in the Upper Big Hole River TPA, having minor sedimentation effects on water resources.

Over the past 10 years, approximately 474 acres of BLM land have undergone prescribed fire treatments while an additional 141 acres have undergone mechanical treatments. These treatments occurred in the Jerry Creek and Dickie Hills areas. Overall these projects generally had minor adverse effects (erosion/sedimentation) on water resources. Within the next several years, BLM plans to implement 2,087 acres of mechanical treatment and 2,659 acres of prescribed fire with the Highland Mountain project in this TPA. BLM is currently planning an additional project to reduce fuels and restore vegetation communities on 500 to 2,000 acres with a combination of mechanical treatments and prescribed fire. These treatments would likely have minor adverse effects on water resources. Prescribed burning would occur under conditions where fire severity and intensity would be low so as to prevent scorching of soils and mortality of desirable vegetation. This should minimize erosion and sedimentation of water resources. All treatments would minimize compaction so as to retain hydrologic function. Fuels treatments conducted on private and Forest Service lands will also likely occur for the foreseeable future with variable effects to water resources. Effects of these treatments could be similar to timber harvest effects on these lands. Reducing fuels under the controlled conditions of deliberate treatments may benefit water resources in the long-term by reducing the risk of high severity fires that could have severe adverse water quality effects.

Increasing residential development will likely continue for the foreseeable future to some degree within the TPA, most notably in the Big Hole River valley bottom. Erosion, soil compaction, and runoff would likely increase due to additional road construction, clearing/leveling for home sites, and establishment of utility infrastructure for residential developments. Nutrient, chemical pollutant, and pathogen inputs to streams would also likely increase due to leaching from septic

systems, urban runoff (fertilizer, chemicals, and petroleum pollutants), and waste from livestock.

Livestock grazing on public and private lands throughout much of the Upper Big Hole River TPA has created areas of localized streambank trampling, soil erosion and compaction, and nutrient inputs to streams. In severe cases stream channel morphology may be altered due to severe loss of riparian vegetation, loss of streambank integrity, channel widening and shallowing, and substantial sediment inputs. These effects to water quality will continue to occur for the foreseeable future. Agricultural water withdrawals are a substantial impact to water resources in the Big Hole River itself. Government agencies and local entities regularly work with ranchers to minimize their agricultural withdrawals during summer low flow periods so as to minimize low flow effects on fish populations in the Big Hole River.

There are a number of streams identified as impaired on the MDEQ 303(d) list in the Upper Big Hole TPA. The Big Hole River itself (6.5 miles on BLM) is listed as impaired for heavy metal contamination, low flow alterations, physical habitat alterations, water temperature, and riparian vegetation alteration. Probable sources of impairment include irrigated crop production, mine tailings, abandoned mine lands, acid mine drainage, highways, channelization, riparian grazing, and streambank modification. These impacts will continue for the foreseeable future regardless of BLM road management in this TPA.

Camp Creek (1.8 miles on BLM) is listed as impaired for heavy metal contamination, sedimentation, low flow alterations and nutrient inputs with probable sources being riparian grazing, irrigated crop production, roads (valley bottom non-BLM road), and abandoned mine lands. Soap Gulch (5 miles on BLM) is impaired due to nutrient inputs, sedimentation, alteration of riparian vegetation with probable causes listed as riparian grazing, roads (valley bottom non-BLM road), and irrigated crop production. Though BLM does not manage the most impactive (valley bottom) road along Camp Creek, BLM does manage a considerable portion of the watersheds of both Soap Gulch and Camp Creek. BLM road management could make a considerable contribution to water resource conditions in these two streams. All three action alternatives (B, C, and D) would provide for the closure or decommissioning of some roads in each of these two drainages that would benefit water resources primarily by reducing sediment inputs. Alternative C would provide the most benefit, followed in sequence by Alternative B, then Alternative D.

Charcoal Gulch (1.3 miles on BLM) is impaired for nutrients and sedimentation with probable causes listed as riparian grazing and roads. Moose Creek (6 miles on BLM) is listed as impaired for low flow alterations due to irrigated crop production. Jerry Creek (0.4 mile on BLM) is impaired for alteration of riparian vegetation, excess algal growth, heavy metals, low flow alterations,

and physical habitat alterations. Probable causes of impairment are listed as riparian grazing, abandoned mine lands, timber harvest, agriculture, irrigated crop production, septic systems, and site clearance for land development. Deep Creek (0.9 mile on BLM) is listed as impaired for alteration of riparian vegetation, low flow alterations, and sedimentation. Probable causes are listed as streambank modification, irrigated crop production, and rangeland grazing. These impacts will continue for the foreseeable future. Impacts in these streams (except for Charcoal Gulch which has a valley bottom BLM road maintained in all alternatives), will continue for the foreseeable future regardless of BLM road management.

Overall, due to the scattered distribution and relatively small proportion of BLM lands (18 percent) and roads (13 percent) relative to the total quantities of lands and roads in the TPA, none of the BLM alternatives would substantially contribute to cumulative effects on water resources at the scale of the Upper Big Hole River TPA.

VEGETATIVE COMMUNITIES – FOREST RESOURCES AND FOREST AND WOODLAND PRODUCTS

Effects of the Alternatives

Under all alternatives, existing roads and roads built to access timber and forest product sales on BLM lands may encourage timber harvest and forest product sales on adjacent lands, particularly where landowners and other agencies looking to improve economic efficiency or opportunities in the management on their lands.

In general, vegetative treatment contractors tend to bid more readily on projects in areas with vehicle access or valuable products. BLM often prioritizes forest vegetation management activities such as forest products and forest protection actions (e.g. wildfire suppression and forest insect and disease control) in similar areas.

Rehabilitation of roads (decommissioning and in some cases road closure) would revegetate currently unvegetated roadbeds, which would increase vegetation biomass production on the landscape through colonization of sites with grasses, forbs, shrubs, and trees. Increases in revegetated area would occur at a rate of approximately 1.5 to 3 acres per mile of rehabilitated road. Eventually rehabilitated roads would support plant communities consistent with site potentials which would help resist weed invasions. However, road closures and removals (decommissioning) could make vegetation management treatments more difficult and costly, thereby inhibiting proposed treatments, reducing public access for product use and removal, and potentially slowing fire detection and suppression.

Under Alternative A there would be no increase in project analysis and implementation costs. However, under Alternative B approximately 48 percent (79.9 miles) of BLM roads would be closed or decommis-

sioned. Under Alternative C about 62 percent (102.8 miles) of roads would be closed or decommissioned, while under Alternative D about 36 percent (58.9 miles) of these roads would be closed or decommissioned. These closures would result in commensurate potential increases in vegetative analysis and treatment costs by alternative. These potential cost increases would be considered on a case by case basis by the BLM during project feasibility determinations, and additional funding may be needed to analyze and implement the projects that would remain feasible. Road closures could also result in potential decreases in quantities of forest products removed. Lack of road access could make small projects cost-prohibitive. Although temporary road building is still an option for access, slopes are generally steeper in the Upper Big Hole TPA as compared to other TPAs and may preclude road building. These limitations may increase the occurrence of helicopter logging and other non-traditional forms of product removal. Helicopters are a feasible access alternative in the Upper Big Hole TPA because forest products generally have higher value in this watershed and could absorb the increased cost of access. The extent of the road-related effects described above would be minimized because BLM would likely still be able to plan and implement projects in many areas on closed roads through the variance process for temporary road use. Road-related effects would be greatest under Alternative C, followed in sequence of decreasing effects by Alternative B, then Alternative D.

Roaded access to forested areas would also affect the gathering of firewood and other forest products by the general public. Most public parties prefer to drive close to areas of product removal so they do not have to carry products over long distances to their vehicles. Alternative A would have the greatest opportunity for firewood and other product removal with 70.6 miles of BLM road open yearlong and 88 additional miles open during summer. Alternative B would provide fewer opportunities than Alternative A with 26.9 miles of road open yearlong and 57.9 additional miles open during summer. Alternative C would provide the fewest opportunities of all alternatives with 19.2 miles of road open yearlong and an additional 40.8 miles open during summer. Alternative D (26.8 miles open yearlong, additional 70.6 miles open during summer) would provide more opportunities than Alternatives B and C, but fewer opportunities than Alternative A.

Cumulative Effects on Forest and Woodland Resources and Products

Forested vegetation in the Upper Big Hole TPA has been affected by past management on all land ownerships. Of the 63,108 acres of BLM owned land in the TPA, 246 were harvested since 1984. One hundred and twenty-six acres were also reforested. Currently, 430 acres are scheduled for insect control harvest in the Upper Big Hole TPA. Planning is also occurring on an additional approximately 1,000 BLM acres to implement forest

restoration harvests and burning. Treatments will result in more open, healthier forest stands. Some temporary roads and travel variances (to temporarily use closed roads) could be associated with these projects.

The Forest Service, with 143,778 acres in the TPA, also manages its forested resources through restoration projects including product removal and prescribed burning. These activities will likely continue in the future and promote healthier forest ecosystems in the planning area. Timber harvest will also continue on state and private ownerships, totaling 149,516 acres in the TPA.

The action alternatives could increase potential forested acreage by decommissioning roads and reclaiming approximately 64 acres under Alternative B, 75 acres under Alternative C, and 58 acres under Alternative D.

Although miles of access would be decreased with road decommissioning, trees have the potential to colonize these areas and provide for forest products in the future.

Currently western spruce budworm, mountain pine beetle, and Douglas-fir Beetle are present in forests within the Upper Big Hole TPA. These species are currently present at higher levels than experienced in the last twenty years and are resulting in widespread tree mortality. Endemic insect levels are expected to remain high in the future, with the bark beetle (mountain pine beetle and Douglas-fir Beetle) infestations peaking in the next several years. Even at lower population levels, these species can reduce forest health and individual tree vigor, sometimes resulting in tree mortality.

Forested vegetation in the Upper Big Hole TPA will also be affected by approximately 6,805 acres of rights-of-way and leases on BLM land. Forested vegetation located in these areas usually is harvested to accommodate the necessary access or facilities. Forest vegetation removal would occur on new authorizations in the future as necessary to maintain sight distances and safety clearances associated with roads and facilities.

Urbanization is expected to continue on the 115,567 acres of private land (28 percent of total acres) within the Upper Big Hole TPA. Forest products are commonly removed from these areas prior to permanent construction. Urbanization is likely to continue in the future and will affect forested vegetation at an unknown rate. As private construction increases, miles of road on private will most likely increase from the current 540 miles (41 percent of total in TPA).

Risk to forests from human-caused wildfires is commonly associated with open roads. Risk to forests from wildfire is greatest under Alternative A with 159 miles of BLM road open during the summer. Alternative B would have less risk of human-caused fire starts with about 81 miles of road open during summer. Alternative C would have the least risk to public forests with only 60 miles of road open during summer months. Alternative D (about 97 miles of road open during summer) would have more

risk than either Alternatives B or C, but less risk than Alternative A. Given that the majority of roads in the TPA (87.4 percent) are non-BLM roads, this contribution to reduced fire risk from BLM roads under the action alternatives is relatively small in the context of the entire TPA.

Since BLM roads constitute only 12.6 percent of all roads in this TPA, and BLM lands make up only 17.7 percent of all lands in the TPA, urbanization and activities on open non-BLM roads in the vicinity may have more cumulative effects on forested vegetation in the TPA than BLM decisions regarding miles of open and closed road.

VEGETATIVE COMMUNITIES – NOXIOUS WEEDS

Under all alternatives, any snowmobile use would have negligible effects on noxious weed spread and populations. Invasive noxious weeds and non-native species are degrading wildland health. These are aggressive plants that can outcompete many native plants, as they have few natural enemies to keep them from dominating an ecosystem. These plant species are spread by many means. However, any land disturbing activity in the TPA has the most potential to introduce and spread weed species. Motorized vehicles are one vector for noxious weed spread as weed seed becomes attached to vehicles and their tires, and are transported from one area to another where seeds become detached and germinate to inhabit new areas.

Effects of Alternative A

Under Alternative A, all BLM routes located within the TPA would continue to be managed as indicated on the Southwest Montana Interagency Visitor/Travel Map (interagency cooperative mapping effort, 1996 revision). Alternative A would provide 158.6 miles of routes open to wheeled motorized use (70.6 miles open yearlong, 88.0 miles seasonally restricted and 7.4 miles closed). Where allowed, snowmobile use would continue to be open to area-wide cross-country use as well as use on existing routes, during the season of use, 12/2-5/15, conditions permitting. Alternative A would have the most roads open and in turn would promote the greatest amount of weeds and other undesirable plant spread and production. More herbicide control would be needed to control weeds under Alternative A than under the other alternatives. Under Alternative A the open BLM road miles would make up about 12.6 percent of all open roads in the Upper Big Hole River TPA.

Effects of Alternative B

Under Alternative B, 84.8 miles of routes would be available for wheeled motorized use (26.9 miles open yearlong, 57.9 miles seasonally restricted). Snowmobile management would continue to remain substantially in effect as represented by the 1996 Southwest Interagency

Visitor/Travel Map. This alternative would close 49.2 miles of road leaving 26.9 miles open yearlong as compared to 69.9 miles of road open yearlong for Alternative A. This would prevent weed spread caused by motorized vehicles on these closed routes, but would increase spread on the open routes because of more concentrated use of these routes. Overall Alternative B would reduce weed spread, but would increase weed treatment costs per road mile on the remaining open roads compared to Alternative A. Under Alternative B, the 84.8 miles of open BLM road would make up about 6.5 percent of all open roads in the TPA.

Effects of Alternative C

Under Alternative C, 60.0 miles of routes would be available for wheeled motorized use (19.2 miles open yearlong, 40.8 miles seasonally restricted). This alternative would close 69.3 miles of road leaving 19.2 miles open yearlong as compared to 69.9 miles of road open yearlong for Alternative A. This would prevent weed spread caused by motorized vehicles on the closed routes, but would increase spread on the open routes because of more concentrated use of these routes. Overall Alternative C would reduce weed spread more than any other alternative, but would increase weed treatment costs per road mile on the remaining open road miles compared to Alternative A. Under Alternative C, the 60 miles of open BLM road would make up about 4.6 percent of all open roads in the Upper Big Hole River TPA.

Effects of Alternative D

Under Alternative D, 97.4 miles of routes would be available for wheeled motorized use (26.8 miles open yearlong, 70.6 miles seasonally restricted). This alternative would close 33.2 miles of road leaving 26.8 miles open yearlong as compared to 69.9 miles of road open yearlong for Alternative A. This would prevent weed spread caused by motorized vehicles on the closed routes, but would increase weed spread on the open routes because of more concentrated use of these routes. Overall Alternative D would reduce weed spread more than Alternative A but less than Alternatives B or C, but would increase weed treatment costs per road mile on the remaining open road miles compared to Alternative A. Under Alternative D, the 97.4 miles of open BLM road would make up about 7.4 percent of all open road miles in the TPA.

Cumulative Effects on Noxious Weeds

Under all alternatives, other past, present, and reasonably foreseeable future actions on BLM and non-BLM lands will affect noxious weeds.

Recreation use is well established in the TPA, with fishing and big game hunting topping the list. The Big Hole River has a national reputation as a premiere fly fishing destination. Big game hunting attracts regional and national attention as well. Motorized recreation uses are

one of the leading causes of introduction and spread of noxious weeds and non native species. Weed seeds are transported by many recreational vectors i.e. water recreation uses, motorized vehicles including their tires, non-motorized vehicles including their tires, pack animals, and humans.

Applications for right-of-way permits on public lands to access private property or for commercial development are likely to increase in the future. As a result, soil disturbing activities (i.e. roads, powerlines, telephone lines, etc.), will likely increase, causing weeds to increase.

A variety of resource management projects, such as BLM initiated vegetation treatments, or wildland fire fuels reduction projects, could affect noxious weed management. There have been multiple fuels treatments in this area in the last 10 years. Treatments consisted of 474 acres of prescribed burning and 141 acres of mechanical treatments primarily in the Jerry Creek and Dickie Hills areas. There are fuels treatments planned by the BLM for this area, mainly in the general area south of Wise River and in the Highland Mountains area. The Highland Mountain project will consist of approximately 2,087 acres of mechanical treatment and 2,659 acres of prescribed fire treatment, implemented in 2007 through 2012. The Wise River project would consist of mechanical and/or prescribed burning treatments from 500 to 2,000 acres focused on the urban interface areas having the objective to restore ecosystem health and reduce fuels. Prescribed burning projects give the ground surface a fertilization effect and eliminate some plant competition for weedy species giving them a niche for establishment and expansion in some areas. Ground disturbing equipment could also transport noxious weed seed to these project sites. BLM implements weed control measures in the aftermath of such ground-disturbing activities so as to minimize noxious weed spread.

Wildland fires create good seed beds and supply nutrients for weed species introduction and production. From 1981 to 2004 there have been 18 wildland fires that burned approximately 230 acres. As with mechanical vegetation treatment projects, BLM implements weed control measures in the aftermath of wildland fires to minimize weed spread.

A portion of the TPA (especially the Soap Gulch and Camp Creek areas) is strongly mineralized and has undergone considerable mining in the past. Current activity is low. However, increases in mineral prices could lead to additional increased or renewed mining activity. Mining is a land disturbing activity and the activity itself and weed seed contaminated equipment that is used could promote weeds in the area. Reclamation of abandoned mine sites can disturb ground and promote weed spread as well. BLM implements weed control measures associated with this reclamation work to minimize weed spread.

Noxious weeds and non-native invasive species are well established and spreading in the area. Weed control activities by BLM and other entities, while often effective at reducing or minimizing weed spread and weed populations, can also lead to some weed spread. Herbicide spray equipment is driven through weed infestations and weed seeds as well as other weed vegetative parts are spread to other lands during and following treatment. This TPA has received about 150 to 200 acres of treatment over the last 6 years on BLM lands. Treatment has primarily been by herbicide. These weed treatments have varying success in killing undesirable plants, depending on many environmental parameters.

Timber sales have built-in stipulations for mitigating weed production and spread. However, with ground disturbance the potential exists for weed introduction to occur on these sites. Since 1995 there has been 189 acres of timber harvest and 126 acres of forest planting (replanted in 1998). Vehicular use associated with tree plantings could contribute to the spread of existing weeds on site. Herbicide treatment of existing weeds is coordinated with tree seedling planting locations and timing, so as to minimize the spread of noxious weeds. .

Future travel management (for all agencies, nationwide) is likely to lead to fewer opportunities for motorized recreational use than under current management (particularly for OHV use). As a result, BLM routes available to motorized use could experience increased use from displaced users, leading to more concentrated use and potentially increased weed spread.

The TPA includes important habitat for big game (elk, bighorn sheep). Noxious weed seeds are transported and spread by wildlife through their digestive system and by attaching to the animals themselves and then being released at a later time.

Livestock grazing on and off BLM lands also contributes to weed spread either through seed being spread or introduced by livestock themselves, or through vehicular uses needed to manage grazing operations.

The majority of the Upper Big Hole River TPA is characterized by undeveloped land (private homes/ranches; BLM, State, and USFS lands). Only about 2,000 people live in the area, many of them making their living by ranching and hay farming. Human population growth for the TPA is expected to remain relatively low. However, the area is experiencing some residential growth on land subdivided near the Big Hole River and as family ranches are sold to out-of-state investors/seasonal residents. Population growth and use of the TPA from the population centers of Butte and Dillon will in turn lead to more opportunities for weed spread and production.

The TPA is largely undeveloped. Several small communities (Divide, Dewey, and Wise River) are located within the TPA; while the communities of Melrose and Wisdom lie just outside. Urbanization is unlikely to become a major issue for many years. However, use of the

TPA by the residents living adjacent to or within this area is increasing and leads to an increase in weed spread and propagation.

About 12.6 percent of all the travel routes in the Upper Big Hole River TPA are located on BLM managed lands (under Alternative A). Because the majority of roads (87.4 percent) and lands (82.3 percent) in the TPA are non-BLM, activities in these areas play a stronger role than activities on BLM lands in determining the status of weed spread and weed populations overall.

VEGETATIVE COMMUNITIES – RIPARIAN VEGETATION

Effects Common to All Alternatives

This section focuses on effects to riparian vegetation. For additional discussion of effects to water quality and stream channels, see the Water Resources and Fish sections.

Roads in riparian areas constitute ground disturbance that can eliminate or preclude presence of native riparian vegetation. This ground disturbance and loss of riparian vegetation may facilitate erosion and sedimentation of streams. Roads may also interfere with natural stream channel functions by occupying floodplains or active stream channel margins (see Water Resources section for more discussion). Noxious weeds may dominate riparian vegetation communities after some type of disturbance (such as roads, livestock grazing, mining, etc.) has reduced native vegetation. Noxious weed seed can be spread into riparian areas by motor vehicles via open roads. Closure of roads and trails can improve or maintain riparian condition by reducing avenues of noxious weed spread, as well as allowing for bare area revegetation which filters sediment in addition to stabilizing banks in some areas. Road and trail restrictions have the same effects but to a lesser degree, because some traffic will inhibit vegetation growth and recovery.

As a means of comparing alternatives, **Table 4-91** depicts the miles of wheeled motorized routes that cross or are within 300 feet of streams or wet areas on BLM lands in the Upper Big Hole River TPA.

Under Alternative A, 38.6 miles of BLM roads and trails

Miles of Wheeled Motorized Routes	ALT A	ALT B	ALT C	ALT D
Open	38.6	25.9	25.9	28.8
Restricted	29.7	21.1	15.4	23.8
Closed	3.3	23.7	29.4	18.1

would remain open that cross or are within 300 feet of riparian areas, 29.7 miles of roads and trails would have seasonal restrictions, and 3.3 miles would be closed. The noxious weed spread, streambank, and sediment delivery effects would continue as described in the Effects Common to All Alternatives section for the open roads. The BLM roads and trails most affecting riparian conditions are along Soap Gulch, McLean Creek, Moose Creek, Bear Creek, Sawlog Gulch and Charcoal Gulch and all would remain open, although McLean Creek and Charcoal Gulch are open with seasonal travel restrictions.

Under Alternative B, 25.9 miles of roads and trails would remain open that cross or are within 300 feet of riparian areas, 21.1 miles of roads and trails would have restrictions, and 23.7 miles would be closed. The noxious weed spread, streambank, and sediment delivery effects would continue as described in the Effects Common to All Alternatives section for the open roads. The BLM roads and trails most affecting riparian conditions are along Soap Gulch, McLean Creek, Moose Creek, Bear Creek, and Charcoal Gulch and all would remain open, although McLean Creek and Charcoal Gulch are open with seasonal travel restrictions. Sawlog Gulch travel use would be restricted by game retrieval rules, reducing the number of vehicular crossings of the Big Hole River at this location compared to Alternative A. A number of other streams would benefit from road and trail closures posed by this alternative. Alternative B would provide benefits to riparian vegetation compared to Alternative A.

Under Alternative C, 25.9 miles of BLM roads and trails would remain open that cross or are within 300 feet of streams or wet areas, 15.4 miles of roads and trails would have seasonal restrictions, and 29.4 miles would be closed. Effects would be similar to Alternative B with regard to the roads and trails most affecting riparian conditions in Soap Gulch, McLean Creek, Moose Creek, Bear Creek, and Charcoal Gulch. However the Sawlog Gulch and Big Hole River crossing would be closed under this alternative. Riparian condition would improve most under this alternative compared to all other alternatives.

Under Alternative D, 28.8 miles of roads and trails would remain open that cross or are within 300 feet of streams or wet areas, 23.8 miles of roads and trails would have seasonal restrictions, and 18.1 miles would be closed. Effects would be similar to Alternatives B and C with regard to roads along Soap Gulch, McLean Creek, Moose Creek, Bear Creek, and Charcoal Gulch. Travel use along Sawlog Gulch and the Big Hole River crossing would be seasonally restricted under this alternative. Under Alternative D, riparian condition would experience fewer road and trail effects than under Alternative A, but more than under Alternatives B or C.

Cumulative Effects on Riparian Vegetation

Noxious weed spread, mining, roads and trails, logging operations, and livestock grazing have affected riparian resource conditions in all TPAs, including the Upper Big Hole River TPA. Some of these factors continue to cause riparian area degradation primarily through direct disturbance or loss of riparian vegetation. Ground disturbance and loss of riparian vegetation facilitate erosion and sedimentation of streams. In the case of noxious weeds, they usually dominate riparian vegetation communities after some type of disturbance (such as roads, livestock grazing, mining, etc.) has reduced native vegetation.

Anticipated subdivision growth on private lands, though anticipated to occur at a lower rate in the Upper Big Hole River TPA than in other TPAs, will lead to more road construction and maintenance. More roads and development will increase severity of runoff events which in turn will cause more sediment delivery to creeks and streams. The additional sediment is likely to affect the functioning condition of some riparian areas by causing streambeds to aggrade at unnatural rates. Streambanks may also be affected if road placements do not allow for natural stream movements or meanders.

Logging and forestry practices on public and private lands are subject to streamside management zone (SMZ) requirements designed to maintain water quality and riparian vegetation. The proposed Riparian Management Zones under Butte RMP Alternatives B and C would be wider than SMZs and activities in these areas would be designed to benefit riparian resources, thus providing more riparian protection and more targeted management of riparian vegetation in both forested and non-forested areas than under RMP Alternatives A and D. The disturbance associated with timber activities does have the potential to increase noxious weed spread which degrades riparian area function and health. On public lands noxious weed control is a standard feature of any ground disturbing activities whereas on private lands noxious weed control is variable.

Livestock grazing will continue in the area and has the potential to impact riparian resource conditions. On BLM lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain riparian vegetation health and vigor. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided. Riparian conditions may improve or degrade as management changes.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, riparian conditions would improve because of the streambank protection gained from shrubby root systems and filtering capability of native riparian sedge and rush species.

In recent years, mitigation work has been completed to harden crossings and reduce sediment production on the roads along Camp Creek, Soap Gulch, McLean Creek, Moose Creek, Sawlog Gulch, and Charcoal Gulch.

The LaMarche Creek fluvial Arctic grayling habitat enhancement project improved riparian condition along this stream by stabilizing banks and creating lateral bars.

The Big Hole Watershed group has completed a number of projects to improve livestock grazing, weed control, and irrigation practices on private land. Riparian conditions along the river have improved in a number of places as a result of increased flows later in the season.

A number of privately owned blocks of land were logged within the past 20 years. Riparian vegetation was removed at the time but has recovered to some degree since then.

Cumulative effects under all the action alternatives would be similar to Alternative A at the scale of the entire TPA. The additional road and trail closures and seasonal restrictions on BLM roads in the action alternatives may slightly offset the cumulative road and trail impacts associated with subdivision development and other lands uses taking place in the TPA as compared to Alternative A. Alternative D would contribute less to riparian vegetation benefits than Alternatives B and C, but would contribute more benefits than Alternative A. Alternative C would contribute the most benefits of all alternatives while Alternative B would contribute more benefits than either Alternatives A or B.

Overall, because BLM roads make up only 12.6 percent of all roads in the TPA (under Alternative A), and BLM lands make up 17.7 percent of all lands in the TPA, the contributions to riparian vegetation benefits associated with closing riparian roads on BLM lands under the action alternatives would be dominated by activities on other lands at the scale of the entire Upper Big Hole River TPA. Activities on private lands (32 percent of total acreage in TPA) and USFS lands (40 percent of total acreage in TPA) would play a substantial role in determining riparian conditions at the scale of the entire TPA.

WILDLIFE

Effects of Alternative A

Under Alternative A, the Upper Big Hole River TPA would have considerably more open roads (158 miles) compared to the action alternatives. Under Alternative A, elk winter range on BLM lands in the Upper Big Hole TPA would have a low road density (1.0 mi/mi²), but this would still be the highest actual road density compared to the action alternatives (**Table 4-92**). Roads can cause direct mortality to wildlife through road kill, prevent wildlife movement, create disturbance, cause the spread of noxious weeds, reduce habitat and cause habitat fragmentation on the landscape (Joslin et al. 1999).

	Actual Road Density	Acres of Low Road Density	Acres of Moderate Road Density	Acres of High Road Density
Alt. A	1.0	28,511	10,886	11,128
Alt. B	0.3	35,033	10,068	5,423
Alt. C	0.3	35,618	9,876	5,082
Alt. D	0.4	32,875	11,844	5,804

Low Density = 0-1 mi/mi², Moderate Density = 1-2 mi/mi², High Density = >2 mi/mi²

Open roads typically increase the level of recreation adjacent to roads which can result in additional disturbance and displacement of wildlife species. Roads can also encourage the public to recreate in areas that had formerly been secluded. Open road miles that are 1 mi/mi² have been found to provide roughly 60 percent of functional habitat for elk (Christensen et al. 1993). Permanent and temporary roads could negatively impact wildlife, including special status species, particularly if roads are open during critical periods such as in lynx winter habitat and during the summer months within grizzly bear habitat.

Wildlife, including special status species, that are especially sensitive to roads in the TPA include (but are not limited to) elk, grizzly bear, lynx, wolverine and some raptors. The detrimental effects of open roads to wildlife under Alternative A would be greater than under any of the action alternatives. Under Alternative A, this TPA would have fewer acres of functional winter range (28,511 acres in low road density areas) compared to the action alternatives (Table 4-92). Alternative B would provide 35,033 acres of functional winter range, Alternative C would provide 35,618 acres, and Alternative D would provide 32,875 acres.

Under Alternatives A and D, approximately 31,607 acres of the Upper Big Hole TPA would be closed to snowmobiles with the remaining 31,600 acres open for cross country snowmobile use. Snowmobiling occurs in both the Decision and Planning Areas and the use of snowmobiles could have substantial negative effects to wintering big game and other wildlife species. Cross-country snowmobile use could lead to harassment of wildlife during the high stress winter season (Joslin et al. 1999). This could cause individuals to leave an area (temporarily or permanently) and/or cause an increase in stress that could lead to mortality. Alternatives A and D would have more detrimental effects to wildlife from cross-country snowmobile use than Alternatives B and C.

In evaluating impacts of travel planning on elk and other big game species, it is important to consider impacts on security habitat. Elk security is the inherent protection allowing elk to remain in an area despite increases in stress or disturbance associated with the hunting season or other human activities. Security habitat includes

blocks of nonlinear forested habitats greater than 250 acres in size that are at least 0.5 mile from an open road (Hillis et al. 1991). Security habitat should also consist of larger trees (greater than 8 inches DBH) with vegetation dense enough to hide an adult elk (Thomas et al. 2002). Under Alternative A, there would be approximately 4,665 acres of functional security habitat for big game species. This is the fewest acres of security habitat of all alternatives. Alternative C would have the greatest acres of security habitat (6,813 acres) (Table 4-93).

	ALT A	ALT B	ALT C	ALT D
Upper Big Hole River TPA	4,665	5,296	6,813	5,258

Core areas are areas large enough for wildlife (especially animals with large home ranges such as carnivores and big game) to forage and reproduce. Subcore areas are areas that could act as stepping stones for wildlife as they move through the region (Craighead et al. 2002). Nearly all lands in the TPA are within core or subcore habitat (254,176 acres). Under Alternative A, there would be 79,300 acres with low road density, 60,765 with moderate road density, and 114,111 with high road density in the TPA for all land ownerships. Alternatives A and D would have fewer acres with low road densities in core and subcore habitat at the landscape level compared to Alternatives B and C.

There are also a substantial number of acres on BLM lands that are considered core/subcore habitat, approximately 42,250 acres. Under Alternative A, there would be 22,784 acres with low road density and 8,124 with moderate road density but the majority of acres would have high road density, 11,342 acres, for core and subcore habitat on BLM lands. Alternatives A and D would have considerable fewer acres with low road densities in core and subcore habitat on BLM lands compared to Alternatives B and C.

Wildlife corridors are areas of predicted movement within or between core and subcore areas. The Big Hole Valley provides a critical corridor link from north to south

and the east half of the TPA provides a corridor from the Highland Mountains to the Pintler/Pioneer Mountains. This corridor also provides local daily movements and seasonal movements between higher elevation summer range along the Continental Divide and lower elevation winter range.

Within the Upper Big Hole TPA there are approximately 16,803 acres identified as “high quality” wildlife movement corridors under all land ownerships. In high quality movement corridors under all alternatives there would be 4,981 acres with low road density, 5,009 acres with moderate road density and 6,813 acres of high road densities.

On BLM lands in the TPA there are 3,205 acres mapped as high quality movement corridors. BLM lands in high quality movement corridors under all alternatives would have 2,714 acres with low road density, 480 acres with moderate road density and only 11 acres with high road density.

Riparian areas provide crucial habitat and critical travel corridors for wildlife including special status species. Riparian areas also provide a refuge for native plants and animals in times of stress such as drought or fire. Roads in riparian areas can prevent use of these crucial areas by wildlife, limit use, or cause loss of habitat. Under Alternative A there would be 32 miles of open roads in riparian areas.

Effects of Alternative B

Under Alternative B, the Upper Big Hole River TPA would have substantially fewer open roads (84.8 miles) compared to Alternative A (158 miles). Of the 84.8 miles of open roads, only 26.9 miles would be open year-round and the remaining 57.9 miles would be seasonally restricted. Alternative B would have more open roads than Alternative C (60 miles) but less than Alternative D (97 miles). Alternative B would decrease harassment to wildlife during all seasons of use, especially during the winter and spring, more than Alternatives A and D. This alternative would also improve habitat and reduce fragmentation more than Alternatives A and D but less than Alternative C.

Under Alternative B, the actual road density in elk winter range in the Upper Big Hole TPA would be 0.3 mi/mi², below the maximum of 1 mi/mi² recommended by MFWP in big game winter range. This is lower than the road density under Alternative A (1.0 mi/mi²), the same as Alternative C, and slightly lower than Alternative D (0.4 mi/mi²) (Table 4-92). Open road miles that are < 0.5 mi/mi² have been found to provide greater than 70 percent of functional habitat for elk (Christensen et al. 1993).

Under Alternative B, this TPA would have more acres of functional winter range (35,033 acres with low road density) compared to Alternative A (28,511 acres), a similar amount to Alternative C (35,681 acres), and more acres

than Alternative D (32,875 acres) (Table 4-92). Alternative B would improve the quality and quantity of winter range in the Upper Big Hole TPA compared to Alternatives A and D but would have slightly fewer beneficial effects to winter range than Alternative C.

Alternative B would reduce the acres open to cross country snowmobile use to 13,240 compared to 31,600 acres under Alternatives A and D. Alternative B would have the most acres closed to cross country snowmobile use (46,930 acres) and would have more acres limited to snowmobile use on existing roads (3,030 acres) than Alternatives A and D (0 acres). Alternative B would have fewer negative effects to big game and other wildlife species than Alternatives A and D but could have considerably more effects than Alternative C since all snowmobile use under Alternative C would be limited to open roads.

The amount of big game security habitat would be greater under all action alternatives compared to Alternative A, which would have 4,665 acres. Alternatives B and D would be nearly identical with 5,296 acres and 5,258 acres, respectively. Alternatives B and D would have fewer acres of functional security habitat compared to Alternative C (6,813 acres) (Table 4-93).

For all land ownerships, Alternative B would increase the acreage of core and subcore habitat with low road density to 84,430 acres, compared to 79,300 acres under Alternative A. Alternative B would also increase the acreage with moderate road density to 63,221 acres over Alternative A (60,765 acres), and would decrease the acreage with high road density to 106,524 acres compared to the 114,111 acres under Alternative A. Alternative B would improve core and subcore habitat across the landscape more than Alternatives A and D but less than Alternative C.

On BLM lands acres in core/subcore habitat, Alternative B would increase the acreage with low road density to 26,759 acres compared to the 22,784 acres under Alternative A. Alternative B would also increase acreage with moderate road density to 9,140 acres compared to Alternative A (8,124 acres), and would substantially reduce the acreage in high road density to 6,351 acres compared to the 11,342 acres under Alternative A. Alternative B would improve core and subcore habitat on BLM lands more than Alternatives A and D but less than Alternative C.

Effects associated with high quality wildlife movement corridors under Alternative B would be the same as under Alternative A.

Alternatives B and C would protect and restore substantially more riparian habitat than Alternative A by reducing the miles of open roads in riparian areas to 19.3 miles (from 32 under Alternative A). Alternatives B and C would also have fewer open roads in riparian habitats than Alternative D (22.2 miles). Alternatives B and C would allow for more breeding, foraging and hiding

habitat as well as improve more movement corridors for a wide variety of species than Alternatives A and D.

Effects of Alternative C

Under Alternative C, the Upper Big Hole River TPA would have substantially fewer open roads (60 miles) compared to Alternative A (158 miles). Of the 60 miles of open roads, only 19.2 miles would be open year-round and the remaining 40.8 miles would be seasonally restricted. Alternative C would also have fewer open roads than Alternative B (81 miles) and considerably less than Alternative D (97 miles). Alternative C would decrease harassment to wildlife during all seasons of use, especially during the winter and spring, more than all other alternatives. This alternative would also improve habitat and reduce fragmentation more than all other alternatives.

Effects associated with open road density in elk winter range under Alternative C would be the same as under Alternative B (**Table 4-92**). Under Alternative C, this TPA would have more acres of functional winter range (36,618 acres with low road density) compared to Alternative A (28,511 acres), a similar amount to Alternative B (35,033 acres), and more acres than Alternative D (32,875 acres) (**Table 4-92**). Alternative C would improve the quality and quantity of winter range in the Upper Big Hole TPA more than Alternatives A and D and would have slightly more beneficial effects to winter range than Alternative B.

Alternative C would have the fewest negative effects to big game and other wildlife species by closing the entire TPA to cross country snowmobile use. Snowmobile use on approximately 31,600 acres would be limited to use on open routes (14 miles).

The amount of big game security habitat would be greater under all action alternatives compared to Alternative A which would have 4,665 acres. Alternative C would have 6,813 acres of security habitat, more acres than any other alternative. Alternatives B and D would be nearly identical with 5,296 and 5,258 acres of security habitat, respectively (**Table 4-93**).

For all land ownerships, Alternative C would increase the acreage of core and subcore habitat with low road density to 85,004 acres, compared to 84,430 acres under Alternative B and 79,300 acres under Alternative A. Alternatives C and B would have similar acreage with moderate road density (63,030 acres and 63,221 acres, respectively), which would be an increase in acreage compared to Alternative A (60,765 acres). Alternative C would decrease the acreage with high road density to 106,142 acres, which would be slightly less than Alternative B (106,524 acres) and substantially less than Alternative A (114,111 acres). Alternative C would improve core and subcore habitat across the landscape more than all other alternatives.

In core and subcore habitat on BLM lands, Alternative C would increase the acreage with low road density to 27,302 acres compared to Alternative B (26,759 acres) and Alternative A (22,784 acres). Alternative C would decrease acreage with moderate road density to 8,947 acres compared to Alternative B (9,140 acres) but would slightly increase acreage with moderate road density compared to Alternative A (8,124 acres). Alternative C would substantially reduce the acreage in high road density to 6,000 acres, compared to the 11,342 acres found under Alternative A. Alternative C would improve core and subcore habitat on BLM lands more than all other alternatives.

Effects associated with high quality wildlife movement corridors would be the same under Alternative C as under Alternative B.

Effects associated with roads in riparian areas under Alternative C would be the same as under Alternative B.

Effects of Alternative D

Under Alternative D, the Upper Big Hole River TPA would have substantially fewer open roads (97 miles) compared to Alternative A (158 miles). Of the 97 miles of open roads, 26.8 miles would be open year-round and the remaining 70.6 miles would be seasonally restricted. Alternative D would have substantially more open roads than Alternative B (81 miles) and Alternative C (60 miles). Alternative D would allow more harassment to wildlife during all seasons of use, especially during the winter and spring, than Alternative B and, especially, Alternative C. This alternative would also restore less habitat and allow more fragmentation than Alternatives B and C but would improve habitat and lessen fragmentation compared to Alternative A.

Under Alternative D, the actual road density in elk winter range in the Upper Big Hole TPA would be 0.4 mi/mi², below the maximum of 1 mi/mi² recommended by FWP in big game winter range (**Table 4-92**). This is lower than the road density under Alternative A (1.0 mi/mi²) but slightly more than Alternatives B and C (0.3 mi/mi²).

Under Alternative D, this TPA would have more acres of functional winter range (32,875 acres with low road density) compared to Alternative A (28,511 acres) but less than Alternative B (35,033 acres) and Alternative C (35,618 acres) (**Table 4-92**). Alternative D would improve the quality and quantity of winter range in the Upper Big Hole TPA compared to Alternative but would have fewer beneficial effects to winter range than Alternatives B and C.

Under Alternatives D and A, approximately 31,607 acres of the Upper Big Hole TPA would be closed to snowmobile use with the remaining 31,600 acres open for cross country snowmobile use. Alternatives D and A would have **substantially** more detrimental effects to

wildlife from cross-country snowmobile use than Alternatives B and C.

The amount of big game security habitat would be greater under all action alternatives compared to Alternative A, which would have 4,665 acres. With 5,258 acres of security habitat, Alternative D would have fewer acres than Alternative C (6,813) and slightly fewer acres than Alternative B (5,296 acres) (**Table 4-93**).

For all land ownerships, Alternative D would increase the acreage of core and subcore habitat with low road density to 82,317 acres compared to Alternative A (79,300 acres). This alternative would have fewer acres with low road density compared to Alternative B (84,430 acres) and Alternative C (85,004 acres). All action alternatives would increase acreage with moderate road density compared to Alternative A. Alternative D would have 64,613 acres with moderate road density while Alternative A would have 60,765 acres. Alternative D would reduce the acreage with high road density to 107,246 acres compared to Alternative A (114,111 acres), but would have more acres with high road density compared to Alternative B (106,524 acres) and Alternative C (106,142 acres). Alternative D would improve core and subcore habitat across the landscape more than Alternative A but less than Alternatives B and C.

In core and subcore habitat on BLM lands, Alternative D would increase the acreage with low road density to 24,812 acres compared to Alternative A (22,784 acres), but would have fewer acres with low road density compared to Alternative B (26,759 acres) and Alternative C (27,302 acres). Alternative D would increase the acreage with moderate road density (10,587 acres) over Alternative A (8,124 acres) and would also increase the number of these acres compared to Alternative B (9,140 acres) and Alternative C (8,947 acres). Alternative D would reduce the acreage with high road density to 6,850 acres compared to Alternative A (11,342), but would have slightly more acres with high road density compared to Alternative B (6,351 acres) and Alternative C (6,000 acres). Alternative D would improve core and subcore habitat on BLM lands more than Alternative A but considerably less than Alternatives B and C.

Effects associated with high quality wildlife movement corridors would be the same under Alternative D as under the other alternatives.

Alternative D would protect and restore substantially more riparian habitat than Alternative A by reducing the miles of open roads in riparian areas to 22.2 miles (from 32 under Alternative A). Alternative D would have more open roads in riparian habitats than Alternatives B and C (19.3 miles). Alternative D would allow for more breeding, foraging and hiding habitat as well as improve more movement corridors for a wide variety of species than Alternative A but less than Alternatives B and C.

Cumulative Effects on Wildlife

Wildlife habitat in the Upper Big Hole TPA has been affected by roads, historic and current mining, timber harvest, weed infestations, recreation, powerline corridor development, and communication sites.

The majority of the Upper Big Hole River TPA is characterized by undeveloped land (private homes/ranches, BLM, state, and USFS lands). Only about 2,000 people live in the area, many of them making their living by ranching and hay farming. Population growth for the TPA is expected to remain low. Several small communities (Divide, Dewey, and Wise River) are located within the TPA.

Recreation use is well established in the TPA, with fishing and big game hunting being the dominant recreational activities. The Big Hole River has a national reputation as a premiere fly fishing destination. Big game hunting attracts regional and national attention, as well.

The amount of historic mining varies throughout the TPA. From Divide to the northwest, there is little mineralization and minimal impacts from historic mining. From Divide to the southeast through the Soap Gulch and Camp Creek drainages, there is a substantial amount of mineralization and historic mining. Current activity, however, is low but increases in mineral prices could lead to renewed mining activity.

In the TPA, there are 20 powerlines and one pipeline. There are no existing communication sites in the TPA and, in the future, communication sites on BLM lands would be restricted to existing sites. No future communication sites are expected in the TPA on BLM lands but they could occur on other public or private lands. There is the potential for future powerlines and pipelines to be built in this TPA.

There are approximately 70 rights-of-way (ROW) in the TPA and applications for ROW permits to access private property or for commercial development are likely to increase in the future. As a result, public access to BLM lands could increase. Fewer ROWs would be expected under Alternative A because more BLM roads would remain open under this alternative. Alternative B would be expected to have fewer ROWs than Alternative C but more than Alternatives A and D. Alternative C would be expected to have the most ROWs and, of the action alternatives, Alternative D would have the fewest.

Approximately 63 bighorn sheep were relocated to the Camp Creek and Soap Gulch drainages between 2000 and 2004. These efforts have increased sheep populations in these areas.

From 1981-2004 there have been 18 wildland fires that burned 230 acres of BLM lands (it is unknown how many acres burned in the entire TPA). Nine of the fires were identified as human-caused and these fires burned the majority of the BLM acres (229). There have been several vegetative treatments in the TPA in the last 10

years. On BLM lands, approximately 474 acres were burned with prescribed fire and another 141 acres were mechanically treated in the Jerry Creek and Dickie Hills areas to remove conifer encroachment into meadow habitat. Timber was harvested on approximately 60 acres of BLM land between 1984 and 1995 and from 1995 to present there has been timber harvest on approximately 200 acres of BLM lands. Timber harvest has also occurred on private and Forest Service lands.

Additional vegetative treatments on BLM lands, consisting of thinning dry Douglas fir and removing conifer encroachment from sagebrush and grasslands, are planned for the Highlands and Wise River areas. Approximately 2,660 acres are planned for prescribed fire in the Highlands and approximately 500-2,000 acres of mechanical and prescribed fire are planned in the Wise River area. These projects would likely improve wildlife habitat by restoring grassland, shrubland, and forest habitat conditions.

Vegetative treatments on BLM lands have had moderate effects to wildlife habitat in the TPA. While most vegetative treatments have improved habitat for wildlife, some old timber sale units have not recovered. Timber harvest on private lands and other public lands has also had minor to moderate effects to wildlife habitat in the TPA. Past mining activities on public and private lands in the Soap Gulch and Camp Creek areas has altered some areas of the landscape, although high quality habitat is still available for wildlife. Roads constructed to access mining claims, timber harvest and recreation activities are, most likely, having the most direct impact on wildlife in the TPA.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the TPA. Motorized activities play a large role in the distribution of noxious weeds. The cumulative effects of the spread of noxious weeds from open roads would be greater under Alternative A than all other alternatives. Alternative A would result in more wildlife habitat being lost or degraded due to noxious weed infestations compared to the action alternatives. Alternative B would have fewer open roads than Alternatives A and D resulting in fewer infestations of noxious weeds. Alternative C would close the most roads and would have the fewest cumulative effects from loss of habitat due to noxious weeds of all alternatives. Open roads and development adjacent to BLM lands and the substantial amount of public use this area receives would still allow for the spread of noxious weeds.

Public lands make up 58 percent of the TPA and provide large blocks of habitat. However, open roads on BLM lands as well as on private lands (about 570 miles) and other public lands (about 574 miles) have reduced the quality of wildlife habitat within the TPA. Open roads in the TPA cause disturbance and harassment to wildlife during the breeding and wintering seasons along with fragmentation and loss of habitat. Open roads in the

Planning Area would likely increase due to development and management of private lands, especially in the Big Hole Valley. Alternative A would have the greatest negative cumulative effects to wildlife and wildlife habitat from open roads with 158 miles of open roads. Alternative B would have fewer negative cumulative effects with 81 miles of open road than Alternatives A and D (97.4 miles), but more than Alternative C (60 miles).

Of the action alternatives, Alternative C would have the most beneficial cumulative effects by reducing habitat fragmentation, restoring habitat, and reducing disturbance during all seasons of use. Alternative B would be more beneficial than Alternatives A and D but less than Alternative C.

Historic and recent timber cutting, past mining activity and firewood gathering along open roads in the TPA may have reduced the amount of suitable snag habitat for cavity nesting species. Alternative A would allow a substantial amount of access to the area for firewood cutting that would continue to prevent snag recruitment for snag dependant species and minimize the amount of down woody material along open roads. Alternative B would protect more snag and down woody habitat from loss due to firewood cutting than Alternatives A and D but would protect less of this habitat type than Alternative C.

The Upper Big Hole TPA provides the most functional big game security habitat of the five TPAs being analyzed in this EIS. The large amount of public land allows for larger blocks of habitat away from roads. However, there would be less security habitat under Alternative A due to higher open road densities than under other alternatives. Alternatives B and C would provide the most security habitat for big game (5,296 and 6,813 acres, respectively) and Alternative D would provide a similar amount to Alternative B (5,258 acres). Security habitat would still be limited on private (unless closed to hunting) and other public lands. Under the action alternatives, the reduction of open roads during the hunting season would help mitigate for the loss of security habitat on adjacent lands.

Approximately 71 percent of the TPA is mapped as core and subcore habitat that is predominately Forest Service and BLM lands. Open roads has had some impact on the quality of core/subcore habitat and wildlife movement corridors in the TPA.

Habitat mapped as core and subcore habitat and wildlife movement corridors having high road densities would continue to be of lower value to wildlife under Alternative A. An increase in open roads in both the Decision and Planning Areas could result in a loss of core and subcore habitat under all alternatives but, especially, Alternative A. Although core/subcore habitat and wildlife movement corridors would continue to be impacted by development on private lands in the Big Hole Valley, Alternatives B and C would allow more BLM lands to

function as core/subcore habitat and wildlife movement corridors. Alternatives B and C would have fewer negative cumulative effects to core/subcore and wildlife habitat than Alternatives A and D.

The cumulative effects of high road densities would continue to negatively affect wildlife species during the breeding season more under Alternative A than under the action alternatives. Alternatives B and C would have the most beneficial cumulative effects to wildlife during the breeding season compared to Alternative D and, especially, Alternative A.

FISH

For the sake of this discussion, “open” roads include roads that are open with seasonal restrictions as well as roads that are open yearlong. Roads identified as “closed” within 300 feet of streams also include roads that would be “decommissioned” in these areas by alternative. Effects to water quality described in the Water Resources section would affect fish populations and fish habitat quality. Analyses described and tabulated in the Water Resources section are referred to in the context of effects to fish in the discussion below.

Effects of Alternative A

Under Alternative A, the Upper Big Hole TPA would have substantially more open roads (158 miles) compared to the action alternatives. Roads can have a wide range of effects on fish and fish habitat. These effects would include, but are not limited to, increased sedimentation from road construction and vehicle use, increased runoff, changes in surface water and drainage patterns from stream crossings, conduits for noxious weeds, loss of riparian vegetation, potential decreases in stream shading that could lead to water temperature increases, loss of instream habitats, and changes in local fish populations when culverts are impassable and limit fish migration.

Watershed (or hydrologic) function can be used as an indicator of relative risk or impacts to fish habitat. To determine the effects on watershed functions, a moving windows analysis was conducted on BLM lands to look at the miles of roads that would be decommissioned and removed from the landscape for each alternative. During this analysis, it was assumed that even though closing roads would improve watershed function, closed roads would remain on the landscape and could still have negative impacts to water quality and prevent or impede the restoration of riparian vegetation. Under Alternative A, there would be 19,646 acres with low road density, 18,204 acres with moderate road density and 25,357 acres with high road density on BLM lands in this TPA (**Table 4-89**). Alternative A would have fewer acres with low road density and more acres with high road density than the action alternatives and this alternative would be expected to have more overall negative effects

to watershed function and fish habitat due to roads than the other alternatives.

For this discussion, road miles within 300 feet of fish bearing streams would be considered an indicator of direct effects to fish habitat and fish populations. Under Alternative A, there would be 0.1 miles of closed road and 7.9 miles of open road within 300 feet of fish bearing streams on BLM lands. Alternative A would have 0.3-1.2 fewer miles of closed roads than the action alternatives and 0.3-1.3 more miles of open roads adjacent to fish bearing streams than the action alternatives. Of the 8 miles of open road adjacent to fish bearing streams under Alternative A, 4.3 miles are along streams with BLM special status species (westslope cutthroat trout and Arctic grayling). Alternative A would have more long-term negative impacts to westslope cutthroat trout as well as to other fish species compared to the action alternatives.

Perennial non-fish bearing streams contribute to fish habitat indirectly by serving as conduits for watershed products (water, sediment, nutrients, contaminants, and in some cases woody material) to fish bearing streams. Under Alternative A, there would be 0.8 miles of closed road and 23 miles of open road within 300 feet of non-fish bearing streams on BLM lands in the TPA. Alternative A would have substantially more miles of open road adjacent to perennial streams than the action alternatives.

This alternative would have the greatest negative impacts to fish and aquatic resources from open roads of all the alternatives.

Effects of Alternative B

Under Alternative B, the Upper Big Hole TPA would have substantially fewer open roads (81 miles) compared to Alternative A (158 miles). Alternative B would have more open roads than Alternative C (60 open miles) but less than Alternative D (97 open miles).

In the context of watershed function, Alternative B would have approximately 946 more BLM acres in the low road density category, 1,330 more BLM acres in the moderate road density category, and 2,257 fewer BLM acres in the high road density category than Alternative A (**Table 4-89**).

Alternative B would contribute to improved hydrologic function more than Alternative A. This analysis does consider “decommissioned” roads, but does not consider “closed” roads as contributing to watershed function. Even though closed roads could still have adverse effects to aquatic habitats, these roads have more potential to become revegetated and lessen sedimentation and runoff, and restore riparian vegetation (thus contributing to improved fish habitat conditions) than open roads. Under Alternative B, there would be approximately 44 more miles of closed roads than under Alternative A, an additional indication that Alternative B would pose less impact to fish habitat than Alternative A. Alternative B

would have 0.4 miles of closed road and 7.6 miles of open road within 300 feet of fish bearing streams on BLM lands. Of the 7.6 miles of open roads, 4 miles would be adjacent to streams with special status species (westslope cutthroat trout and/or Arctic grayling). Alternative B would slightly reduce direct effects fish bearing streams (including streams with special status species) compared to Alternative A.

Alternative B would contribute fewer indirect effects to fish habitat associated with roads within 300 feet of perennial non-fish bearing streams than Alternative A. Under Alternative B there would be 8.1 miles of closed road and 15.7 miles of open road within 300 feet of perennial non-fish bearing streams on BLM lands in the TPA. This would be approximately 7.3 more miles of closed roads in these areas than under Alternative A. Alternative B would have fewer road-related adverse effects to fish and aquatic habitats than Alternative A and would contribute to aquatic habitat improvement compared to the current condition.

Effects of Alternative C

Under Alternative C, the Upper Big Hole TPA would have substantially fewer open roads (60 miles) compared to Alternative A (158 miles). Alternative C would also have fewer open roads than Alternative B (81 miles) and Alternative D (97 miles).

In the context of watershed function, Alternative C would have 1,815 more BLM acres in the low road density category, 1,302 more BLM acres in the moderate road density category, and 3,112 fewer acres in the high road density category than Alternative A (**Table 4-89**). This alternative would have 869 more BLM acres in the low road density category, 28 fewer acres in the moderate road density category, and 835 fewer acres in the high road density category than Alternative B. This analysis does consider “decommissioned” roads, but does not consider “closed” roads as contributing to watershed function. Even though closed roads could still have adverse effects to aquatic habitats, these roads have more potential to become revegetated and lessen sedimentation and runoff, and restore riparian vegetation (thus contributing to improved fish habitat conditions) than open roads. Under Alternative C there would be approximately 62 more miles of closed roads than under Alternative A, and approximately 19 more miles of closed road than under Alternative B. From the standpoint of watershed function, Alternative C would pose less impact to fish habitat than Alternative B, and would provide the greatest improvement to watershed function of all the alternatives.

Alternative C would have more miles of closed roads (1.3) and fewer miles of open roads (6.7) within 300 feet of fish bearing streams on BLM lands than all other alternatives. Of the 6.7 miles of open road, 4.0 miles would be adjacent to streams with special status species (westslope cutthroat trout and/or Arctic

grayling). Alternative C would reduce direct effects to fish bearing streams from roads more than all other alternatives.

Alternative C would contribute fewer indirect effects to fish habitat associated with roads within 300 feet of perennial non-fish bearing streams on BLM lands compared to all other alternatives. Under Alternative C there would be 9.4 miles of closed road and 14.4 miles of open road within 300 feet of perennial non-fish bearing streams on BLM lands in the TPA. This would be 8.6 more miles of closed road than Alternative A and 1.3 more miles of closed road than Alternative B in these areas.

Overall Alternative C would have fewer road-related adverse effects to fish and aquatic habitats than any of the alternatives and would contribute the most to aquatic habitat improvement compared to the current conditions.

Effects of Alternative D

Under Alternative D, the Upper Big Hole TPA would have substantially fewer open roads (97 miles) compared to Alternative A (158 miles). Alternative D would have considerably more open roads than Alternative B (81 miles) and Alternative C (60 miles).

In the context of watershed function, Alternative D would have 933 more acres in the low road density category, 1,149 more acres in the moderate road density category, and 2,081 fewer acres in the high road density category on BLM lands than Alternative A (**Table 4-89**). This alternative would have the second fewest BLM acres in the low and moderate road density categories, and the second most BLM acres in the high road density category of all the alternatives. This analysis does consider “decommissioned” roads, but does not consider “closed” roads as contributing to watershed function. Even though closed roads could still have adverse effects to aquatic habitats, these roads have more potential to become revegetated and lessen sedimentation and runoff, and restore riparian vegetation (thus contributing to improved fish habitat conditions) than open roads. The fewest total road miles would be closed under Alternative D (33 closed miles) of the action alternatives (51 closed miles under Alternative B and 69 closed miles under Alternative C). Alternative D would improve watershed function more than Alternative A, but less than Alternatives B and C.

Effects associated with roads within 300 feet of fish bearing streams on BLM lands under Alternative D would be the same as under Alternative B.

Alternative D would contribute more indirect effects to fish habitat associated with roads within 300 feet of perennial non-fish bearing streams than Alternatives B and C, but less than Alternative A. Under Alternative D there would be 6.3 miles of closed road and 17.5 miles of open road within 300 feet of perennial non-fish bearing streams on BLM lands in the TPA. This would be 5.5

more miles of closed roads than under Alternative A, 1.8 fewer miles of closed roads than Alternative B, and 3.1 fewer miles of closed roads than Alternative C in these areas.

Alternative D would have fewer road-related adverse effects to fish and aquatic habitats than Alternative A, but more than Alternatives B and C, and would contribute to aquatic habitat improvement compared to the current condition.

Cumulative Effects on Fish

The Upper Big Hole TPA supports a variety of native and introduced fish species. One of the major human influences to fish in the TPA has been the introduction of non-native trout species including rainbow trout, brook trout, and brown trout throughout the TPA as well as Yellowstone cutthroat trout in Moose Creek and Wise River. Rainbow trout have hybridized with the native westslope cutthroat trout in many streams. Brook trout and brown trout have displaced the native cutthroats in other streams, especially those altered by sedimentation and increased water temperatures brought on by human activities. Yellowstone cutthroat trout have also hybridized with westslope cutthroat trout in Moose Creek.

The majority of the Upper Big Hole River TPA is characterized by undeveloped land (private homes/ranches, BLM, State, and USFS lands). Only about 2,000 people live in the area, many of them making their living by ranching and hay farming. Population growth for the TPA is expected to remain low and the area will likely remain predominantly undeveloped for the foreseeable future.

Recreation use is well established in the TPA, with fishing and big game hunting being the dominant recreational activities. The Big Hole River has a national reputation as a premiere fly fishing destination primarily for rainbow and brown trout. Big game hunting attracts regional and national attention, as well.

Agricultural activities from farming and ranching can contribute increases in nutrients, sedimentation and cause the loss or degradation of aquatic habitats. Many streams in the TPA have been impacted by historic and on-going livestock grazing that breaks down streambanks, widens channels, removes vegetative cover, and causes increases in fine sediment and nutrients.

Agricultural water withdrawals are a substantial impact to water resources in the Big Hole River itself. During late summer the Big Hole River typically experiences lower than natural flows, increased water temperatures, and algal blooms. These conditions are exacerbated by agricultural water withdrawals during this period. Government agencies and local entities regularly work with ranchers to minimize their agricultural withdrawals during summer low flow periods to minimize low flow effects on fish populations in the Big Hole River. In particular, concern about the population status of fluvial

Arctic grayling have prompted stakeholders in the Big Hole River to provide greater instream flows during low flow periods to benefit Arctic grayling and prevent a federal listing of this species under the Endangered Species Act.

The amount of historic mining varies throughout the TPA. From Divide to the northwest, there is little mineralization and minimal impacts from historic mining. From Divide to the southeast through the Soap Gulch and Camp Creek drainages, there is a substantial amount of mineralization and historic mining. Current activity, however, is low but increases in mineral prices could lead to renewed mining activity. Increases in mineral prices could lead to increased or renewed mining activity in the Soap Gulch and Camp Creek drainages. The impacts from historic mining on aquatic habitats have been concentrated in the Soap Gulch and Camp Creek areas. See the Cumulative Effects portion of the Water Resources section for a description of streams impacted with heavy metal contamination due to historic mining.

Fires, floods, and drought have historically affected fish habitat in the TPA. These disturbances can cause a pulse of sediment or may temporarily reduce the quality of fish habitat in some watersheds while leaving other streams largely unaffected. Population recovery in disturbed streams may be facilitated by fish immigration from nearby drainages less affected by the catastrophic event. From 1981-2004 there have been 18 wildland fires that burned 230 acres. Nine of the fires were identified as human-caused and these fires burned the majority of the acres (229). There have been several vegetative treatments in the TPA on BLM lands in the last 10 years. Approximately 474 acres were burned with prescribed fire and another 141 acres were mechanically treated in the Jerry Creek and Dickie Hills areas to remove conifer encroachment into meadow habitat. These activities had minimal effects on fish habitat.

Timber harvest can alter the recruitment of large woody material, reduce canopy closures, and result in an increase in fine sediment to streams. Timber harvest along with associated roads can contribute substantially to the overall cumulative effects in forested watersheds. Approximately 60 acres of timber on BLM lands were harvested between 1984 and 1995 and from 1995 to present there have been approximately 200 acres of timber harvest. Adjacent private and Forest Service lands have also had a small amount of timber harvest in the past and additional harvest is expected in the future with a range of effects to fish and aquatic habitat.

Past vegetation treatments on BLM lands may have had minor to moderate effects to aquatic habitat in the TPA. While most vegetative treatments have improved overall watershed functions, some old timber sale units have not recovered and have removed riparian vegetation. Timber harvest on private lands and other public lands may have also had minor to moderate effects to fish and aquatic habitats in the TPA.

Additional vegetation treatments, consisting of thinning dry Douglas fir and removing conifer encroachment from sagebrush and grasslands, are planned for the Highlands and Wise River areas on BLM lands. Approximately 2,660 acres are planned for prescribed fire in the Highlands and approximately 500-2,000 acres of mechanical and prescribed fire are planned in the Wise River area. These treatments will likely have minimal effects to fish and aquatic habitat.

Roads are another major contributor of sediment to streams and a major problem with regards to cumulative watershed effects. Roads and trails can have localized effects on nearby stream segments or at stream crossing sites, especially fords. Cumulatively, roads degrade aquatic habitat due to sedimentation from road construction and vehicle use, increased runoff, changes in surface water and drainage patterns from stream crossings, loss of riparian vegetation, and loss of large woody material. Roads can cause changes in local fish populations when culverts are impassable and limit fish migration. Alternative A would have more negative cumulative effects to watersheds and individual streams due to roads than the action alternatives. Alternative B would have fewer negative cumulative effects than Alternatives A and D but more than Alternative C. Alternative B would improve overall watershed functions as well as improve habitat in individual streams more than Alternatives A and D but less than C. Alternative C would have the greatest beneficial cumulative effects.

SPECIAL STATUS PLANTS

Effects Common to All Alternatives

Ground-disturbing activities from road construction and maintenance, as well as road use by vehicles can affect special status plant populations and habitat. These activities can reduce sensitive plant species through disturbance to individual populations, increasing competition from invasive species, and reducing habitat connectivity. Closure of roads and trails can improve or maintain sensitive plant populations or habitat by reducing avenues of noxious weed spread, maintaining habitat connectivity, and improving pollinator habitat. Road and trail restrictions have the same effects but to a lesser degree.

Effects of the Alternatives

Under Alternative A, 70.6 miles of BLM roads and trails would remain open, 88.0 miles of roads and trails would be open with seasonal restrictions, and 7.4 miles of roads and trails would be closed. On the open roads, effects would continue as described in the Effects Common to All Alternatives section. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. Restricted routes have some positive impact because some possible noxious weed spread is reduced; however the benefit isn't as large as closing or decommissioning a route.

Under Alternative B, 26.9 miles of BLM roads and trails would remain open, 57.9 miles of roads and trails would be open with seasonal restrictions, 49.2 miles of roads and trails would be closed, and 27.7 miles would be decommissioned. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The restricted roads would reduce weed spread a limited amount. Alternative B would benefit and reduce risk to special status plants compared to Alternative A.

Under Alternative C, 19.2 miles of BLM roads and trails would remain open, 40.8 miles of roads and trails would be open with seasonal restrictions, 69.3 miles of roads and trails would be closed, and 33.5 miles would be decommissioned. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The restricted roads would reduce weed spread a limited amount. Alternative C would benefit and reduce risk to special status plants the most of any alternative because it would eliminate disturbance, vehicular use, and spread of noxious weeds on the most road miles.

Under Alternative D, 26.8 miles of BLM roads and trails would remain open, 70.6 miles of roads and trails would be open with seasonal restrictions, 33.2 miles of roads and trails would be closed, and 25.7 miles would be decommissioned. On the open roads, effects would continue as described in the Effects Common to All Alternatives section. On the closed routes, vectors of noxious weed spread would be reduced and habitat connectivity and health would be improved for sensitive plants and their pollinators. The restricted roads would reduce weed spread a limited amount. Alternative D would benefit and reduce risk to special status plants more than Alternative A, but less than Alternatives B and C.

Cumulative Effects on Special Status Plants

Under all alternatives there are a number of past, present, and reasonably foreseeable future actions that affect special status plant populations.

Livestock grazing will continue in the area and has the potential to impact sensitive plant populations and habitat. On public lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain sensitive species populations and habitat. On private lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided. Conditions may improve or degrade as management changes.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, sensitive plants would benefit from the reduced competition. Use of her-

bicides for noxious weed control could cause mortality to special status plants if individual plants are inadvertently sprayed.

Although less residential development is anticipated in the Upper Big Hole River area than in other TPAs, recent and anticipated subdivision growth on private lands will lead to more road construction and maintenance. More roads and development will reduce sensitive plant species habitat and in some cases individual populations. Additionally, subdivisions have the potential to disrupt the connectivity of plant habitat and populations as well as disturbing or eliminating pollinators needed by sensitive species. Some sensitive species that require soil disturbance may benefit.

Timber sale activity disturbance can destroy or degrade sensitive plant habitat. On public lands, projects would be designed to avoid, mitigate, or enhance sensitive plant habitats. The disturbance associated with timber harvest activities does have the potential to increase noxious weed spread which degrades sensitive species habitat and individual plant populations.

Mine closures are planned, and have been completed, in the Soap Gulch and Camp Creek areas where sensitive plant habitat is present. Activities have been planned to minimize or eliminate surface disturbance in sensitive plant habitat, however some plant populations or habitat may be inadvertently disturbed.

The Big Hole Watershed group has completed a number of projects to improve livestock grazing, weed control, and irrigation practices on private land. Riparian conditions along the river have improved in a number of places as a result. Habitat for Idaho sedge would improve as well as it is a riparian species.

The BLM fuels reduction project now being planned for the Wise River area is not anticipated to have any adverse effects on special status plants. Treatments would be designed to minimize surface disturbance in sensitive plant habitat. Additionally, treatment would improve habitat in some areas by opening up parks and edges where trees have expanded into grassland soils and trees have thickened to the point of closing canopies.

At the scale of the entire Upper Big Hole River TPA (all land ownerships), the BLM travel plan alternatives would have slightly variable contributions to cumulative effects on special status plants. Under Alternative A less than 1 percent of all roads in the TPA would be closed. Under Alternative B adverse effects on special status plants would be slightly reduced compared to Alternative A because 6.1 percent of all roads in the TPA would be closed or decommissioned. Alternative C would provide the most benefits of all alternatives as 7.9 percent of all roads in the TPA would be closed or decommissioned. Alternative D would provide slightly more benefits than Alternative A but slightly fewer benefits than either Alternatives B or C as 4.5 percent of all roads in the TPA would be closed or decommissioned. Because

BLM lands make up only 17.7 percent of all lands in the TPA, activities on non-BLM lands would play a dominant role in determining status of special status plants.

WILDLAND FIRE MANAGEMENT

Travel planning alternatives were analyzed to determine whether they could result in impact on wildland fire management, causing change to any of the following indicators:

- Fire regime condition class (FRCC)
- Firefighter and public safety
- Reducing threat to Wildland Urban Interface (WUI)

Effects Common to All Alternatives

Public road access during the fire season provides opportunities for human-caused fires either due to catalytic converters on vehicles igniting dry vegetation, or due to some types of human activities. Roads that are closed to public access reduce the risk of human-caused fire starts in those areas.

Decommissioned roads and roads that are closed and not regularly maintained for navigability reduce access for fire suppression. Closed roads may become impassible due to vegetation regrowth, downfall of trees, or severe erosion. Some roads may be closed with earthen berms or fallen trees and would need to be physically manipulated to make them useable for vehicles again. These roads would extend firefighting response time and have negative impacts on efforts to reduce wildland fire threat to WUI areas and firefighter and public safety. In an emergency fire suppression situation, any navigable closed roads needed for fire suppression would be used immediately. Non-navigable closed roads could also be used if deemed to be needed for fire suppression, after needed improvements are made to make those roads useable. Planning and implementation of fuels reduction treatments could occur in association with closed roads if variances for temporary road use were to be allowed. Variances would be subject to internal BLM review.

In the context of fuels reduction projects, availability of open roads is important to facilitating fuels project location as well as increasing project feasibility and decreasing costs. Open roads also facilitate spread of noxious weeds by transporting weed seed on vehicles and their tires. Presence of large noxious weed populations could delay or cause fuels projects to be cost-prohibitive due to the fact that the weeds may have to be treated before and/or after the fuels treatment. Also, some applications of fuel treatments (e.g., prescribed fire) may promote the spread of some weeds. The presence of weeds and non-native species are indicators that FRCC has departed from historical conditions.

Noxious weeds and non-native invasive species are well established and spreading in the Upper Big Hole River TPA.

Effects of Alternative A

Under Alternative A, all BLM routes located within the TPA would continue to be managed as indicated on the Southwest Montana Interagency Visitor/Travel Map (USDA-FS, USDI-BLM, and State of Montana, 1996). Alternative A provides 157.9 miles of routes open to wheeled motorized use (69.9 miles open yearlong, 88.0 miles seasonally restricted). Alternative A would allow for the greatest flexibility between alternatives for access for suppression purposes. Fuels project feasibility would be highest under this alternative. However, public access during the fire season would be the greatest under this alternative and would provide the most opportunities for human-caused fire starts.

The distribution of noxious weeds could be the greatest under Alternative A with the most open roads and noxious weeds already well established. This would contribute to reduced feasibility of fuels reduction projects more than under any other alternative.

Effects of Alternative B

Under Alternative B, 80.9 miles of routes would be available for wheeled motorized use (26.9 miles open yearlong, 57.9 miles seasonally restricted). Alternative B would limit the flexibility for access for suppression purposes, and fuels project feasibility would go down compared to Alternative A due to the fact that access would be limited to 84.8 miles of road. Of the 76.9 miles of closed roads, 27.7 miles would be decommissioned and would likely be unusable for fire suppression. The risk of human-caused fires from motorized use would be limited compared to Alternative A, due to a 44 percent decrease in miles of road open to motorized public travel.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because more roads would be closed than under Alternative A, Alternative B should help reduce the spread of noxious weeds, and may make fuels treatment more feasible than Alternative A, reducing FRCC departure.

Effects of Alternative C

Under Alternative C, 60.0 miles of routes would be available for wheeled motorized use (19.2 miles open yearlong, 40.8 miles seasonally restricted).

Alternative C would limit the flexibility for access for suppression purposes, and fuels project feasibility would go down compared to both Alternatives A and B, due to the fact that access would be limited to 60 miles of road. Of the 102.8 miles of closed roads, 33.5 miles would be decommissioned and would likely be unusable for fire suppression. The risk of human-caused fires associated

with motorized use would be the lowest of all alternatives, due to a 58 percent decrease in miles of road open to motorized public travel. However, this degree of reduced motorized access may promote more non-motorized users to a concentrated area, increasing the odds for a human-caused fire to occur by another ignition source.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because more roads would be closed than under any other alternative, Alternative C should help reduce the spread of noxious weeds more than any other alternative, and may make fuels treatment more feasible, reducing FRCC departure.

Effects of Alternative D

Under alternative D, 26.8 miles of open routes would be available yearlong for wheeled motorized use and 70.6 miles would be restricted seasonally. Of the 58.9 miles of closed roads, 25.7 miles would be decommissioned and would likely be unusable for fire suppression. Alternative D would be more flexible than Alternatives B and C but would limit flexibility for access for suppression purposes, and fuels project feasibility would go down compared to Alternative A. The risk of human-caused fires associated with motorized vehicle use would be reduced compared to Alternative A, but would be greater than under Alternatives B and C, due to a 31 percent decrease in open roads compared to Alternative A.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the area. Because an intermediate number of road miles would be closed under this alternative, Alternative D should help reduce the spread of noxious weeds and may make fuels treatment more feasible compared to Alternative A, but would promote more weed spread and potentially make projects less feasible than Alternatives B and C.

Cumulative Effects on Wildland Fire Management

Effects on wildland fire management associated with any of the BLM travel plan alternatives would be overshadowed by reasonably foreseeable uncharacteristic fire, continued fire suppression made necessary by WUI and intermingled landownership, and large-scale forest insect infestations and disease outbreaks that would continue for the planning period. BLM lands make up about 12.6 percent of all lands while BLM roads make up about 17.7 percent of all roads in the Upper Big Hole River TPA.

Revision of the Beaverhead-Deerlodge National Forest Plan could result in more or less treatment of adjacent areas. Because no decision has been made, the effects are not known. Wildland fire management, particularly where wildland fire use (management of naturally ignited wildland fires to achieve resource objectives) may

occur on USFS lands, will be determined in the plan decision. BLM would need to coordinate with USFS on all wildland fire use actions and events. Wildland fire use on USFS lands could affect FRCC on BLM lands. USFS lands make up 40 percent of all lands in the Upper Big Hole River TPA so activities there would likely have more influence on future fire characteristics than activities on BLM lands (17.7 percent of all lands in TPA).

Decisions to increase the level of wildland fire use, prescribed fire, or open burning by the public could impact the BLM's ability to use wildland fire and prescribed fire due to air quality concerns and requirements. This could postpone or eliminate BLM fuel reductions or treatments to improve FRCC.

Access is a critical component of wildland fire suppression. In some cases, access to public lands is being reduced by adjacent landowners gating or closing roads, which could hamper wildland fire suppression efforts and pose a risk to public and firefighter safety. Reducing access would also increase the potential for larger fires to occur due to an increase in time needed to access a fire and control it. Time needed to move in crews would be extended, and the ability to effectively apply and place resources (e.g., engines, water tenders, etc.) would be limited.

Effects on wildland fire management, including FRCC and firefighter and public safety due to management accomplished by other landowners may affect wildland fire management on public lands. When activity fuels (such as logging slash) are not treated adequately, fuel hazard could increase on adjacent lands which could affect fire intensity and severity on public lands. When adjacent owners treat fuels or implement fire mitigation plans in the WUI, fires are easier to suppress and firefighter safety is increased. In the Boulder/Jefferson City TPA, activities on private lands (32 percent of all lands in TPA) would have more influence on future fire characteristics in the area overall than activities on BLM lands (17.7 percent of all lands in TPA).

Human population increases and subsequent residential development are likely to expand the WUI and could alter forest management, taking the emphasis off restoring historic composition and structure and focusing more on fuel reduction.

CULTURAL AND PALEONTOLOGICAL RESOURCES

Effects Common to All Alternatives

Alternative-specific risks or impacts to cultural and paleontological resources are difficult to discern due to a lack of extensive site-specific knowledge about the presence of these resources in a given TPA. By designating open routes, limiting open-country travel, and closing some routes, inadvertent discovery of cultural and pa-

leontological resources and vandalism to them is reduced. Higher road densities in a given area would allow greater access to more land on the average, but that does not imply greater amounts of vandalism, since the vehicles would remain on designated routes.

VISUAL RESOURCES

Effects Common to All Alternatives

Roads (temporary or permanent) may affect visual quality. Roads that remain open for public use may impact visual qualities where noticeable. The quantity of open roads would also influence sensitivity levels since with more open roads, more areas would generally be viewed by more members of the public. Closing or decommissioning roads would generally reduce effects to visual resources and reduce sensitivity levels because fewer members of the public would generally be accessing and viewing areas with closed roads.

Effects of the Alternatives

Under Alternative A, approximately 158.6 road miles would remain open (including open with seasonal restrictions), while 7.4 miles would remain closed. This alternative would leave the greatest mileage of open roads and would have the greatest level of impact to visual resources of all alternatives.

Under Alternative B, there would be 84.8 miles of open road (including open with seasonal restrictions), 49.2 miles of closed road, and 27.7 miles of decommissioned road. Road closures and decommissioning under this alternative would reduce effects on visual resources compared to Alternative A.

Under Alternative C, there would be 60 miles of open road (including open with seasonal restrictions), 69.3 miles of closed road, and 33.5 miles of decommissioned road. Alternative C would have fewer adverse effects and would improve visual resources the most of all alternatives.

Under Alternative D, there would be 97.4 miles of open road (including open with seasonal restrictions), 33.2 miles of closed road, and 25.7 miles of decommissioned roads. Alternative D would improve visual resources compared to Alternative A, but would have more adverse effects than Alternatives B and C.

Cumulative Effects on Visual Resources

Under all alternatives, most activities on BLM lands would generally not adversely affect visual resources to unacceptable degrees because discretionary activities on BLM lands would be required to meet Visual Resource Management objectives within individual project areas.

Activities on non-BLM lands, particularly activities near BLM lands associated with residential development, urbanization, additional mining, or vegetation management, could have adverse cumulative effects on visual

resources on BLM lands because BLM VRM objectives would obviously not apply to non-BLM activities.

LIVESTOCK GRAZING

Effects Common to All Alternatives

Roads and trails can potentially affect livestock grazing management. Roads and trails often act as avenues of noxious weed spread. Noxious and invasive weeds can reduce the quantity and quality of forage. Users of roads and trails can cause management problems for livestock permittees when they leave gates open at fences, vandalize range improvements, or harass livestock purposely or unintentionally.

Closure of roads and trails can improve or maintain the forage base by reducing vectors of noxious weed spread. Additionally, road and trail closures can reduce management conflicts. On the other hand, closures may increase permittees' time requirements if and when work has to be conducted with horses or afoot. Permittees could minimize effects of closed roads on grazing management time by seeking variances from the BLM for temporary use of specific closed roads.

Effects of the Alternatives

Under Alternative A, 158.6 miles of BLM roads and trails would remain open during the grazing season, and 7.4 miles of roads and trails would be closed. The effects would continue as described above. All action alternatives would close or decommission more roads and trails than Alternative A. As more roads and trails are closed, noxious and invasive weed spread along with multiple user conflicts would be reduced. On the other hand, permittee management time may increase. Consequently, more effects as described under the Effects Common to All Alternatives section would occur under Alternative C (60 miles open during grazing season, 102.8 miles closed or decommissioned) than under any other alternative. Alternative B (80.9 miles open during grazing season, 79.9 miles closed or decommissioned) would produce fewer effects than Alternative than C, but more than Alternative A or Alternative D (97.4 miles open during grazing season, 58.9 miles closed or decommissioned). Alternative D would have fewer effects than Alternatives B or C, but more than Alternative A.

Cumulative Effects on Livestock Grazing

A number of past, present, and reasonably foreseeable future actions affect livestock grazing at the scale of the entire Upper Big Hole River TPA. Livestock grazing will continue in the area and has the potential to impact forage quality and quantity. On public lands, ongoing rangeland health assessments and implementation of livestock grazing guidelines would continue to improve or maintain forage quality and quantity. On private

lands, livestock grazing is expected to decline slowly as more ranch and farmland is subdivided.

Noxious weed control will continue on both public and private lands with varying degrees of success. To the extent that these efforts are successful, forage conditions would benefit.

The Big Hole Watershed group has completed a number of projects to improve livestock grazing, weed control, and irrigation practices on private land. Livestock grazing management would improve correspondingly.

The fuels reduction project scheduled for the Wise River area is not anticipated to have any major effects on livestock grazing. Reduction of conifers in meadows and parks would improve forage production for livestock. Some allotments may require growing season rest for one to two years after treatments are completed.

Because BLM lands make up only 17.7 percent of all lands in the Upper Big Hole River TPA, all of the BLM travel plan alternatives would have a minor contribution to cumulative effects on livestock grazing at the scale of the entire TPA.

MINERALS

Effects Common to All Alternatives

Road closures and decommissioning could affect access to locatable minerals in areas of moderate or high mineral potential. Operators would be required to seek travel variances from the BLM to use motor vehicles to conduct mineral exploration on closed roads, or to conduct exploration on seasonally restricted routes during the season of closure. Decommissioned roads could not be used for motorized exploration. Travel management provisions that require a permit or variance could result in reducing access to mining claims or interfere with the ability to conduct exploration work for some operators. Historic knowledge of mineralized areas associated with "closed" roads may be lost after long periods of time if no exploration occurs there. Additional costs and time could be required for exploration and development of mining projects associated with closed or decommissioned roads. Impacts of road closures or decommissioning in areas with low mineral potential would not be substantial to mineral development.

Effects of the Alternatives

Alternative A for the Upper Big Hole TPA would seasonally restrict access on 18 percent of the roads in areas with high mineral potential and 6 percent of those in moderate mineral potential areas (**Table 4-94**).

Alternative B for the Upper Big Hole TPA would seasonally restrict access on 14 percent, close 8 percent, and decommission 3 percent of the roads in areas with high mineral potential. Additionally this travel plan alternative would seasonally restrict access on 4 percent and

Table 4-94				
Analysis of Access to Mineral Potential Areas				
Upper Big Hole River TPA				
Mineral Potential	Open Miles (%)	Seasonally Restricted Miles (%)	Closed Miles (%)	Decom Miles (%)
Alternative A				
High	17.8 (11%)	29.8 (18%)	0.8 (0%)	0.0 (0%)
Moderate	10.2 (6%)	10.2 (6%)	0.1 (1%)	0.0 (0%)
Low	41.8 (25%)	48.0 (29%)	6.5 (4%)	0.0 (0%)
Total Miles = 165.3				
Alternative B				
High	7.7 (5%)	23.1 (14%)	13.4 (8%)	4.3 (3%)
Moderate	1.2 (1%)	6.7 (4%)	11.6 (7%)	1.0 (0%)
Low to none	12.2 (7%)	34.5 (21%)	26.4 (16%)	23.3 (14%)
Total Miles = 165.3				
Alternative C				
High	5.7 (3%)	11.3 (7%)	26.9 (16%)	4.6 (3%)
Moderate	1.2 (1%)	6.6 (4%)	7.6 (5%)	5.1 (3%)
Low to none	12.2 (7%)	25.5 (16%)	34.9 (21%)	23.8 (14%)
Total Miles = 165.3				
Alternative D				
High	8.9 (5%)	26.3 (16%)	9.3 (6%)	4.0 (2%)
Moderate	4.2 (3%)	7.9 (5%)	7.5 (4%)	0.9 (1%)
Low to none	12.2 (7%)	47.0 (28%)	16.4 (10%)	20.7 (13%)
Total Miles = 165.3				

Mineral Potential areas have been delineated by the Montana Bureau of Mines and Geology (MBMG)

close 7 percent of roads in areas with moderate mineral potential in this TPA (Table 4-94).

Alternative C for the Upper Big Hole TPA would seasonally restrict access on 7 percent, close 16 percent, and decommission 3 percent of the roads in areas with high mineral potential. Additionally this alternative would seasonally restrict access on 4 percent, close 5 percent, and decommission 3 percent of roads in areas with moderate mineral potential in this TPA (Table 4-94).

Alternative D in the Upper Big Hole TPA would seasonally restrict access on 16 percent, close 6 percent, and decommission 2 percent of the roads in areas with high mineral potential. Additionally this alternative would

seasonally restrict access on 5 percent, close 4 percent, and decommission 1 percent of roads in areas with moderate mineral potential in this TPA (Table 4-94).

Cumulative Effects on Access to Mineralized Areas

No other past, present, or reasonably foreseeable future actions in the Upper Big Hole River TPA would adversely affect mineral availability or access.

RECREATION

Effects of travel plan alternatives on Recreation in the Upper Big Hole River TPA are described qualitatively below.

Effects of the Alternatives

Under Alternative A, all BLM routes located within the TPA would continue to be managed as indicated on the Southwest Montana Interagency Visitor/Travel Map (interagency cooperative mapping effort, 1996 revision). Alternative A provides 158.6 miles of routes open to wheeled motorized use (70.6 miles open yearlong, 88.0 miles seasonally restricted). Where allowed, snowmobile use would continue to be open to area-wide cross-country use as well as use on existing routes, during the season of use, 12/2-5/15, conditions permitting.

Under Alternative B, motorized travel opportunities would be decreased by about 50 percent while non-motorized opportunities would be enhanced and conflicts between users would be reduced. Effects of Alternative C would be similar to Alternative B with the exception that 22 additional miles of roads would be closed and snowmobile use would be limited to designated routes only. This alternative would reduce motorized recreation opportunities while non-motorized opportunities would be most enhanced of all alternatives. Impacts of Alternative D would be similar to those of Alternative A with the exception that fewer secondary roads would be available to motorized travel.

Cumulative Effects on Recreation

Under Alternative A, motorized travel opportunities would be the greatest under this alternative given the miles of roads available to wheeled vehicles and the acres available to snowmobiles. Big game hunting opportunities and motorized access within the Sawlog Gulch, Jerry Creek-Johnson Creek, Tie Creek, Dickie Hills, Sawmill, Humbug Spires/McClain Creek, and Soap/Camp Creek areas would continue. Existing travel restrictions in these areas would encourage big game retention, quality walk-in hunting and game retrieval challenges as motorized vehicle use would be somewhat limited. During the non-hunting season conflicts between non-motorized and motorized users would remain relatively high within some areas. Public access and management of developed recreation sites along the Big Hole River would continue to provide for a wide spec-

trum of water based opportunities and visitor trends are expected to increase. The Upper Big Hole Special Recreation Area and plan would continue and management priorities would remain high. The state would continue lead management responsibilities for the river and quality fishing and floating opportunities will continue subject to water flow conditions.

Under the action alternatives, big game hunting opportunities within the TPA would continue for both motorized and non-motorized users as the primary access routes would remain. Additional travel restrictions of secondary and primitive roads in numerous areas would promote more big game retention on public lands and better walk-in hunting experiences. Game retrieval challenges would be increased in many portions of the TPA since fewer retrieval roads would be available. Recreation Opportunity Spectrum designations would be established and therefore a range of varied settings would be provided and maintained. Although available travel routes and motorized riding opportunities would be limited, access to higher elevation lands and quality walk-in areas would be retained to help disperse users and ensure natural settings. Cumulative impacts on developed recreation sites and water based activities would be similar to Alternative A.

TRAVEL MANAGEMENT AND ACCESS

Effects of Alternative A

BLM routes in the Upper Big Hole River TPA would continue to be managed as both open yearlong (70.6 miles) and open with seasonal restrictions (88 miles) (Table-4-95). Alternative A would provide the greatest amount of motorized use opportunities and the least amount of non-motorized opportunities of all the alternatives.

Proposed Management	Total Miles			
	Alt A	Alt B	Alt C	Alt D
Wheeled motorized routes				
Open Yearlong	69.9	26.9	19.2	26.8
Seasonally Restricted	88.0	57.9	40.8	70.6
Closed	7.4	49.2	69.3	33.2
Decommissioned	-	27.7	33.5	25.7
Non-motorized trails ¹	11.5	81.0	106.9	62.9

¹ Non-motorized trails include all existing trails, closed roads, and decommissioned roads.

Where allowed, snowmobile use would continue to be open to area-wide cross-country use as well as use on existing routes, during the season of use, 12/2-5/15, conditions permitting. Alternative A would provide the most miles of routes available to seasonal snowmobile users and the greatest opportunity for motorized winter use

while providing the fewest opportunities for non-motorized winter recreation of all alternatives.

The extent of management activities and costs under Alternative A would be mixed. Less personnel time would be required to monitor travel compliance than under the action alternatives. However, more effort would be required for initial implementation (signing designated routes, installing bulletin boards) than under the action alternatives. Estimated costs for road/trail maintenance would be highest of all alternatives.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be minimal under this alternative, given the availability of motorized access.

Effects of Alternative B

Approximately 50 percent fewer route miles would be open to wheeled motorized access yearlong or seasonally restricted than under Alternative A (Table-4-95).

Snowmobile management would continue to remain substantially in effect as represented by the 1996 Southwest Interagency Visitor/Travel Map. However, several additional areas would be closed to cross country travel, and travel in other areas would be restricted to existing designated routes and trails. Proposed cross country closures include the area located between the Soap Gulch and Camp Creek roads, the Goat Mountain/Maiden Rock area, and the Sawmill Gulch/Nez Perce Ridge area. The proposed closures would have little impact on snowmobile use due to the poor snow conditions in these areas.

Route restrictions/closures that would enhance recreational opportunities include: enhancement of high-elevation hunting in the Humbug Spires area; road density reduction in the Nez Perce Creek road area that would enhance non-motorized recreation, as well as provide big game security; and restricting motorized vehicle crossings of the Big Hole River from 12/2-7/15 in the Sawlog Gulch (Fishtrap Creek area). The river crossing restriction would help enhance non-motorized recreational experiences as well as provide improved public safety.

The extent of management activities and costs under Alternative B would be mixed. Less personnel time would be required for initial implementation (signing designated routes, installing bulletin boards) than under Alternative A. However, more effort would be required for public education and compliance than under Alternative A. Estimated costs for road/trail maintenance would be less than under Alternative A.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would increase under Alternative B compared to Alternative A.

Effects of Alternative C

Alternative C would have the least number of wheeled motorized routes open yearlong or seasonally restricted than all other alternatives in the Upper Big Hole River TPA (**Table-4-95**). This would result in fewer opportunities for motorized users. Alternative C would have 62 percent fewer motorized miles than Alternative A, and 30 percent fewer miles than Alternative B.

For areas open to snowmobile use under the Southwest Montana Interagency Visitor/Travel Map, travel would be restricted to designated routes only. No cross-country travel would be allowed. Alternative C would provide the lowest level of opportunities for snowmobile use.

Route closures that would enhance non-motorized opportunities include: additional yearlong closures between Soap Gulch and Camp Creek travel corridors (Humbug Spires area), additional yearlong closures near Johnson and Jerry Creeks (Jimmie New Creek area), and closure of the Sawlog Gulch route (Fishtrap Creek area).

Closing the Sawlog Gulch route (Fishtrap Creek area) would provide for improved public safety by eliminating fording of the Big Hole River.

Closure and decommissioning of routes in the Upper Big Hole River TPA would result in more non-motorized opportunities under Alternative C than under any other alternative. Alternative C would have 89 percent more miles of non-motorized trails than Alternative A, and 46 percent more than Alternative B.

The extent of management activities and costs under Alternative C would be mixed. Less personnel time would be required for initial implementation (signing designated routes, installing bulletin boards) than under any alternative. However, more effort would be required for public education and compliance than under any other alternative. Estimated costs for road/trail maintenance would be the lowest of the alternatives.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be greater under Alternative C than under any other alternative.

Effects of Alternative D

Alternative D would offer the highest level of motorized access of the action alternatives with 97.4 miles of open and seasonally restricted routes (**Table-4-95**). This would be 38 percent less than Alternative A, but 13 and 38 percent more than under Alternatives B and C, respectively.

Conversely, Alternative D would provide fewer opportunities for non-motorized use than Alternatives B and C. Route closures under Alternative D that would enhance user opportunities include: additional routes in the Humbug Spires area and adjusting existing seasonal route restrictions to allow for high elevation big game

hunting access; additional routes for the Jimmie New Creek area, including game retrieval routes; and a seasonal closure on Sawlog Gulch (Fishtrap Creek area) that could enhance non-motorized opportunities.

For the Sawlog Gulch/Fishtrap Creek area, motorized access would be managed the same as under Alternative B, with a seasonal closure from December 2 to July 15. This change would provide for improved public safety from fording the Big Hole River during periods of high river flows and enhanced non-motorized opportunities.

The Big Hole watershed would be a priority area for restoration and protection treatments. Vegetation treatments could impact user opportunities and create user conflicts, depending on the timing and duration of the treatments.

Snowmobile management and effects would be the same as under Alternative A.

The extent of management activities and costs under Alternative D would be mixed. Less personnel time would be required to monitor travel compliance than under Alternatives B and C, but more time would be needed than under Alternative A. However, more effort would be required for initial implementation (signing designated routes, installing bulletin boards) than under Alternatives B and C, but less effort would be needed than under Alternative A. Estimated costs for road/trail maintenance would be higher than the other action alternatives, but less than under Alternative A.

The need for the BLM and members of the public to obtain travel variances for temporary specific uses of specific closed roads would be greater under Alternative D than under Alternative A, but less than under Alternatives B and C.

Cumulative Effects on Travel Management and Access

Under all alternatives there are a number of past, present, and reasonably foreseeable future BLM and non-BLM actions and activities affecting travel management and access in the Upper Big Hole River TPA.

The majority of the Upper Big Hole River TPA is characterized by undeveloped land (cattle ranches; BLM, State, and USFS lands). Only about 2,000 people live in the area, many of them making their living by ranching and hay farming. Human population growth for the TPA is expected to remain low. However, as the area becomes more populated, there could be increased public pressure to alter the travel management to accommodate more or less motorized use.

The TPA is largely undeveloped. Several small communities (Divide, Dewey, and Wise River) are located within the TPA; Melrose and Wisdom lie just outside. The extent of urbanization is low, only about 2,000 people live in the area. Urbanization is unlikely to become an issue for many years in this area.

Recreation use is well established in the TPA, with fishing and big game hunting topping the list. The Big Hole River has a national reputation as a premiere fly fishing destination. Big game hunting attracts regional and national attention as well. As recreation use grows, conflicts between non-motorized and motorized recreation users could lead to increased public demands for either more, or less motorized use.

The TPA includes important habitat for big game (elk, bighorn sheep, mule deer) and fisheries (last wild population of fluvial Arctic grayling). Concerns could lead to demands to restrict motorized use.

The Humbug Spires WSA, Humbug Spires Potential ACEC, and Upper Big Hole River Eligible WSR segment are located within the TPA. These special designations could influence (restrict) travel management for existing roads and trails as well as for new proposed roads and trails.

In some site specific cases, visual resource management may affect or restrict new road construction.

Applications for right-of-way permits to access private property or for commercial development are likely to increase in the future. As a result, public access to BLM lands, via the rights-of-way, could increase as well.

Limits or reductions in the BLM's funding and ability to maintain designated routes could lead to an overall reduction of maintained motorized routes.

A variety of resource management projects, such as BLM initiated vegetation treatments, or wildland fire fuels reduction projects, could affect travel management. BLM forest management activities from 1984 to present include 126 acres of forest planting and 246 acres of timber harvest. Future activities may include approximately 430 acres of forest and woodland treatment (thinning, selective harvest). Past wildland fire management activities include treatments of 474 acres of prescribed fire and 141 acres of mechanical treatments in the Jerry Creek and Dickie Hills areas. Future treatments would include the Highland Mountain and the Wise River projects. The Highland Mountain project will entail 2,087 acres of mechanical treatment and 2,659 acres of prescribed fire treatment starting in 2007 through 2012. The Wise River project (currently being planned) will consist of mechanical and/or prescribed fire treatments ranging from 500-2,000 acres, focused on the urban interface areas. Depending on the type and scope of project, effects could vary from temporary, short-term area/route closures, to new opportunities (new routes) for motorized or non-motorized access.

A portion of this TPA is highly mineralized, particularly in the Soap Gulch/Camp Creek area. Current mining activity is low. Increases in mineral prices, however, could lead to additional increased or renewed mining activity. Depending on the type and scope of mining activity, effects on travel planning could vary from tem-

porary, short-term area/route closures, to increased opportunities (new routes) for motorized or non-motorized access.

Noxious weeds and non-native invasive species are well established and spreading rapidly in the TPA. Motorized activities play a large role in the distribution of noxious weeds. Concerns over the spread of noxious weeds may lead to the need to impose motorized travel restrictions or closures.

Motorized use on dirt roads and trails is a major contributor to soil erosion and stream sedimentation. These concerns may influence travel management, and result in fewer motorized opportunities.

Most illegal activities (trash dumping, drug use, underage alcohol use, unattended camp fires, vandalism, etc.) are directly associated with motorized use. Increases in illegal activity may lead to a need to alter travel management and impose motorized travel or other restrictions (site specific management).

For perspective, BLM managed lands represent approximately 17.7 percent of the total travel planning area (357,275 total acres, 63,108 BLM acres); while BLM managed routes represent approximately 12.6 percent of the total routes available (1,309 total miles, 165 miles of BLM roads/trails). Future travel management (for all agencies, nationwide) is likely to lead to fewer opportunities for motorized recreational use than under current management (particularly for OHV use). As a result, BLM routes available to motorized use in this TPA could experience increased use from displaced users, eventually leading to more concentrated use, increased resource impacts, and user conflicts. These impacts could lead to demands from motorized users for additional routes, and conversely, demands from non-motorized users for fewer routes.

Under all alternatives, increases in human population, recreation use, user conflicts; and concerns for wildlife, fisheries resources, noxious weed spread, soil erosion/water quality, and illegal activities are likely to lead to increased conflicts associated with travel management. Under Alternative A, this may lead to increased demands to restrict motorized travel, particularly in the areas adjacent to Divide, Dewey, and Wise River. Under Alternative B, these pressures would have less impact on travel management than under Alternatives A and D, due to the overall reduction in motorized opportunities and separation of motorized and non-motorized uses. Under Alternative C, these pressures would likely have the least impact on travel management than under the other alternatives, due to the greatest reduction in motorized opportunities and separation of motorized and non-motorized uses of all alternatives. Under Alternative D, these pressures may lead to increased demands to restrict motorized travel, particularly in areas with urban development.

TRANSPORTATION FACILITIES

For the sake of this discussion, “open” roads include roads that are open yearlong as well as those that are open with seasonal restrictions.

Effects of Alternative A

Under Alternative A, the Upper Big Hole TPA would have 157.9 miles of open roads and no motorized trails (**Table-4-96**). Estimated costs for annual maintenance and stabilization of roads under Alternative A would be substantially higher than under any other alternative. Estimated annual costs for monitoring and compliance, and weed control would also be more than under the action alternatives.

Effects of Alternative B

Under Alternative B, the Upper Big Hole TPA would have 80.9 miles of open roads and no motorized trails (**Table-4-96**). Estimated costs for annual maintenance and stabilization of roads under Alternative B would be more than two times less than under Alternative A, more than under Alternative C, and slightly less than under Alternative D due to the reduction in roads from current conditions. Estimated annual costs for monitoring, compliance, and weed control would also be much less than under Alternative A.

Effects to transportation facility management under Alternative B would result in increased costs associated with new signage and sign maintenance due to changing seasonal use restrictions in the Humbug Spires area, the reduction in road density in the Jimmie New Creek area, and restricting motorized access in the Sawlog Gulch area of Fishtrap Creek.

Closing additional portions of the Upper Big Hole TPA to cross-country snowmobile travel would also result in an increase in transportation facility costs for additional signage and sign maintenance.

Effects of Alternative C

Under Alternative C, the Upper Big Hole TPA would have 60 miles of open roads and no motorized trails (**Table-4-96**). Estimated costs for annual maintenance

and stabilization of roads under Alternative C would be the least of all the alternatives due to the least number of motorized routes. Estimated annual costs for monitoring, compliance, and weed control would also be less than under the other alternatives.

Effects to transportation facility management under Alternative C would result in increased costs associated with new signage and sign maintenance due to route closures and seasonal restriction changes in the Humbug Spires area, route closures to reduce road density in the Jimmie New Creek area, and the year-long closure of the Sawlog Gulch area of Fishtrap Creek.

Changing portions of the TPA from an open designation to a limited designation for snowmobile use would result in increases costs associated with new signage and sign maintenance.

Effects of Alternative D

Under Alternative D, the Upper Big Hole TPA would have 97.4 miles of open roads and no motorized trails (**Table-4-96**). Estimated costs for annual maintenance and periodic stabilization of roads under Alternative D would be about half the cost as under Alternative A due to a reduction in motorized access. Road maintenance would be higher under Alternative D than under either Alternative B or C. Estimated annual costs for monitoring, compliance and weed control would also be much less under Alternative D than under Alternative A, and more than under Alternatives B and C.

Transportation facility costs under Alternative D would increase due to new signage and sign maintenance required in the Humbug Spires area, Jimmie New Creek area, and the Sawlog Gulch area of Fishtrap Creek.

LANDS AND REALTY

Effects Common to All Alternatives

The Butte Field Office administers approximately 122 rights-of-way within the boundaries of the Upper Big Hole TPA, which encumber approximately 6,805 acres of BLM land (**Table 4-97**). Various types of road rights-of-way (ROW) are the most common type of grant, ac-

Classification/Cost	Alt A	Alt B	Alt C	Alt D
Miles of Open/Restricted Roads	158.6	80.9	60	97.4
Motorized Trails	0	0	0	0
Annual Road Maintenance	\$12,632	\$6,472	\$4,800	\$7,792
Annual Trail Maintenance	\$0	\$0	\$0	\$0
Periodic Road Stabilization	\$5,053	\$2,589	\$1,920	\$3,117
Periodic Trail Stabilization	\$0	\$0	\$0	\$0
Monitoring/Compliance	\$7,895	\$4,045	\$3,000	\$4,870
Weed Control	\$2,369	\$1,214	\$900	\$1,461

counting for 57 percent, or over half of the total. Other types of authorized uses include: oil and gas pipelines, lines for electrical distribution and telephone facilities, communication sites, ditches, railroads, and mineral material sites.

Type	Approximate Number	Approximate Acres
Roads	70	2,907
Power	20	865
Telephone	4	45
O&G Pipelines	1	2
Comm. Sites	0	0
2920 Leases	0	0
Other	27	2,986
Totals	122	6,805

Approximately one right-of-way application for new facilities as well as amendments, assignments, renewals, or relinquishments of existing right-of-way grants are processed annually in the TPA. This would not vary by alternative.

The general trend of granting rights-of-way is expected to increase through the planning period as a result of increasing public demands. From a cumulative effects standpoint, development of adjacent federal, state, and private land, increased recreational use and the trend of homeownership away from urban areas, coupled with traditional on-going uses, are all expected to require more guaranteed access involving public land, including BLM lands.

SPECIAL DESIGNATIONS

There would be no effects to any special designation areas such as Wild and Scenic Rivers, Wilderness Study Areas, or Areas of Critical Environmental Concern under any of the travel plan alternatives for the Upper Big Hole River TPA.

CUMULATIVE EFFECTS OF TRAVEL PLANS AT THE PLANNING AREA SCALE

This section discusses cumulative effects of the five site-specific travel plans in aggregate at the level of all BLM lands in the Butte Field Office (Decision Area), as well as (to the extent possible) all lands in the entire Planning Area regardless of ownership. Effects of activities on BLM lands must be considered in the context of the fact that the approximately 307,300 acres of BLM surface lands administered by the Butte Field Office make up about 4.2 percent of the approximate total of 7,191,181

acres of land in the Planning Area. For the sake of context, total road miles in the Planning Area have been calculated based on available GIS data as approximately 17,810 miles. This figure is an underestimation of total road miles and should be considered a minimum. Total road mileage on Butte Field Office lands is estimated at 856 miles, or 4.8 percent of all roads in the Planning Area based on the 17,810 mile figure. Private lands make up about 49 percent of all lands and 64 percent of all roads are on private lands in the Planning Area. References to effects in this section tie back to effects described for a particular resource or resource use under the TPA-specific discussions.

No additional cumulative effects to Minerals, Lands and Realty, Cultural and Paleontological Resources, or Special Designations associated with the five site-specific travel plans have been identified at the Decision Area or Planning Area scales beyond those discussed in the cumulative effects section for the RMP.

AIR QUALITY

Contributions of BLM travel plan management to cumulative effects on air quality would be minor regardless of alternatives selected in final implementation decisions because BLM roads make up only 4.8 percent of all roads in the Planning Area. Alternative A would promote the most widespread contributions to airborne dust due to the greatest (and most dispersed) mileage of open roads. Alternative B would lessen this impact by virtue of closing or decommissioning 199 more road miles than under Alternative A. Alternative C would lessen the distribution of airborne dust the greatest of all alternatives by providing for closure or decommissioning of 253 more road miles than Alternative A. Alternative D would be intermediate between Alternatives A and B by providing for closure or decommissioning of 138 more road miles than Alternative A.

Vehicle emissions may be reduced somewhat accordingly as described above for airborne dust. However, it is unknown whether proposed road closures associated with action alternatives would markedly affect motorized use levels, or whether proposed closures would merely redistribute use to other areas or focus it more intensively on remaining open routes.

SOILS

Under current conditions (Alternative A), approximately 172 miles of motorized routes mapped on the BLM transportation system would remain closed. Generalized impacts to soil resources described above for each TPA (and in "Effects Common to All Alternatives" sections) would reduce over time on these routes as they revegetate and soils stabilize. These routes represent about 20 percent of the approximately 856 BLM road miles, and 1.0 percent of the at least 17,810 road miles across all ownerships in the entire Planning Area.

Alternative B would close (318 miles) or decommission (53 miles) approximately 371 miles of routes in the Decision Area currently open to use by motorized vehicles, the second most of any alternative. These routes represent about 43 percent of the approximately 856 BLM road miles in the Decision Area, and 2.1 percent of the at least 17,810 road miles across all ownerships in the entire Planning Area. This reduction in ground disturbance should reduce adverse effects on soils more than under Alternatives A and D, but less than under Alternative C.

Alternative C would close (375 miles) or decommission (50 miles) approximately 425 miles of routes currently open to use by motorized vehicles. These routes represent about 50 percent of the approximately 856 BLM road miles in the Decision Area, and 2.4 percent of the at least 17,810 road miles across all ownerships in the entire Planning Area. This reduction in ground disturbance associated with motorized routes would reduce impacts to soils more than under other alternative.

Alternative D would close (266 miles) or decommission (44 miles) approximately 310 miles of routes currently used by motorized vehicles. These routes represent about 36 percent of the approximately 856 BLM road miles in the Decision Area, and 1.7 percent of the at least 17,810 road miles across all ownerships in the entire Planning Area. This reduction in ground disturbance would benefit soils more than in Alternative A, but less than in Alternatives B and C.

WATER RESOURCES

Under current conditions (Alternative A) approximately 172 miles of motorized routes, mapped on the BLM transportation system for the entire Decision Area, would remain closed. Over time, erosion and sediment delivery would likely be reduced as these closed routes revegetate and soils stabilize.

Alternative B would close (318 miles) or decommission (53 miles) approximately 371 miles of routes in the Decision Area currently open to use by motorized vehicles, the second most of any alternative. This reduction in ground disturbance would reduce soil erosion, promote vegetative recovery, and should produce a moderate to high long-term benefit to water quality (compared to the current conditions).

Alternative C would close (375 miles) or decommission (50 miles) approximately 425 miles of routes in the Decision Area currently open to use by motorized vehicles. This reduction in ground disturbance associated with motorized routes would reduce impacts to water quality (primarily sedimentation) more than with any other alternative.

Alternative D would close (266 miles) or decommission (44 miles) approximately 310 miles of routes in the Decision Area currently used by motorized vehicles. This reduction in ground disturbance would reduce soil ero-

sion and should provide a moderate to high long-term benefit to water quality (compared to current conditions). However, the improvement would be less than under Alternatives B and C.

Generally, road density is an indicator of overall watershed health and function. Watersheds with higher road densities tend to have lower water quality due to greater potential for erosion and subsequent sedimentation. Of all the alternatives, Alternative A maintains the most BLM acres in the entire Decision Area with high road density (107,566 acres with greater than 2 mi/mi² road density) and the fewest acres with low road density (116,236 acres with less than 1 mi/mi² road density (Table 4-98).

Alternative B would result in more acres with low road density across the Decision Area (131,982 acres with less than 1mi/mi² road density) compared to Alternative A (116,236 acres) and Alternative D (123,073 acres), but less than Alternative C (141,264 acres). In the moderate road density category (1 to 2 mi/mi² road density), Alternative B would produce over 4,000 more acres of this category compared to Alternative A. Alternative B would result in almost 20,000 acres less in the high road density category (greater than 2 mi/mi² road density) than Alternative A. This would represent a reduction in risks and adverse effects to water resources associated with watershed conditions, from the current management situation.

Across all Decision Area lands, Alternative C would provide the most acres with low road density (141,264 acres with less than 1 mi/mi² road density) compared to all other alternatives (Table 4-98). This represents 25,000 more acres than currently exists. Alternative C would also produce the fewest acres with high road densities (road density greater than 2 mi/mi²) of all alternatives (26,000 fewer acres than current conditions). Of the action alternatives, Alternative C would produce 6,500 fewer acres of high road density compared to Alternative B and 14,300 less than Alternative D. This would indicate a lower risk to water quality under Alternative C than under the other alternatives.

Table 4-98
Acres of BLM Land in Road Density Categories by Alternative for all Decision Area Lands

Alternative	Road Density Category		
	Low (<1 mi/mi ²)	Moderate (1 to 2 mi/mi ²)	High (> 2 mi/mi ²)
Alt. A	116,236	78,175	107,566
Alt. B	131,982	82,267	87,729
Alt. C	141,264	79,516	81,196
Alt. D	123,073	83,424	95,481

Alternative D would result in more areas with low road densities than currently exists (123,073 acres versus 116,236 acres with Alternative A). However, it would have the least among the action alternatives. It would also provide a reduction in the amount of area with high road density (greater than 2 mi/mi² road density) from current conditions (95,481 acres versus 107,560 acres for Alternative A). However, this would be the lowest reduction among the action alternatives. These road densities suggest that this alternative would pose a reduced risk (to water quality) from current conditions, but the highest among the action alternatives.

Motorized routes within 300 feet of streams generally have greater potential to impact water quality through erosion and sedimentation, increased water temperatures (due to loss of shading vegetation), and direct alteration of stream channel morphology than those farther away. Under Alternative A, approximately 94.3 miles of motorized routes within 300 feet of streams (including intermittent streams) would remain open to motorized use Decision Area-wide. This is the highest of any alternative and represents the greatest threat to water quality associated with motorized routes of the alternatives.

Under Alternative B, approximately 77.4 miles of motorized routes within 300 feet of streams (including intermittent streams) would remain open to motorized use Decision Area-wide. This is less than with Alternatives A and D (94.3 miles and 81.2 miles, respectively), but more than with Alternative C (73.7 miles). Alternative B would pose the second lowest threat to water quality (associated with roads in and near riparian areas) of all alternatives. It would also represent an improvement over existing conditions.

Under Alternative C, approximately 73.7 miles of motorized routes within 300 feet of streams (including intermittent streams) would remain open to motorized use Decision Area-wide. This is less than with any other alternative and would represent a reduction of 21.6 miles from current conditions. Therefore, Alternative C would pose the lowest threat to water quality associated with roads in and near riparian areas of all alternatives.

Under Alternative D, approximately 81.2 miles of motorized routes within 300 feet of streams (including intermittent streams) would remain open to motorized use Decision Area-wide. This is 13.1 miles less than are currently open but would leave more miles open than under Alternatives B and C. As a result, Alternative D would pose the second greatest threat to water quality related to roads in and near riparian areas of all alternatives (but it would still represent an improvement over current conditions).

Overall, from a roads management standpoint, Alternative C would pose the greatest improvement to water resources (and least contribution to adverse cumulative effects) of all the alternatives. Alternative B would be the next most beneficial, followed by Alternative D, then

Alternative A. At the Planning Area scale, effects to water resources associated with management of the 856 miles of road administered by the Butte Field Office would be minor in the cumulative effects context of the at least 17,810 road miles in the Planning Area overall.

VEGETATIVE COMMUNITIES – FOREST RESOURCES AND FOREST AND WOODLAND PRODUCTS

Since BLM manages only 4.8 percent of the road miles in the Planning Area on the whole, the extent of cumulative effects from road management on BLM lands at the Planning Area scale is not great. However, federal and state public lands are used more extensively than other lands for firewood and other product gathering by the general public, as permission or a bill of sale is needed from landowners to gather products from private lands.

Effects referenced below tie back to effects of travel plan alternatives on forest resources and forest products described for each TPA-specific discussion above.

Effects of Alternative A

As compared with the other alternatives, travel management under Alternative A provides the highest level of support for forest/woodland management and timber removal activities. There would be no impact on the forest and woodland treatments or the forest products program from travel management. Alternative A has the most miles of open road for economic efficiency, as well as to provide public access for small sales permits (firewood and Christmas trees in particular).

At the scale of all BLM lands managed by the Butte Field Office, Alternative A would retain closure on approximately 20 percent (172 miles) of the current total of approximately 856 road miles. No additional roads would be decommissioned with this alternative so all 172 miles of closed roads would be subject to potential use for vegetation treatments if travel variances for temporary road use were allowed.

Effects of Alternative B

Travel management under Alternative B in the five TPAs being analyzed with this RMP revision, would provide an adequate level of support for the proposed forest management activities by maintaining approximately 84 percent of the existing roads in these TPAs shown under Alternative A as available for forest management and timber removal activities. While Alternative B would reduce the amount of open and limited use roads for the public by about 55 percent of the total roads available under Alternative A, travel variances could allow temporary use of “closed” roads for vegetation management projects. Road closures under Alternative B are expected to reduce the economic efficiency of some projects, as well as reduce by approximately one-half, public access for small sales permits (firewood and

Christmas tree) in these five TPAs. The maintenance costs for the closed roads would also be reduced, improving management efficiency in isolated areas which have limited product availability and low priority for vegetative treatment.

At the scale of all BLM lands managed by the Butte Field Office, Alternative B would close or decommission approximately 44 percent (371 miles) of the current total of approximately 856 road miles. Approximately 53 miles (6.2 percent of Field Office total) of the road miles across the Field Office would be decommissioned under this alternative. The remaining 318 miles of closed roads would be subject to potential use for vegetation treatments if travel variances for temporary road use were allowed. Alternative B would contribute to cumulative effects associated with making planning and implementation of vegetation treatment projects more costly and complex, as well as decreasing public access for forest product use more than Alternatives A and D, but less than Alternative C.

Effects of Alternative C

Effects from proposed travel management under Alternative C in the five Travel Planning Areas (TPAs) being analyzed with this RMP revision, would be reduced when compared to Alternative B in spite of the fact that no construction of new permanent roads would be allowed for purposes of extracting forest products under Alternative C. Alternative C would maintain approximately 87 percent of the existing roads in the five TPAs under Alternative A, as available for forest management and timber removal activities. While Alternative C would reduce the amount of open and limited use roads for the public by about 67 percent of the roads available under Alternative A, travel variances could allow temporary use of “closed” roads for vegetation management projects. Road closures under Alternative C are expected to reduce the economic efficiency of some projects, as well as reduce by approximately two thirds, public access for small sales permits (firewood and Christmas tree) in these five TPAs.

At the scale of all BLM lands managed by the Butte Field Office, Alternative C would close or decommission approximately 49 percent (425 miles) of the current total of approximately 856 BLM road miles. Approximately 50.1 miles (5.8 percent of Field Office total) of the road miles across the Field Office would be decommissioned under this alternative. The remaining 375 miles of closed roads would be subject to potential use for vegetation treatments if travel variances for temporary road use were allowed. Alternative C would contribute the most of all alternatives to cumulative effects associated with making planning and implementation of vegetation treatment projects more costly and complex, as well as decreasing public access for forest product use.

Effects of Alternative D

Effects from proposed travel management under Alternative D in the five Travel Planning Areas (TPAs) being analyzed with this RMP revision, would be similar to those described for Alternative C. Alternative D would maintain approximately 87 percent of the existing roads in the five TPAs under Alternative A, as available for forest management and timber removal activities. While Alternative D would reduce the amount of open and limited use roads for the public by about 39 percent of the roads available under Alternative A, travel variances could allow temporary use of “closed” roads for vegetation management projects. Road closures under Alternative C are expected to reduce the economic efficiency of some projects, as well as reduce by approximately 39 percent, public access for small sales permits (firewood and Christmas tree) and reduced ability to meet public demand in these five TPAs.

At the scale of all BLM lands managed by the Butte Field Office, Alternative D would close or decommission approximately 36 percent (310 miles) of the current total of approximately 856 road miles. Approximately 43.4 miles (5.1 percent of Field Office total) of the road miles across the Field Office would be decommissioned under this alternative. The remaining 267 miles of closed roads would be subject to potential use for vegetation treatments if travel variances for temporary road use were allowed. Alternative D would contribute to cumulative effects associated with making planning and implementation of vegetation treatment projects more costly and complex, as well as decreasing public access for forest product use, less than Alternatives B and C, but more than Alternative A.

VEGETATIVE COMMUNITIES -NOXIOUS WEEDS

Effects of the five site-specific travel plans in aggregate at the Field Office scale are discussed below. In this discussion closed or decommissioned roads are considered to reduce impacts to the landscape associated with noxious weeds because they eliminate motorized vehicle use as a vector for increasing spread of noxious weeds.

Since BLM roads make up about 4.8 percent of all roads and BLM lands make up 4.2 percent of all lands in the Planning Area, effects of BLM travel planning alternatives on noxious weeds at the RMP Planning Area scale would be minor. Activities and effects discussed above for each TPA on private lands (49 percent of lands, 63 percent of roads) and other public lands (42 percent of lands, 29 percent of roads) would have a stronger influence on noxious weeds in the Planning Area with activities on private lands likely having the greatest effect overall.

Effects of Alternative A

At the scale of all BLM lands managed by the Butte Field Office, Alternative A would retain closure on approximately 20 percent (172 miles) of the current total of approximately 856 BLM road miles. No additional roads would be decommissioned with this alternative. Alternative A would have the least positive contribution of all alternatives to cumulative effects on weeds by providing for the largest network of open BLM roads for weed spread. Weed spread would be greatest under this alternative than under all other alternatives.

Effects of Alternative B

At the scale of all BLM lands managed by the Butte Field Office, Alternative B would close or decommission approximately 44 percent (371 miles) of the current total of approximately 856 BLM road miles. Alternative B would contribute positively to cumulative effects on noxious weeds by reducing open road miles from on which weed spread can occur. Under Alternative B these benefits would be greater than under Alternatives A and D, but less than under Alternative C. Alternative B would have higher weed treatment costs on a per road mile basis than Alternative A due to increased concentration of motorized use on fewer open road miles.

Effects of Alternative C

At the scale of all BLM lands managed by the Butte Field Office, Alternative C would close or decommission approximately 49 percent (425 miles) of the current total of approximately 856 BLM road miles. Alternative C would contribute positively the most of all alternatives to cumulative effects on noxious weeds by promoting weed spread from fewer open roads than under any other alternative. Like Alternative B, Alternative C would have higher weed treatment costs on a per road mile basis than Alternative A due to increased concentration of motorized use on fewer open road miles.

Effects of Alternative D

At the scale of all BLM lands managed by the Butte Field Office, Alternative D would close or decommission approximately 36 percent (310 miles) of the current total of approximately 856 BLM road miles. Alternative D would contribute positively to cumulative effects on noxious weeds by promoting less weed spread from roads less than Alternatives B and C, but more than Alternative A. Like Alternatives B and C, Alternative D would have higher weed treatment costs on a per road mile basis than Alternative A due to increased concentration of motorized use on fewer open road miles.

VEGETATIVE COMMUNITIES – RIPARIAN VEGETATION

The following discussion summarizes contributions to cumulative effects on riparian vegetation associated with

BLM road management at the scale of all BLM lands in the Butte Field Office. Specific mechanisms of effect on riparian vegetation tie back to effects described for TPA-specific discussions above, particularly in the Effects Common to All Alternatives sections of those discussions. Since BLM roads make up about 4.8 percent of all roads and BLM lands make up 4.2 percent of all lands in the Planning Area, effects of BLM travel planning alternatives on riparian vegetation at the RMP Planning Area scale would be minor. Activities and effects discussed above for each TPA on private lands (48 percent of lands, 63 percent of roads in Planning Area) and other public lands (42 percent of lands, 29 percent of roads in Planning Area) would have a stronger influence on riparian vegetation in the Planning Area with activities on private lands likely having the greatest effect overall.

Effects of Alternative A

Under Alternative A, Decision Area-wide, approximately 94.3 miles of routes within 300 feet of streams and wet areas would remain open to motorized use. While this is not a direct indication of road and trail effects on riparian vegetation, it is a relative indication when compared to the other alternatives. Alternative A would leave the greatest mileage of routes within 300 feet of streams open to motorized use of all alternatives.

Effects of Alternative B

Under Alternative B, Decision Area-wide, approximately 77.4 miles of routes within 300 feet of streams and wet areas would remain open to motorized use. This would be less than under Alternative A (94.3 miles) and Alternative D (81.2 miles), but more than under Alternative C (73.7 miles), and suggests that Alternative B has the next-to-least amount of road-related impacts to riparian vegetation of the alternatives.

Effects of Alternative C

Under Alternative C, Decision Area-wide, approximately 73.7 miles of routes within 300 feet of streams and wet areas would remain open to motorized use. This is the least of all alternatives and suggests that Alternative C would have the least road-related impacts (and most benefits) to riparian vegetation of all alternatives.

Effects of Alternative D

Under Alternative D, approximately 81.2 miles of motorized routes within 300 feet of streams would remain open to motorized use Decision Area-wide. This is less than under Alternative A but more than under Alternatives B and C. This suggests that Alternative D would pose the next greatest amount of impact associated with roads to riparian vegetation of all alternatives.

WILDLIFE

Effects of Alternative A

Under Alternative A, there would be approximately 472 miles of open roads in the Decision Area and an additional 157.4 miles with seasonal closures. This is substantially more miles of open roads compared to the action alternatives. Limited road restrictions and road closures under Alternative A would not address the impacts of travel management within important wildlife habitat areas such as big game winter and calving habitat, occupied grizzly bear habitat, and wildlife movement corridors. Roads can result in loss of habitat and approximately 2-5 acres of habitat is permanently lost with every mile of road. Open roads cause disturbance and displacement of wildlife, especially to those species sensitive to disturbance, or during crucial seasons of use (winter or spring). Roads fragment habitat, introduce noxious weeds, and make wildlife susceptible to direct mortality (road kill and hunting).

Riparian Habitat

Roads within riparian areas can cause disturbance to wildlife and degradation of habitat. There could be a loss of habitat for resident and migratory birds that use riparian areas for nesting and brood rearing. In addition, habitat would be lost for a wide range of wildlife species that use riparian areas for breeding, denning, foraging, overwintering, or for travel corridors. The more roads within riparian areas, especially open roads, the lower the quality of habitat (through disturbance and loss of vegetation) and less likely the habitat would be used.

Riparian roads were evaluated within a 300-foot area adjacent to streams to compare the effects of roads in riparian areas between alternatives. Across Butte Field Office lands, there would be 94.3 miles of open roads and 17 miles of closed roads within riparian areas under Alternative A. This would be considerably more open

roads and fewer closed roads than under the action alternatives.

Elk Winter Range

Roads can impact big game species, especially during critical phases of their life cycle. Disturbance and displacement of big game species can increase stress and energy demands of animals during critical periods such as the winter, breeding or calving seasons, and reduce survival, especially during the winter and spring months. Motorized use of roads can produce disturbance that prevents full utilization of available habitat. The losses in potential use of habitat can exceed 50 percent when open road densities exceed 2 mi/mi² (Christensen et al. 1993). During the hunting season, the probability of bull elk survival in areas close to open roads is much lower than in areas away from roads. Road kill causes direct mortality of elk and major interstate freeways may act as movement barriers in some cases.

Table 4-99 displays road densities in big game winter range by big game analysis areas (distinct geographic locations based on winter range and Elk Management Units) in the entire Decision Area (all Butte Field Office lands).

Alternative A would have the highest road density in comparison to the action alternatives. Of the 11 Big Game Analysis Units, five of them would have more acres with high road density than moderate or low road densities (Big Belts, Blackfoot, Clancy, Granite Butte and Jefferson) (**Table 4-99**). Three Big Game Analysis Units (Clancy, Granite Butte and Jefferson) offer large acres of potential winter range within the Decision Area but the quality of this habitat is low due to high open road densities under Alternative A. Winter range would be greatly improved in these three Big Game Analysis Units with the reduction of road densities under Alternatives B and C and moderately to greatly improved with a reduction of road densities under Alternative D.

Elk Winter Range Analysis Unit	Acres of Low Density (0-1 mi/mi²)	Acres of Moderate Density (1-2 mi/mi²)	Acres of High Density (>2 mi/mi²)
Big Belts	2,193	2,207	2,288
Big Hole	12,958	4,504	5,554
Blackfoot	49	76	320
Clancy	1,547	2,159	7,148
Elkhorns	16,225	8,515	4,631
Granite Butte	1,932	3,886	11,881
Highlands	14,871	6,205	5,333
Jefferson	13,059	7,003	13,317
Missouri	19,955	1,409	2,667
Upper Missouri	4,115	1,437	929
Yellowstone	2,370	660	222

Low Density - (0-1mi/mi²), Moderate Density - (1-2 mi/mi²), High Density - (>2 mi/mi²)

Source: GIS Analysis

Under Alternative A, the amount of big game security habitat on BLM lands in the Butte Field Office would be 5,846 acres. This is the least amount of security habitat of all alternatives (Table 4-100).

	A	B	C	D
All BLM Lands in Butte Field Office	5,846	8,510	10,946	7,007

Core and Subcore Habitat

Core areas were described as areas large enough for wildlife to forage and reproduce, while subcore areas were areas that could act as stepping stones for wildlife as they moved through the region. Table 4-101 shows the approximate acres by road density categories displayed as “low”, “moderate” and “high” for core and subcore habitat. These acres were based on a Moving Windows Analysis.

Because core and subcore areas were delineated based on existing areas with low road density, these areas have the most acres with low road density in both the Planning and Decision Areas.

At the Planning Area scale, BLM roads can affect the quality of core and subcore habitat on other federal and private lands. BLM roads adjacent to other lands with low road densities can degrade the quality of the adjacent habitat and reduce the use of those areas by wildlife. Alternative A would have substantially fewer acres with low road densities than the action alternatives in core and subcore habitat.

Approximately 24 percent (71,600 acres) of the Decision Area is considered core or subcore habitat. As with the Planning Area, Alternative A would have the fewest

	Low Road Density (0-1)	Moderate Road Density (1-2)	High Road Density (>2)
Planning Area			
Alt. A	2,001,951	515,059	878,065
Alt. B	2,010,928	520,019	864,139
Alt. C	2,012,918	520,146	862,134
Alt. D	2,007,448	522,053	865,577
Decision Area (BLM lands)			
Alt. A	33,406	12,629	25,564
Alt. B	40,458	15,052	16,099
Alt. C	42,043	14,959	14,638
Alt. D	37,442	16,850	17,334

BLM acres with low road density and Alternative C would have the most acres. The amount of BLM acres in low road density would be substantially less under Alternative A than the action alternatives. Alternative A would provide roughly 7,000 fewer BLM acres of low road density than Alternative B and approximately 4,000 fewer acres than Alternative D (Table 4-101). Alternative A would have roughly 8,600 fewer BLM acres of core and subcore habitat in low road density than Alternative C.

Wildlife Movement Corridors

Wildlife travel corridors are a vital component of habitat for a variety of species. Corridors are travel routes used by wildlife to disperse to new core areas and/or for seasonal movements between summer and winter ranges. A corridor may also be used for daily movements from loafing to foraging areas. Habitat fragmentation and isolation of populations as a result of degradation or elimination of corridors can result in small, vulnerable wildlife populations. Disturbance related to high road density within wildlife corridors can degrade the quality of wildlife corridors, eventually making them unavailable to wildlife species that depend on them. Corridors were described as areas of predicted movement between core and subcore areas, where habitat quality is high, but not as high and contiguous as the core and sub-core areas.

Craighead *et al.* (2002) modeled wildlife corridors within the Northern Rocky Mountain Region, delineated core and subcore areas, and described corridors based on their habitat quality. High road densities within wildlife movement corridors can degrade the quality of corridors, eventually making them unavailable to wildlife species that depend on them. Factors considered in the delineation of corridors included topography, road density, presence of riparian areas, human developments and activities, vegetative cover and land ownership patterns (Craighead *et al.* 2002).

High and moderate quality corridors were combined on Table 4-102 to show acres of road density in higher quality movement corridors. As with core and subcore habitat, roads on BLM lands can affect the quality of movement corridors on adjacent lands. At the Planning Area scale, travel management under Alternative A would maintain the fewest acres with low road density in high or moderate quality movement corridors of all the alternatives.

Approximately 28 percent (85,120 acres) of the Decision Area is considered to be in high or moderate quality wildlife corridors. As with the Planning Area, Alternative A would have the fewest BLM acres with low road density and Alternative C would have the most acres. The amount of BLM acres in low road density varies markedly between Alternative A and the action alternatives. Alternative A would have roughly 5,300 fewer BLM acres with low road density (47,226 total acres) than Alternative B and approximately 5,100 fewer acres than Alternative D (Table 4-102). Alternative A would

	Low Road Density (0-1)	Moderate Road Density (1-2)	High Road Density (>2)
Planning Area			
Alt. A	237,630	186,068	339,185
Alt. B	244,114	188,383	330,404
Alt. C	244,413	188,910	329,538
Alt. D	243,738	188,220	330,907
Decision Area			
Alt. A	47,226	17,513	20,386
Alt. B	52,580	18,371	14,163
Alt. C	52,756	18,912	13,447
Alt. D	52,359	18,211	14,533

have over 5,500 fewer BLM acres in low road density than Alternative C.

Table 4-103 shows the acres of road density in low quality wildlife movement corridors (areas with more roads, less federal or state lands and more potential disturbance).

	Low Road Density (0-1)	Moderate Road Density (1-2)	High Road Density (>2)
Planning Area			
Alt. A	323,877	221,390	291,595
Alt. B	326,503	221,534	288,780
Alt. C	329,363	219,489	287,952
Alt. D	325,217	222,315	289,295
Decision Area			
Alt. A	18,505	13,821	14,886
Alt. B	21,048	13,563	12,613
Alt. C	22,670	12,342	12,195
Alt. D	19,995	14,128	13,089

At the Planning Area scale, Alternative A would provide the fewest acres in low road density of all the alternatives.

Approximately 16 percent (47,220 acres) of the Decision Area is considered to be in low quality wildlife corridors. As with the Planning Area scale, Alternative A would have the fewest BLM acres with low road density and Alternative C would have the most acres. Alternative A would have over 2,500 fewer BLM acres with low road density (18,505 total acres) than Alternative B and approximately 1,500 fewer acres than Alternative D (**Table 4-103**). Alternative A would have approximately

4,200 fewer BLM acres with low road density than Alternative C.

Effects of Alternative B

Less motorized access would occur with Alternative B than Alternatives A or D, but Alternative B would provide more motorized access than Alternative C. Across the Field Office, there would be approximately 263 miles of open roads, 371 miles of closed and decommissioned roads and 154 miles open with seasonal restrictions. Seasonal restrictions would reduce the impacts of roads within important wildlife habitats such as big game winter range and spring habitat.

Riparian Habitat

Under Alternative B, there would be 77.4 miles of open roads and 34 miles of closed roads within a 300-foot riparian analysis area on BLM lands across the Field Office. Alternative B would have fewer open roads in riparian areas than under Alternative A. This alternative would also have fewer open roads compared to Alternative D but about 4 miles more than Alternative C. Alternative B would provide for more improvement in riparian habitat at the Decision Area scale compared to Alternatives A and D, but would provide for less improvement than Alternative C.

Elk Winter Range

Table 4-104 displays road densities within elk winter range by Big Game Analysis Areas in the Decision Area. Alternative B would increase the number of acres with low road density in elk winter range in all Big Game Analysis Areas over Alternative A with the exception of Elkhorns (Alternatives B and A would be similar because a travel plan already exists for this area) and Big Belts. In the Big Belts, some roads that had temporary closures in the Ward Ranch area and in the area of the 2000 fires would be opened under Alternative B (East Helena TPA).

Alternative B would have considerable increases in acres of low road density in the Granite Butte, Highlands, and Jefferson Big Game Analysis Areas over Alternative A. This alternative would have fewer acres in the low road density category in most Big Game Analysis Areas compared to Alternative C, especially in the Big Hole, Granite Butte, and Missouri Big Game Analysis Areas.

Alternative B would have more acres in the low road density category in six Big Game Analysis Areas compared to Alternative D. The Big Game Analysis Areas with the largest differences between Alternatives B and D would be the Big Hole, Granite Butte, Highlands, and the Missouri.

Under Alternative B, the amount of big game security habitat on BLM lands in the Butte Field Office would be 8,510 acres (**Table 4-100**). This is about 2,664 acres more than under Alternative A and is the second highest total of security habitat acres of all four alternatives.

Elk Winter Range Analysis Unit	Acres of Low Density	Acres of Moderate Density	Acres of High Density
Big Belts	1,969	2,295	2,425
Big Hole	14,537	4,872	3,607
Blackfoot	52	81	312
Clancy	1,919	3,321	5,614
Elkhorns	16,092	8,721	4,559
Granite Butte	5,289	4,536	7,875
Highlands	19,797	5,017	1,594
Jefferson	16,294	8,749	8,335
Missouri	20,849	2,250	932

Low Density - (0-1 mi/mi²), Moderate Density - (1-2 mi/mi²),
High Density - (>2 mi/mi²)

Source: GIS Analysis

Core and Subcore Habitat

At the Planning Area scale, Alternative B would have approximately 9,000 more acres in low road density than Alternative A in core and subcore habitat (Table 4-101). The majority of core and subcore habitat at the Planning Area scale is predominately found on Forest Service lands. This displays how BLM roads can affect the quality of core and subcore habitat on adjacent federal, state, and private lands. BLM roads adjacent to other federal, state, or private lands with low road densities can degrade the quality of the adjacent habitat and reduce the use of those areas by wildlife. In the low road density category, Alternative B would provide approximately 3,500 more acres than Alternative D, but approximately 2,000 fewer acres than Alternative C.

Approximately 24 percent (71,600 acres) of the Decision Area is considered core or subcore habitat. Alternative B would have over 7,000 more BLM acres with low road density (40,458 total acres) than Alternative A, and 3,000 more acres than Alternative D. Alternative B would have about 1,600 fewer BLM acres in low road density than Alternative C (Table 4-101).

Wildlife Corridors

At the Planning Area scale, travel management under Alternative B would increase the amount of acres in low road density in high or moderate movement corridors by approximately 6,500 acres over Alternative A (Table 4-102). As a group, the action alternatives vary substantially from Alternative A but vary relatively slightly from each other. Alternative B would have only 300 fewer acres in the low road density category compared to Alternative C and only 400 more acres than Alternative D.

Approximately 28 percent (85,120 acres) of the Decision Area is considered to be in high or moderate quality wildlife corridors. Alternative B would have over 5,000 more BLM acres with low road density (52,580 total acres) than Alternative A and only 220 more acres than Alternative D. Alternative B would have slightly fewer BLM acres in low road density (200 acres) than Alternative C.

In the context of low quality wildlife movement corridors, at the Planning Area scale, travel management under Alternative B would increase the amount of acres with low road density compared to Alternatives A and D but would have fewer acres than Alternative C (Table 4-103). Alternative B would provide approximately 2,600 more acres of low road density than Alternative A, 1,300 more acres than Alternative D and approximately 2,900 acres less than Alternative C.

Within low quality movement corridors in the Decision Area, Alternative B would have over 2,500 more BLM acres with low road density (21,048 total acres) than Alternative A and 1,000 more acres than Alternative D. Alternative B would have approximately 1,600 fewer BLM acres in low road density than Alternative C (Table 4-103).

Effects of Alternative C

Less motorized access would occur with Alternative C than with any of the other alternatives. Across BLM lands in the Butte Field Office, there would be approximately 244 miles of open roads, 425 miles of closed and decommissioned roads and 128 miles open with seasonal restrictions. Alternative C would have the greatest benefits to wildlife species from closed, decommissioned, and seasonally restricted roads of all other alternatives. Alternative C would increase the quality of habitat by reducing disturbance. The quantity of habitat would be increased by reducing fragmentation, allowing roads to become re-vegetated and preventing the spread of noxious weeds. Big game would have additional security habitat during the hunting season and wildlife would have additional refuge during critical seasons of use, such as during the winter or spring months, with Alternative C.

Riparian Habitat

Under the travel management, Alternative C would have 73.7 miles of open roads and 37.6 miles of closed roads within 300 feet of streams on BLM lands across the Field Office. Alternative C would have fewer miles of open roads and more miles of closed roads in riparian areas compared to the other alternatives; therefore, providing the most protection of riparian habitat.

Elk Winter Range

Table 4-105 displays the road densities within elk winter range by Big Game Analysis Areas in the Decision Area. Alternative C would increase the number of acres

with low road density in elk winter range in most Big Game Analysis Areas over the other alternatives.

Elk Winter Range Analysis Unit	Acres of Low Density	Acres of Moderate Density	Acres of High Density
Big Belts	2,195	2,088	2,405
Big Hole	15,070	4,680	3,265
Blackfoot	52	81	312
Clancy	1,921	3,322	5,610
Elkhorns	17,072	7,751	4,548
Granite Butte	6,445	4,637	6,617
Highlands	19,797	5,017	1,594
Jefferson	16,345	9,016	8,018
Missouri	21,903	1,969	159

Low Density - (0-1mi/mi²), Moderate Density - (1-2 mi/mi²), High Density - (>2 mi/mi²)
Source: GIS Analysis

Alternatives C and B would have the same or similar number of acres with low road density in the Blackfoot, Highlands, Jefferson and Clancy Big Game Analysis Areas. Alternative C would have more acres in the low road density category (up to 1,200 acres per Big Game Analysis Area) in the Big Belts, Big Hole, Elkhorns, Granite Butte and Missouri Big Game Analysis Areas compared to Alternative B. Alternative C would have considerable increases in acreage of low road density in the Big Hole, Granite Butte, Highlands, Jefferson and Missouri Big Game Analysis Areas over Alternative A. This alternative would have more acreage of low road density in seven Big Game Analysis Areas compared to Alternative D. The Big Game Analysis Areas with the largest differences between Alternatives C and D would be the Big Hole, Granite Butte, Highlands, and the Missouri.

The actual road density in elk winter range would be the lowest under Alternative C of all alternatives and this alternative would have more acreage of elk winter range in low road density than all other alternatives. Alternative C would do more than any other alternative to protect and restore big game winter range.

Under Alternative C the amount of big game security habitat on BLM lands in the Butte Field Office would be 10,946 acres (Table 4-100). This is 5,100 acres more than under Alternative A and about 2,400 acres more than under Alternative B. Alternative C would provide the highest total of security habitat acres of all four alternatives.

Core and Subcore Habitat

At the Planning Area scale Alternative C would have approximately 11,000 more acres in the low road density category than Alternative A in core and subcore habitat (Table 4-101). Alternative C would provide more acreage of low road density than all other alternatives and would help to improve the quality and quantity of core and subcore habitat on other federal, state, and private lands more than all other alternatives.

Approximately 24 percent (71,600 acres) of the Decision Area is considered core or subcore habitat. Alternative C would have over 8,600 more BLM acres with low road density (42,043 total acres) than Alternative A, and 4,600 more BLM acres than Alternative D. Alternative C would also have 1,600 more BLM acres with low road density than Alternative B (Table 4-101).

Wildlife Movement Corridors

As with the core and subcore habitat, roads on BLM lands can affect the quality of movement corridors on adjacent lands. At the Planning Area scale, travel management under Alternative C would increase the amount of acreage with low road densities by approximately 6,780 acres over Alternative A (Table 4-102). Alternative C would have 300 acres more than Alternative B and 700 acres more than Alternative D in the low road density category.

Approximately 28 percent (85,120 acres) of the Decision Area is considered to be in high or moderate quality wildlife corridors. Alternative C would have over 5,500 more BLM acres with low road density (52,756 total acres) than Alternative A but only 400 more BLM acres than Alternative D. Alternative C would have 200 more BLM acres in low road density than Alternative B (Table 4-102).

Table 4-103 shows the acres of road density in low quality wildlife movement corridors. At the Planning Area scale, travel management under Alternative C would have the most acres in low road density of all alternatives. Alternative C would provide approximately 5,500 additional acres of low road density in low quality corridors over Alternative A and approximately 4,100 more than Alternative D. Alternative C would provide about 2,900 more acres in low road density than Alternative B.

Approximately 16 percent (47,220 acres) of the Decision Area is considered to be in low quality wildlife corridors. Alternative C would have over 4,100 more BLM acres with low road density (22,670 total acres) than Alternative A, and 2,700 more acres than Alternative D. Alternative C would have approximately 1,600 more BLM acres in low road density over Alternative B (Table 4-103).

Overall, Alternative C would provide the most suitable core and subcore habitat and wildlife movement corridors in both the Decision and Planning Areas.

Effects of Alternative D

Alternative D would allow more motorized access than the other action alternatives but less than Alternative A. Across BLM lands in the Butte Field Office there would be approximately 305 miles of open roads, 309.6 miles of closed and decommissioned roads, and 174 miles of seasonally restricted roads. Fewer seasonal restrictions would increase impacts associated with travel and recreation within important wildlife habitat areas. Alternative D would have more open roads than the other action alternatives but fewer open roads than Alternative A.

Alternative D would have more negative and long-term effects on wildlife and wildlife habitat from permanent and open roads than Alternatives B and C but fewer effects than Alternative A.

Riparian Habitat

Under Alternative D, 81.2 miles of open roads and 30.2 miles of closed roads would be located within 300 feet of streams on BLM lands across the Butte Field Office. Alternative D would have more miles of open road in riparian areas compared to the other action alternatives but 13 miles less than Alternative A. Alternative D would have more negative effects from roads in riparian areas such as loss of riparian vegetation and habitat and disturbance than the other action alternatives, but fewer negative effects than Alternative A.

Elk Winter Range

Table 4-106 displays road densities within elk winter range by Big Game Analysis Areas in the Decision Area. Alternative D would increase the number of acres with low road density in elk winter range in all Big Game Analysis Areas over Alternative A with the exception of Elkhorns (Alternatives D and A would be similar because a travel plan already exists for this area) and Big Belts. In the Big Belts, some roads that had temporary closures in the Ward Ranch area and in the area of the 2000 fires would be opened under Alternative

D (East Helena TPA). Alternative D would increase acres with low road density in the Granite Butte, Highlands and Jefferson Big Game Analysis Areas over Alternative A, but would have fewer acres in low road density in most Big Game Analysis Areas compared to Alternatives B and C. Alternative D would have fewer acres in low road density in six Big Game Analysis Areas compared to Alternative B, and in seven Big Game Analysis Areas compared to Alternative C. The Big Game Analysis Areas with the largest differences between Alternatives D and B would be the Big Hole, Granite Butte, Highlands, and the Missouri. This same relative difference comparison applies between Alternatives D and C.

Approximately 28 percent (85,120 acres) of the Decision Area is considered to be in high or moderate quality wildlife corridors. Alternative D would have over 5,100 more BLM acres with low road density (52,359 total acres) than Alternative A and only 220 fewer acres than Alternative B. Alternative D would have approximately 400 fewer BLM acres in low road density than Alternative C (**Table 4-102**).

Table 4-103 shows the acres of road density in low quality wildlife movement corridors (areas with more roads, less federal or state lands and more potential disturbance). At the Planning Area scale, travel management under Alternative D would increase the amount of acres with low road density compared to Alternative A but would have fewer acres in this category than Alternatives B and C. Alternative D would provide approximately 1,300 more acres of low road density than Alternative A, but 1,300 less than Alternative B and approximately 4,100 less than Alternative C.

Under Alternative D, the amount of big game security habitat on BLM lands in the Butte Field Office would be 7,007 acres (**Table 4-100**). This is approximately 1,160 acres more than under Alternative A but is the lowest number of security habitat acres of the action alternatives.

Elk Winter Range Analysis Unit	Acres Low Density	Acres Moderate Density	Acres High Density
Big Belts	1,583	2,158	2,947
Big Hole	13,335	5,888	3,793
Blackfoot	52	79	314
Clancy	1,919	3,321	5,614
Elkhorns	16,092	8,720	4,559
Granite Butte	4,287	4,796	8,616
Highlands	18,841	5,778	1,789
Jefferson	16,248	8,412	8,719
Missouri	20,243	2,062	1,726

Low Density - (0-1 mi/mi²), Moderate Density - (1-2 mi/mi²), High Density - (>2 mi/mi²)

Source: GIS Analysis

Core and Subcore Habitat

At the Planning Area scale, Alternative D would have approximately 5,500 more acres in the low road density category than Alternative A in core and subcore habitat (Table 4-101). Alternative D would provide about 3,500 fewer acres in the low road density category than Alternative B and about 5,500 fewer acres in this category than Alternative C.

Approximately 24 percent (71,600 acres) of the Decision Area is considered core or subcore habitat. Alternative D would have over 4,000 more BLM acres with low road density (37,442 total acres) than Alternative A, and 3,000 fewer acres than Alternative B. Alternative D would have approximately 4,600 fewer BLM acres in low road density than Alternative C (Table 4-101).

Wildlife Movement Corridors

At the Planning Area scale, travel management under Alternative D would increase the amount of acres with low road density in high and moderate quality movement corridors by approximately 6,100 acres over Alternative A (Table 4-102). Alternative D would have only 700 fewer acres in low road density compared to Alternative C and only 400 fewer acres than Alternative B.

Approximately 16 percent (47,220 acres) of the Decision Area is considered to be in low quality wildlife corridors. Alternative D would have over 1,500 more BLM acres with low road density (19,995 total acres) than Alternative A and 1,000 fewer acres than Alternatives B and C (Table 4-103).

FISH

Watershed function and roads within 300 feet of streams were used as indicators of the cumulative impacts of the five site-specific travel plans for BLM lands within the Butte Field Office. Relative comparisons of alternatives

would apply to effects described for fish habitat in the TPA-specific analyses.

Effects of Alternative A

Table 4-107 displays acreage of land by major watersheds in the Decision Area (BLM lands in the Butte Field Office) in different road density classes (low, medium, and high). Alternative A would have the greatest detrimental effects to watershed function and subsequently fish habitat, compared to the other alternatives.

Alternative A would maintain the most BLM acres with high density roads (107,566 acres) and the fewest BLM acres with low density roads (116,236 acres) of all other alternatives (Table 4-107).

Table 4-108 and Table 4-109 display miles of open and closed road within 300 feet of streams. The number of open road miles within 300 feet of streams on BLM lands would be greatest under Alternative A (94.3 miles) of all the alternatives. Alternative A would provide for the greatest mileage of riparian roads by each subcategory as well: 39.9 miles near fish bearing streams, 28.1 miles near perennial non-fish bearing streams, and 26.3 miles near intermittent streams. The miles of closed roads in riparian areas would be the least under Alternative A (17.1 miles) with the same trend being the case where Alternative A would provide for the fewest closed riparian roads by sub-category of all alternatives.

Effects of Alternative B

Alternative B would have more acres with low density roads across the Decision Area (131,982 acres) compared to Alternative A (116,236). In the moderate road density category, Alternative B has nearly 4,000 more acres compared to Alternative A and almost 20,000 acres less in the high road density than Alternative A (Table 4-107). The most marked differences between alternatives would be in the Big Hole, Boulder, Jeffer-

Table 4-107
Decision Area Acres in Road Density Categories by Alternative by Watershed

Road Density	Low (0-1 mi/mi ²)				Moderate (1-2 mi/mi ²)				High (>2 mi/mi ²)			
	Alternative	A	B	C	D	A	B	C	D	A	B	C
Big Hole	20,426	27,498	32,286	23,198	16,812	17,382	15,490	19,575	23,946	16,305	13,408	18,411
Blackfoot	186	230	230	191	147	156	156	155	1,277	1,223	1,223	1,263
Boulder	16,467	17,684	18,023	17,616	11,145	11,727	12,410	11,142	13,321	11,523	10,500	12,176
Jefferson	13,763	14,270	14,270	14,194	11,983	11,834	11,834	11,893	14,583	14,224	14,224	14,242
Madison	822	822	822	822	387	387	387	387	189	189	189	189
Upper Clark Fork	0	0	0	0	0	0	0	0	0	0	0	0
Upper Missouri River	58,823	65,729	69,884	61,303	35,783	38,863	37,321	38,354	53,615	43,630	41,017	48,565
Upper Yellowstone	5,749	5,749	5,749	5,749	1,918	1,918	1,918	1,918	635	635	635	635
Total	116,236	131,982	141,264	123,073	78,175	82,267	79,516	83,424	107,566	87,729	81,196	95,481

son, and Upper Missouri watersheds. For the five site-specific travel plans considered in aggregate at the Field Office scale, Alternative B would provide improved watershed function and reduced road-related impacts to fish habitat compared to Alternative A.

Under Alternative B there would be approximately 18 percent fewer open road miles within 300 feet of streams than under Alternative A (Table 4-108). Alternative B would provide for about 16.8 more miles of closed road within 300 feet of streams than Alternative A (Table 4-109). Differences between alternatives would be in the Big Hole, Boulder, and Upper Missouri River watersheds where more riparian roads would be closed under Alternative B than Alternative A in every case and in every subcategory of riparian areas (fish bearing streams, perennial non-fish bearing streams, intermittent streams). Alternative B would have fewer road-related adverse effects to fish and aquatic habitats associated with roads in and near riparian areas than Alternative A.

Overall, at the scale of all BLM lands in the Butte Field Office, Alternative B would pose fewer road-related adverse effects to fish and aquatic habitats than Alternative A, and would actually lessen existing impacts to improve aquatic habitats.

Effects of Alternative C

Alternative C would have the most BLM acres with low density roads (141,264 acres) compared to all other alternatives. This alternative would have 25,000 acres more in the low road density category and 26,000 fewer acres in the high road density category compared to Alternative A (Table 4-107). This alternative would have 9,282 more BLM acres in the low road density category and 6,500 fewer acres in the high road density category than Alternative B (Table 4-107). Alternative C would have the fewest acres with high road densities of all alternatives with the watersheds seeing the most effects being the Big Hole, Boulder, and Upper Missouri River.

Watershed	Fish-bearing				Perennial				Intermittent				Total Open Roads			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Big Hole	13.6	12.8	11.9	12.9	13.1	10	9.6	10.6	10.6	6.0	4.9	7.5	37.3	28.8	26.4	31
Jefferson	2.6	2.6	2.6	2.6	0.6	0.6	0.6	0.6	4.1	4.1	4.1	4.1	7.3	7.3	7.3	7.3
Boulder	5.8	5.0	4.7	5.0	5.6	5.5	5.4	5.4	4.6	2.2	2.2	2.6	16	12.7	12.3	13
Madison	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Missouri River	16.1	14.8	14.8	15.4	8.4	6.7	6.5	6.9	6.6	5.0	4.8	5.5	31.1	26.5	26.1	27.8
Upper Yellowstone	1.2	1.2	1.2	1.2	0.4	0.4	0.4	0.4	0	0	0	0	1.6	1.6	1.6	1.6
Upper Clark Fork	0.6	0.4	0	0.4	0	0	0	0	0.4	0.1	0	0.1	1.0	0.5	0	0.5
Blackfoot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	39.9	36.8	35.2	37.5	28.1	23.2	22.5	23.9	26.3	17.4	16	19.8	94.3	77.4	73.7	81.2

Watershed	Fish-bearing				Perennial				Intermittent				Total Closed Roads			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Big Hole	0.3	1.1	2.0	1.0	0.1	3.2	3.6	2.6	0.7	5.3	6.4	3.8	1.1	9.6	12.0	7.4
Jefferson	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	1.4	1.4	1.4	1.4
Boulder	1	1.8	2.1	1.8	0	0.1	0.2	0.2	0	2.4	2.4	2.0	1	4.3	4.7	4
Madison	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Missouri River	4.2	5.4	5.4	4.9	5.2	6.9	7.1	6.7	4.2	5.8	6.0	5.3	13.6	18.1	18.5	16.9
Upper Yellowstone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Clark Fork	0	0.2	0.6	0.2	0	0	0	0	0	0.3	0.4	0.3	0	0.5	1.0	0.5
Blackfoot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	6.0	9.0	10.6	8.4	5.8	10.7	11.4	10.0	5.3	14.2	15.6	11.8	17.1	33.9	37.6	30.2

For the five site-specific travel plans considered in aggregate at the Field Office scale, Alternative C would provide the greatest degree of improved watershed function and reduced road-related impacts to fish habitat of all alternatives.

Under Alternative C there would be approximately 22 percent fewer open road miles within 300 feet of streams on BLM lands than under Alternative A (Table 4-108). Alternative C would provide for approximately 20 more miles of closed road within 300 feet of streams than Alternative A and about 3.7 more miles than Alternative B (Table 4-109). Differences between alternatives would be in the Big Hole, Boulder, and Upper Missouri River watersheds where more riparian roads would be closed under Alternative C than any other alternative in all riparian categories. Alternative C would have fewer road-related adverse effects to fish and aquatic habitats associated with roads in and near riparian areas than any other alternative. Overall, at the scale of all BLM lands in the Butte Field Office, Alternative C would pose fewer road-related adverse effects to fish and aquatic habitats than all other alternatives, and would actually lessen existing impacts to improve aquatic habitats more than any other alternative.

Alternative D

Alternative D would provide fewer acres with low density roads (123,073 acres) across the Decision Area compared to Alternatives B and C, but more acres than Alternative A (116,236 acres). Of the action alternatives, Alternative D would have the most acres with high road density (95,481 acres) but moderate road densities would be similar for both Alternatives D and B (Table 4-107). Alternative D would have roughly 12,000 fewer acres with high road density than Alternative A. For the five site-specific travel plans considered in aggregate at the Field Office scale, Alternative D would provide improved watershed function and reduced road-related impacts to fish habitat compared to Alternative A, but more adverse effects than either Alternatives B or C.

Under Alternative D there would be approximately 14 percent fewer open roads within 300 feet of streams than under Alternative A, 5 percent more than under Alternative B, and 10 percent more than under Alternative C (Table 4-108). Alternative D would provide for approximately 13 more miles of closed road within 300 feet of streams than Alternative A, 3.7 fewer miles than Alternative B, and 7.4 fewer miles than Alternative C (Table 4-109). Alternative D would have fewer road-related adverse effects to fish and aquatic habitats associated with roads in and near riparian areas than Alternative A, but more than Alternatives B and C.

Alternative D would close and decommission fewer roads during travel management than Alternatives B and C but more than Alternative A.

Overall, at the scale of all BLM lands in the Butte Field Office, Alternative D would pose fewer road-related

adverse effects to fish and aquatic habitats than Alternative A, but would pose greater impacts than Alternatives B or C. Alternative D would lessen existing impacts to improve aquatic habitats compared to the current condition of Alternative A.

SPECIAL STATUS PLANTS

The following discussion summarizes contributions to cumulative effects on special status plants associated with BLM road management at the scale of all BLM lands in the Butte Field Office. Specific mechanisms of effect on special status plants tie back to effects described for TPA-specific discussions above, particularly in the Effects Common to All Alternatives sections of those discussions.

Since BLM roads make up about 4.8 percent of all roads and BLM lands make up 4.2 percent of all lands in the Planning Area, effects of BLM travel planning alternatives on special status plants at the RMP Planning Area scale would be minor. Activities and effects discussed above for each TPA on private lands (48 percent of lands, 63 percent of roads in Planning Area) and other public lands (42 percent of lands, 29 percent of roads in Planning Area) would have a stronger influence on special status plants in the Planning Area with activities on private lands likely having the greatest effect overall.

Effects of the Alternatives

Under Alternative A the greatest amount of BLM road use (629 open miles or 3.5 percent of all roads in the RMP Planning Area) would be possible, causing the greatest amount of special status plant habitat to be at risk. Habitat would be at risk because of greater ground disturbance and increased weed spread which reduces connectivity between populations, increases competition from invasive species, and increases plant mortality.

Under Alternative B, 417 BLM road miles (2.3 percent of all roads in the RMP Planning Area) would be open, reducing adverse effects to special status plants compared to Alternative A.

Under Alternative C, 372 BLM road miles (2.1 percent of all roads in the RMP Planning Area) would be open. Alternative C would reduce adverse effects to special status plants more than any other alternative.

Under Alternative D, 479 BLM road miles (2.7 percent of all roads in the RMP Planning Area) would be open. Alternative D would reduce adverse effects to special status plants more than Alternative A, but less than Alternatives B and C.

WILDLAND FIRE MANAGEMENT

Effects referenced below are described in more detail in the Wildland Fire Management sections of each of the five specific TPA discussions above. The contribution of the five site-specific travel plans are discussed in aggregate

gate at the Decision Area (all BLM lands in the Butte Field Office) and Planning Area scales below.

The following conditions would apply to closed BLM roads under all alternatives. Many closed roads would still be available for use in fire suppression as well as fuels reduction treatments. Planning and implementation of fuels reduction treatments could occur in association with closed roads if variances for temporary road use were to be allowed. Variances would be subject to internal BLM review.

Effects of Alternative A

Alternative A would leave the most miles of road (629 miles) available for public use (open yearlong and open with seasonal restrictions) of Butte Field Office BLM lands. Roads open to the public can provide benefits for wildland fire suppression by providing access that is usually passable (not overgrown with vegetation or closed by small rock slides, etc.) and allowing access for fuel reduction treatments. Alternative A would provide the most open road miles in the DA and would therefore provide the most benefits of all alternatives for fire suppression access as well as allowing ready access for fuels reduction projects.

Roads open to the public also provide additional opportunities for human-caused fire ignitions (either accidental or intentional). Human activities are the leading source of wildland fire ignition in the Planning Area. Alternative A would contribute the most open road miles of all alternatives from which these fire starts could occur and would therefore provide the greatest overall risk of human-caused fire starts.

At the Planning Area scale, the 629 miles of open BLM roads would make up about 3.5 percent of the at least 17,810 road miles in the entire Planning Area. The contribution of BLM roads is minor at the Planning Area scale, indicating that road management and activities off BLM lands have much more influence on future wildland fire characteristics at this scale than BLM road management.

Effects of Alternative B

Alternative B would leave 417 miles of BLM road available for public use (open and seasonally restricted), slightly more than Alternative C, but 34 percent less than the 629 miles available under Alternative A. Alternative B would provide fewer open road miles in the DA than Alternative A and would therefore have fewer benefits than Alternative A for fire suppression access as well as allowing ready access for fuels reduction projects.

Roads open to the public also provide additional opportunities for human-caused fire ignitions (either accidental or intentional). Human activities are the leading source of wildland fire ignition in the Planning Area. Alternative A would contribute fewer open road miles

than Alternative A from which these fire starts could occur and would therefore provide less risk of human-caused fire starts than Alternative A.

At the Planning Area scale, the 417 miles of open BLM roads would make up about 3.5 percent of the at least 17,810 road miles in the entire Planning Area. The contribution of BLM roads is minor at the Planning Area scale, indicating that road management and activities off BLM lands have much more influence on future wildland fire characteristics at this scale than BLM road management.

Effects of Alternative C

Alternative C would leave 372 miles of road available for public use (open yearlong and open with restrictions), slightly less than Alternative B, but 41 percent less than the 629 miles available in Alternative A. Alternative C would provide the least open road miles in the DA of any alternative and would therefore provide the least benefit of all alternatives for fire suppression access as well as allowing ready access for fuels reduction projects.

Roads open to the public also provide additional opportunities for human-caused fire ignitions (either accidental or intentional). Human activities are the leading source of wildland fire ignition in the Planning Area. Alternative C would contribute fewer open road miles than any other alternative and would therefore provide the least risk of human-caused fire starts than any other alternative.

At the Planning Area scale, the 372 miles of open BLM roads would make up about 2.1 percent of the at least 17,810 road miles in the entire Planning Area. The contribution of BLM roads is minor at the Planning Area scale, indicating that road management and activities off BLM lands have much more influence on future wildland fire characteristics at this scale than BLM road management.

Effects of Alternative D

Alternative D leaves 479 miles of road available for public use (open yearlong and open with restrictions), slightly more than Alternatives B and C, but 24 percent less than the 629 miles available in Alternative A. Alternative D would provide fewer open road miles in the DA than Alternative A, but more than either Alternatives B or C and would therefore have fewer benefits than Alternative A but more benefits than Alternatives B and C for fire suppression access as well as allowing ready access for fuels reduction projects.

Roads open to the public also provide additional opportunities for human-caused fire ignitions (either accidental or intentional). Human activities are the leading source of wildland fire ignition in the Planning Area. Alternative D would contribute fewer open road miles than Alternative A, but more miles than either Alterna-

tives B or C from which these fire starts could occur. Alternative D would provide less risk of human-caused fire starts than Alternative A, but more risk than Alternatives B and C.

At the Planning Area scale, the 479 miles of open BLM roads would make up about 2.7 percent of the at least 17,810 road miles in the entire Planning Area. The contribution of BLM roads is minor at the Planning Area scale, indicating that road management and activities off BLM lands have much more influence on future wild-land fire characteristics at this scale than BLM road management.

CULTURAL AND PALEONTOLOGICAL RESOURCES

At the scale of either the RMP Planning Area or the RMP Decision Area, alternative-specific risks or impacts to cultural and paleontological resources are difficult to discern due to a lack of extensive site-specific knowledge about the presence of these resources in a given TPA. By designating open routes, limiting open-country travel, and closing some routes, inadvertent discovery of cultural and paleontological resources and vandalism to them is reduced. Higher road densities in a given area would allow greater access to more land on the average, but that does not imply greater amounts of vandalism, since the vehicles would remain on designated routes.

VISUAL RESOURCES

The following discussion characterizes effects to visual resources at the scale of all Butte Field Office BLM lands. Road mileages depicted are for all BLM lands in the RMP Decision Area with the alternatives of the five site-specific travel plans incorporated.

Effects Common to All Alternatives

Roads (temporary or permanent) may affect visual quality. Roads that remain open for public use may impact visual qualities where noticeable. The quantity of open roads would also influence sensitivity levels since with more open roads, more areas would generally be viewed by more members of the public. Closing or decommissioning roads would generally reduce effects to visual resources and reduce sensitivity levels because fewer members of the public would generally be accessing and viewing areas with closed roads.

Effects of the Alternatives

Alternative A would have the most miles of open road (approximately 629 miles) Butte Field Office-wide. This would create the most adverse effects to visual resources of all alternatives from a standpoint of both direct impacts of roads and creating the most potential for sensitive viewpoints.

Under Alternative B, reducing the mileage of designated open routes Field Office-wide to 417 miles would en-

hance scenic qualities and reduce sensitive viewpoints compared to Alternative A.

Under Alternative C, adverse effects from travel management and transportation would be slightly less than those of Alternative B with respect to impacts from open roads (372 open miles) on the landscape. Alternative C would improve visual resources the most of any alternative.

Under Alternative D, impacts from travel management would be less than with Alternative A, but greater than with Alternatives B and C. Alternative D would have 150 fewer miles of open road (479 open miles) than Alternative A. This reduction would lower sensitive viewpoints and the noticeability of landscape changes. Alternative D would have more adverse impacts to visual resources than Alternatives B and C.

Under all alternatives, most activities on BLM lands would generally not adversely affect visual resources to unacceptable degrees because discretionary activities on BLM lands would be required to meet Visual Resource Management objectives within individual project areas.

Activities on non-BLM lands, particularly activities near BLM lands associated with residential development, urbanization, additional mining, or vegetation management, could have adverse cumulative effects on visual resources on BLM lands because BLM VRM objectives would not apply to non-BLM activities.

LIVESTOCK GRAZING

At the RMP Planning Area scale, contributions to cumulative effects on livestock grazing from alternatives for the five site-specific travel plans would be similar for all action alternatives. All action alternatives would close and decommission more roads and trails than Alternative A. As more roads and trails are closed, noxious and invasive weed spread along with multiple user conflicts would be reduced. On the other hand, permittee management time on BLM lands may increase. Consequently, more effects associated with closed roads as described under the Effects Common to All Alternatives sections for each TPA above would occur under Alternative C than under any other alternative. Alternative B would produce fewer effects than Alternative C, but more than Alternatives A and D. A summary of the relative degree of proposed road closures at the RMP Decision Area scale (all BLM Butte Field Office lands) as well as the Planning Area scale by alternative is below.

Under current conditions (Alternative A), approximately 172 miles of motorized routes mapped on the BLM transportation system would remain closed. These routes represent about 20 percent of the approximately 856 BLM road miles, and approximately 1.0 percent of the road miles across all ownerships in the entire Planning Area.

Alternative B would close (318 miles) or decommission (53 miles) approximately 371 miles of routes in the Decision Area currently open to use by motorized vehicles, the second most of any alternative. These routes represent about 43 percent of the approximately 856 BLM road miles in the Decision Area, and approximately 2.1 percent of the road miles across all ownerships in the entire Planning Area.

Alternative C would close (375 miles) or decommission (50 miles) approximately 425 miles of routes currently open to use by motorized vehicles. These routes represent about 50 percent of the approximately 856 BLM road miles in the Decision Area, and approximately 2.4 percent of the road miles across all ownerships in the entire Planning Area.

Alternative D would close (266 miles) or decommission (44 miles) approximately 310 miles of routes currently used by motorized vehicles. These routes represent about 36 percent of the approximately 856 BLM road miles in the Decision Area, and 1.7 percent of the road miles across all ownerships in the entire Planning Area.

RECREATION

Effects of the alternatives for the five site-specific travel plans on Recreation are discussed at the scale of the Butte Field Office below. The public often targets public lands for various recreational activities. At the scale of the 7.2 million-acre RMP Planning Area, the 302,000 acres of Decision Area lands make up about 4.2 percent of the total. Recreation opportunities on other public lands at the scale of the entire RMP Planning Area exist on approximately 2,803,359 acres of USFS lands (39 percent of all lands), approximately 318,000 acres of state lands (4.4 percent of all lands), approximately 11,466 acres of Bureau of Reclamation lands (0.2 percent of all lands), and approximately 150,000 acres of National Park Service lands (2 percent of all lands). BLM lands make up about 8.4 percent of public lands in the RMP Planning Area available for public recreation.

Effects of Alternative A

This alternative would maximize motorized recreation opportunities, and minimize non-motorized opportunities within the five Travel Planning Areas (Helena, East Helena, Lewis & Clark-NW, Boulder/Jefferson City and Upper Big Hole) compared to the other alternatives. Approximately 372 miles of open road (including seasonally restricted roads) would be available in the five TPAs analyzed. This would provide approximately 629 miles of open road available across all Butte Field Office BLM lands.

Effects of Alternative B

Road availability for wheeled motorized travel within the five TPAs being analyzed would be the second lowest of all alternatives (approximately 171 miles open yearlong or open with restrictions, 417 miles Butte Field

Office wide). Under this alternative motorized recreation users would be more affected than under Alternative A while visitors seeking non-motorized opportunities would be benefited with more walk-in areas associated with closed roads or from established trailheads.

Effects of Alternative C

Road availability for wheeled motorized travel within the five TPAs being analyzed would be the lowest of any of the alternatives (approximately 122 miles open yearlong or open with restrictions, 372 miles Butte Field Office wide). Under this alternative motorized recreation users would be most affected while visitors seeking non-motorized opportunities would be benefited the most.

Effects of Alternative D

This alternative would provide the second highest mileage of available roads (230 miles in the five TPAs, 479 miles Butte Field Office wide) of all alternatives for wheeled motorized recreation opportunities within the five Travel Plan Areas (Helena, East Helena, Lewis & Clark-NW, Boulder/Jefferson City, and Upper Big Hole) analyzed as part of this planning effort. Motorized recreation users would have more opportunities than under Alternatives B and C, but fewer opportunities than under Alternative A. Non-motorized users would have more opportunities than under Alternative A but fewer than under Alternatives B and C.

TRAVEL MANAGEMENT AND ACCESS

To understand the entire cumulative effects picture for travel management and access at the Decision Area and Planning Area scales, past travel management actions, recent travel planning decisions and effects of the five site-specific travel plans are important.

Past Travel Management Actions

Beginning in 1946, and continuing up to June 2003, the majority of lands managed by the BLM were managed under the “open” area designation. With some exceptions, under this management, the public was allowed to travel off-road (cross country) on motorized vehicles (both wheeled and snowmobiles) without restriction. During the initial decades under this management (1950-1980), the level of off-road motorized recreation use, adverse resource impacts, and user conflicts were relatively low. In more recent years (1980’s to the present), the Butte Field Office (as well as the rest of the nation) has experienced a dramatic increase in the popularity of Off Highway Vehicle recreation. According to a 1995 U.S. Bureau of Census abstract report for recreational use on public lands (U.S. Census Bureau. 1995), off-highway vehicle travel increased 138 percent between the years of 1982-1992, while other forms of motorized travel increased 186 percent. From 1997 to 2001, the number of ATVs in use increased by almost 40 percent (USDA-FS. 2005b). Nationwide, motorized enthusiasts are buying OHVs at a rate of 1,500 units per day, with

nearly one-third of them doing so as first time buyers. Non-motorized use increased as well. According to the U.S. Bureau of Census report, between the years of 1982-1992, non-motorized travel increased 290 percent. As a result, both nationally and at the scale of the Butte Field Office, user conflicts between motorized and non-motorized users have increased.

In 2003, BLM issued a major travel management document, the *2003 Off-Highway Vehicle Record of Decision* and plan amendment for Montana, North Dakota, and portions of South Dakota. Under this decision, all wheeled motorized use is restricted to existing roads and trails only (no cross country use), including big game retrieval, unless in an area with a site-specific travel plan that manages otherwise.

Prior to the recent Butte RMP revision roads/trails inventory, the total number of roads and trails located within the Butte Field Office was generally considered to be 285 miles. This figure has been used for many years by BLM personnel, and represents the primary roads and trails used by the public and agency over the past 20-30 years. During the comprehensive road and trails inventory conducted for the Butte RMP (2002-2004), a total of approximately 856 miles of roads and trails were documented. There is no data available to analyze when or at what rate this growth of the road network occurred (from 285 to 856 miles), or the numbers of miles of roads/trails that are attributed to agency development, versus public development (user made routes). The current total mileage is a combination of both BLM construction and user made routes that BLM never intended to place on the landscape. In some cases, the locations of existing routes and the (vehicle) type, frequency, and season of use, have resulted in resource impacts. This legacy of past travel management has a direct impact on current as well as future travel management.

Recent BLM Travel Plan Decisions

Recent BLM travel planning decisions for four TPAs in the Butte Field Office reflect a general trend of reduced motorized use with more distinction made in designated uses compared to the past (**Table 4-110**). While mileages of road open year-round have generally decreased, miles of seasonally restricted routes, miles of motorized trail for OHVs and motorcycles, and miles of closed roads have generally increased.

Outside of but adjacent to the Butte RMP Planning Area, the Dillon BLM Resource Management Plan (February 2006) provides another example of a recent travel management decision. Prior to its recent travel management revisions, the Dillon Field Office had 1,860 miles of road open yearlong, 242 miles open with seasonal restrictions, and 822,284 acres of area in the "Open" area designation for snowmobile use. With the travel plan revisions made in the Dillon RMP, there are now 1,183 road miles open yearlong, 159 miles with seasonal restrictions, and 763,057 acres in the "Open" area designation for snowmobile use.

Recent USFS Travel Plan Decisions

There have been two recent travel plan decisions made by the USFS on National Forest lands that are partially located within the Butte RMP Planning Area boundary. The North Belts Travel Plan completed in 2005 on the Helena National Forest applies to lands northeast of Canyon Ferry Reservoir. Some of these lands are within the Butte RMP PA boundary while others are outside the PA boundary. This decision has resulted in fewer combined miles of open motorized routes from 415 miles to 345 miles, and a reduction of open area for cross-country snowmobile use (**Table 4-111**).

Butte Field Office Travel Planning Area; (Plan Date)	Plan Status (Before/ After Plan)	Open Yearlong	Seasonally Restricted	Closed	Motorized trails	Non- motorized trails	Open Area for Wheeled Vehicles	Open Area Designation for Snowmobiles
Whitetail-Pipestone (2002)	Before	99.4	0	1.7	0	0	28,647	28,647
	After	51	22	32	20.2	0	0	0
Clancy-Unionville (2000)	Before	14	0	0	15	0	5,590	5,590
	After	5	4	5	14	0	0	1,350
Sleeping Giant (2004)	Before	29	0	0	0	0	7,463	7,463
	After	4.5	4.5	20	0	0	0	0
Elkhorn Mountains¹ (1995)	Before	0	1,036	0	32	-- ²	125,900	125,900
	After	0	708	328	151	-- ²	31,400	31,400

¹The data for the Elkhorn Mountains travel management plan includes both BLM and USFS managed lands.

²Data Unavailable

Plan Status	Open Roads, Passenger	Dual Use	Motorcycle Trails	Motorized Trails	Snowmobile Only Trail	Snowmobile Open Area Designation
Before	370	0	2	40	3	113,550
After	160	125	14	43	3	63,686

The Gallatin National Forest travel plan (USDI-FS 2006b), a Forest-wide effort completed in 2006, applies to approximately 2.8 million acres within the Butte RMP Planning Area as well as USFS lands outside the Planning Area. This decision increased the miles of routes available for winter driving, snowmobile use, and cross-country skiing (Table 4-112).

Use Type	Before Plan	After Plan
Pleasure Driving	162	169
Snowmobiling	400	468
Cross-Country Skiing	214	231

Effects of Five Site-Specific Travel Plans at RMP Decision Area Scale

This section discusses effects of the alternatives of the five site-specific travel plans considered in aggregate at the RMP Decision Area (all Butte Field Office BLM lands) scale as well as the Planning Area scale. Table 4-113 displays RMP Decision Area-wide road mileages by alternative.

For summer use, the total miles of routes available for all motorized uses combined increased slightly from 1,577 miles to 1,588 miles, but included shifts in types of uses with mileage increases for pleasure driving and motorcycle riding, and miles reductions for backcountry

Indicator	Alt A	Alt B	Alt C	Alt D
Miles of open yearlong routes	471.8	263.0	244.3	304.8
Miles of seasonally restricted routes	157.5	153.8	128.1	173.9
Miles of decommissioned routes	0	52.6	50.1	43.4
Miles of closed routes	172.0	317.7	375.2	266.2

Source: BLM Butte Field Office transportation GIS database, 2005.

roads and ATV routes (Table 4-114). Combined totals of routes where non-motorized uses were either emphasized or allowed reduced from 7,509 miles to 5,775 miles with reductions in routes where mountain bike and pack and stock saddle uses were emphasized, and increases in miles where mountain bike use is allowed (but not emphasized).

Effects of Alternative A

Under Alternative A, approximately 629 miles of roads would be open (471.8 miles open yearlong, 157.5 miles open with seasonal restrictions) Decision Area-wide for motorized use opportunities (Table 4-113). This would be the greatest number of open miles of all the alternatives and would create the most opportunities for motorized users, and the least opportunities for non-motorized users of all alternatives. Approximately 172

Plan Status	Pleasure Driving	Backcountry Roads (4 X 4)	ATV	Motorcycle	Mountain Bike Use emphasized	Mountain Bike Use allowed	Pack and Stock Saddle Use emphasized	Pack and Stock Saddle Use allowed	Hiking Use emphasized
Before Plan	309	417	757	74	2,386	898	2,115	1	2,109
After Plan	402	337	554	295	1,323	1,754	347	347 ¹	2,004 ²

¹ Use for this activity is prohibited on some trails.

² Use for this activity is not prohibited on any trails; use is either emphasized or allowed.

miles of road (approximately 20 percent of Field Office total of 856 miles) would remain closed Field Office-wide under this alternative.

Under Alternative A, user conflicts would be greater and safety would be reduced compared to the action alternatives because motorized and non-motorized users would share more of the same routes, which could lead to accidents and injuries.

Management costs under Alternative A would be mixed. Less personnel time would be required to monitor travel compliance than under the action alternatives. However, more effort would be required for signing designated open routes than under any other alternative (routes open yearlong and open with restrictions would be signed while closed routes would not be signed).

Effects of Alternative B

Under Alternative B, opportunities for wheeled motorized access would be less, while opportunities for non-motorized user would be greater than under Alternative A (**Table 4-113**). Under Alternative B, approximately 43 percent of the current total of approximately 856 road miles would be closed or decommissioned. Alternative B would provide fewer opportunities for motorized users, but would increase opportunities for non-motorized users compared to Alternative A.

Under Alternative B, wheeled motorized and non-motorized users would have more separate routes than under Alternative A. User conflicts would be reduced compared to Alternative A.

The extent of management activities and costs under Alternative B would be mixed. Less personnel time would be required for initial implementation (signing designated routes, installing bulletin boards) than under Alternative A, but more time would be needed than under Alternative C. However, more effort on the part of the BLM would be required for public education and travel plan compliance than under Alternative A, but less time would be needed for this than under Alternative C.

Effects of Alternative C

Under Alternative C, opportunities for wheeled motorized access would be less, while opportunities for non-motorized users would be greater than under any other alternative (**Table 4-113**). Under Alternative C approximately 49 percent of all BLM roads in the Decision Area would be closed or decommissioned.

User conflicts may be less under Alternative C than the other alternatives because wheeled motorized and non-motorized users would have a greater number of separate routes, thereby reducing the chances of encounters.

The extent of management activities and costs under Alternative C would be mixed. More personnel time would be required to monitor user compliance than under Alternatives A and B, but signage requirements

would be less than under any other alternative due to Alternative C having the fewest open routes.

Road and trail safety would be greater under Alternative C than under all other alternatives. Increased opportunities for dispersed recreation would result in a reduction in accidents and injuries from motorized and non-motorized recreationists using the same trails.

Effects of Alternative D

Under Alternative D, opportunities for wheeled motorized access would be less than under Alternative A, but greater than under Alternatives B and C (**Table 4-113**). Opportunities for non-motorized users would be greater than under Alternative A but less than under Alternatives B and C. Under Alternative D approximately 36 percent of all BLM roads in the Decision Area would be closed or decommissioned.

Under Alternative D, user conflicts would be less than under Alternative A, but more than under Alternatives B or C. Due to increased route closures and seasonal restrictions, some dispersed recreation opportunities would be created that allow motorized and non-motorized users to recreate separately compared to the current condition.

The extent of management activities and costs under Alternative D would be mixed. Alternative D would entail additional construction costs compared to the other alternatives due to several new roads that would be constructed to interconnect with existing routes. Increased education and compliance monitoring would result in increased management costs under Alternative D compared to Alternative A, but these costs would be lower than under Alternatives B and C. Signage costs would be less than under Alternative A but greater than under either Alternatives B or C.

Additional Effects at Decision Area and Planning Area Scales

Decreased opportunities for motorized recreation would help reduce the cumulative effects on natural resources, help provide non-motorized opportunities, and help reduce conflicts between motorized and non-motorized users. Under the action alternatives, motorized users would end up with fewer miles of dispersed roads or trails to recreate upon, and/or be displaced from some site-specific areas. As a result, motorized use would become more concentrated onto a smaller network of roads and trails. With some exceptions, given the combined level of motorized opportunities available across public lands managed by various agencies (USFS, BLM, MFWP, etc.), it should be many years before competition among motorized users for the same space becomes a social issue. Exceptions may include focus areas such as the Whitetail-Pipestone designated OHV trail system. Whitetail-Pipestone has gained rapidly in popularity (and public exposure) since its recent travel plan development in 2002; and receives use by local residents as

well as regional and nationwide visitors. Given the increasing popularity of motorized use, focus areas such as Whitetail-Pipestone would likely become more crowded in the future regardless of future travel management direction.

At the Planning Area scale, there are other key variables affecting travel management. Private lands account for nearly 49 percent of lands in the Planning Area. There is a general trend for private landowners to restrict public access onto or across their lands. This trend may be offset somewhat by the acquisition of additional lands by BLM, access easements, and block hunting agreements. Human population in the Planning Area grew by 40 percent between 1970 and 2002. In some cases, this population influx has led to fragmentation of large tracts of private lands for residential development, further complicating public access issues. This trend will likely continue. These same factors and influences would also affect travel management decisions made by other agencies located within the Planning Area, such as USFS, MFWP, and Bureau of Reclamation. Given that Butte Field Office lands occupy about 4.2 percent of all lands, and BLM roads make up about 4.8 percent of Planning Area total road mileage, the effects of BLM travel plan alternatives on travel management overall would be relatively minor at this scale.

TRANSPORTATION FACILITIES

Costs associated with travel management for all BLM lands in the Butte Field Office (**Table 4-115**) are based on historical cost figures for road and trail maintenance. Percentage of annual maintenance is also historical, with 20 percent of the total mileage of roads receiving annual maintenance. The remaining 80 percent of roads and trails would receive stabilization work and emergency repairs as needed.

Under Alternative A, the Butte Field Office transportation system would have 629.2 miles of open roads (including open with seasonal restrictions) and 75 miles of motorized trails (**Table 4-115**).

Estimated costs for annual maintenance, periodic stabilization, monitoring of compliance with travel plans, and weed control on roads would be about 30 percent more than any of the action alternatives.

Under Alternative B, the Butte Field Office transportation system would have 416.9 miles of open roads (including open with seasonal restrictions) and 75 miles of motorized trails (**Table 4-115**). Estimated costs for annual maintenance, periodic stabilization, monitoring of compliance with travel plans, and weed control on roads under Alternative B would be slightly higher than under Alternative C and less than under Alternatives A and D.

Under Alternative C the transportation system would have 372.4 miles of open roads (including open with restrictions) and 75 miles of motorized trails (**Table 4-115**). Estimated costs for annual maintenance, periodic stabilization, monitoring of compliance with travel plans, and weed control on roads under Alternative C would be less than under any other alternative.

Under Alternative D, the Butte Field Office transportation system would have 478.6 miles of open roads (including open with restrictions) and 75 miles of motorized trails (**Table 4-115**). Estimated costs for annual maintenance, periodic stabilization, monitoring of compliance with travel plans, and weed control on roads under Alternative D would be greater than under Alternatives B and C, but less than under Alternative A.

Classification/ Cost	Alt A	Alt B	Alt C	Alt D
Miles of Open/ Restricted Roads	629.2	416.8	372.4	478.6
Motorized Trails	75	75	75	75
Annual Road Maintenance	\$50,336	\$33,352	\$29,792	\$38,288
Annual Trail Maintenance	\$3,000	\$3,000	\$3,000	\$3,000
Periodic Road Stabilization	\$33,574	\$22,246	\$19,871	\$25,538
Periodic Trail Stabilization	\$1,200	\$1,200	\$1,200	\$1,200
Monitoring/Compliance	\$31,460	\$20,845	\$18,535	\$23,930
Weed Control	\$9,438	\$6,254	\$5,586	\$7,179