CHAPTER 4
Environmental Impacts

INTRODUCTION

This chapter presents the environmental impacts of management actions described in chapter 2. Both the beneficial and the adverse impacts are described. Assumptions used in analyzing the environmental impacts are described for each resource. These assumptions include the demand for various resources, the ability of the resources to meet the demand, and how the actions would be carried out. The assumptions are based on previous events, experience of personnel, and knowledge of the resources in the planning area.

This chapter is outlined alphabetically by resource and by alternative. Under each alternative the following are addressed: assumptions, impacts from management common to all alternatives, which sometimes includes cumulative impacts, impacts from management actions for each alternative, and conclusion. The conclusion contains a summary of impacts. This summary includes cumulative impacts, unavoidable adverse, irreversible and irretrievable impacts, and contains short-term impacts versus long-term productivity. For the purpose of analysis, "short-term" impacts described in this document are those that would last five years or less; "long-term" impacts would last six years or more. The analyses presented in this chapter were based on available information and on the professional judgment of resource specialists.

It is difficult to assess the environmental impacts of land management without considering the interrelationships between various resource values and future development activities. For instance, impacts to big game would affect not only the wildlife population, but also the recreational use that depends on that resource. Conversely, environmental protection measures may raise costs of oil and gas exploration and production or make many areas unavailable for development. A road that serves oil and gas development and production enhances vehicular recreational opportunities for many people, but recreational usage of roads could create impacts to big game on crucial winter ranges. These factors are considered in the succeeding pages.

This document does not consider impacts resulting from site-specific coal mining as there are no current coal lease applications. When a coal lease application and mine plan is submitted, a site-specific environmental impact statement of all resources, including prime or unique farmland, would be completed.

The Cherry Creek Dam and associated special recreation management area proposals are discussed in this chapter. The anticipated impacts from creating a reservoir at the dam site, development of a recreation area and obtaining the water are in this document. Environmental impacts from the actual construction of the dam will be addressed in another document.

GENERAL ASSUMPTIONS

The following assumptions apply to all analyses presented in this chapter. The BLM will comply with applicable laws, regulations, and policies in implementation of this resource management plan. Compliance with applicable laws, regulations, and policies is a part of day-to-day business. Such regulations deal with all resources and environmental components. The management actions will be carried out if adequate personnel and funding are available.

AIR QUALITY

Assumptions

Air quality has the potential to be affected by mineral development, lands and realty actions, forestry practices, livestock grazing management activities, off-road vehicle uses, recreation activities, wildlife development, and fire control efforts. Management actions would comply with applicable federal, state, and local standards for air quality.

Impacts From Management Common To All Alternatives

The following are cumulative impacts to air resources. In the past, volcanoes in the west spewed enormous volumes of volcanic ash. Pushed by the prevailing winds, this ash was deposited tens of feet thick across eastern Montana. As evidenced by more recent volcanic eruptions in the Philippines and Washington state, particles can have a regional and even global affect on air quality. Volcanic activity also releases gases, degrading air quality downwind from the point of discharge. These gases include chlorides, hydrochloric acid, ammonia, hydrogen sulfide, and carbon dioxide.

Widespread use of internal combustion engines and improvement of agricultural implements started to affect air quality in the region in the 1920s. Pollution from combustion by-products on such a widespread scale could be absorbed and dissipated by the atmosphere without appreciable effects. The amount of soils exposed to wind erosion and the potential for particle suspension increased as acre-

age plowed increased. Climatic conditions during the 1920s seemed optimal for small grain crops. Promotion by railroads and the Homestead Act, allowing individuals to patent land, increased acreage being farmed in this region. The drought of the 1930s resulted in high wind erosion rates and effected the air quality as far away as the East coast, resulting in days of perpetual twilight in New York.

The arrival of the internal combustion engine affected air quality in other areas. Emissions from use and numbers of personal automobiles affected the air quality of the region. Increased use of the personal automobile expanded exploration for fluid minerals and construction of suitable roads, resulting in impacts to air quality. The need for energy producing minerals increased the exploration for these minerals and when found, extraction released particulates and volatile compounds.

Lands put into the Conservation Reserve Program of the Food Security Act of 1985 resulted in less soil erosion, improving air quality by reducing particulates.

Chemical spraying for noxious weed control is an air pollutant that would dissipate rapidly.

Oil and gas exploration and development results in surface disturbance and release of volatile compounds affecting the atmosphere. While the areas affected are relatively small, the areas of oil and gas exploration and development are concentrated based on geologic characteristics. This concentration of exploration and development has a greater effect locally and downwind. Suspended particles from soil disturbance and flaring and venting of gas would continue to affect air quality locally and downwind. Air quality related values downwind from oil and gas producing areas may detrimentally affect Class I airsheds by emissions as activity increases.

Mining, shipping, and burning of coal resources can add to particulate suspension as well as sulfur dioxide pollution.

Particle suspension occurs on a localized, short-term basis when construction takes place in recreation areas, linear rights-of-way, and reservoir and pit construction.

In fire areas (planned and unplanned ignition), a short-term degradation in air quality occurs from suspended particulates and gases. Wind erosion and effects on air quality would continue until vegetation has reestablished.

Air quality in this region is probably affected more by activities outside the region. Large population centers upwind, such as Billings, Montana, continue to affect the region's air quality. Refineries and manufacturing processes produce pollutants that are brought into the region with the wind.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

Surface disturbance from structural improvement construction, coal mining, locatable mineral development, mineral material development, nonenergy leasable mineral development, oil and gas development, and open off-road vehicle use would cause dust and exhaust emissions. Gas vapors or other emissions from oil well blowouts, gas line ruptures, flaring and venting of produced gas would cause odors from nonpoisonous gases and fumes. The dust from surface disturbance and nonpoisonous gas odors would be short term and insignificant. Given its toxicity, if hydrogen sulfide emissions occur, they would be localized but possibly significant. Standard operating procedures for oil and gas development and production include appropriate mitigation measures to lessen the likelihood of such impacts.

Conclusion

Management actions which could contribute to cumulative affects on air quality are flaring from oil and gas wells, and air pollutants from a coal fired generation plant. The primary areas of concern for cumulative effects are classified as Class I areas. Class I areas in or next to the planning area are Fort Belknap Indian Reservation, Fort Peck Indian Reservation, U L Bend Wilderness Area, and Theodore Roosevelt National Park. Potential air polluting activities affecting these areas would have to be mitigated.

There would be no unavoidable adverse, irretrievable or irreversible impacts to air quality. There would be short-term impacts but no long-term impacts from surface disturbance, oil and gas flaring, fire smoke, coal development and use.

ALTERNATIVE B

The impacts would be similar to those in Alternative A. The primary differences are in special management areas and there would be no coal leasing under this alternative. The special management areas are Smoky Butte Area of Critical Environmental Concern (80 surface and 680 minerals acres), the cultural areas of critical environmental concern (2,130 surface and 1,802 mineral acres), Lewis and Clark Trail, Makoshika State Park, Calypso, Powder River Depot, and Cherry Creek special recreation management areas (21,022 surface and 32,864 mineral acres), the paleontological (39,996 surface and 48,713 mineral acres) and wildlife areas of critical and environmental concern (1,167 surface

and mineral acres), and crucial winter ranges (636,265 surface and 700,979 mineral acres). There would be no air quality impacts associated with coal leasing in these areas.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A, except under this alternative there would be no impacts from coal development.

ALTERNATIVE C

The impacts to air quality would be the same as Alternative A.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

ALTERNATIVE D (Preferred Alternative)

The impacts to air quality would be the same as Alternative A, except under this alternative impacts from mineral development or open off-road vehicle use would not occur on the following special management areas: cultural areas of critical environmental concern (2,130 surface and 1,802 mineral acres), paleontological areas of critical environmental concern (39,996 surface and 48,713 mineral acres, wildlife areas of critical environmental concern (11,182 surface and mineral acres), Smoky Butte Area of Critical Environmental Concern (80 surface and 680 mineral acres) and the special recreation management areas (17,098 surface and 26,236 mineral acres).

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative B.

CULTURAL RESOURCES

Assumptions

Cultural resources would be treated as similar and equally distributed in terms of density, distribution, type, composition, and significance throughout the planning area.

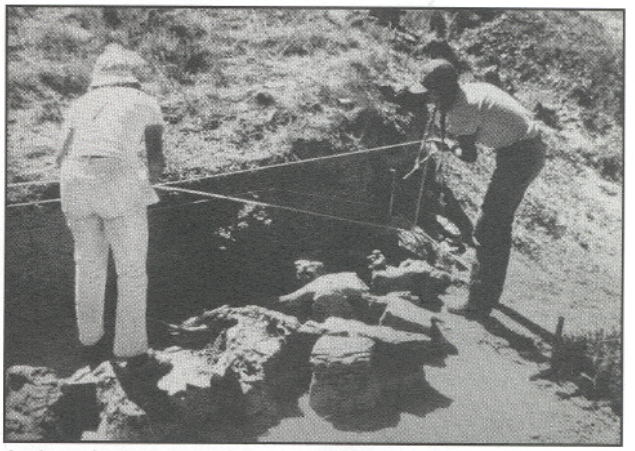
Surface disturbance has the potential to affect cultural resources. There is an average of one cultural site for every 100 acres of public land. One excavation to research a cultural resource property will be conducted every five years. Each excavation would disturb 1/4 acre. Approximately one property out of 7 to 10 is found to be eligible for the National Register of Historic Places.

Impacts From Management Common To All Alternatives

Surface-disturbing activities have the potential to cause adverse impacts to cultural resources. Activities using heavy equipment cause the most surface disturbance and impacts on cultural properties. These activities include mineral development (mineral materials, leasable, and locatable); road building; and site development (such as recreation sites). Off-road vehicle use, some recreational activities, and unauthorized collecting of artifacts have the potential to impact cultural resources. Natural processes (such as erosion and animal burrowing) have the potential to remove, damage or destroy cultural resources and result in the loss of important data. Other activities and actions also have the potential to affect cultural resources, such as fire, wood product sales, hazardous waste cleanups, land tenure adjustments, construction of livestock wells, springs, pipelines, fences and reservoirs, vegetative treatments and wildlife developments.

Adherence to the cultural resource laws and regulations will minimize and mitigate nearly all anticipated impacts to cultural resources.

The cultural resource inventory process attempts to identify all previously unknown properties in a target area prior to



Archaeological site test excavation.

their being impacted, disturbed or destroyed. Cultural properties not located during inventory or mitigated through the application of BLM's identification, evaluation and treatment procedures could otherwise be disturbed or destroyed by surface disturbing activities.

In nearly all situations, cultural properties could be avoided by project redesign or relocation (BLM's preferred standard practice) negating the need for additional mitigation measures. Significant cultural properties that cannot be avoided, could be mitigated through data recovery or excavation prior to allowing a project to proceed.

The practice of applying archaeological mitigation measures to affected significant cultural resources offsets some of the impacts caused by surface disturbing activities. However, residual impacts would still occur.

Inventory and mitigation increases the cultural resource database and scientific body of knowledge. Surface-disturbing activities also have the potential to discover properties that would otherwise be unknown by locating properties that were buried or not found during inventory. Chance discovery by the public also can identify previously unknown properties. Recovery or preservation of data from these finds is dependent on the find being brought to the attention of the scientific community or the BLM.

If a significant property is being impacted by natural means, such as erosion, steps would be taken to reduce those impacts and prevent further degradation. The property could also be subjected to salvage mitigation measures.

Ninety-one cultural sites could be encountered per year by wildfire and fire line construction activity. Of these sites, 9 to 13 would be potentially eligible for the National Register of Historic Places. Intensive fire suppression, in emergency situations, is regulated by the requirements listed in 36 CFR 78 and 800.12. Fire rehabilitation activities generally do not cause additional disturbance beyond the fire emergency situation. These impacts can be mitigated.

The retention of public ownership and the acquisition of lands and minerals in the areas of important cultural properties would benefit cultural resources. Approximately 25 cultural properties could be found by inventories associated with 2,500 acres of land adjustments per year. Of these sites, 2 to 3 could be eligible for the National Register of Historic Places. This would require mitigation. Over the 20-year life of this plan, the 50,000 acres of land adjustments could identify 500 cultural resource properties with 50 to 71 properties considered eligible for the National Register of Historic Places.

At present, there are some 228 cultural resource sites recorded in the high oil and gas development potential areas. These 228 cultural sites are located on both BLM-administered federal surface (171 sites, 2 eligible and 1 site potentially eligible), and on private surface overlying BLM-administered federal oil and gas mineral estate (57 ineligible sites). Three sites would require mitigation should they be impacted by future oil and gas developments.

In the next 20 years, it is projected that 24 cultural properties would be encountered by proposed oil and gas development activities. It is also projected that between two to three of those properties could be eligible for the National Register of Historic Places requiring mitigation.

Surface disturbance for range improvement projects could encounter 92 sites over a 20-year period with 9 to 13 of these 92 sites found eligible for the National Register of Historic Places necessitating mitigation. Over a 20-year period, 40 waterfowl projects would identify 2 to 4 ineligible cultural properties.

Allowing prairie dog expansion could affect significant cultural sites, as prairie dog burrowing disturbs the context and relationships of buried cultural materials in soil profiles, causing the loss of archeological data.

Impacts could also occur to cultural resource properties or areas which derive their significance from their topographic setting and religious values. Impacts to sites which have religious values (traditional cultural properties and localities with traditional lifeway values) usually are not able to be mitigated through standard mechanical or archival means, and there are some sites that cannot be mitigated at all. Consequently, there would be continuing impacts from off-site development causing disturbances to the setting and feeling of the site.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

The Hoe, Big Sheep Mountain, Jordan Bison Kill, Seline, and Powder River Depot sites would not be designated as areas of critical environmental concern. These properties would be managed through the cultural resource planning process.

Over the 20-year life of the plan, 63 cultural sites could be identified from rights-of-way. Of these, 6 to 9 could be found eligible for the National Register of Historic Places and would require mitigation.

One projected mine (location unknown at this time) would disturb 14,000 acres over the 40-year life of the mine and 140 cultural sites would be encountered by coal mine development. Of these sites, 14 to 20 could be found eligible for the National Register of Historic Places, requiring mitigation.

Before coal leasing, cultural resource properties that are listed on the National Register of Historic Places would be declared unsuitable for coal leasing. Cultural resource properties that have been determined eligible for the National Register of Historic Places, but have not been listed, would not fulfill the unsuitability criterion. These sites would still be subject to mitigation before disturbance.

Conclusion

Cumulative impacts on cultural resources would not be significant. Over the next 20 years, surface-disturbing activities, land tenure adjustments, oil and gas developments, and coal leasing could identify 910 cultural properties with 90 to 129 eligible to the National Register, requiring mitigation. Not designating the five cultural areas of critical environmental concern would not insure long-term protection, but these properties would be managed consistent with existing laws and regulations.

Unavoidable adverse impacts would occur to any cultural resources not discovered during survey, those damaged or destroyed by unauthorized surface disturbance, and vandalism. Although mitigation by excavation recovers valuable data, the process of archeological excavation using the most current archeological methods and technology, still results in the destruction of cultural properties and the destruction and loss of some data.

Irretrievable, irreversible impacts would occur to cultural resources that are mitigated. Surface-disturbing activities that impact, disturb or destroy buried cultural resource properties can result in the irretrievable loss of previously undetected buried cultural resource values and data. Some data may also be lost through archeological excavation. There would be no short-term impacts affecting long-term productivity of cultural resources.

ALTERNATIVE B

Designating the Hoe, Big Sheep Mountain, Seline, Powder River Depot, and Jordan Bison Kill sites as cultural areas of critical environmental concern and excluding all surface-disturbing activities in these areas would enhance preservation and protection of the areas of critical environmental concern.

Impacts to cultural resources would be the same as those in Alternative A, except in Alternative B there would be no impacts from rights-of-way and coal development. Construction of the Cherry Creek Dam would encounter 32 cultural properties. It is projected that 3 to 4 sites could be found eligible to the National Register of Historic Places requiring mitigation.

Surface-disturbing activities in the Black-footed Ferret Area of Critical Environmental Concern would be restricted. This would reduce impacts to cultural properties. To date, seven sites have been recorded in this area with three additional sites projected to be found. Allowing expansion of prairie dogs in the core area, could affect a projected 7 to 10 eligible sites requiring mitigation due to prairie dog burrowing. Prairie dog burrowing can damage cultural values by disturbing the context and relationships of buried cultural materials in soil profiles, causing the loss of archeological data.

Conclusion

Five cultural areas managed as areas of critical environmental concern would improve protection of these cultural resources. Over the next 20 years, surface-disturbing activities, land tenure adjustments, and oil and gas developments could encounter 1,422 to 1,424 cultural properties with 141 to 201 properties considered eligible to the National Register requiring mitigation. Unavoidable, irreversible, and irretrievable impacts would be the same as Alternative A. There would be no short-term impacts affecting long-term productivity of cultural resources.

ALTERNATIVE C

This alternative would designate the five cultural areas of critical environmental concern as in Alternative B. The areas of critical environmental concern would be protected through mitigation.

Rights-of-way would be avoided from the areas of critical environmental concern. For the remainder of the planning area, impacts from rights-of-way development would be the same as Alternative A.

Within the 583,771 acres available for further consideration for coal leasing, of the 584 sites that could be identified, some 273 cultural sites have been recorded. These 273 cultural sites are located on both BLM-administered federal surface (112 sites, 11 eligible) and on private surface overlying BLM-administered federal coal mineral estate (161 sites, none eligible). A total of 11 of these sites have been determined eligible for the National Register of His-

toric Places, requiring mitigation should they be impacted by future coal developments. In addition 57 to 81 sites could be found eligible for the National Historic Register of Historic Places, requiring mitigation. New properties discovered as part of cultural resource surveys conducted during mine plan development and mitigation efforts would add information to the cultural resource data base. This would benefit cultural resources.

There are 32 cultural properties identified in the Cherry Creek Special Recreation Management Area. Special recreation management area developments could affect 3 to 4 sites that could be found eligible to the National Register of Historic Places, requiring mitigation.

Surface-disturbing activities in the Black-footed Ferret Area of Critical Environmental Concern would be restricted. This would reduce impacts to cultural properties. To date, seven sites of the projected 10 have been recorded within this area. Allowing expansion of prairie dogs on public lands in the core area could affect a projected 7 to 10 eligible sites requiring mitigation due to prairie dog burrowing. Prairie dog burrowing can damage cultural values by disturbing the context and relationships of buried cultural materials in soil profiles, causing the loss of archeological data.

Conclusion

Over the next 20 years, cumulative impacts could occur as a result of surface-disturbing activities, land tenure adjustments, and oil and gas developments. These actions encounter 2,057 to 2,059 cultural properties with 204 to 291 of those properties eligible for the National Register of Historic Places, requiring mitigation. Unavoidable adverse impacts would occur to any cultural property not discovered during a Class III inventory. Any cultural property not discovered during inventory would be irretrievable and irreversible. There would be no short-term impacts affecting long-term productivity of cultural resources.

ALTERNATIVE D (Preferred Alternative)

Impacts to cultural resources would be the same as Alternative B, except those impacts from rights-of-way, coal leasing, and off-road vehicle use.

In Alternative D avoiding the cultural areas of critical environmental concern when rights-of-way are constructed would reduce impacts. Most the cultural areas of critical environmental concern are small so avoidance could occur. For the remainder of the planning area, rights-of-way development would have the same impacts as Alternative A.

Impacts from coal leasing would be the same as Alternative C.

Open off-road vehicle use on 2,320 acres in two areas near Terry and Glendive, Montana, could encounter some 23 cultural resource properties in these areas with 2 to 3 cultural properties found to be eligible for the National Register of Historic Places, requiring mitigation. To date, some 12 sites are known to exist and have been recorded within these areas. At present none have been found eligible for the National Register of Historic Places. Buried cultural material could be uncovered and damaged by off-road vehicle activities. If monitoring determines this to be the case, mitigation of significant cultural properties would occur.

Conclusion

Cumulative, unavoidable adverse, irretrievable and irreversible impacts would be the same as Alternative B. Over the next 20 years, surface-disturbing activities, land tenure adjustments, oil and gas developments, coal leasing, Cherry Creek Dam development, and intensive off-road vehicle use areas could encounter 2,092 cultural properties with 208 to 296 of those properties eligible for the National Register of Historic Places, requiring mitigation. There would be no short-term impacts affecting long-term productivity of cultural resources.

FIRE MANAGEMENT

Assumptions

The number of fire occurrences in the planning area would consist of about 26 wildfires per year, averaging 348 acres per fire. The fires would range in size from 1/4 acre to 1,000 acres. Surface disturbance caused from fire lines would average 3 acres per fire or a total of 78 acres per year.

Impacts From Management Common To All Alternatives

Not allowing wood product sales for firewood except in the Knowlton, Pine Unit, and Missouri Breaks would result in minor impacts to fire suppression from accumulation of downed and dead fuels.

Prescribed fire can reduce fire hazards that are present because of an accumulation of fuels.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

There are no specific management actions that would result in a significant impact to the fire program.

Conclusion

There are no cumulative, unavoidable adverse, irretrievable or irreversible impacts to fire management. There would be no short-term impacts affecting long-term productivity.

ALTERNATIVE B

Excluding livestock grazing and concentrating public use in the Lewis and Clark Trail (14,000 acres), Calypso (69 acres), Cherry Creek (2,858 acres), and the Powder River Depot (171 acres) special recreation management areas would create a greater potential for wildfires.

Conclusion

There are no cumulative, unavoidable adverse, irretrievable or irreversible impacts to fire management. There would be no short-term impacts affecting long-term productivity.

ALTERNATIVE C

The same impacts would occur to the fire management program as Alternative B, except under this alternative there would not be as great an accumulation of fire fuels as livestock grazing would be allowed in the special recreation management areas.

Conclusion

There are no cumulative, unavoidable adverse, irretrievable or irreversible impacts to fire management. There would be no short-term impacts affecting long-term productivity.

ALTERNATIVE D (Preferred Alternative)

Excluding livestock grazing and concentrating public use in the Calypso (69 acres), Cherry Creek (2,858 acres), and the Powder River Depot (171 acres) special recreation management areas would create a greater potential for wildfires.

Conclusion

There are no cumulative, unavoidable adverse, irretrievable or irreversible impacts to fire management. There would be no short-term impacts affecting long-term productivity.

FORESTRY

Assumptions

There is a small demand for major wood products (saw timber sales) in the planning area. The demand for minor wood products (firewood, post and poles, and Christmas trees) and other vegetative products (wildings, boughs for Christmas wreaths) would be met and would remain constant over the next 20 years. Minor wood product sales would average about 25 permits for firewood (5 cords each), one permit for 100 trees for posts and poles, and 100 Christmas trees per year.

Impacts From Management Common To All Alternatives

Limber pine would be enhanced and other forest resources would not be significantly impacted.

Impacts From Management Actions Specific To Each Alternative

There would be no significant impacts to forest resources under Alternatives A,B,C, and D.

Conclusion

There are no cumulative, unavoidable adverse, irretrievable or irreversible impacts to forestry in any of the alternatives. There would be no short-term impacts affecting long-term productivity.

LANDS

Assumptions

An average of 2,500 acres of land adjustments would be completed each year. It is projected that 12,500 acres of land would be exchanged over a 5-year period, and 50,000 acres would be adjusted in 20 years. Since land is exchanged on a fair-market value basis, there would be no net change in the value of public and private lands from exchanges, but rather a shifting of the existing public and private land base. When possible, lands would be exchanged within county boundaries to lessen the effects on tax base and payment in lieu of taxes payments.

An average of 13 linear rights-of-way (roads, overhead power lines, pipelines, or buried cables) would disturb 55 acres per year. A total of 65 linear rights-of-way would disturb 275 acres over a 5-year period, and 260 linear rights-of-way would disturb 1,100 acres over a 20-year period. Only one major pipeline (10 inches or greater in diameter) is expected to be built across public lands in the planning area over the next 20 years. This project would require a right-of-way 50 feet wide and 40 miles long and would disturb 240 acres.

An average of two nonlinear rights-of-way (communication sites or facilities) would disturb 10 acres per year. A total of 10 nonlinear rights-of-way would disturb 50 acres over a 5-year period, and 40 nonlinear rights-of-way would disturb 200 acres over a 20-year period.

The total disturbance for rights-of-way would be 1,540 acres over a 20-year period. Fifty percent of this disturbance would be reclaimed within the 20-year period after the rights-of-way are relinquished.

Approximately three land use permits or leases would be issued each year. These vary in size from 1 acre to more than 80 acres, depending upon use. A majority of permits are issued with temporary work areas or emergency road repair.

One easement would be acquired per year to increase access to public lands.

Impacts From Management Common To All Alternatives

Lands not meeting the criteria for disposal would not be available for exchange or sale following site specific inventories. This would not significantly impact the lands program.

Resolution of unauthorized uses of public lands would produce positive environmental impacts and economic

Geologic formations in Makoshika State Park.

impacts. These lands would be reclaimed, benefitting multiple-use management.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

There are no specific management actions that would result in a significant impact.

Conclusion

There would be no cumulative impacts for the lands program. Land exchanges and sales would adjust the public land pattern to better manage public lands. There would be no cumulative impacts to rights-of-way in this alternative. Unavoidable adverse impacts could occur on public lands transferred to other ownerships due to changes in land use. Payments in lieu of taxes and county tax base would be affected, but this impact is not expected to be significant. There would be no irreversible or irretrievable impacts to the lands program. The short-term impacts of land adjustment would affect the long-term managing of public lands in the planning area.

ALTERNATIVE B

Rights-of-way development (694,236 acres) would be significantly affected within the special recreation management areas, crucial winter ranges, and areas of critical environmental concern. Rights-of-way for irrigation pumping stations would be affected the greatest by the exclusion of rights-of-way. This is due to ditching elevations necessary to irrigate adjacent private lands. It is estimated that one facility would be affected throughout the life of the plan. Companies would be required to reroute new developments in the special recreation management areas and areas of critical environmental concern, and delay construction in crucial winter ranges. This would increase their costs.

Conclusion

Cumulative, unavoidable adverse, irretrievable, irreversible and short-term impacts on long-term productivity of land tenure adjustment actions would be the same as Alternative A. Cumulative impacts to rights-of-way applicants would be increased costs. There would be no unavoidable adverse, irretrievable or irreversible impacts to rights-of-way applicants. Short-term impacts on long-term productivity due to exclusion of rights-of-way development would be the increased distances.

ALTERNATIVE C

Rights-of-way development would be affected within the special recreation management areas, Makoshika State Park, and areas of critical environmental concern. Approximately 64,224 acres within these areas would be avoided from rights-of-way development. Rights-of-way would be rerouted if an alternative route exists. As rights-of-way would be allowed when necessary, the impact to companies would not be as significant as Alternative B.

Conclusion

Cumulative, unavoidable adverse, irretrievable and irreversible impacts, and short-term impacts on long-term productivity would be the same as Alternative A. When rights-of-way development is avoided, the impacts would be the same as Alternative B.

ALTERNATIVE D (Preferred Alternative)

Rights-of-way development would be significantly affected from the cultural and wildlife areas of critical environmental concern, Makoshika State Park, and the special recreation management areas. These areas would be avoided and the Smoky Butte Area of Critical Environmental Concern excluded from rights-of-way development. The impacts to companies would be the same as Alternative C, but under this alternative on 33,019 acres.

Conclusion

Cumulative, unavoidable adverse, irretrievable, irreversible impacts and short-term impacts on long-term productivity would be the same as Alternative A. When rights-of-way development is avoided, the impacts would be the same as Alternative B.

LIVESTOCK GRAZING MANAGEMENT

Assumptions

Livestock grazing management actions would be implemented focusing on “I” category allotments. Improvement

projects funded by BLM over the next 20 years would be 200 reservoirs, 65 wells, 70 springs, 225 miles of pipelines, 100 miles of fence, 5,000 acres of prescribed burns, and 4,000 acres of mechanical treatments. Improvement projects funded by livestock operators on public land would be 120 reservoirs, 35 wells, 50 springs, 135 miles of pipelines, 150 miles of fence, and 4,000 acres of mechanical treatments.

Implementation of grazing management actions or activity plans would occur at a rate of two to three allotments per year. Over the next 20 years the rate of project development by livestock operators and the BLM would be 320 reservoirs, 100 wells, 100 to 120 springs, 360 miles of pipeline, 250 miles of fence, and 8,000 acres of land treatments.

Impacts From Management Common To All Alternatives

The following are cumulative impacts to livestock grazing. In the early 1880s trail herds came up from Texas and Kansas. These cattle thrived on the open range until the severe winter of 1886. "Of a herd of 2,000 which the Hashknife threw onto the range late in the fall, only six were found alive" (Brown 1991). More than half of the cattle in eastern Montana perished that winter. After this, stockmen began to settle in the area and commenced to put up hay and care for their stock in the winter.

The Buffalo Rapids irrigation project added 22,938 irrigatable acres to the area near Terry, Montana, in 1939. These projects helped to add hay and crops for winter feed (USDI, BLM 1958). This added to stabilization and increases in livestock production.

Construction of railroads from 1908 to 1928 and the increase in the prevalence of the automobile helped improve marketability of livestock (USDI, BLM 1958).

Drought was prevalent in the area in the 1930s. Livestock died, soil blew away, and people left the ranges and nonirrigated lands.

In 1935, two grazing districts were formed under the Taylor Grazing Act. All of the public domain lands, which were lands that were never homesteaded, were administered by the Grazing Service who in 1946 became part of the BLM (USDI, BLM 1958). The Taylor Grazing Act of 1934, as amended, proposed "to stop injury to the public grazing lands by preventing overgrazing and soil deterioration, to provide for their orderly use, improvement and development to stabilize the livestock industry dependent upon the public range and for other purposes."

Prior to this time the public land was grazed by whoever used the forage first. This promoted overgrazing. The Taylor Grazing Act began the process of attaching grazing use on the public lands to private land that was capable of supporting livestock during the winter.

These past events have helped to bring stability to the livestock operations in the area. Fluctuations in livestock numbers since the 1960s have primarily been affected by economics, weather, and insects. The drought and grasshopper infestations in the 1980s brought about substantial reductions in livestock numbers. The graph of cattle and calves for Montana (figure 11) shows the trend in cattle numbers since 1940. This graph can be compared to the graph of mean annual precipitation for northeastern Montana which shows the good moisture years of the 1960s and 1970s and the erratic precipitation in the 1980s.

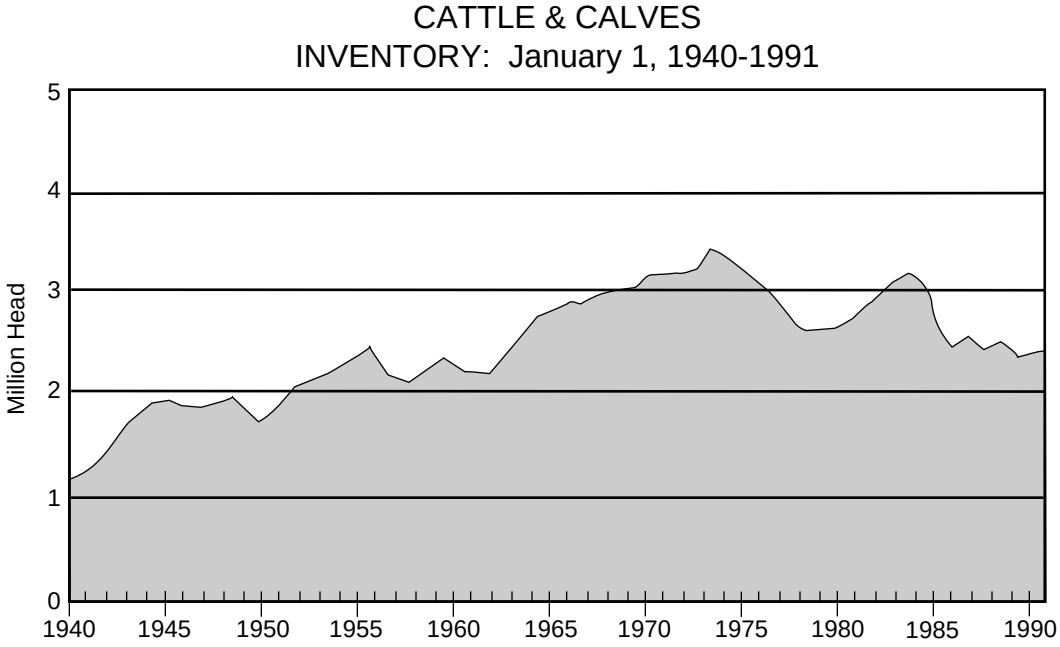
Sheep numbers peeked in the early 1940s. The reduction in fur values and restrictions on predator control has provided for increases in predator populations. This factor combined with decreasing returns for sheep products have helped fuel a steady decline in sheep populations since 1960 (see figure 12).

Reductions in grazing use imposed by the U.S. Fish and Wildlife Service on the Charles M. Russell National Wildlife Refuge in the late 1980s has reduced livestock production on ranches bordering the refuge.

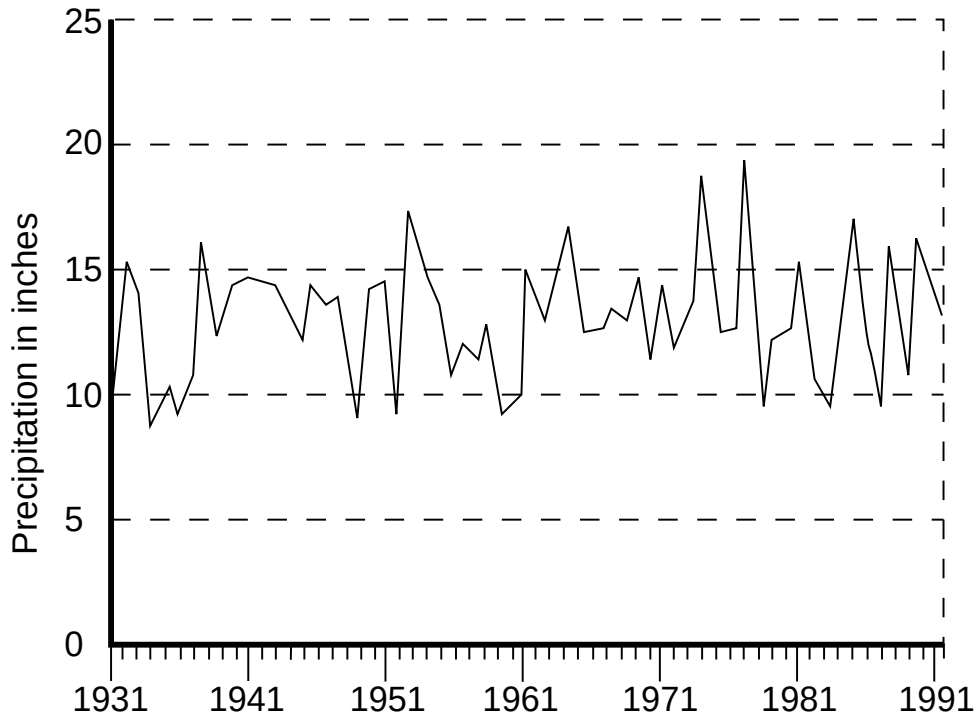
The spread of noxious weeds has also impacted livestock production. Leafy spurge is currently estimated at 4,500 acres. Patches of knapweed have been found and have a high potential for spreading. Some infestations of leafy spurge have resulted in significant impacts to individual livestock operators but the overall current impact to livestock production in the planning area has been minor.

Ecological status is expected to improve due to efforts of livestock operators; county agents and boards; Montana

FIGURE 11

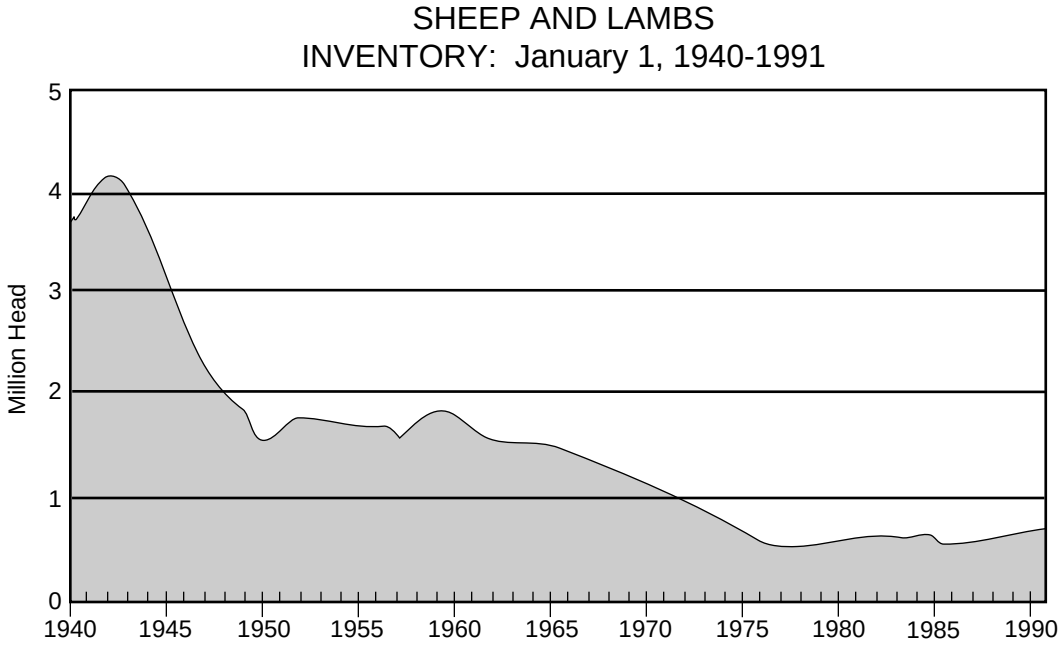


Source: USDA, Montana Agricultural Statistic Services 1991.



Source: National Oceanic and Atmospheric Administration 1992.

FIGURE 12



Source: USDA, Montana Agricultural Statistic Services 1991.

Department of State Lands; Montana Department of Fish, Wildlife and Parks; Soil Conservation Service and Agricultural Stabilization Service; and the BLM. These efforts and improvements in range management will help to stabilize and increase livestock production.

Factors which could negatively affect livestock production in the next 20 years are economics, national policy, weather, insects, and the spread of noxious weeds. All alternatives for this plan will provide for a stable or increased amount of forage available for livestock production.

Fire suppression efforts would limit forage loss caused by wildfires. Fires would reduce forage from 1 to 2 years, and livestock grazing would be lost (1,812 animal unit months per year) until vegetation recovers. In an average year this impact would only be significant if the animal unit months lost were on one allotment. Prescribed fire can be used to enhance vegetative cover for livestock grazing. Thick stands of ponderosa pine without grass and forbs understory may have no value for grazing, yet following a fire these areas would provide up to 0.16 to 0.22 animal unit months per acre, or 800 to 1,100 animal unit months over the next 20 years. Ponderosa pine areas with a grass and forb understory would increase production by 1/3 to 1/2 following a fire. These benefits may be realized for 10 to 15 years following a fire.

Allowing prairie dog expansion causes a 40 to 90 percent loss of forage (Heitschmidt 1991). The loss in forage would become most critical during dry years, when forage is limited.

There may also be some benefit to livestock grazing in prairie dog towns due to the higher protein concentration in forage (Whicker, April D. and James K. Detling 1988 and Michael E. O'Meilia 1976).

Activity plans would be developed with priority given to 12 allotments containing riparian areas that are not properly functioning or in poor condition. Livestock grazing would benefit from improvement of the vegetative resources in riparian areas. Management of these areas would cause minor impacts to livestock operators as changes are implemented.

Visual resource management Class I (83,240 acres) limits the options available for livestock management. In the next 20 years, proposed range improvements which may not be authorized as a result of visual resource management Class I designations are 3 miles of fence, 10 reservoirs, 2 wells, and 4.5 miles of pipeline.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

Open off-road vehicle use designation is a management action that may cause impacts to livestock grazing. Open off-road vehicle use may cause a decrease of desirable forage, an increase in noxious weeds, and create an opportunity for disturbance to livestock. The planning area has been open for off-road vehicle historically, and there is no evidence of significant impacts, but the potential exists if an increase in off-road vehicle use occurs. As lands are reclaimed and new areas are mined, coal development would cancel 640 animal unit months per year, or a maximum of 640 to 830 animal unit months at any one time.

Conclusion

Vegetation and forage would increase due to enhancement of riparian/wetland areas, prescribed burning, mechanical treatment and development of rangeland improvements. There would be no unavoidable adverse, irreversible and irretrievable impacts to livestock grazing. Short-term impacts affecting long-term productivity would be from the development of new allotment management plans and open off-road vehicle use. The development of new allotment management plans could change management practices for livestock operators. This could result in an increase of more dependable forage and development of new range improvements that could enhance the manageability of the livestock operations. Open off-road vehicle use would increase noxious weeds, which would increase costs and decrease desirable forage.

ALTERNATIVE B

When 160 acres are sold to Fallon County for a sanitary landfill, 36 animal unit months would be canceled. There are 1,151 acres of active prairie dog towns on public lands in the Black-footed Ferret Area of Critical Environmental Concern. There would be a 40 to 90 percent loss of forage due to prairie dogs (Heitschmidt 1991). Allowing prairie dog expansion in the black-footed ferret core area could affect 10,015 acres of public land. The decrease in forage would become the most critical during dry years, when forage is limited.

Excluding livestock from the Lewis and Clark Trail Special Recreation Management Area would result in partial or complete loss of animal unit months for 66 permittees and lessees. A total of approximately 2,900 animal unit months would be lost to livestock grazing.

The most significant impact would be when grazing use shifts to a different season of use (8,880 animal unit months) from excluding grazing on crucial winter ranges from December 1 through March 31. There are 42 allotments affected during that period. The BLM would need to construct 75 miles of fence in this crucial winter range, and the operators would be responsible for the maintenance. Available animal unit months in the planning area would decrease by 574 from excluding grazing on the Calypso, Cherry Creek, and Powder River Depot special recreation management areas; and the Smoky Butte and the Piping Plover areas of critical environmental concern. The Cherry Creek Special Recreation Management Area would have a reduction of 482 animal unit months. These animal unit months are spread among three allotments and the largest reduction to one allotment would be 10 percent. Based on total animal unit months in these allotments, these impacts are not significant. BLM would protest water rights applied on Cherry Creek for more than 15-acre feet. Impacts to upstream users applying for these water rights would not be significant as 15-acre feet allows for most developments needed for livestock operations.

Designating the planning area as limited for off-road vehicle use would reduce the off-road vehicle impacts described in Alternative A.

Conclusion

Cumulative impacts would be the same as Alternative A, except under this alternative the decrease in forage in the core area for the black-footed ferret and in the Black-footed Ferret Area of Critical Environmental Concern becomes more critical during dry years. Unavoidable adverse impacts would occur to those livestock operators affected by the exclusion of livestock in the Lewis and Clark Trail, Cherry Creek, Powder River Depot and Calypso special recreation management areas, the Smoky Butte and the Piping Plover areas of critical environmental concern, Fallon County sanitary landfill, and the seasonal use restrictions on crucial winter ranges.

These actions would affect 102 allotments by causing them to change management practices, acquire other lands or reduce herds. There would be no irreversible and irretrievable impacts. Development of new allotment management plans would have the same short-term impacts affecting long-term productivity as in Alternative A. Limited off-road vehicle use would decrease the spread of noxious weeds in the short-term. This also would decrease control costs and increase desirable forage.

ALTERNATIVE C

Impacts from off-road vehicle use and coal development would be the same as Alternative A. Impacts from the black-footed ferret core area, the Black-footed Ferret Area of Critical Environmental Concern, the Piping Plover Area of Critical Environmental Concern; and the Cherry Creek, Powder River Depot, and Calypso special recreation management areas would be the same as Alternative B. Approving the recreation and public purposes application for Makoshika State Park (3,924 acres) to the Montana Department of Fish, Wildlife and Parks would result in canceling BLM-administration of 304 animal unit months for the three operators that would be affected. Exchanging the 640 acres to Fallon County for a sanitary landfill would result in the cancellation and acquisition of 145 animal unit months.

Conclusion

Cumulative impacts would be the same as Alternative A, except under this alternative the decrease in forage in the black-footed ferret core area and in the Black-footed Ferret Area of Critical Environmental Concern becomes more critical during dry years. Unavoidable adverse impacts would be the same as Alternative B, except under this alternative they would only occur on five allotments from the Piping Plover Area of Critical Environmental Concern, Makoshika State Park, and the Fallon County sanitary landfill. There would be no irreversible and irretrievable impacts and short-term impacts affecting long-term productivity would be the same as Alternative A.

ALTERNATIVE D (Preferred Alternative)

Management actions would not significantly impact livestock grazing. Areas excluded from livestock grazing would be the Cherry Creek, Powder River Depot, and Calypso special recreation management areas, and from May 1 through July 15 in the Piping Plover Area of Critical Environmental Concern. The impacts for these areas would be the same as Alternative B. These actions would reduce 563 available animal unit months and require an additional 10 1/2 miles of fence.

Impacts from the Black-footed Ferret Area of Critical Environmental Concern are the same as in Alternative B.

Since most of the planning area would be limited off-road vehicle use, disturbance to livestock may increase in the areas designated as open.

Disposal of public lands for the Fallon County sanitary landfill and Makoshika State Park would cancel BLM-administration of 295 animal unit months. Allotments affected in Makoshika State Park are:

Ferguson, 356 public animal unit months, 22 animal unit months would be cancelled from BLM-administration;

Nemitz-Engle common allotment, Nemitz: 451 public animal unit months, 61 animal unit months would be cancelled from BLM-administration and Engle: 217 public animal unit months, 29 animal unit months would be cancelled from BLM-administration;

Engle (Individual) allotment, 68 public animal unit months and 38 animal unit months would be cancelled from BLM-administration.

As lands for coal development are reclaimed and new areas are mined, animal unit months would be canceled at a rate of 640 per year, or a maximum of 640 to 830 animal unit months at any one time. This impact is not significant.

Conclusion

Cumulative impacts would be the same as Alternative A, except under this alternative the decrease in forage in the Black-footed Ferret Area of Critical Environmental Concern becomes more critical during dry years. Unavoidable adverse impacts would be the same as Alternative B, except they would only occur on ten allotments in the special recreation management areas, the Piping Plover Area of Critical Environmental Concern, Makoshika State Park, and the Fallon County sanitary landfill. There would be no irreversible and irretrievable impacts. Short-term impacts affecting long-term productivity would be the same as Alternative B, except under this alternative there would be an increase of noxious weeds on the 2,320 acres open to off-road vehicle use.

Eastern Montana prairie.

MINERALS

COAL

Assumptions

The uncertainty now of mine location and size will limit analysis to a general discussion, and some of the assumptions are on the basis of best estimates. Other assumptions are on the basis of existing literature, research, and industry input. Coal in the planning area has low potential for underground mining, so coal analysis is based on surface mining only. This analysis is not meant as a substitute for a detailed site-specific evaluation for an environmental impact statement that will be required when a mining project is actually proposed (the "Coal" section in the Minerals appendix has additional assumptions and explains the coal planning process applied when a specific tract is under consideration).

There would be no new coal mines developed in the next 5 years. If leasing occurs, one mine would be developed in the next 20 years. It would take about 7 years from the date of issuance of a coal lease to develop the mine and start coal production. The mine would disturb about 340 acres of land per year for a total of approximately 14,000 acres over a 40-year mine life. The production rate would be 5.5 million tons per year for a total of 220 million tons. Each year's disturbance area would take from 10 to 13 years for completion of the cycle (from initial disturbance, through mining, reclamation, and bond release). Reclamation from previous years would be during mining in later years. Final reclamation would be complete 9 to 12 years after mining has ceased. When the mine is in full production, the total area under either active mining or reclamation in any given year would range from 3,400 to 4,400 acres.

The reasonably foreseeable development scenario for coal in the planning area was developed by updating the Fort Union Long Range Coal Market Analysis (USDI, BLM 1987b). Since 1987, several changes have occurred in the management of federal coal in the region. The most significant change was on May 23, 1989, when the Fort Union Regional Coal Team decided not to start coal activity in the region and to decertify the region so as to allow coal leasing by application. The forecast balance between coal supply and demand in the region through the year 2000 was an important factor in that decision.

Impacts From Management Common To All Alternatives

Coal-for-coal exchanges compensate the BLM by providing coal of equal value. If the BLM does not receive lands containing coal, the net impact would be a diminished federal coal estate.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

After application of 20 unsuitability criteria (43 CFR 3461.1) as conducted for Fort Union Round II regional coal leasing in the planning area, there would be 354,641 acres of federal coal, with an estimated 6.97 billion tons of coal available for further consideration for coal activity. Oil and gas production could present minor conflicts with coal development in these areas.

Mineral material and locatable mineral development could be in conflict with coal development if they are available on the same site. However, sand and gravel would be available elsewhere and the likelihood of a locatable mineral claim on the same property would be minimal.

Conclusion

Cumulative impacts would be positive for coal production in Alternative A. There is more than enough federal coal in the planning area available to meet the demand of one coal mine in the next 20 years. There might be a shift in location of the mine due to restrictions. If BLM managed coal is available, it will probably be included in a mine plan. This is because use of federal coal will allow a wide choice of mine sites.

Unavoidable adverse impacts would be the unavailability of about 3 billion tons of coal after application of the 20 unsuitability criteria. Irreversible and irretrievable impacts could be the mining and removal of 220 million tons of coal from the federal coal reserve. There would be no short-term impacts affecting long-term productivity.

ALTERNATIVE B

A total of 847,379 acres of federal coal containing an estimated 9.16 billion tons of high and moderate potential

development coal would be unavailable for coal leasing. This would result in a significant loss of federal revenues from rents, royalties, and bonus bids.

Conclusion

Cumulative impacts would be negative for coal production in this alternative. The reasonably foreseeable development for coal is one mine in the next 20 years. Under Alternative B, the demand probably can be met with private and state coal. There would be no income to the federal government and no involvement of BLM in management decisions. Not making coal available is an unavoidable adverse impact. There would be no irretrievable or irreversible impacts. Short-term impacts affecting long-term productivity would be the unavailability of 2.95 billion tons of coal on 847,379 acres of federal mineral estate.

ALTERNATIVE C

The application of the 20 unsuitability criteria (43 CFR 3461.1) would remove 263,608 federal acres with 2.94 billion tons of coal from coal leasing (see the "Coal" section in the Minerals appendix). A total of 583,771 federal coal acres with an estimated 6.23 billion tons of coal would be available for further consideration. The impacts would be the same as Alternative A.

Conclusion

The cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity resulting from management actions would be the same as Alternative A.

ALTERNATIVE D (Preferred Alternative)

The application of the 20 unsuitability criteria (43 CFR 3461.1) would remove 266,805 federal acres with 2.99 billion tons of coal from coal leasing (see the "Coal" section in the Minerals appendix). A total of 580,547 federal coal acres with an estimated 6.18 billion tons of coal would be available for further consideration. The impacts would be the same as Alternative A.

Conclusion

The cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity resulting from management actions would be the same as Alternative A.

LOCATABLE MINERALS

Assumptions

Five claims per year would be filed (most likely for bentonite), but only one mine would be active in the next 20 years. Each mining claim would cover an estimated 20 acres.

Mineral claims for bentonite, gold, and uranium exist in the planning area; however, no development for locatable minerals has been recorded. The likelihood of future development is minimal. If bentonite becomes an issue in the future, further planning would be needed.

The chance of a coal developer and a mineral claimant leasing or claiming the same property is minimal.

Impacts From Management Common To All Alternatives

There are no impacts to locatable minerals from management common actions.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

The continuing availability of coal identified in the Fort Union Region II coal leasing creates potential conflicts with locatable minerals. Coal development would prevent operations for other minerals on the same site unless operators reach a mutual agreement for timing of each activity. The chance of a coal developer and a claim on the same property would be remote.

Conclusion

As the likelihood of future locatable mineral development is expected to be minimal, there would be no cumulative, unavoidable adverse, irreversible and irretrievable impacts. There would be no short-term impacts affecting long-term productivity.

ALTERNATIVE B

The withdrawal of public land from locatable mineral entry (84,807 acres) would prevent locatable minerals from be-

ing claimed. Impacts would occur to individuals who lose access to potential mineral resources; however, these impacts would be insignificant.

Smoky Butte intrusives consist of mineral assemblages which are not considered economically valuable. About 100 acres of the proposed withdrawal are located as active lode claims. Surface mining of 100 acres would destroy the main butte in the west one-half of section 12 and obliterate all of the locatable resource values. Any chance of mining is very remote.

When withdrawing the locatable minerals from entry, the rights of the existing claimants will still allow them to hold these claims under the General Mining Laws. The claimants can only lose title to the claims if they abandon the claims or if the claims are determined to be invalid.

Conclusion

As the likelihood of future locatable mineral development is expected to be minimal, there would be no cumulative, unavoidable adverse, irreversible and irretrievable impacts. There would be no short-term impacts affecting long-term productivity.

ALTERNATIVE C

Impacts from coal development would be the same as in Alternative A. Impacts from withdrawing public land from locatable mineral entry would be the same as Alternative B, except under this alternative withdrawals would occur on 8,075 acres.

Conclusion

As the likelihood of future locatable mineral development is expected to be minimal, there would be no cumulative, unavoidable adverse, irreversible and irretrievable impacts. There would be no short-term impacts affecting long-term productivity.

ALTERNATIVE D (Preferred Alternative)

Impacts would be the same as Alternative C, except under this alternative a total of 59,656 acres would be withdrawn from locatable mineral entry (see table 57 in the "Locatable Minerals and Mineral Materials" section in the Minerals appendix).

Conclusion

As the likelihood of future locatable mineral development is expected to be minimal, there would be no cumulative, unavoidable adverse, irreversible and irretrievable impacts. There would be no short-term impacts affecting long-term productivity.

MINERAL MATERIALS

Assumptions

Three mineral material sales or permits (probably for sand and gravel) would be issued per year. Each mineral site would disturb about 5 acres, and would yield 10,000 yards of material. Each pit would operate about 5 years.

Impacts From Management Common To All Alternatives

Mineral material sales would not be allowed in Makoshika State Park. Timing limitations for upland game bird leks and nests, and raptor nests and buffer zones could interfere with some pit operations. Approximately 100 acres may have activities curtailed due to visual resource class III management objectives. The relative abundance of mineral materials versus the low demand makes these impacts minimal.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

There are no specific management actions that would result in significant impacts.

Conclusion

Cumulative impacts to mineral materials would be positive. There are no management actions that would significantly affect the availability of mineral materials. There would be no unavoidable adverse impacts. The irreversible and irretrievable impacts would be the 10,000 cubic yards extracted yearly from each pit. These mineral materials would not be replaceable. There would be no short-term impacts affecting long-term productivity.

ALTERNATIVE B

Closure of mineral material sales in the Fallon County sanitary landfill, the Powder River Depot, Lewis and Clark Trail, and Cherry Creek special recreation management areas and the areas of critical environmental concern would prevent access to mineral materials on 78,339 federal mineral acres. There are approximately 300 acres of mineral materials in the Lewis and Clark Trail Special Recreation Management Area estimated to contain about 6.7 million cubic yards of sand and gravel reserves. The amount assumed to be permitted each year (30,000 cubic yards) is about 0.44 percent of the estimated reserve base for sand and gravel. Closure would result in lost revenue from those permits that are not for free-use. The availability of other public land would reduce this loss.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

ALTERNATIVE C

The unavailability of mineral material sales in the Piping Plover, Smoky Butte, and Black-footed Ferret areas of critical environmental concern and in the Fallon County sanitary landfill would prevent access to mineral materials. Additional sites would be available to satisfy the mineral demand.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

ALTERNATIVE D (Preferred Alternative)

Mineral materials would be unavailable in the Powder River Depot, Lewis and Clark Trail, and Cherry Creek special recreation management areas, areas of critical environmental concern and the Fallon County sanitary landfill. These areas total 88,834 federal mineral acres (see table 57 in the “Locatable Minerals and Mineral Materials” section in the Minerals appendix). The lack of access to these areas results in the potential loss of income to the federal government. An undetermined amount of scoria would be buried or moved during surface mining of coal. This disturbance would eliminate scoria sites from future commercial use. Additional mineral material sites in the planning area could satisfy the demand.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

NONENERGY LEASABLE MINERALS

Assumptions

The likelihood of future development is minimal to none.

Impacts From Management Common To All Alternatives

There are no impacts to nonenergy leasable minerals from management common actions.

Impacts From Management Actions Specific To Each Alternative

There are no impacts to nonenergy leasable minerals under Alternatives A,B,C, and D.

Conclusion

As the likelihood of future nonenergy leasable mineral development is anticipated to be minimal, there would be no cumulative, unavoidable adverse, irreversible, or irretrievable impacts. There would be no short-term impacts affecting long-term productivity.

OIL AND GAS

Assumptions

Drilling in the planning area would proceed at a rate of 686 oil and gas wells during the next 5 years and 2,744 wells during the next 20 years regardless of mineral ownership.

Table 40 shows the predicted development rates for the next 5 years for each of the identified high and moderate oil and gas potential development areas. Table 41 shows maximum surface disturbance likely to occur in the high and moderate development potential areas.

TABLE 40
DRILLING RATES FOR THE NEXT 5 YEARS

	Producing Wells	Dry Wells
High Areas		
Cedar Creek anticline	84	34
Williston basin	107	288
Cow Creek/Richey	4	11
Mosby dome	1	1
Sumatra	13	36
Moderate Potential Areas	29	78
Total	238	448

TABLE 41
SURFACE DISTURBANCE AREAS FOR HIGH AND MODERATE DEVELOPMENT POTENTIAL OIL AND GAS

	5 years
High Areas	
Cedar Creek anticline	649
Williston basin	2,171
Cow Creek/Richey	68
Mosby dome	7
Sumatra	177
Moderate Potential Areas	483
Total	3,555

Surface disturbance for a typical shallow oil well (less than 5,000 feet deep) includes 1.5 acres for a 1-mile bladed trail and 2 acres for the well pad for a total of 3.5 acres disturbed. Surface disturbance for a typical deep oil well (from 5,000 to 12,000 feet deep) includes 1.5 acres for a 1-mile bladed trail and 4 acres for the well pad for a total of 5.5 acres. Surface disturbance for a typical shallow gas well (less than 2,000 feet deep) includes 0.5 acres for the well pad and no disturbance for a trail.

Producing oil and gas wells in the planning area have an average life span of 25 years, which includes 20 years of production and 5 years for reclamation. Wells completed as dry holes have a 5-year reclamation life span.

Impacts From Management Common To All Alternatives

The following are cumulative impacts to oil and gas resources. In the past, most of the federal oil and gas acreage in the planning area was made available for leasing with only the terms of the lease affording protection to other resources from oil and gas activities. Under current land use planning and environmental protection requirements, most of the federal oil and gas acreage in the planning area is available for leasing. All federal leases are issued with standard stipulations which provide protection to other resources from oil and gas activities. Nonfederal oil and gas resources, such as Indian and fee, are available for leasing by the mineral owner with lease terms or other contractual agreements. The cumulative impact to oil and gas resources has been a reduction of the resources from the removal of oil and gas from producing wells. The cumulative impact to leases is a reduction in lease value from stipulations and regulations. The cumulative impacts to lease developments are a reduction in wells drilled on leases encumbered with stipulations, an increase in wells drilled on leases with minimal constraints, and an increase in operating costs because of land use decisions, lease stipulations and regulations.

Leases would be issued with stipulations to protect other resources from impacts associated with oil and gas operations. Leases would be issued with a no surface occupancy stipulation to protect bald eagle, ferruginous hawk, peregrine falcon and grouse nests, least tern habitat, grouse leks, limber pine, paleontological localities, and Visual Resource Management Class I areas. The stipulation would affect 8,947 acres of lands classified as high development potential oil and gas, and 129,309 acres of lands classified as moderate development potential oil and gas for a total of 138,256 acres.

The areas affected by the no surface occupancy stipulation would be accessible by directional drilling, except for 19,383 acres within the Visual Resource Management Class I areas where the interior of large blocks of no surface occupancy acreage would not be accessible by directional drilling. Impacts from the stipulation would be a decrease in lease value, increase in operating costs, relocation of wellsites, hinderance of orderly field development, possible loss of revenues, and loss of oil or gas resources from drainage by off-lease wells. The inaccessible areas would result in one well not being drilled in 20 years.

Leases would be issued with a controlled surface use stipulation to protect prairie dog habitat, Visual Resource Management Class II areas, Makoshika Park and a timing limitation stipulation to protect raptor nests, grouse nesting zones, and elk spring calving areas. These stipulations would affect 94,564 acres of lands classified as high development potential oil and gas, and 1,456,889 acres of lands classified as moderate development potential oil and gas for a total of 1,551,453 acres. Impacts from these stipulations would be a decrease in lease value, increase in operating costs, possible relocation of wellsites, hinderance of orderly field development, possible loss of revenues, and loss of oil or gas resources from drainage by off-lease wells.

The planning area includes 160 acres closed to oil and gas leasing. Impacts from no leasing would be the possible loss of oil or gas by drainage from nearby off-lease wells, possible loss of revenues, loss of scientific information and possible hinderance to orderly field development.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

Leases would be issued with a no surface occupancy stipulation to protect the Seline, the recreation area within the Powder River Depot cultural sites (Powder River Depot recreation site), riparian/wetland areas, and the piping plover site. The no surface occupancy stipulation would affect 1,756 acres of lands classified as high development potential oil and gas, and 3,709 acres classified as moderate development potential oil and gas, for a total of 5,465 acres. Impacts from the stipulation would be the same as in the Management Common section with an additional two wells not being drilled in 20 years.

Leases would be issued with a controlled surface use stipulation to protect potential black-footed ferret habitat, steep slopes, and a timing limitation stipulation to protect crucial winter ranges. These stipulations would affect 87,250 acres of lands classified as high development potential oil and gas, and 1,071,827 acres of lands classified as moderate development potential oil and gas for a total of 1,159,077 acres. Impacts from these stipulations would be the same as in the "Management Common" section.

Leases would be issued with lease terms and standard lease stipulations to protect the Lewis and Clark Trail area, Smoky Butte, Cherry Creek recreation area, potential prairie dog habitat for the black-footed ferret, the Hell Creek, Bug Creek, Sand Arroyo and Ash Creek Divide paleontological areas, and the Big Sheep Mountain, Hoe, Jordan Bison Kill, and the Powder River Depot (excluding the recreation area) cultural sites. A total of 195,316 acres would be affected. Impacts from lease terms and standard stipulations could be a decrease in lease value, an increase in operating costs, relocation of wellsites, delay in operations, hinderance in orderly field development, uncertainty by the operator regarding restrictions at lease issuance, possible delay or loss of revenues and possible loss of oil or gas from drainage by off-lease wells.

Impacts from the closure of areas to geophysical operations would be the inability to acquire subsurface data in those areas and interference with complete data acquisition in an area. Lack of or incomplete geophysical data could affect leasing and lease development decisions. The number of leases sold and the number of wells drilled could be reduced because of the lack of data.

Conclusion

In this alternative, no federal oil and gas acreage in addition to management common would be closed to leasing. Federal leases would continue to be issued with standard stipulations in addition to lease terms. Wells will continue to be drilled in the planning area that are considered to be the most economically viable. Leases with the most constraints or requirements will probably be the least developed or not purchased. Areas that are closed to oil and gas leasing will preclude the drilling of wells. The cumulative impacts to oil and gas resources will be the continued removal of the resources by producing wells on leases with the fewest restrictions and lowest operating costs. Leasing and drilling should continue during the next 20 years at almost the same rate as during the last 20 years, except that three fewer wells would be drilled because of lease development constraints.

The impacts are unavoidable because of the need to protect other resources from oil and gas operations; however, the impacts are short-term and do not affect the long-term production except in area inaccessible to drilling. Production of oil and gas results in the irreversible and irretrievable loss of those natural resources.

ALTERNATIVE B

In addition to the stipulations identified in the "Management Common" section, leases would be issued with a no surface occupancy stipulation to protect the Piping Plover Area of Critical Environmental Concern and the Fallon County sanitary landfill. The no surface occupancy stipulation would affect 176 acres of lands classified as high development potential oil and gas. Impacts from the stipu-

lation would be the same as in the "Management Common" section.

To protect crucial winter ranges; riparian/wetlands; Smoky Butte Area of Critical Environmental Concern; steep slopes; the cultural, paleontological, and black-footed ferret areas of critical environmental concern; potential black-footed ferret habitat, and the special recreation management areas, 1,266,555 acres of oil and gas would be closed to leasing. This would affect 87,250 acres of lands classified as high development potential oil and gas, and 1,179,305 acres classified as moderate development potential oil and gas. As a result, 173 wells would not be drilled in 20 years. Impacts from no leasing would be the same as in the "Management Common" section.

Conclusion

In addition to management common, 1,266,555 federal oil and gas acres would be closed to leasing. Federal leases would be issued with stipulations when needed to protect other resources. Wells will continue to be drilled in the planning area that are considered to be the most economically viable. Leases with the most constraints or requirements would probably be the least developed or not purchased. Areas that are closed to oil and gas leasing would preclude the drilling of wells.

The cumulative impacts to oil and gas resources will be the continued removal of the resources by producing wells on leases with the fewest restrictions and lowest operating costs. The value of federal leases would decrease with the addition of restrictive stipulations which also increase operating costs. Compliance with stipulations could force the well to be moved to an adjacent lease with fewer restrictions. Leasing and drilling activities would decline on federal oil and gas acreage because of closures and lease restrictions.

Drilling could decrease on Indian and fee lands if those lands are closed to leasing or if additional restrictions are placed on lease development. Areas closed to leasing would not provide the opportunity for protection of drainage from adjacent wells which would increase the loss of federal revenues. The decline of leasing and drilling would result in less oil and gas production. Less production would leave more of the oil and gas resources in place except for that removed by adjacent wells. The reduced ability to drill wells in the planning area would cause more wells to be drilled in other areas. The closure of federal lands to oil and gas leasing and addition of restrictive lease stipulations would result in a dramatic reduction of federal acreage available for leasing and wells being drilled. During the next 20 years 174 wells would not be drilled.

Unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

ALTERNATIVE C

In addition to the stipulations identified in the "Management Common" section, leases would be issued with a no surface occupancy stipulation to protect the Seline cultural area of critical environmental concern, and the Powder River Depot and Cherry Creek special recreation management Areas. The no surface occupancy stipulation would affect 80 acres of lands classified as high development potential oil and gas, and 2,236 acres of lands classified as moderate development potential oil and gas.

Lease terms would be used to protect crucial winter ranges, steep slopes, Lewis and Clark Trail Special Recreation Management Area, riparian/wetlands, Smoky Butte Area of Critical Environmental Concern, the Fallon County sanitary landfill, the remaining areas of critical environmental concern, potential black-footed ferret habitat, and potential prairie dog habitat for the black-footed ferret. Lease terms would affect 1,264,876 acres.

Conclusion

Federal leases would be issued with stipulations as needed to protect other resources. Wells would continue to be drilled in the planning area that are considered to be the most economically viable. Leases with the most constraints or requirements will probably be the least developed or not purchased. Areas that are closed to oil and gas leasing will preclude the drilling of wells.

Areas open to leasing with only lease terms would provide the most opportunities for exploration and development, and protection of federal oil and gas resources from drainage by off-lease wells. These areas could experience the greatest loss of federal oil and gas resources from production. Areas open to leasing with stipulations would provide fewer opportunities for exploration and development and protection of federal oil and gas resources from drainage by off-lease wells. Lease stipulations could decrease the value of the lease, impose restrictions on lease activities and increase costs of lease activities. Compliance with stipulations could force the well to be moved to a lease with fewer restrictions.

The cumulative impacts to oil and gas resources will be the continued removal of the resources from producing wells on leases with the fewest restrictions and lowest operating costs. Leasing and drilling should continue during the next

20 years at almost the same rate as during the last 20 years except that three fewer wells would be drilled because of lease development constraints.

Unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

ALTERNATIVE D (Preferred Alternative)

In addition to the stipulations identified in the "Management Common" section, leases would be issued with a no surface occupancy stipulation to protect the special recreation management areas, the Fallon County sanitary landfill, Smoky Butte Area of Critical Environmental Concern, riparian/wetlands, and the cultural resource, paleontological resource and piping plover areas of critical environmental concern. The no surface occupancy stipulation would affect 5,236 acres classified as high development potential oil and gas, and 72,432 acres classified as moderate development potential oil and gas. Impacts from the stipulation would be the same as in the "Management Common" section with one well not being drilled in 20 years.

Leases would be issued with a controlled surface use stipulation to protect steep slopes, Black-footed Ferret Area of Critical Environmental Concern and potential black-footed ferret habitat, and with a timing limitation stipulation to protect crucial winter ranges. These stipulations would affect 87,250 acres of lands classified as high development potential oil and gas, and 1,071,304 acres of lands classified as moderate development potential oil and gas, for a total of 1,158,554 acres. Impacts from these stipulations would be the same as in the "Management Common" section with one well not being drilled in 20 years.

Leases would be issued with lease terms to protect the potential prairie dog habitat for the black-footed ferret. Lease terms would affect 56,839 acres. Impacts from lease terms would be the same as Alternative A.

No additional lands would be closed to leasing.

Conclusion

Federal leases would be issued with stipulations as needed to protect other areas. Wells would continue to be drilled in the planning area that are considered to be the most economically viable. Leases with the most constraints or requirements will probably be the least developed or not purchased. Areas that are closed to oil and gas leasing will preclude the drilling of wells. Areas open to leasing with only lease terms would provide the most opportunities for exploration and development, and protection of federal oil and gas resources from drainage by off-lease wells. These areas could experience the greatest loss of federal oil and gas resources from production.

Areas open to leasing with stipulations would provide fewer opportunities for exploration and development and protection of federal oil and gas resources from drainage by off-lease wells. Lease stipulations could decrease the value of the lease, impose restrictions on lease activities and increase costs of lease activities. Compliance with stipulations could force the well to be moved to a lease with fewer restrictions.

The cumulative impacts to oil and gas resources will be the continued removal of the resources from producing wells on leases with the fewest restrictions and lowest operating costs. Leasing and drilling should continue during the next 20 years at almost the same rate as during the last 20 years, except three wells would not be drilled in 20 years because of lease stipulations.

In this alternative, oil and gas leasing would be open with controlled surface use or timing restrictions on 1,462,415 acres of federal minerals classified as moderate development potential and 99,295 acres of federal minerals classified as high development potential oil and gas. Oil and gas leasing would be open with no surface occupancy stipulations on 183,050 federal mineral acres of moderate development potential and 9,500 federal mineral acres of high development potential oil and gas. There would be 160 federal mineral acres closed to leasing.

Unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

PALEONTOLOGY

Assumptions

The entire planning area is underlain by geologic formation that could produce fossil material. The Judith River and Hell Creek formations, and the Tullock Member and its equivalent in the Ludlow Member of the Fort Union Formation generally produce most of the significant paleontologic values. Occurrences of significant fossils in the other geologic formations are rare. An average of 50 new paleontology localities would be identified each year. Two excavations over the next 5 years could be conducted to retrieve fossils. Excavation and the associated facilities would dis-

turb an average of 1/4 acre per excavation. Paleontological material is fragile and can be irretrievably lost if exposed at the surface for a long period of time and not collected for research purposes.

Impacts From Management Common To All Alternatives

Surface-disturbing activities could cause insignificant impacts to paleontologic resources. Emergency activities, such as wildfire and hazardous material cleanup after accidents that require the use of heavy equipment, would have the potential to damage or destroy paleontologic resources. These activities would occur randomly. The potential of damaging or destroying fossil material would be low in emergency situations.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

Impacts to the paleontologic resource would be minimal because of the application of mitigation measures.

Conclusion

Cumulative impacts on paleontological resources would not be significant. Not designating the four paleontological areas of critical environmental concern would not insure long-term protection. These properties would be managed consistent with existing policy and guidance. Unavoidable adverse impacts would occur to paleontological resources not discovered during survey, those damaged or destroyed by unauthorized surface disturbance, and vandalism. Irretrievable and irreversible impacts would occur to paleontological resources removed from localities for mitigation. There would be no short-term impacts affecting long-term productivity of paleontological resources.

ALTERNATIVE B

Surface-disturbing activities would have the same impacts as Alternative A. The designation of four paleontological areas of critical environmental concern would be a positive impact from not allowing surface-disturbing activities.

Conclusion

Cumulative impacts to paleontological resources would be positive. Four paleontological areas managed as areas of critical environmental concern would insure protection and enhancement of the paleontological resources, by preserving significant paleontological resources for future study by the scientific community. Unavoidable, irreversible and irretrievable impacts would be the same as Alternative A. There would be no short-term impacts affecting long-term productivity of paleontological resources.

ALTERNATIVE C

Surface-disturbing activities would have the same impacts as Alternative A. The designation of four paleontological areas of critical environmental concern would be a positive impact, but to a lesser degree than Alternative B because of allowing more surface-disturbing activities within the areas of critical environmental concern.

Conclusion

Cumulative, unavoidable adverse, irretrievable irreversible impacts would be the same as Alternative B. There would be no short-term impacts affecting long-term productivity of paleontological resources.

ALTERNATIVE D (Preferred Alternative)

The impacts would be the same as Alternative B.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative B.

RECREATION

Assumptions

The 1988 Statewide Comprehensive Outdoor Recreation Plan (State of Montana, MDFW&P 1988) estimates that future recreational demand and participation in activities should increase at the same rate as the expected population growth. Because of the Montana State 1990 population of 799,065 people, the plan estimate was incorrect. Population

in the planning area has declined and is expected to continue to decline until the year 2000. This could be offset by demand from out-of-state users. Lands in the planning area form a large portion of Montana Department of Fish, Wildlife and Park's Region 7 and a small portion of Region 6. A comparison of the resident recreation participation shows there is minor differences in participation between the two regions (State of Montana, MDFW&P 1988). Therefore, the recreational participation figures for Region 7 were used to determine impacts.

It is expected that six recreational facilities in 20 years would be developed in the Big Dry Extensive Recreation Management Area. Development would be in response to the need for additional fishing access, picnic sites, and camping areas. Each facility would disturb 1 acre and would require a new access road. Each road would disturb 2.4 acres.

Reasonably foreseeable development for the proposed special recreation management areas are:

Cherry Creek Special Recreation Management Area - Development would consist of a reservoir with an earthen dam, an overnight campground, day-use facilities, and an access road (see the Recreation appendix). An 18-inch pipeline to pump water from the Yellowstone River to the reservoir would maintain a certain pool depth for fisheries.

Two reservoir sizes are considered for this planning effort: a 40-foot pool depth and a 50-foot pool depth. The 40-foot pool depth reservoir would cover 455 acres; the 50-foot pool depth reservoir would cover 569 acres. In both cases, the dam would be an earthen structure built mostly with materials taken from within the project area.

Cherry Creek.

Day-use and overnight camping facilities would be developed on 80 acres. Improvements would include a boat ramp, pavilion, shower facility, administrative site, visitor contact station and fee collection area, recreational vehicle camping area, walk-in tent camping area, picnic area, restrooms, drinking water, hiking trails, parking lots, and a swimming beach. Also, a daytime recreation complex would be developed that includes a ball field, volleyball area and a lawn area. Facilities would be designed for the physically impaired. It is expected that fees would be charged for day use and overnight camping. Surface disturbance for the improvements would be about 20 acres.

Access to the site would require upgrading 2.5 miles of an existing road, and constructing 3 miles of new roads (includes recreation site interior roads). Based on a disturbance width of 30 feet, upgrading the existing road would result in a surface disturbance of 3.5 acres. New road construction would result in a surface disturbance of 11 acres.

The pipeline would be an 18-inch polyvinyl chloride line, with a pumping station. Based on a pipeline length of 10,560 feet and disturbance width of 30 feet, about 7 acres would be disturbed during construction. The pipeline would be reclaimed with native vegetation.

Powder River Depot Special Recreation Management Area - Development would consist of overnight camping, day use, river access and interpretive (Lewis and Clark National Historic Trail) facilities.

The access road would be upgraded, resulting in 5 acres of surface disturbance. Constructing the campsites, picnic tables, boat ramp and information pavilion would disturb 1 acre.

Calypso Special Recreation Management Area - Development would consist of overnight camping, picnicking facilities, and a boat ramp. Development would result in 1 acre of surface disturbance.

Lewis and Clark Trail Special Recreation Management Area - Development would consist of those facilities necessary to improve access, while maintaining an overall primitive setting of the Lewis and Clark Trail. Development would primarily be access roads, boat ramps, picnic tables, fire rings, and direction and interpretive signs. It is anticipated that 10 river access sites would be developed over the 14,000-acre area. Development would result in a total of 60 acres of surface disturbance, 50 acres for the roads, and 10 acres for the boat ramps and picnic sites.

Impacts From Management Common To All Alternatives

Recreation developments, such as small fishing access sites, would benefit the public. This would satisfy some of

the demand for additional fishing facilities identified in the Montana Statewide Comprehensive Outdoor Recreation Plan. Interpretive signing would benefit the public by providing information on public land resources and use management.

The Lewis and Clark National Historic Trail would be protected from visual intrusions, whenever possible. This would benefit those wishing to experience a "Lewis and Clark" setting.

The extensive recreation management area would be open to rights-of-way and communication site locations. It is expected that this would result in some localized negative impacts to recreation opportunities. Where the view is a key element in the recreation setting, visual intrusions from power lines and communications sites could result in sightseeing opportunities being foregone. However, these impacts would not be widespread. Recreation use could shift to other public lands in the planning area.

Land exchanges and access acquisitions would continue. Exchanges would combine small, scattered parcels of public lands into larger blocks, while access acquisitions would make more public lands accessible. These actions would increase dispersed recreation opportunities, such as sightseeing, hiking, hunting, and picnicking throughout the planning area.

Managing livestock grazing in riparian/wetland areas would increase recreation opportunities. Improved vegetative conditions and the resulting increase in diversity and numbers of wildlife would create additional recreation opportunities, such as wildlife viewing and hunting.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

Impacts to visual resources from coal development, locatable mineral entry, mineral material development, and oil and gas activities would be minimal over the long term. Visual impacts would be reduced through project design prior to project approval. After the activities are completed, reclamation would, as much as possible, return the landscape to its original contour, color and vegetative composition. The greatest impacts would be the short-term impacts that would occur during operations. Activities such as excavation, road construction, building construction, and dust and movement from heavy equipment would introduce new elements that would dominate and contrast with the landscape. After operations cease and reclamation is completed, the visual impacts would be minimal.

The open off-road vehicle designation would benefit off-road enthusiasts by allowing use to continue throughout most of the planning area. Current use is not expected to be widespread in the planning area and is not expected to significantly increase in the future. Most use occurs near communities where public lands are readily accessible and during the hunting season.

Managing the planning area as an extensive recreation management area would adversely impact the opportunities for developed recreation. The camping, fishing, and picnicking opportunities associated with development of Cherry Creek, Calypso, Lewis and Clark Trail, and Powder River Depot would be foregone. BLM management would not contribute toward satisfying the demand for additional fishing related facilities identified in the Montana Statewide Comprehensive Outdoor Recreation Plan (State of Montana, MDFW&P 1988).

Conclusion

Cumulative impacts to recreation would be positive from land exchanges, access acquisition and managing livestock to enhance riparian/wetland areas Management of public land would emphasize dispersed recreation opportunities. Public demand for developed recreation facilities would continue to exceed supply. With public recreation facilities remaining constant, many existing recreation facilities, sites and resources will likely sustain overuse.

Demand for more access to public lands is expected to increase. Access for the general public to private lands is expected to decrease. This is due to a number of factors. The public is becoming more aware of public land recreation opportunities that exist. Visitation is expected to increase as the result of federal, state, and local agency marketing to increase tourism. With an increase in nonlocal users, demand for commercially guided activities such as hunting, fishing and sightseeing will increase. This will result in more private lands being leased by outfitters. Added to this are the ranches in eastern Montana being purchased by owners who are not allowing public access. Although cooperative access programs will provide additional public and private land opportunities, these programs are not anticipated to keep up with demand. Acquiring additional access to public lands will also help meet some of the demand. However, demand is expected to increase much faster than BLM's ability to acquire new access. With the decrease in availability of private lands, local users will be looking more toward using public land. This may increase public pressure to eliminate commercial outfitting on public land.

There would be no unavoidable adverse, irreversible and irretrievable impacts, or short-term impacts affecting long-term productivity.

ALTERNATIVE B

Cherry Creek, Powder River Depot, Calypso, Lewis and Clark Trail, and Makoshika State Park special recreation management areas would emphasize recreation as the primary use and management concern. Recreational improvements would be developed in these areas. These actions would contribute toward satisfying the demand for additional fishing facilities identified by the Montana Statewide Comprehensive Outdoor Recreation Plan (State of Montana, MDFW&P 1988). Recreation opportunities such as wildlife viewing and hunting would increase as the diversity and numbers of wildlife increase from improved crucial winter ranges. Recreation opportunities associated with wildlife would increase as the result of actions to improve crucial winter ranges.

Recreation opportunities associated with viewing cultural, paleontological and geologic resources would increase by designating and managing areas of critical environmental concern. Recreation would be enhanced in several areas (crucial winter ranges, and cultural and paleontological areas of critical environmental concern) and provided in the remaining areas of the planning area. Hunters and fishermen would benefit from management emphasizing recreation, wildlife, and fisheries. Off-road vehicle use would be limited to existing roads and trails and closed on the Calypso Trail. Recreational vehicle use opportunities would not be available. The greatest impact would be near communities where recreational vehicle use is highest. Closing the Calypso Trail would result in both positive and negative impacts. By eliminating the off-road travel that occurs primarily during the hunting season, scenic quality would slightly improve. The absence of vehicle tracks off the trail and the reduced motorized use of the trail would result in a setting that appears less altered by man. This is consistent with the management objectives of the adjacent wilderness study area. The negative impact would be the loss of motorized access for hunting and sightseeing. Recreationists would have to walk, shift their use to other areas, or forego the opportunity. Abundant hunting opportunities using motorized access are available throughout the planning area. There is limited motorized sightseeing that occurs along the trail. Similar opportunities are available at nearby Makoshika State Park.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts would be the same as Alternative A. The short-term impacts of construction and management of the Makoshika State Park, Calypso, Cherry Creek, Powder River Depot, and Lewis and Clark Trail special recreation management areas would significantly affect the recreation opportunities over the long term and satisfy some of the local, regional, and national demand for additional facilities. Additional recreation facilities would significantly increase fishing, camping, and boating opportunities.

ALTERNATIVE C

The impacts to the recreation opportunities resulting from development in the special recreation management areas would be the same as Alternative B.

Impacts from open off-road vehicle use would be the same as Alternative A.

Allowing livestock grazing within the developed recreation sites would adversely impact the recreation experience, the visual setting and the facilities. The sights, sounds, and smells of livestock would be offensive to some recreationists. Livestock grazing would prohibit the establishment of new landscaping and opportunities to manage the vegetative landscape would be foregone. Maintenance costs would increase from livestock rubbing on interior fences, signs, and picnic tables. The cost of landscaping would increase because of the need to protect new plants with livestock-proof fences.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts would be the same as Alternative A. The short-term impacts of construction and management of the Calypso, Cherry Creek, Lewis and Clark Trail, and Powder River Depot special recreation management areas would significantly affect the recreation opportunities over the long term. Fishing, camping, and boating opportunities would dramatically improve.

ALTERNATIVE D (Preferred Alternative)

Limiting off-road vehicle use throughout the planning area would result in these opportunities being lost, except in the open areas near Glendive and Terry. Outside of the big game hunting season, off-road travel is minimal. The loss of these opportunities would not be considered significant. During the big game hunting seasons when the majority of off-road travel occurs, hunters would either have to shift to a nonmotorized means of access or use roaded areas. Although this would be an inconvenience, big game re-

trieval is allowed and public lands would continue to be accessible. The impacts are not considered significant. In some areas, hunting opportunities would be expected to improve because the game animals would not be spooked by vehicles driving cross-country.

Closing the Calypso Trail would result in the unavailability of recreational use opportunities. The greatest impact would be near communities where recreational vehicle use is highest. Closing the Calypso Trail would result in both positive and negative impacts. By eliminating the off-road travel that occurs primarily during the hunting season, scenic quality would slightly improve. The absence of vehicle tracks off the trail and the reduced motorized use of the trail would result in a setting that appears less altered by man. This is consistent with the management objectives of the adjacent wilderness study area. The negative impact would be the loss of motorized access for hunting and sightseeing. Recreationists would have to walk, shift their use to other areas or forego the opportunity. Abundant hunting opportunities using motorized access are available throughout the planning area. There is limited motorized sightseeing that occurs along the trail. Similar opportunities are available at nearby Makoshika State Park.

Although geophysical exploration would be allowed within the Lewis and Clark Trail Special Recreation Management Area, the impacts would be minimal. For any exploration that would occur, the sights, sounds and visual impacts would be short term.

Preserving Smoky Butte Area of Critical Environmental Concern will ensure the public of a unique recreation opportunity.

There would be no impacts to recreation from allowing livestock grazing to continue throughout the Lewis and Clark Trail Special Management Recreation Area.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts would be the same as Alternative A. The short-term impacts of construction and management of the Lewis and Clark Trail, Calypso, Cherry Creek, and Powder River Depot special recreation management areas would significantly affect the recreation opportunities over the long term. Fishing, camping, and boating opportunities would dramatically improve.

SOCIOECONOMICS

Assumptions

BLM resource decisions could affect social well-being in a variety of ways. These include:

-changes in the amount and quality of resources such as recreational opportunities and livestock grazing

-resolution of problems related to resource use such as access problems

-changes in the ability to earn a living from a resource due to changes in the amount and quality of the resource, which could affect standard of living and therefore social well-being.

Other intangible affects to social well-being include individuals having a sense of control over the decisions that affect their future, and feeling that the government strives to act in ways that benefit everyone equally, rather than a few.

Impacts From Management Common To All Alternatives

Management actions could affect local and nonlocal residents concerned about land management in the planning area. Impacts to social well-being include:

addressing access problems could enhance the social well-being of people who recreate outdoors; and

protecting nesting sites for game birds, raptors, the least tern, and bald eagles which could increase the social well-being of people interested in resource protection.

For additional social impacts see the Socioeconomics appendix.

In general, the management actions described in the “Management Common” sections involve the application of current BLM policies and the utilization of best management practices for surface-disturbing activities. The economic impacts of the proposed management actions would be insignificant when compared to the existing situation. These impacts can be accommodated within the existing BLM program budgets.

The costs of range improvements would increase due to the restrictions imposed in grouse nesting areas and visual resource management Class I areas.

Costs associated with administering the land exchange program would increase. There would be no long-term changes in the amount of public land in the planning area, so there would be only minor adjustments in payment in lieu of taxes to the counties depending on the location of the lands exchanged.

Oil and gas operators would experience increased costs due to site relocations and delays in grouse leks and nesting sites.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

Impacts to social well-being include:

> increases in dispersed recreation opportunities which could enhance the social well-being of people who recreate in this type of setting.

This alternative addresses some of the concerns of area residents and other interested individuals about preserving the agricultural way of life because few changes to livestock grazing are proposed. Some individuals favor the development of new recreation opportunities at Cherry Creek, placing limits on off-road vehicle use, providing habitat for black-footed ferret reintroduction, and enhancing local economic development; however, these concerns are not addressed.

The economic impacts on farm and ranch operations from developing coal can be assessed by expressing in dollar terms, the agricultural, livestock and crop, production lost. Agricultural productions are examined using the average value for production for counties in the planning area. The average per acre value of agriculture in the counties was $16 per acre in 1987 (State of Montana, Department of Agriculture 1989). In the long term, based on a 12-year reclamation period, 3,900 acres would be out of production each year. This would result in an annual reduction of $62,400 in agricultural production. This represents less than 0.1 percent of the 1987 value of the agricultural production of the counties in the planning area.

Impacts of strip mining on the management and operations of livestock ranches could be more severe than on dryland farming (USDI, BLM 1981a). Mine development located near the center of a ranch could seriously interfere with the movement of livestock, fencing and pasture arrangements, livestock water supplies and distribution, and a general disruption of the overall operation. Compensation by the mining company to the farm and ranch operator will depend upon the type of landowner lease, land ownership pattern, and percentage of land owned versus land leased. The greatest impacts would occur to operators who lease the land that is removed from production; no compensation will be made for the lost leases. See the Socioeconomics appendix for additional discussion.

Special recreation management areas would not be designated, but recreation would continue to be available to the public. By not developing special recreation management areas, the BLM would forego new construction costs. Opportunities would be lost for increased recreational experience. Hunting gains would be offset by the decline in big game habitat conditions in the crucial winter ranges. The overall impact on the local economy would be minimal.

Conclusion

The social well-being of people satisfied with present management would be enhanced. The concerns of residents and others interested in preserving the agricultural way of life would be addressed. The concerns of those interested in developed recreation opportunities, enhancing habitat for wildlife and enhancing local economic development through recreation improvements would not be addressed. The cumulative economic impacts of implementing the management actions in Alternative A would result in little change from the existing situation and would not significantly affect the regional economy. There would be no unavoidable adverse, irreversible and irretrievable impacts or short-term impacts affecting long-term productivity on social or economic conditions.

ALTERNATIVE B

Impacts to social well-being include the following:

> increases in the number and types of developed recreational opportunities for people who recreate in this type of setting;
>
> enhanced protection of wildlife and fisheries which could enhance the social well-being of people interested in resource protection;
>
> increased employment related to recreation (including a short-term increase in construction employment related to the Cherry Creek dam and reservoir) which would enhance the standard of living for those indi-

viduals who become employed;

increased local business activity related to recreation (including construction for the Cherry Creek dam in the short term) that stimulates the local economy;

reduced off-road vehicle recreational opportunities which could reduce the social well-being of people who enjoy off-road travel;

reduced animal unit months for livestock grazing on approximately 102 operations which could reduce the standard of living of affected ranchers;

decreased economic activity related to oil and gas exploration and development could reduce the standard of living of affected employees; and

decreased oil and gas exploration and development on federal land could positively or negatively affect production on adjacent private lands; this could result in more revenue to the landowner in some cases, and less in others.

This alternative would address the concerns of some area residents and other interested individuals through the provision of new recreational opportunities, limiting off-road vehicle use, and protection of wildlife. However, potential negative impacts to the agricultural way of life due to the loss of income from livestock grazing and loss of local business activity are not consistent with the concerns about the health of the livestock industry or local economic development. The jobs lost would have a higher average income than the jobs created. Long-term net decrease in local business activity (livestock grazing and oil and gas related decreases would not offset recreational increases) could negatively affect the local economy.

Livestock grazing on public lands would be reduced. About 102 permittees and operators would see a reduction in animal unit months as a result of the development of the Cherry Creek, Powder River Depot, Calypso, and Lewis and Clark Trail special recreation management areas; the management of crucial winter ranges through fencing and seasonal use restrictions; and the sale of land for a sanitary landfill in Fallon County. Except for the landfill site, portions of the affected allotments are in five counties (Dawson, Garfield, McCone, Prairie, and Richland) between the Missouri and Yellowstone rivers.

An estimated 3,510 animal unit months would be lost to operators in the special recreation management areas, Piping Plover Area of Critical Environmental Concern, Smoky Butte Area of Critical Environmental Concern, and the sanitary landfill site. An additional 8,880 animal unit months would be affected due to seasonal use restrictions on the crucial winter ranges. The seasonal use restrictions could result in increased costs by shifting grazing to private lands, or feeding the livestock hay during the December 1 through March 31 period. About 20 percent of the cattle and sheep permittees in the crucial winter ranges could be affected. For analysis, the animal unit months were valued according to the number of cattle they could sustain.

The impacts on output, earnings, and employment for livestock, oil and gas, and recreation are in table 42. A description of the economic analysis methodology and assumptions is in the "Economics" section in the Socioeco-

TABLE 42
CHANGES IN OUTPUT, EARNINGS, AND EMPLOYMENT
(Thousands of Dollars)

Economic Sector	Direct Output	Total Economic Activity[1]	Household Earnings	Employment All Sectors
Livestock	- 568	- 1,410	-281	-17
Oil and Gas	-13,380	-18,500	-2,770	-136
Recreation[2]	1,106	1,970	709	63
Total	-12,842	-17,940	-2,342	- 90

[1]Total economic activity includes the direct and secondary spending changes that occur in all industries.

[2]The impacts to output, earnings, and employment for developing the Powder River Depot and the Calypso special recreation management areas and constructing a dam and reservoir in the Cherry Creek Special Recreation Management Area are included in the recreation sector.

nomic appendix. There would be an estimated $22,400 in federal grazing fees lost annually from managing the special recreation management areas, Piping Plover Area of Critical Environmental Concern, Smoky Butte Area of Critical Environmental Concern, sanitary landfill, and seasonal use restrictions on crucial winter ranges. Oil and gas leasing, exploration, and development activities would be restricted. The average annual production lost is based on the average production from 43 producing wells. About $1.34 million of federal production royalties would be lost annually. There would be a loss of $516,000 in federal lease rents for the acres closed to leasing. The state of Montana's share of federal rents and royalties foregone would be $926,000 annually.

There would be increased visitor use of the public lands for nonconsumptive and consumptive activities. Nonconsumptive recreational activities include camping, hiking, bird watching, and cross-country skiing. Consumptive activities include rockhounding, hunting, and fishing. With the improvement in wildlife habitat, hunting days should increase. The increases would occur primarily on public lands in the five counties (Dawson, Garfield, McCone, Prairie, and Richland) between the Missouri and Yellowstone rivers.

The development of the Lewis and Clark Trail, Cherry Creek, Powder River Depot, Makoshika State Park, and Calypso special recreation management areas would provide a variety of recreational activities. The Lewis and Clark Trail, Powder River Depot and Calypso special recreation management areas and nearby Terry Badlands Wilderness Study Area (a watchable wildlife area) are now used by the public even though few improvements exist. Construction and maintenance of visitor facilities at these sites and in the Makoshika State Park Special Recreation Management Area and improved access to the Yellowstone and Missouri rivers would enhance the users' experience and result in increased visitor use.

The proximity of Powder River Depot and Calypso special recreation management areas and Terry Badlands Wilderness Study Area to one another and to the Cherry Creek Special Recreation Management Area has the potential to make the area a major recreational destination in eastern Montana. This would provide economic benefits to the planning area from Miles City to Glendive.

Construction of the dam and reservoir in the Cherry Creek Special Recreation Management Area is an important part of developing the recreational potential of the area. It would provide recreational opportunities for many people in the planning area and would provide continued economic benefits to the regional economy. The town of Terry would benefit from the construction of the dam and associated facilities. The construction would take an estimated two years of summer construction seasons with peak employment of 90 workers. The construction costs for the 50-foot pool depth dam, reservoir and recreation facilities are now estimated at $13 million spread over a 2-year period. The regional economy would benefit from the construction as shown in table 43.

TABLE 43
CHERRY CREEK
SPECIAL RECREATION MANAGEMENT AREA
5O-FOOT POOL DEPTH DAM
AND RESERVOIR CONSTRUCTION
CHANGES IN OUTPUT, EARNINGS
AND EMPLOYMENT

	(Millions of Dollars) Year 1	Year 2
Direct Construction Expenditures	6.50	6.50
Total Economic Activity	12.48	12.48
Earnings	4.07	4.07
Employment[1]	229	229

[1]The total number of temporary jobs in economic sectors generated by the direct construction expenditures during the construction period.

The benefit to cost ratio for the 50-foot pool depth dam and reservoir is summarized in table 44.

TABLE 44
CHERRY CREEK RESERVOIR

Pool Depth Feet	Annual Benefits	Annualized Costs	Benefit to Cost Ratio[1]
50	1,243,750	1,357,965	.92

[1]The benefit to cost ratio is calculated by dividing the estimated annual benefits by the annualized costs (see the "Economics" section of the Socioeconomics appendix for visitor use, economic benefits and cost summary).

The increased one-time construction, maintenance, and annual administrative costs to BLM to carry out this alternative include: construction and maintenance of 266 miles of fence in the crucial winter ranges, special recreation management areas, and areas of critical environmental concern; costs associated with the joint management of Makoshika State Park Special Recreation Management Area; increased costs of signs and enforcement of off-road vehicle use; and the construction and maintenance of the dam and reservoir in the Cherry Creek Special Recreation Management Area.

The annual net impacts on the regional economy, excluding the one-time benefits of constructing the dam and reservoir in the Cherry Creek Special Recreation Management Area, would be negative under this alternative (see table 42). The direct output of goods and services would decrease $12.8 million, total economic activity would decrease $17.9 million, household earnings would decrease $2.3 million, and employment would decrease by 90 jobs. The fact that the jobs that are lost are primarily in the agricultural and oil and gas sectors that have higher than average earnings, and the jobs that are created are in the retail trade and services sectors, which have lower than average earnings. The average earnings lost per job are $19,600, and the average earnings of the jobs created are $11,250 compared to the planning area average earnings per job of $16,100.

The net impacts on economic activity would be less than one percent. However, there would be a 36 percent reduction in federal oil and gas rents and royalties, and a 7 percent reduction in the federal grazing fees compared to the fiscal year 1989 receipts.

Conclusion

Cumulative impacts would be that people concerned with the agricultural way of life and local economic development may not feel their concerns are addressed; social well-being may decline for these individuals and for those who lose employment in ranching or oil and gas related fields. People interested in developed recreation areas and protecting wildlife would feel their concerns are addressed; social well-being could be enhanced for these individuals and those who obtain recreation related employment.

Cumulative impacts to economic conditions from the Cherry Creek Dam and special recreation management area would produce a positive impact on the economic conditions in Prairie County and particularly, the town of Terry. There would be an increase of new jobs during construction and in the town of Terry after completion of the special recreation management area.

There would be no unavoidable adverse, irreversible and irretrievable impacts on social economic conditions. The short-term impacts of changing the work force from production jobs to retail and service jobs would be a decrease in earnings as production jobs generally have a higher pay scale than retail jobs. Negative short-term impacts would occur for those who enjoy production jobs, such as oil field and agricultural work.

ALTERNATIVE C

Impacts to social well-being include:

increased developed recreational opportunities which could enhance the social well-being of people who recreate outdoor;

increased employment related to recreation which could enhance the standard of living of individuals who become employed;

increased local business activities related to recreation (including construction for the Cherry Creek Dam in the short term) which would help to stimulate the local economy;

reduced and canceled animal unit months for livestock grazing which could reduce the standard of living of five operators.

This alternative addresses many of the concerns of area residents through the provision of new recreational opportunities, limited change to livestock grazing and enhanced local economic development. Those who wish to limit off-road vehicle use, or to enhance habitat for wildlife, may not feel their concerns are addressed.

Livestock grazing on public lands would be reduced. Animal unit months would be reduced as a result of designation of the Piping Plover Area of Critical Environmental Concern; the transfer of the public lands in Makoshika State Park to the Montana Department of Fish, Wildlife and Parks, and the temporary loss of grazing in the development of coal mining. There would also be an estimated $800 federal grazing fees lost each year. The impacts or output, earnings, and employment are summarized in table 45. For a description of the economic analysis methodology see the “Economics” section in the Socioeconomics appendix.

Oil and gas operators would experience increased costs due to site relocations and delays from lease terms in crucial winter ranges, and no surface occupancy stipulations in the Cherry Creek and Powder River Depot special recreation management areas and the Seline Area of Critical Environmental Concern. The net impact would be insignificant. Impacts from coal mining would be the same as Alternative A.

Construction and maintenance of visitor facilities at the special recreation management areas would enhance the users’ experience and result in increased visitor use. The 40-foot pool depth dam, reservoir and recreation facilities would be constructed in the Cherry Creek Special Recreation Management Area. Visitor use would increase, but less than in Alternative B. These developments could provide economic benefits to the area from Miles City to Glendive.

TABLE 45
CHANGES IN OUTPUT, EARNINGS, AND EMPLOYMENT
(Thousands of Dollars)

Economic Sector	Direct Output	Total Economic Activity[1]	Household Earnings	Employment All Sectors
Livestock	- 12.7	- 31.6	- 6.3	- >1
Recreation[2]	579.2	1,031.1	371.0	33
Total	566.5	999.5	364.7	+32

[1]Total economic activity includes the direct and secondary spending changes that occur in all industries.

[2]The impacts to output, earnings, and employment for developing the Powder River Depot and the Calypso special recreation management areas and construction a dam and reservoir in the Cherry Creek Special Recreation Management Area are included in the recreation sector.

Construction of the 40-foot pool depth dam and reservoir in the Cherry Creek Special Recreation Management Area is an important part of developing the recreational potential of the area. It would provide recreational opportunities for people in the planning area, and would provide continued economic benefits to the regional economy. The town of Terry would benefit from the construction of the dam and associated facilities. The construction would take an estimated 2 years of summer construction seasons with peak employment of 90 workers. The construction costs for the 40-foot pool depth dam, reservoir and recreation facilities are currently estimated at $10.8 million dollars spread over the 2-year period. The regional economy would benefit from the construction as shown in table 46.

TABLE 46
CHERRY CREEK
SPECIAL RECREATION MANAGEMENT AREA
4O-FOOT POOL DEPTH DAM
AND RESERVOIR CONSTRUCTION
CHANGES IN OUTPUT, EARNINGS
AND EMPLOYMENT

	(Millions of Dollars) Year 1	Year 2
Direct Construction Expenditures	5.40	5.40
Total Economic Activity	10.38	10.38
Earnings	3.38	3.38
Employment[1]	191	191

[1]The total number of temporary jobs in economic sectors generated by the direct construction expenditures during the construction period.

The benefit to cost ratio for the 40-foot pool depth dam and reservoir is summarized in table 47.

TABLE 47
CHERRY CREEK RESERVOIR

Pool Depth Feet	Annual Benefits	Annualized Costs	Benefit to Cost Ratio[1]
40	1,077,500	1,161,967	.93

[1]The benefit to cost ratio is calculated by dividing the estimated annual benefits by the annualized costs (see the "Economics" section of the Socioeconomics appendix for visitor use, economic benefits and cost summary).

The changes in one-time construction, maintenance, and federal annual administrative costs include: the cost savings associated with the disposal of public lands in Makoshika State Park, and the construction and maintenance of the dam and reservoir in the Cherry Creek Special Recreation Management Area.

The net impacts to the regional economy on an annual basis, excluding the one-time benefits of constructing the dam and reservoir in the Cherry Creek Special Recreation Management Area would be positive. The direct output of goods and services would increase $561,000, total economic activity would increase $987,000, household earnings would increase $362,000, and employment would increase by 32 jobs (see table 45). The jobs that would be created are primarily in the retail trade and services sectors with average earnings of $11,100 compared to the planning area's average earnings per job of $16,100. In summary, the net impacts on economic activity would be less than one percent.

Conclusion

Cumulative impacts to social well-being would generally be positive due to limited changes to livestock grazing, provision of new recreation opportunities and enhanced local economic development. However, some individuals may feel not enough protection would be given to wildlife. Unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

ALTERNATIVE D (Preferred Alternative)

Impacts to social well-being include:

increases in the number and types of recreational opportunities;

enhanced protection of wildlife and fisheries for people interested in resource protection;

increased employment related to recreation which would enhance the standard of living of individuals who obtain employment;

increased local business activity related to recreation (including construction for the dam and reservoir in the Cherry Creek Special Recreation Management Area in the short term) which would help to stimulate the local economy;

decreased off-road vehicle opportunities for recreation purposes which could decrease social well-being for people who participate in this activity; and

reduced animal unit months for livestock grazing on ten operations which could reduce the standard of living of affected ranchers.

This alternative would address most of the concerns of area residents and other interested individuals through the provision of new recreation opportunities, limiting off-road vehicle use, enhanced protection of wildlife, and enhanced local economic development. Changes to livestock grazing are limited but some individuals may be concerned about the loss of livestock grazing due to designation of special recreation management areas, the Fallon County land sale, and making land available for black-footed ferret reintroduction.

Livestock grazing on public lands would be reduced in this alternative. Approximately ten operations would see a reduction in animal unit months as a result of the development of the Cherry Creek, the Powder River Depot, and the Calypso special recreation management areas, the disposal of 640 acres to Fallon County for a sanitary landfill, the designation of the areas of critical environmental concern; the transfer of the public lands in Makoshika State Park to the Montana Department of Fish, Wildlife and Parks. Impacts from coal mining would be the same as Alternative A. There could be an estimated $1,800 in federal grazing fees lost each year. The impacts or output, earnings, and employment are summarized in table 48.

TABLE 48
CHANGES IN OUTPUT, EARNINGS, AND EMPLOYMENT
(Thousands of Dollars)

Economic Sector	Direct Output	Total Economic Activity[1]	Household Earnings	Employment All Sectors
Livestock	-35.6	-88.2	-17.1	- 1
Recreation[2]	594.9	1,058.9	381.1	34
Total	559.3	970.7	363.5	+33

[1]Total economic activity includes the direct and secondary spending changes that occur in industries.

[2]The impacts to output, earnings, and employment for developing the Powder River Depot and the Calypso special recreation management areas and developing a dam and reservoir in the Cherry Creek Special Recreation Management Area are included in the recreation sector.

The development of the Lewis and Clark Trail, Cherry Creek, the Powder River Depot, and the Calypso special recreation management areas would provide a variety of recreation activities. The Powder River Depot, Lewis and Clark Trail, and Calypso special recreation management areas and nearby Terry Badlands Wilderness Study Area (a watchable wildlife area) are now used by the public even though few improvements exist. Construction and maintenance of visitor facilities at these areas would enhance the users' experience and result in increased visitor use. The proximity of these sites to one another, and to the dam and reservoir in the Cherry Creek Special Recreation Management Area, have the potential to make the area a major recreational destination in eastern Montana. These developments could provide economic benefits to the planning area from Miles City to Glendive.

Construction of the dam and reservoir in the Cherry Creek Special Recreation Management Area is an important part of developing the recreational potential of the area. It would provide recreational opportunities for most of the people in the planning area and would provide continued economic benefits to the regional economy. The town of Terry would benefit from the construction of the dam and associated facilities. The construction would take an estimated two years (two summer construction seasons) with peak employment of 90 workers. The regional economy would benefit from the construction as described in table 43 under Alternative B. For a benefit to cost ratio, see table 44 in Alternative B.

The changes in one-time construction, annual federal maintenance and administrative costs to implement this alternative include: the construction and maintenance of 10.5 miles of fence and 35 water developments in crucial winter ranges, special recreation management areas, and the Piping Plover Area of Critical Environmental Concern; the cost saving with the transfer of the public lands in Makoshika State Park; increased costs of signs and enforcement of limited off-road vehicle use; and the construction and maintenance of the dam, reservoir and recreation facilities in the Cherry Creek Special Recreation Management Area.

The net impacts on the regional economy on an annual basis, excluding the one-time benefits of constructing the dam and reservoir for the Cherry Creek Special Recreation Management Area, would be positive under this alternative (see table 48). The direct output of goods and services would increase $559,000, total economic activity would increase $971,000, household income would increase $364,000, and employment would increase by 33 jobs. The jobs that would be created are primarily in the retail trade and services sectors, with average earnings $11,300 compared to the planning area's average earnings per job of $16,000. The net cumulative impacts on economic activity would be less than one percent.

Conclusion

Cumulative impacts would be that people concerned with local economic development, developed recreation areas, and enhanced wildlife habitat would feel their concerns are addressed. Social well-being could be enhanced for these individuals and those who obtain recreation related employment. Although impacts to livestock grazing would be limited, these changes may concern some individuals and could diminish their social well-being. Unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

SOIL AND WATER

Assumptions

A certain level of soil erosion, sedimentation, and associated water quality degradation would occur from natural causes. The assumption is made that these impacts to the soil and water resources are accelerated by human related surface-disturbing activities.

The necessary water rights would be obtained.

Impacts From Management Common To All Alternatives

The following are cumulative impacts to soil and water resources. Before the coming of the white man, bison herds and natural disasters had the greatest affect on soil and water resources in the area. As herds traveled the region in mass, they stripped the land of vegetation, decimated riparian areas, and trampled stream banks. Without vegetation, winds would remove topsoil. Without the filtering effect of vegetation, floods and runoff would remove more soil and deliver it to streams and rivers. Suspended sediments and dissolved salts would result in degraded water quality. Until the vegetation was reestablished, wind continued to remove topsoil, delaying surface soils development.

Man-caused impacts to water quality in the planning area began with the military presence from the late 1860s through the 1890s. During that time, large numbers of domesticated animals (horses, mules, sheep, and cattle) were introduced, which heavily utilized areas including stream bottom riparian areas. As homesteaders settled the area, coal mining and agricultural development added to the water quality impacts.

Agriculture contributes to nonpoint source water pollution in the area. The Conservation Reserve Program of the Food Security Act of 1985 is in the process of idling much of the highly erodible cropland, decreasing the amount of soil erosion from cropland. Fields determined to have highly erodible soils are contracted to be planted to protect the soil and will remain undisturbed for a period of ten years. As the acreage in Conservation Reserve Program increases, the amount of soil erosion decreases, enhancing water quality. Conservation Reserve Program acreage may be released and could be cropped at the end of the contract period. Soil erosion and water quality degradation would increase if Conservation Reserve Program land is released and converted to cropland.

Use of conservation tillage practices will increase in the future. These practices leave more crop residue on the surface to reduce the amount of soil being eroded by wind and water, benefiting soil and water resources. Certain conservation tillage practices are dependent on herbicides, and the misuse of these herbicides could prove detrimental to water quality.

Vegetation recovery takes several years depending on many environmental conditions, including soil type and precipitation. Compaction affects the hydrology of a watershed by significantly reducing infiltration and increasing surface runoff. Excessive vegetation removal can also increase surface runoff. Routing of surface runoff results in rapid delivery of water to stream channels, possibly increasing the size of peak flows, which may result in increased channel degradation and downstream sedimentation. The effects of soil compaction persist without mechanical amelioration, and require up to seven years for full recovery.

Range management activities affect watershed hydrology, mainly due to vegetation removal and soil compaction associated with grazing and ground disturbance caused by road and reservoir construction. Implementing grazing systems and management practices for grazing (including utilization levels for herbaceous and woody species, limits on streambank alteration by livestock, season of use, or fencing to improve or maintain riparian/wetland areas) lessens soil erosion, compaction, runoff, sedimentation, and improves stream channel integrity. Management practices are used to maintain or improve soil and vegetative productivity which will improve water quality.

Mining of coal, oil and gas exploration and development, and energy transmission corridors have impacted watershed condition. The degree to which a watershed recovers from these activities corresponds with vegetative recovery. Surface water resources are disrupted by overburden removal in coal mining. Coal seams typically serve as groundwater aquifers. As they are removed, groundwater is impacted in quality and quantity.

Oil and gas affects relatively small areas, which are concentrated based on geologic characteristics. Oil and gas well sites are not allowed in areas which may be flooded or where activities could damage water quality. All oil and gas wells are required to have cement placed in the annulus to ensure no cross-contamination of the aquifers. Water quality could be affected from increased salt and sediment load in these areas. Oil spills would have an effect on water quality and soil productivity. As activity increases, the potential for damaging soil and water increases.

Vegetative treatments in areas would result in a temporary loss of existing vegetative ground cover and a corresponding temporary increase in soil erosion, runoff, sedimentation, and water quality degradation. Over a 2-year period soil and vegetation productivity would be improved.

A short-term increase in soil erosion, compaction, runoff, sedimentation, and water quality degradation would occur on structural improvements that involve surface disturbance. However, these impacts would be minimal. Depending on the management objectives for that area, a long-term benefit would result to the soil and water resources.

Implementing grazing systems, season of use, or fencing to improve or maintain riparian/wetland areas would lessen soil erosion, compaction, runoff, sedimentation, and stream channel integrity. Soil and vegetative productivity, and water quality would also be maintained or improved. The Cherry Creek Special Water Quality Project (USDA, SCS 1991) could enhance the watershed in Cherry Creek, as both private and federal lands could improve.

When the results of vegetation monitoring for ecological status shows an increase in forage productivity, that increase would be distributed in accordance with resource objectives for the allotment. This would reduce soil erosion, runoff, and sedimentation. Soil and vegetative productivity would be maintained or improved in areas where adequate vegetative cover is lacking.

In fire use areas (planned and unplanned ignition), a short-term increase in soil erosion, runoff, sedimentation, and water quality degradation would occur from the loss of vegetative ground cover. As the vegetation becomes reestablished these impacts would diminish. If intensive fire suppression is used an increase in soil erosion and compaction would occur. The affects to soil and water would be minimal.

Future impacts to water resources on public lands will decrease compared to past impacts. Effects on soil and

water quality will be transitory and remedied by natural processes.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

Soil erosion, compaction, sedimentation, and water quality degradation would result wherever a surface-disturbing activity occurred. Standard operating procedures, in addition to those measures in management common to all alternatives, will cause these impacts to be short term and insignificant. The surface-disturbing activity which has the greatest potential to impact soil and water is coal development. This activity would require mitigation measures to lessen any impacts.

Some potential exists for contamination of subsurface aquifers during oil and gas drilling and production operations. This potential is mitigated by the casing and cementing requirements of Federal Onshore Oil and Gas Order No. 2. This order specifies that all usable water zones must be protected. Protection involves setting and cementing casing through usable water producing sections encountered during drilling. This would prevent drilling fluids, as well as fluids and gases from other formations encountered in the wellbore from contaminating aquifers. This measure, when properly completed, adequately mitigates the anticipated impacts to ground water. The BLM reviews, and modifies as needed, each proposed drilling program to determine the adequacy of the casing and cementing program. A cement bond log may be required to verify the integrity of the cement.

Operators of onshore Federal and Indian oil and gas leases must comply with Onshore Order No. 7 prior to disposal of produced water. Produced water is often highly saline and the potential exists for contamination of surface and ground water, soil and vegetation. The Onshore Order provides requirements and standards for the protection of surface and subsurface resources. Injection wells that are used to dispose the produced water must be approved by the Environmental Protection Agency under the Underground Injection Control program. Information submitted in support of obtaining a underground injection control permit is accepted by the BLM in approving the disposal method, provided the information submitted in support of obtaining such a permit satisfies all applicable BLM statutory responsibilities and relevant requirements (including but not limited to drilling safety, down hole integrity, and protection of mineral and surface resources). Migration of produced water from the intended disposal zone and leakage to a usable water zone could occur upon failure of the casing and the equipment used to isolate the disposal zone (tubing and packer). There are numerous standards to insure that underground injection wells do not result in pollution of usable water sources, including periodic pressure testing of well casing, tubing and packers to confirm integrity of the system and isolation of disposal zones.

Plugging programs for abandoned wells are designed to secure the well bore and prevent contamination to mineral or water bearing formations. Cement is pumped into the wellbore to seal any perforations. Cement is also pumped into the wellbore at certain formations to act as plugs to prevent migration of any fluids or gases that might enter the wellbore.

The “Oil and Gas” section of the Minerals appendix includes a more complete description of drilling operations, disposal of produced water and abandonment procedures, and the measures employed to protect usable water.

In linear rights-of-way (buried pipe or power lines) impacts to soil and water resources would occur during construction. The impacts from road and facility rights-of-way would continue for as long as they are used. When these rights-of-way are no longer used, mitigation of the impacts to soil and water resources would occur as it does for a buried pipe and power line rights-of-way.

Multiple traverses of an area during off-road vehicle use causes soil erosion which may impact water quality.

Conclusion

Cumulative impacts would be as stated in management common. Vegetation treatments, riparian/wetland management, forage allocations and construction of structural improvements would enhance vegetation, decrease soil erosion and enhance water quality. There would be no unavoidable adverse, irreversible and irretrievable impacts to soil or water. Short-term impacts affecting long-term productivity would be management actions for vegetation improvements requiring surface disturbance. There would be a temporary increase in soil erosion, runoff, sedimentation and water quality degradation. Depending on the management objective for the area, a long-term benefit could result to soil and water resources.

ALTERNATIVE B

The impacts affecting soil and water are the same as Alternative A, except under this alternative they would not occur on areas where surface disturbance is excluded. There would be no impacts from coal development as coal

leasing is not allowed under this alternative. Impacts to soil and water from off-road vehicle use would be reduced under this alternative.

Off-road vehicle use impacts vegetation, causing soils to erode, which may impact water quality. The damage from off-road vehicle use is lessened when vehicles are limited to existing roads and trails.

Impacts from the construction of the Cherry Creek Dam would not be significant. There is a potential for conflicts from the upstream users if they were to apply for water rights for more than 15-acre feet as the BLM would protest. The extent of fecal coliform in the Cherry Creek drainage caused by livestock is unknown. This information will be determined in the Cherry Creek Water Quality Special Project (USDA, SCS 1991).

If borrow for construction of the dam is taken from above the mean high water line there would be a short-term negative impact from wind and water erosion. Mitigation and reclamation measures would reduce this impact.

There would be some impacts to the Yellowtail Dam and the Yellowstone River from water being pumped into the Cherry Creek Dam. The water would be released from Yellowtail Dam during April through October. The maximum released would be 10 cubic feet-per-second. This would drop the level of the lake at Yellowtail Dam by 0.2 feet and increase the flow of the Yellowstone River by 0.6 percent in August and 0.05 percent in June. This would not cause significant impacts. Sediment load increases in the Yellowstone River from releasing water in the Yellowtail Dam are not anticipated.

The following scenarios were used to analyze the impacts of dam failure under conditions where such failure would have the most noticeable impact downstream. The development for the concurrent flood is 200,000 cubic feet-per-second, the level at which permanently-inhabited structures begin to experience flooding (the incipient danger flood). The discharge for the concurrent flood is 200,000 cubic feet-per-second, the level at which permanently-inhabited structures begin to experience flooding.

1. Sudden failure of the dam; no flood (sunny day failure).
2. Dam failure during the probable maximum flood.
3. Routing the probable maximum flood with no dam in place.
4. Dam failure during a flood that is equivalent to 22 percent of the probable maximum flood. Such a flood would overtop and fail Cherry Creek Dam.
5. Routing 22 percent of the probable maximum flood with no dam in place.
6. Dam failure during a flood that is equivalent to 50 percent of the probable maximum flood. The discharge of this flood, combined with the incipient danger flood, could potentially endanger inhabitants of structures in the downstream floodplain.
7. Routing 50 percent of the probable maximum flood with no dam in place.

The results of the analyses indicate that the failure of Cherry Creek Dam would not have any significant impact on permanently inhabited structures in the downstream floodplain. Therefore, selection of an inflow design flood greater than the 500-year flood does not provide any additional protection against loss of life.

Clark Reservoir.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

ALTERNATIVE C

Impacts to soil and water would be the same as Alternative B, except multiple traverses of an area during off-road vehicle use causes soil erosion which may impact water quality.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

ALTERNATIVE D (Preferred Alternative)

Impacts to soil and water from Alternative D would be the same as Alternative B, except under this alternative those impacts would occur on less acres. There would be reduced impacts from limiting off-road vehicle use, and impacts from the Cherry Creek Dam would be the same as Alternative B.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

VEGETATION

Assumptions

Vegetation treatment includes grazing management, prescribed burns, mechanical, chemical, and biological. Activity plans would be implemented at a rate of two to three per year. A total of 8,000 acres would be mechanically treated over the next 20 years. About 5,000 acres would be prescribed burned over the next 20 years.

It is estimated that, at present, 12,000 acres need chemical (aerial and ground application) and biological (grazing, insects, and pathogens) treatment for noxious weed control.

Impacts From Management Common To All Alternatives

The following are the cumulative impacts to vegetation. Cumulative impacts to vegetation began when European man first arrived in eastern Montana. Journals of early explorers include descriptions of areas dominated by cactus and a lack of forage and large herds of bison. The area around Fort Union at the junction of the Yellowstone and Missouri rivers was described in the early 1830s as "... The hills were partly bare, and very few flowers were in blossom; the whole country was covered with short, dry grass, among which were numerous round spots with tufts of Cactus ferox, which was only partly in flower" (Brown 1969).

The killing of the bison in the early 1880s made room for large numbers of cattle and horses. The riparian areas were the primary source of water. Without fencing, grazing was uncontrolled. During a severe winter in 1886 in which many cattle died, the "cattle congregated in the valleys and browsed on the shoots of willow and cottonwood, gnawed the bark from brush too large to eat, and even consumed the unpalatable sagebrush. Pieces of wood the diameter of a lead pencil were seen in the manure" (Brown 1969).

Military forts were constructed along major rivers. The rivers were used as travel routes and were the first areas to be settled. Steamboats traveled the Yellowstone and Missouri rivers and trees were removed to fuel the boats.

Adjacent to major rivers, extensive prairie dog towns could be found on suitable soils. These areas were in poor and fair conditions. Poisoning efforts in the 1920s and 1930s brought substantial reductions. The listing of the black-footed ferret as endangered is a sign of the success of this campaign.

Areas further from the river corridors were settled in the early 1890s during the homestead days. With these homesteads was a requirement to farm a portion of the land. These lands were often not suitable for intensive agricultural use. The population of these rural areas had reached their highest level in recorded history. The farming combined with uncontrolled grazing during these years took its toll on the native prairie. The drought of 1919 slowed population growth and the droughts of the 1930s caused mass exodus. The population in the planning area was cut in half from 1930 to 1940.

At this time the federal government purchased 368,107 acres of abandoned homesteads under the Bankhead-Jones Act. Purchased rangeland had been in units which were submarginal in size and were in poor condition. After purchase, this federal land was operated under conservation

practices and management. Crested wheatgrass was sown on much of the former farmland while others returned gradually to native prairie (USDI, BLM 1958).

The Taylor Grazing Act of 1934 began the process of attaching federal lands to a private base which was used during the winter months. This helped bring more control to grazing in the area. Although season long grazing was common, there was a move toward a proper stocking level. Since that time, livestock operators, county agents and boards, Montana Department of State Lands, the Soil Conservation Service, Agriculture Stabilization and Conservation Service, and the BLM have taken steps toward steady improvement in range condition by implementing improved range management principles.

Animal science has also played a role in livestock production and impacts to vegetation caused by livestock. Steers weighing 350 pounds at weaning were once common. Now steer weights of 500 pounds or more are common. Mature cow weights have also increased from 800 to 1,000 pound cows to 900 to 1,400 pound cows. The increase in cattle size has resulted in increased forage removal on some BLM allotments since the 1960s.

The Conservation Reserve Program began in the early 1980s and is administered by the Soil Conservation Service and the Agricultural Stabilization Conservation Service. This was another effort to bring marginal cropland back to grassland. Most of these lands were planted to crested wheatgrass or other introduced grasses. This has further changed the vegetation types in the area. It is estimated that 50 to 65 percent of the land will return to cropland in the mid 1990s if there is no further incentive to keep it in grass.

Agriculture has been the major use of vegetation in the area. Development of the roadway and interstate system has been a steady impact and caused removal of vegetation. Oil and gas development was one of the more recent impacts to the vegetation resource. In 1979, seismic activity began in earnest and tapered off by 1985. This activity was exploratory in nature and consisted primarily of cross-country travel in large drilling rigs. Coupled with this was development of oil and gas wells. Over the last 16 years a total disturbance of approximately 10,000 acres has resulted due to oil and gas development. Some of these sites have been abandoned and reclaimed with native species.

The spread of noxious weeds in all alternatives threatens to be a major negative impact on the ecological status of the vegetation. With 4,500 acres infested by leafy spurge alone on public land and limited funding for weed control, noxious weeds will continue to spread. Scattered patches of knapweed have been found. Knapweed has high potential for spread. Tamarisk or salt cedar, an introduced ornamental, has had devastating effects in the southwest. It has completely dried up some riparian areas due to its high water requirements and it has out- competed native riparian plants. Its potential for spread in the northern states is unknown. It has already been observed along the Yellowstone River and other major tributaries. Tamarisk is not on the Montana Noxious Weed List and no control efforts by the BLM have been undertaken. Since Tamarisk is transported along rivers and creeks, a control effort would have to be supported by other agencies and private landowners.

Vegetation within the riparian/wetland areas would improve. There would be increased forage for livestock and wildlife, and soil protection. Vegetative cover and species diversity would be enhanced from allocating vegetation increases based on allotment objectives. Plant vigor of crested wheatgrass would be enhanced from haying and harvesting of seed. These benefits would result primarily from vegetation treatments and grazing management.

Generally, prescribed fires are planned to remove vegetation susceptible to mortality from fires and favor vegetation which returns shortly after fire. A thick stand of ponderosa pine would be a likely vegetation type for prescribed fire. Some thick stands of ponderosa pine have little vegetation ground cover. Following a fire, the vegetation community would change to a grass, forb, and shrub community. In the absence of fire, these areas will gradually revert back to ponderosa pine. Young trees will reach 5 to 10 feet within 15 years following fire. Tree density will depend on grass competition within the burn area.

Limber pine would be maintained and other forest resources would not be significantly impacted.

As prairie dog colonies expand, 40 to 90 percent of the vegetation will continue to be removed by prairie dogs and the vegetation will remain in early to mid seral status.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

Surface-disturbing activities would not significantly impact vegetation during construction. If a permanent facility was constructed the actual site would be void of any vegetation. On projects where a permanent facility is not constructed, reclamation would be implemented and the impacts would be minimized.

Coal development would significantly impact vegetation during the 40-year life of the mine. The actual pit of 340

acres would be void of vegetation and 3,400 to 4,400 acres would be in varying stages of reclamation.

Off-road vehicle use causes approximately 0.15 acres of vegetation damage per mile of travel. This loss may be temporary or perpetuated if the trail is continually reused. Vegetation loss from off-road vehicle use occurs due to soil erosion.

There is concern that catalytic converters may catch dry vegetation and start fires. Seven percent of the fires which occur in the resource area are caused by man. The actual ignition source of these man-caused fires is not identified. The vegetation loss may be significant locally.

Potential for spread of noxious weeds through off-road vehicle use is one of the more troublesome impacts to the native vegetation. Weed infestations can displace native vegetation even in good and excellent conditions and are costly to control. Vehicles are a common source of new weed infestations.

Conclusion

Cumulative impacts to vegetation would be positive in this alternative. Activities proposed in this plan and future activities of livestock producers and other agencies will result in gradual improvement in ecological status of the upland vegetation over the next 20 years. The greatest potential for improvement will be found in riparian/wetland areas. Improvement of these areas in the past was overlooked as these were considered "sacrifice zones." Attention for improvement has recently focused on these areas on private and public lands. The 1988 reauthorization of the Clean Water Act has added emphasis for improvement in riparian areas. Riparian/wetland areas would improve, increasing livestock and wildlife forage, providing soil protection, enhancing water quality and provide cover for wildlife. Limber pine would be protected insuring the continuation of the species. Unavoidable adverse impacts would be from permanent structures or improvements such as roads or buildings. The actual site occupied by a reservoir or permanent structure would be void of vegetation. There would be no irreversible and irretrievable impacts to vegetation. Short-term impacts affecting long-term productivity would be from surface-disturbing activities, such as construction of structural improvements, rights-of-way, mining, oil and gas development and mechanical treatments. Mechanical treatments would adversely affect vegetation in the short term resulting in increased vegetation in the long term.

ALTERNATIVE B

Impacts would be the same as Alternative A, except under this alternative those impacts would not occur on areas where surface disturbance is excluded. Closing the Calypso Trail would result in revegetation of vehicle tracks where soils are suitable. There would be a minor increase in vegetation disturbance due to development of access and small scale campground development. Riparian vegetation would be removed during boat ramp construction. These actions would comply with the Clean Water Act and Natural Streambed and Land Preservation Act of 1975. Impacts from off-road vehicle use also would be reduced. Off-road vehicle use impacts vegetation, causing soils to erode, which may impact water quality. The damage from off-road vehicle use is lessened when vehicles are limited to existing roads and trails. There would be no impacts from coal mining. Within the Black-footed Ferret Area of Critical Environmental Concern, 40 to 90 percent of the vegetation will continue to be removed by prairie dogs and the vegetation will remain in early to mid seral status.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A, except under this alternative the rate of improvement to riparian areas would be the greatest, and there would be a reduction of vegetation loss from restricting oil and gas and coal development.

ALTERNATIVE C

Impacts from special recreation management areas and prairie dog colonies in the Black-footed Ferret Area of Critical Environmental Concern would be the same as Alternative B. The remaining impacts to vegetation would be the same as Alternative A.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

ALTERNATIVE D (Preferred Alternative)

Impacts to vegetation would be the same as Alternative A, except under this alternative those impacts would occur on less acres; and 40 to 90 percent of the vegetation in the

prairie dog colonies of the Black-footed Ferret Area of Critical Environmental Concern will continue to be removed by prairie dogs. The vegetation would remain in early to mid seral status. There would be a minor increase in vegetation disturbance due to development of access and small scale campground development. Riparian vegetation would be removed during boat ramp construction. These actions would comply with the Clean Water Act and Natural Streambed and Land Preservation Act of 1975.

Closing the Lewis and Clark Trail Special Recreation Management Area to mineral material permits and sales would prevent removal of 300 acres of riparian and upland vegetation over the next 20 years.

Off-road vehicle use impacts vegetation, causing soils to erode, which may impact water quality. The damage from off-road vehicle use is lessened when vehicles are limited to existing roads and trails. With a limited designation for the planning area, and closure of the Calypso Trail and in the Smoky Butte Area of Critical Environmental Concern, off-road vehicle use may increase in the areas designated open. This would result in increased vegetation loss. The potential for vegetation production on the open off-road vehicle area near Glendive is lower than the average for Dawson County due to the soils and steeper slopes. The riparian vegetation is limited to ephemeral streams. Every mile of a 15 inch trail that is developed will result in a loss of approximately 0.15 acre of vegetation. The open designation will also allow for increased potential for spread of noxious weeds and displacement of native vegetation.

Closing Smoky Butte Area of Critical Environmental Concern to vehicle use would prevent potential for future loss of vegetation. Cover will increase on existing trails. Closing the Calypso Trail would result in revegetation of vehicle tracks where soils are suitable.

Conclusion

Cumulative, unavoidable adverse, irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.

WILDLIFE

Assumptions

Impacts to wildlife in oil and gas moderate potential development areas would be the same as in the high potential areas.

Yearly developed waterfowl projects would disturb 10 to 20 acres per project.

Impacts From Management Common To All Alternatives

The following are cumulative impacts to wildlife. In the past, wildlife such as the wolf, grizzly bear and prairie dog were reduced or eliminated as they were viewed as an impediment to "progress." Millions of acres of habitat in the United States have been altered, not because wildlife occupying these acres were undesirable, but because the habitat was desired for other uses. The best example is the conversion of millions of acres of native prairie to farmland, hay ground or tame pasture.

The overall condition of wildlife habitat since the turn of the century has declined. Buffalo and livestock were generally restricted to those areas with a permanent source of water, such as rivers and streams and in some cases natural springs. These areas received heavy use and were in a deteriorated state. As such, millions of acres were unavailable to livestock, but were available to the more mobile wildlife. With the installation of fences and mechanized equipment capable of providing water to arid areas, many areas previously unavailable to livestock were now available. Many of these areas were not managed, resulting in a decrease in the condition of the habitat. This is especially true of many of the green ash draws characteristic of this planning area.

Prairie dogs once occupied thousands of acres in Montana. This habitat for the black-footed ferret was reduced to the point where the black-footed ferret could no longer survive. Present policy is to protect what habitat remains on public land.

Actions conducted within the planning area in the past impacted many of those animals now listed as federally endangered or threatened. These species included the piping plover, least tern, black-footed ferret, whooping crane, bald eagle, peregrine falcon, and pallid sturgeon. Current activities on BLM lands within the planning area have little impact on these species. The greatest impact to other wildlife on private and public lands is livestock grazing. In some cases, the impacts associated with agriculture have been beneficial to specific species of wildlife (wild turkeys, pheasants, Canada geese and white-tailed deer). In other instances, the impact of livestock grazing and its associated activities has been negative to wildlife (sage grouse).

Currently, within the planning area native range is being converted to farmland, hay land or tame pasture. This

Sage grouse.

conversion is primarily limited to private land. Although BLM lands are not farmed, some are being converted to tame pasture for the benefit of livestock. The impact to wildlife such as sage grouse and antelope is negative.

Livestock producers are becoming better informed and the trend is toward better range management practices. With the continued installation of livestock reservoirs, the habitat for species such as waterfowl and fisheries is enhanced. Historically, these habitats were not present or if present, rare. New water developments such as reservoirs will benefit those species dependent on aquatic habitat. Canada geese is one species that has grown significantly as a result of water development and agriculture.

There may be an eventual loss of opportunity for reestablishing the black-footed ferret due to eradication of the prairie dog on nonfederal lands. Prairie dogs are enhanced by excessive grazing. Improved grazing management practices will have a negative impact on the prairie dog and those species associated with their habitat. Removal of prairie dog habitat will have a significant impact to the associated species, including the black-footed ferret.

The potential for negative impacts to wildlife from vegetative manipulation (mechanical treatments, fire, hay cutting, firewood cutting, etc.) is highest when large areas are treated. The greatest positive impacts are achieved when small, irregular shaped blocks are treated. Proper project design can ensure improved wildlife habitat and increased species diversity. Impacts on upland wildlife species can be beneficial or adverse for any type of treatment depending on project design.

Riparian habitats would be avoided. If proper project design and mitigation are used, there will be no significant direct impacts to riparian wildlife species.

Sagebrush treatments can be detrimental to sage grouse year-round and to wintering big game in years when snow depths make low-growing plants unavailable.

Generally, impacts to wildlife from livestock grazing are increased as the level of utilization increases. Nesting birds are not impacted provided adequate residual vegetation remains following grazing. Big game species would not be negatively impacted when a minimum of 50 percent of the available, current year's growth of browse remains following grazing by livestock. When these conditions are not provided, wildlife will be negatively impacted.

A 50 percent limit on the utilization of upland browse will provide for the improvement of the condition of these browse species. This same level of utilization in the riparian areas will result in the downward trend of the browse component.

Impacts From Management Actions Specific To Each Alternative

ALTERNATIVE A

Crucial winter ranges would be protected from oil and gas development by application of a timing restriction from December 1 through March 31. This restriction in development would provide a one-year positive benefit to wintering wildlife. However, the overall impact to wildlife would be negative as subsequent production type activities would be authorized year-round. Geophysical exploration could negatively affect wildlife, especially nesting raptors. The level of impact will be determined by the type and duration of the geophysical exploration. The impact could be locally significant. Developing locatable minerals and removal of mineral materials would have a minimal impact on wildlife habitat.

Allowing the installation of rights-of-ways could have a significant adverse impact to wildlife, depending on the size, location, and duration of the disturbance. Disturbance to animals on their crucial winter ranges, nesting and roosting sites may be locally significant.

If a coal mine is developed, impacts to wildlife would be significant; however, through unsuitability criterion, the

most valuable habitats would be protected. The impacts of allowing other mineral development activities could be severe on those animals that inhabit Smoky Butte. Because of the terrain associated with Smoky Butte, this area provides habitat for numerous species of wildlife. Removal of part of this butte could be detrimental to the wildlife. It is suspected a snake den exists in the butte. Should the rocks adjacent to this den be removed, the snake den may be lost. Activities associated with removal of the minerals could negatively impact nesting raptors, wintering big game, and other small game and nongame birds.

Wildlife habitat within the Powder River Depot and Calypso areas would benefit as recreational use would not be encouraged. Loss of habitat and displacement of wildlife associated with recreational activities would be reduced.

Intensive off-road vehicle use would occur during the hunting season, with less use throughout the year from other activities. Habitat disturbance resulting from unrestricted off-road vehicle use includes the compaction of vegetation. Off-road vehicle use and presence of humans on crucial winter ranges may cause wildlife to move from a specific area due to intolerance of disturbance. Off-road vehicle use in riparian bottoms causes abandonment of nests by raptors. Ground nesting birds could have nests destroyed or abandoned from off-road vehicle activity during the nesting season (March through June). Off-road vehicle use could result in increase in soil erosion (sedimentation) and a decrease in the quality of nearby fisheries habitat. The impacts are not expected to be significant. Smoky Butte is not legally accessible. It is not anticipated a great deal of off-road vehicle activity would take place. With the steepness of this site, should off-road vehicle use occur, impacts could occur to nesting raptors and wintering wildlife. This area is also big game crucial winter range.

Cherry Creek drainage would continue to provide a fishery and habitat for upland species.

Conclusion

The cumulative impacts to wildlife are generally positive; however, the speed at which habitats improve would be slow. Future actions and activities by the BLM will have little impact on the overall populations of wildlife as only 10 percent of the planning area is BLM-administered lands. On the lands we do manage, the level of emphasis will improve wildlife habitat. Disturbance associated with oil and gas leasing and development will continue to negatively impact wildlife. However, based on the projected number of wells to be drilled over the life of this plan, the impact is not significant.

The riparian objective of having 75 percent of the riparian areas in proper functioning condition by 1997 would be difficult to achieve. The rate upland habitat needed by ground nesting birds improves would be slow.

Livestock grazing would impact important habitat types. Areas where livestock are not properly managed would deteriorate or remain at less than potential, causing an unavoidable adverse impact to wildlife habitat. Allotments where interdisciplinary management plans have been implemented would improve. Habitat would improve through livestock management and managing surface-disturbing activities in riparian areas.

As disturbance activities are authorized, potential impacts to wintering wildlife on crucial winter ranges would continue. Oil and gas development would be restricted from December through March, however, production is authorized year round, resulting in unavoidable adverse impacts to wildlife. Crucial winter ranges are unsuitable for coal development and so are protected.

Habitat would not be available for reintroduction of the black-footed ferret. This may delay the recovery of the black-footed ferret.

ALTERNATIVE B

Generally, the impacts to wildlife from surface-disturbing activities such as rights-of-ways, off-road vehicle use, mineral material sales, locatable minerals, nonenergy leasable minerals, and oil and gas development would be minor as these activities would be eliminated or restricted. Excluding livestock grazing in the special recreation management areas would improve vegetation for wildlife. However, encouraging recreational use in the special recreation management areas would result in some loss of habitat, displacement of wildlife, and increased stress to wildlife.

Livestock grazing would be excluded on the Piping Plover Area of Critical Environmental Concern, Lewis and Clark Trail Special Recreation Management Area and from December 1 through March 31 in crucial winter ranges. Competition for forage between livestock and wildlife would be eliminated, resulting in a significantly positive impact to wildlife.

No oil and gas would be leased in the Black-footed Ferret Area of Critical Environmental Concern; crucial winter ranges; steep slopes; Smoky Butte Area of Critical Environmental Concern; riparian/wetlands; cultural areas of critical environmental concern; or in the Cherry Creek, Lewis and Clark Trail, and Powder River Depot special recreation management areas. This restriction would provide a permanent positive benefit to wildlife habitat. Not only would wildlife be protected from disturbance associ-

ated with the development of new wells, but wildlife would also be protected from disturbance resulting from the maintenance.

Many of the steep slopes are crucial winter ranges for wildlife. By protecting these steep slopes, habitat crucial to wildlife would also be protected. In addition, other wildlife inhabiting these slopes either seasonally or yearlong may also be protected. The probability of oil and gas development on steep slopes is not likely; therefore, the impact to wildlife would not be great.

Keeping development out of riparian/wetland sites is a positive benefit to wildlife. It is estimated that approximately 90 percent of the wildlife in the planning area are dependent on riparian/wetlands at some point in time. Over 5,000 acres of riparian/wetland sites overlie federal oil and gas. This would be a positive benefit for wildlife.

Although small in size, Smoky Butte provides locally unique habitat. Closing this area to oil and gas development would be positive. The area provides habitat for raptors, mule deer, as well as numerous species of small mammals and nongame birds. Smoky Butte may contain a snake den, which would be protected. With the steepness of Smoky Butte, the potential for oil and gas development is remote. Whatever protection could be provided would be positive.

The Black-footed Ferret Area of Critical Environmental Concern (1,151 public surface acres) would be designated. Prairie dog colonies and their expansion on public land would be managed for the reintroduction and recovery of the black-footed ferret as well as associated species (see map 23). New prairie dog colonies on public lands would be important for black-footed ferret recovery.

A 50-foot pool depth dam for the Cherry Creek Special Recreation Management Area would impact the area in a positive and negative manner. When the dam is constructed, existing habitat would be lost. However, this habitat would be replaced with high-value wetland habitat. The lost habitat consists of sagebrush-grasslands. The dam site is habitat for antelope and sage grouse, as well as other upland wildlife species. The fishery in the Cherry Creek drainage would be altered. About 569 acres of uplands would be altered by construction of this dam. The loss of the current habitat would not constitute a significant impact. A significant impact would result when the dam is constructed, as an estimated 9.9 miles of shoreline would be created, of which 3.2 miles would be high-value waterfowl habitat. Of the 569 surface acres, 25.2 acres would be high-value waterfowl habitat.

The effects of removing water from Yellowtail Dam or directly from the Yellowstone River is not expected to be significant. The increase in the flow of water released from the Yellowtail Dam is estimated to be between .02 percent and .6 percent of the normal flow of the Yellowstone River. The Cherry Creek drainage comprises .5 percent to .6 percent of the flow for the Yellowstone River.

Habitat could be created for piping plovers, least terns, and whooping cranes. Reducing the amount of sediment which is allowed to enter the Yellowstone River may be the most serious impact to threatened and endangered species. It is estimated Cherry Creek provides 1.0 percent to 1.8 percent (5,400 to 9,800 tons) of the total sediment for the Yellowstone River. Some native river fish such as blue suckers, paddlefish and sturgeons are dependent on turbid water for survival. The amount of sediment provided by Cherry Creek drainage although small (1.0 percent to 1.8 percent) may be locally significant. Should this sediment be removed in that portion of the Yellowstone River directly below the mouth of Cherry Creek, that portion may no longer provide suitable habitat for the survival of some river fishes.

The impact to wildlife from limiting off-road vehicle use to existing roads and trails would be positive. The potential to disturb wintering wildlife, ground-nesting birds, and raptors would decrease.

Conclusion

Future actions and activities by the BLM will have little impact on the overall populations of wildlife as only 10 percent of the planning area is BLM-administered lands. On the lands BLM manages, the level of emphasis will result in a slow rate of improvement, although more rapid than in Alternative A, and more positive than the other alternatives, resulting in the quickest and greatest positive benefit to wildlife. The closing of crucial winter ranges to oil and gas leasing will be beneficial to wildlife, especially in the future as long-term production of wells would be eliminated. Other surface-disturbing activities affecting wildlife habitat are not expected to be significant, as some crucial habitats will be excluded and other crucial habitat mitigated. Although fish habitat in the Yellowstone River may be slightly altered, the cumulative impact of the Cherry Creek Dam would be positive. However, should other large diversion dams be constructed on the tributaries of the Yellowstone River, a significant negative impact to the ecosystem could result.

The impact to wildlife habitat as a result of controlled livestock grazing would be positive. Disturbance to wintering wildlife and competition for forage would be reduced. Impacts to the uplands and to the riparian areas are similar to those impacts in Alternative A.

Prairie dog habitat would be managed for black-footed ferret reintroduction.

ALTERNATIVE C

Avoiding construction of rights-of-way in the cultural, wildlife, and Smoky Butte areas of critical environmental concern; Makoshika State Park; and the special recreation management areas would benefit wildlife. Allowing the construction of rights-of-way on crucial winter ranges from December through March would negatively impact wintering wildlife during severe winters. Depending on the amount and the longevity of the construction, this disturbance could result in loss of wintering wildlife.

Oil and gas leasing subject to a no surface occupancy stipulation would benefit wildlife by eliminating the alternation of habitat and by reducing disturbance to the animals. The Piping Plover Area of Critical Environmental Concern (16 acres of high oil and gas potential development) would be protected through the application of lease terms. Geophysical exploration could negatively affect wildlife, especially nesting raptors. The level of impact will be determined by the type and duration of the geophysical exploration. Developing locatable minerals and removal of mineral materials would have a minimal impact on wildlife habitat.

Encouraging recreational use in the special recreation management areas would result in loss of habitat and the displacement of wildlife. These impacts would be insignificant.

Open off-road vehicle use would have the same impacts as Alternative A.

The impacts to the Black-footed Ferret Area of Critical Environmental Concern would be the same as Alternative B.

The impacts to wildlife and fish from the Cherry Creek Special Recreation Management Area would be the same as Alternative B, except under this alternative there would be 455 acres flooded, and 6.9 miles of shoreline with 2.2 miles of high-value waterfowl habitat. There would be a total of 21.9 acres of waterfowl habitat.

Conclusion

The cumulative impacts to wildlife are positive, and more rapid than Alternative A, but substantially less than alternatives B and D. The cumulative impacts are similar to those identified in Alternative A, except for the reintroduction of the black-footed ferret.

Prairie dog habitat would be available for reintroduction of the black-footed ferret. Reintroduction of the black-footed ferret would expedite the recovery of this species.

ALTERNATIVE D (Preferred Alternative)

Generally, the impacts to wildlife from surface-disturbing activities such as rights-of-way, off-road vehicle uses, mineral material sales, locatable minerals, and nonenergy leasable minerals would be lessened as these activities would be restricted. Stress to the wildlife and habitat disturbance would be reduced.

Allowing oil and gas development on steep slopes could result in a negative impact to wildlife, especially on crucial winter ranges. Wintering wildlife often seek out these slopes due to the availability of forage, as well as the thermal properties associated with these slopes. Oil and gas development on the slopes in crucial winter ranges would result in a negative impact to wildlife. No surface occupancy for oil and gas development on Smoky Butte Area of Critical Environmental Concern would be a positive impact to wildlife, especially to nesting raptors. This area is also big game crucial winter range.

Crucial winter ranges would be protected from oil and gas drilling activities by application of timing restrictions from December 1 through March 31. This restriction would provide a one-year benefit to wintering wildlife. However, the overall impact to wildlife would be negative as subsequent production type activities would be authorized year-round. About 180 public acres of crucial winter range would be altered or lost, based on the projected number of wells to be drilled during the life of this plan.

Geophysical exploration could negatively affect wildlife, especially nesting raptors. The level of impact will be determined by the type and duration of the geophysical exploration.

Impacts to the Black-footed Ferret Area of Critical Environmental Concern would be the same as Alternative B, except in this alternative locatable mineral entry would be allowed in the area of critical environmental concern.

Impacts to prairie dogs and black-footed ferrets from the extraction of locatable minerals is expected to be minimal based on historic permits. However, should a large amount of prairie dog habitat be altered or if the removal of the locatable minerals occur over an extended period of time, the impacts would be significant. Removal of critical black-footed ferret habitat or disturbance to individual populations of prairie dogs or black-footed ferrets would constitute the greatest impact.

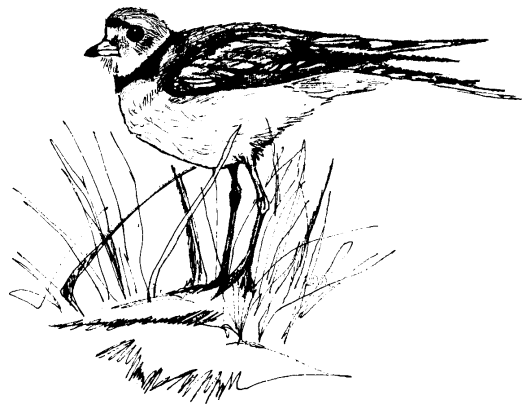
Excluding livestock grazing in the Calypso, Powder River Depot, and Cherry Creek special recreation management areas would have a positive impact on wildlife habitat. Vegetation associated with riparian areas would improve, as would the vegetation needed by ground nesting birds. Excluding livestock grazing on the Piping Plover Area of Critical Environmental Concern from May 1 through July 15 would protect piping plover eggs and young from trampling.

Encouraging recreational use of the special recreation management areas would result in the displacement of wildlife. Of the 2,320 acres open to off-road vehicle use, 1,920 acres have been designated as mule deer crucial winter range. Designating the area near Glendive as open to off-road vehicle use will have a detrimental effect to wintering mule deer. Mule deer will move off this area due to their intolerance to disturbance. The net result will be adjacent crucial winter range could be overutilized or the mule deer will be forced onto less desirable winter habitat.

In areas where oil and gas is leased with a no surface occupancy stipulation, wildlife would benefit by minimizing the alteration of habitat and by reducing disturbance to the animals.

In areas where locatable minerals would be withdrawn, mineral material sales, and nonenergy leasable minerals would be closed, wildlife habitat would not be altered and disturbance to animals would be reduced.

The impacts from Cherry Creek Dam and special recreation management areas would be the same as Alternative B.



Conclusion

The cumulative impact to wildlife is generally positive. The speed at which habitats improve would be more rapid than Alternatives A or C, but less than Alternative B. Future actions and activities by the BLM will have little impact on the overall populations of wildlife, as only 10 percent of the planning area is BLM-administered lands. The lands BLM manages will slowly improve.

The riparian objective of having 75 percent of the riparian areas in proper functioning condition by 1997 would be difficult to achieve. Uplands, needed by nesting birds, would improve at a slow rate.

Livestock grazing would impact important habitat types. Those habitat areas where livestock are not properly managed would deteriorate or remain at less than potential, causing an adverse impact to wildlife habitat. Allotments where interdisciplinary plans have been implemented, wildlife habitat should gradually improve through livestock management and managing surface-disturbing activities in riparian areas.

As disturbance activities on crucial winter ranges are authorized, potential impacts to wintering wildlife would occur. Oil and gas development would be restricted from December through March; however, production would be authorized year-round, resulting in adverse impacts. Crucial winter ranges are unsuitable for coal development and are so protected.

Habitat would be made available for black-footed ferret reintroduction and for associated species. Expansion of prairie dogs within the 11,166 acres would be allowed.

Irreversible and irretrievable impacts, and short-term impacts affecting long-term productivity would be the same as Alternative A.