MONTANA

Environmental Assessment for New Managed Haying and Grazing Provisions for Some Conservation Reserve Program Lands

Farm Service Agency

FINAL
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COVER PAGE

Proposed Action:	The United States Department of Agriculture (USDA) Commodity Credit Corporation (CCC) proposes to change the allowable frequency of managed haying and grazing on certain Conservation Reserve Program (CRP) lands in Montana. Farm Service Agency (FSA) administers CRP on behalf of the CCC. On September 26, 2006, a legal settlement was signed between the National Wildlife Federation (NWF) and FSA that limited the frequency of haying on CRP lands to once every ten years and grazing to once every five years in the State of Montana; with a suspension of haying and grazing during the primary nesting season (May 15 to August 1). The settlement stipulated that if a change to the frequency of haying and grazing or the primary nesting season (PNS) dates is desired, then an Environmental Assessment would be prepared that identifies the potential environmental and socioeconomic impacts of such a change. This Environmental Assessment evaluates the potential impacts of three action alternatives against the no action baseline of the lawsuit settlement terms (Alternative A). Alternative B would allow haying once every five years and grazing once every three years with a PNS of May 15 to July 15. Alternative C would permit haying and grazing at the same frequency of Alternative B, but with a shortened PNS of May 15 to July 1. Alternative D, the Preferred Alternative, would allow managed haying and grazing to occur on authorized lands once every five years with a PNS of May 15 to August 1.
Type of Document:	Final Environmental Assessment
Lead Agency:	United States Department of Agriculture
Sponsoring Agency:	Farm Service Agency on behalf of CCC
Further Information:	For further information, contact Matthew Ponish, Environmental Compliance Manager, USDA FSA CEPD, Stop 0513, 1400 Independence Ave., SW, Washington, D.C. 20250-0513, (202) 720-6853, or by email at Matthew.Ponish@wdc.usda.gov
Comments:	This Environmental Assessment is prepared in accordance with USDA Farm Service Agency National Environmental Policy Act implementation procedures found in 7 Code of Federal Regulations 799, as well as the National Environmental Policy Act of 1969, Public Law 91-190, and 42 U.S. Code 4321-4347, 1 January 1970, as amended. Farm Service Agency would provide a public comment period prior to any decision. A copy of this Environmental Assessment can be reviewed at: http://www.fsa.usda.gov/FSA/webapp?area=home&subject=ecrc&topic=nep-cd or at: http://public.geo-marine.com.

Written comments regarding this assessment may be submitted to:

Montana Managed Haying and Grazing Comments,
c/o Geo-Marine Incorporated
2713 Magruder Boulevard, Suite D
Hampton, Virginia 23666,

or online at: http://public.geo-marine.com

Comments are due within 30 calendar days of publication of this document.

EXECUTIVE SUMMARY

BACKGROUND

The United States Department of Agriculture (USDA) Commodity Credit Corporation (CCC) oversees the Conservation Reserve Program (CRP), the Federal government's largest private land environmental improvement program. Farm Service Agency (FSA) administers CRP on behalf of the CCC. CRP is a voluntary program authorized by the Food Security Act of 1985, as amended, that supports the implementation of long-term conservation measures designed to improve the quality of ground and surface waters, control soil erosion, and enhance wildlife habitat on environmentally sensitive agricultural land.

In exchange for annual rental payments and cost-share assistance, producers take lands out of agricultural production and establish approved resource conserving covers (conservation practices or CPs) to accomplish the goals of CRP: improve water quality, control erosion, and enhance wildlife habitat. The land is enrolled in long-term contracts of ten to 15 years. Prior to contract approval, a site-specific conservation plan must be developed by the USDA Natural Resource Conservation Service (NRCS) or a Technical Service Provider (TSP) following the NRCS Field Office Technical Guide (FOTG).

PURPOSE AND NEED FOR THE PROPOSED ACTION

On September 26, 2006, a legal settlement was signed between the National Wildlife Federation (NWF) (National office and various State offices) and the FSA that mandated allowable frequencies for managed haying and grazing on CRP lands in some States and established Primary Nesting Season (PNS) dates during which no haying or grazing could occur. The settlement applies to new contracts, including re-enrollments, signed after September 25, 2006, or existing contracts that had not had any managed haying and grazing approved prior to that date. The settlement stipulated that if a State wanted to change these mandated terms, an Environmental Assessment (EA) would have to be developed to address the potential impacts associated with managed haying and grazing.

The State Technical Committee and the National Office of FSA propose to change the settlement provisions for managed haying and grazing in the State of Montana. The need for these proposed changes are to (1) effectively manage CRP covers and improve their performance to meet their conservation purpose, and (2) make CRP an attractive program to landowners. Managed haying and grazing has been an important and attractive component of CRP for landowners, many of whom have established haying and grazing into their farming operations and improved their CRP fields in the process.

ELIGIBLE LAND

To be eligible for enrollment in CRP, lands are required to meet cropland or marginal pastureland eligibility criteria in accordance with policy set forth by the Farm Security and Rural Investment Act of 2002 (2002 Farm Bill) and detailed in the FSA Handbook: Agricultural Resource Conservation Program for State and County Offices (USDA/FSA 2003a). Eligible cropland must be planted or considered planted to an agricultural commodity during four of the six crop-years from 1996 to 2001 (as of the 2002 Farm Bill), and must be physically and legally capable of being planted in a normal manner to an agricultural commodity as determined by the County Committee. In addition, eligible cropland must fall into one or more of the following secondary categories:

- Cropland for a field or a portion of a field where the weighted average Erodibility Index (EI) for the three predominant soils on the acreage offered is eight or greater;
- Land currently enrolled in CRP scheduled to expire September 30 of the fiscal year the acreage is offered for enrollment; and
- Cropland located within a National- or State-designated Conservation Priority area.

HAYING AND GRAZING PROVISIONS

The 2002 Farm Bill allowed producers to implement managed haying and grazing on CRP lands with certain practices to improve the quality and performance of the CRP cover. The practice must be fully established for at least one year prior to haying and grazing. Eligible conservation practices (CP) for managed haying and grazing are:

- CP 1: Introduced grasses and legumes
- CP 2: Permanent native grasses
- CP 4B: Permanent wildlife habitat (corridors)(limited to non-easement lands)
- CP 4D: Permanent wildlife habitat (limited to non-easement lands)
- CP 10: Vegetative cover – grass-already established
- CP 18B: Permanent covers reducing salinity (limited to non-easement lands)
- CP 18C: Permanent salt tolerant covers (limited to non-easement lands)

Managed haying and grazing is not authorized for any other CRP practices, land enrolled in useful life easements, or land within 120 feet of a permanent body of water. Prior to implementing managed haying and grazing, a producer must submit a request to the local FSA office and obtain a modified conservation plan. The allowable frequency of haying and grazing varies by State, but can be no more frequent than one out of every three years.

Managed haying and grazing cannot occur on the same acreage in the same year and cannot be conducted on the same acreage used for emergency haying and grazing in the same year. A producer implementing managed haying and grazing is assessed a 25 percent payment reduction of their annual rental rate for the year in which haying or grazing occurs. Managed haying is allowed on 50 percent of a CRP field or contiguous fields for a single period of up to 90 days. Managed grazing is allowed on 100 percent of a field at up to 75 percent of the stocking rate established by the NRCS for a single period of 120 days or two 60-day periods. Managed haying and grazing must be complete by September 30.

PRIMARY NESTING SEASON

Managed haying and grazing is not allowed during the PNS. The PNS is established by the State Technical Committee to protect nesting birds and other important wildlife and varies by State. The State Technical Committee typically consists of representatives from local FSA offices, NRCS, and Federal and State fish and wildlife agencies. The PNS is established to allow sufficient time for nesting and chick rearing periods for grassland birds important to the State. These seasons typically last approximately three to four months during the spring and summer.

PROPOSED ACTION

The Proposed Action is to change the allowable frequencies of managed haying and grazing for the State. Currently in the State under the settlement, managed haying is allowed once every ten years and managed grazing once every five years; and the PNS is May 15 to August 1. Prior to the settlement, managed haying and grazing was allowed every three years and the PNS was May 15 to July 15. Alternative B would allow managed haying once every five years and grazing once every three years with the PNS of May 15 to July 15. Alternative C would allow managed haying once every five years and grazing once every three years with a PNS of May 15 to July 1. Alternative D would allow managed haying and grazing once every five years while keeping the PNS at May 15 to August 1.

NO ACTION ALTERNATIVE

The No Action Alternative, or Alternative A, is carried forward in this EA in accordance with 40 Code of Federal Regulations (CFR) 1502.14(d) to represent the environmental baseline against which to compare the other alternatives. The No Action Alternative would allow managed haying and grazing provisions to continue as they are currently administered in the State: managed haying is allowed once every ten years, with managed grazing allowed once every five years, and a PNS of May 15 to August 1.

AFFECTED ENVIRONMENT

The geographic scope of this analysis is the lands enrolled in CRP within the State of Montana. Managed haying and grazing is a component of the CRP associated with certain practices. The effects associated with implementing these practices were analyzed in a final Programmatic Environmental Impact Statement (PEIS) for the Conservation Reserve Program (USDA/FSA 2003b) and some resource areas have been eliminated based on that environmental evaluation. The affected lands are further limited to those enrolled in CRP under the conservation covers authorized for managed haying and grazing. Resource areas potentially affected by this proposed action and analyzed in detail in this EA include:

- Biological Resources
- Water Quality
- Soil Resources

- Air Quality
- Socioeconomics

Biological resources encompass vegetation, wildlife, and protected species. For this analysis, water resources are limited to surface water quality, and air quality is limited to carbon sequestration.

ENVIRONMENTAL CONSEQUENCES

The environmental consequences from the proposed action alternatives and the No Action alternative are addressed in this EA and summarized in the table below.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES				
Resource	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Biological Resources *Vegetation, Wildlife, and Protected Species*	Under Alternative A, managed haying would occur once every ten years and grazing once every five years outside the PNS of May 15 to August 1. Potential benefits to vegetation of managed haying and grazing, in general, would be similar to those described for Alternative B; however, they would occur less frequently. The PNS would adequately cover the reproductive period of both cool and warm season grasses, reducing potential impacts to their health and vigor. Disturbance rejuvenates grasslands and positively affects plant stand health and vigor. It creates a mosaic of successional habitats that increases diversity that is beneficial for the majority of wildlife. Thatch could increase vegetation densities that would threaten vegetative structure diversity and productivity of the vegetative stand. Excess thatch inhibits vegetative growth, harbors plant pathogens, and reduces the success of desirable plants naturally re-seeding and inter-seeding. Excessive thatch can reduce water filtration to soil, but it also serves as mulch that can	Under Alternative B managed haying would occur once every five years and grazing would occur once every three years, with a PNS of May 15 to July 15. Vegetation would likely be enhanced through increased plant stand health and vigor, increased productivity of grassland plants, and reduced accumulation of thatch. Frequencies of managed haying once every five years and grazing once every three years are within the historic disturbance regimes on the Great Plains that are shown to rejuvenate grasslands. The potential for excessive thatch accumulations and associated negative effects on vegetation and wildlife would be minimized. The loss of plant materials would be short term, and would occur more frequently than either Alternatives A or D. This plant loss could recover through re-growth after haying or grazing if there is sufficient time and enough precipitation before a frost. The PNS would allow	Under Alternative C, managed haying and grazing would occur at the same frequency of Alternative B, but the PNS would be from May 15 to July 1. Impacts would be similar to those described in Alternative B; however, a shortened PNS would allow managed haying and grazing to occur an additional two weeks earlier, potentially impacting both cool and warm season grasses. Cutting or grazing close to the end of the shortened PNS may diminish the health and vigor of these plants. However, as specified by NRCS Practice Code 511 Forage Harvest Management, forage would be cut at a stage of maturity not to hinder regrowth. Furthermore, the minimal remaining stubble heights specified in NRCS Practice Code 511 and NRCS Plant Materials Technical Notes 10 and 53 would ensure survival of both cool and warm season plants. If established provisions standards, and guidelines are followed, and the Conservation Plan is adapted to resource conditions; no	Under Alternative D, managed haying and grazing would occur once every five years outside the PNS of May 15 to August 1. This frequency is within the historic disturbance regimes on the Great Plains that are shown to rejuvenate grasslands. Benefits to vegetation under this alternative would be similar to those described for Alternative B, although impacts associated with grazing would occur only once every five years. The PNS would adequately cover the reproductive period of both cool and warm season grasses, reducing potential impacts to their health and vigor. The reduced frequency of grazing, may allow woody species to encroach on to CRP lands. As with the other action alternatives, the potential for excessive thatch accumulations and associated negative effects on vegetation and wildlife would be minimized. The loss of plant materials would be short term,

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Biological Resources *Vegetation, Wildlife, and Protected Species* (cont'd)	retain soil moisture and protect plants from cold temperatures. However, these impacts are not significant since the conservation cover rarely fails completely. The direct impact of haying and grazing to vegetation is the short-term loss of plant materials, which could recover through plant re-growth after these activities if established provisions, standards, guidelines, and the Conservation Plan are followed and there is sufficient precipitation before a frost.	managed haying and grazing to occur two weeks earlier. This would still provide protection to the reproductive period associated with cool season grasses; yet could impact the health and vigor of warm season grasses. However, as specified by NRCS Practice Code 511 Forage Harvest Management, forage should be cut at a stage of maturity not to hinder regrowth. Furthermore, minimal stubble heights contained in NRCS Practice Code 511 Forage Harvest Management Specifications and Plant Materials Technical Note 53; as well as the reduced stocking rate specified in NRCS Practice Code 528 Prescribed Grazing Specifications would ensure the survival of warm season grasses. Therefore, if established provisions, standards, and guidelines are followed, and the Conservation Plan is adapted to resource conditions, no significant negative impacts to vegetation are expected under Alternative B.	significant negative effects are expected.	and would occur less frequently than the other action alternatives. The plant stand could recover through plant re-growth after haying or grazing if there is sufficient time and precipitation before the first frost. Thus, if established provisions standards, guidelines and the Conservation Plan is adapted to resource conditions, no significant negative effects to vegetation are expected under Alternative D.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Biological Resources *Vegetation, Wildlife, and Protected Species* (cont'd)	Alternative A provides more benefit for large mammals that are primarily browsers and few benefits for grazers by allowing woody vegetation encroachment in grasslands. The longer frequency interval of managed haying and grazing (once every ten and five years, respectively) is not as beneficial for antelope that graze, as this frequency does not provide optimal productivity of the grass and forb component of the vegetative stand. However, these impacts are not significantly negative for large mammals.	Increasing the frequency of haying to once every five years and grazing to once every three years under Alternative B maintains the productivity and vigor of cool season grasslands. Benefits to large mammals that graze would be optimal under this alternative. The increased haying and grazing frequency would also increase the productivity of cool season forage species resulting in improved forage quality. However, large mammals that browse would benefit less under this alternative due to decreased woody vegetation. The shorter PNS is unlikely to impact large mammal fawning/calving as it would likely be finished prior to July 15, with the exception of deer. However, deer prefer areas with more cover for fawning, such as dense shrubs and riparian areas. Due to the limited available habitat CRP provides deer for fawning, there would not likely be an impact to deer populations. No significant negative impacts to large	Benefits to large animals would be similar to those of Alternative B. The shorter PNS is unlikely to impact large mammal fawning/calving as it would likely be finished prior to July 1, with the exception of deer. As with Alternative B, this impact is not expected to be significant due to the limited available habitat CRP provides deer for fawning. No significant negative impacts to large mammals are expected under Alternative C.	This alternative is likely to have similar benefits for large animals as the other action alternatives. Although the frequency of managed haying and grazing of Alternative D is less than the other action alternatives (once every five years), they are within the historic disturbance regime for the Great Plains that maintains the productivity and vigor of grasslands. The frequency of this alternative would be more beneficial than the other action alternatives for large mammals that browse, potentially allowing more growth of woody vegetation over that of the other action alternatives. No significant negative impacts to large mammals are expected from Alternative D.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Biological Resources *Vegetation, Wildlife, and Protected Species* (cont'd)	Species diversity may be reduced for small animals with the longer intervals between managed haying and grazing; however, this interval would reduce direct mortality rates and provide for longer periods for greater numbers of small mammals to recover. Mortality impacts are not expected at the population level from implementation of Alternative A. Direct impacts can be reduced by taking such actions as initiating haying at the center of field to allow for escape to either side, and following the outer most tracks of the previous pass. Additionally, the provisions of leaving half a field unhayed and the use of a reduced stocking rate would further reduce the potential direct impact. Mortality and decreased diversity impacts under Alternative A are not significantly negative for small mammals.	mammals are expected from Alternative B. The frequency of Alternative B of managed haying and grazing once every three years, outside the PNS of May 15 to July 15, maintains early successional environments such as grasslands, which positively impacts small mammals by maintaining optimal habitat. The shorter PNS would not likely affect small mammals as most breed in spring and have litters in the early summer. However, the potential for direct mortality impacts are greater than either Alternative A or D, but not at the population level. Direct impacts would be reduced through procedures discussed for Alternative A. Provided established provisions, standards, and guidelines are followed, and the Conservation Plan is adapted to resource conditions, Alternative B would have no significant negative impact on small mammals.	Potential direct and indirect impacts to small mammals would be the same as those described for Alternative B. The shorter PNS would not likely affect small mammals as most breed in spring and have litters in the early summer. Direct impacts would be reduced through procedures discussed for Alternative A. Provided established provisions, standards, and guidelines are followed, and the Conservation Plan is adapted to resource conditions, Alternative C would have no significant negative impact on small mammals.	Alternative D would likely have similar benefits for small mammals as those described for the other action alternatives. The decreased frequency of managed haying and grazing once every five years would maintain early successional environments that positively impact small mammals. However, it has been documented that small mammal abundance decreases in the third year after disturbance. The potential for direct mortality impacts to small mammals is greater than that of Alternative A; yet less than the other action alternatives. Direct impacts would be reduced through procedures discussed in Alternative A. Provided established provisions, standards, and guidelines are followed, and the Conservation Plan is adapted to resource conditions, Alternative D would have no significant negative impact on small mammals.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Biological Resources *Vegetation, Wildlife, and Protected Species* (cont'd)	The needs of the majority of nesting grassland bird species that benefit from the recommended historic disturbance regimes that rejuvenate grasslands would not be met under this alternative. The overall indirect impact for a majority of the bird species being analyzed would be negative; yet are not significant. Managed haying has the most potential to directly affect the reproductive success of grassland birds. The mourning dove and northern harrier would potentially have one of the greatest exposures of grassland species; with direct impacts to an estimated 28% of their peak breeding period that is not encompassed by the No Action PNS period. Given this exposure, once every ten years the mourning dove could potentially experience 1% mortality. This would be reduced to less than one half of one percent every ten years if only economically viable eligible acreage was hayed. Measures to reduce grassland bird mortality include beginning haying in the middle of a field and use of a	The overall indirect impacts to birds would be positive over time for a majority of the bird species analyzed under Alternative B. This frequency of haying and grazing mimics the historic disturbance regime that creates habitat that is beneficial for most grassland birds. The change in the PNS exposes breeding grassland birds to a greater direct impact because the PNS would cover less of their actual peak breeding season. The savannah sparrow would likely have the greatest exposure to direct impacts with 51% of its peak breeding period not encompassed by the Alternative B PNS period. The estimated mortality rate for the savannah sparrow is expected to be 2% mortality under this alternative once every five years. However, if only economically viable acres are hayed that rate decreases to 1%. With adherence to established provisions, standards, and guidelines and the Conservation Plan adapted to resource	Indirect impacts to grassland birds would be the same as described for Alternative B. Alternative C shortens the PNS to May 15 to July 1; thus breeding grassland birds would have greater exposure to direct impacts because the PNS would cover less of their actual peak breeding season. The savannah sparrow would likely have the greatest exposure to direct impacts with 70% of their peak breeding season exposed. The estimated mortality rate for the savannah sparrow is expected to be 3% under this alternative every five years. If only economically viable acres are hayed mortality decreases to 2.5%. With adherence to established provisions, standards, and guidelines and the Conservation Plan adapted to resource conditions, no significant negative impact on grassland birds is expected.	Benefits for grassland birds under this alternative would be similar to those described for Alternative B; the frequency of managed haying and grazing once every five years is within the historic disturbance regime that maintains beneficial grassland bird habitat. As with Alternative A, the mourning dove and northern harrier would likely have the greatest exposure to direct impacts. Alternative D has the lowest potential for direct impacts of all the action alternatives. Mortality rates are estimated to be 1% for these species, occurring once every five years. Haying only economically acres decreases the potential mortality to less than one half of one percent once every five years. Provided established provisions, standards, and guidelines are followed, and the Conservation Plan is adapted to resource conditions, no significant negative effects are expected.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Biological Resources *Vegetation, Wildlife, and Protected Species* (cont'd)	flushing bar to allow time for evacuation in advance of machinery. Provided established provisions, standards, and guidelines are followed and the Conservation Plan is adapted to resource conditions, Alternative A would have no significant negative impact on grassland birds. The longer interval between disturbances under Alternative A does not maintain microsites preferred by amphibians and reptiles, which may lead to a decrease in abundance and diversity. While short-term losses the year of managed haying and grazing due to trampling and crushing may occur, it would occur less frequently than the action alternatives. Moreover, the reproduction cycle of the amphibians found in Montana requires habitat for breeding and laying eggs that would not be eligible for managed haying and grazing; therefore, it is unlikely that managed haying and grazing would significantly negatively affect entire populations. Direct impacts can be reduced by taking	conditions, no significant negative impact on grassland birds is expected. Alternative B increases the frequency of managed haying once every five years and grazing to once every three years, outside the PNS of May 15 to July 15. The benefits of Alternative B to vegetation from the increased frequency of disturbance also benefit amphibians and reptiles by increasing the diversity in structure and creating or maintaining microsites. The change in PNS would result in greater exposure of nests to direct impacts, yet this impact would be minimal since they generally breed in early spring and are still protected by the PNS period. Direct impacts would be reduced through procedures discussed for	Alternative C shortens the length of the PNS to May 15 to July 1. Impacts to amphibians and reptiles would likely be the same as under Alternative B. However, the change in PNS would result in greater exposure of nests to direct impacts. However, this impact would be minimal since they generally breed in early spring, still within the PNS period. Direct impacts would be reduced through procedures discussed for Alternative A. Provided established provisions, standards, and guidelines are followed, and the Conservation Plan is adapted to resource conditions, no significant impacts to reptiles or amphibians are expected under	Alternative D is similar to the other alternatives in that managed haying would occur once every five years, but decreases the frequency of managed grazing from that of the other action alternatives to once every five years, outside the current PNS of May 15 to August 1. This frequency would provide microsites that are beneficial to amphibians and reptiles by increasing the diversity in structure and creating or maintaining microsites. The potential for direct impacts would be decreased over the other action alternatives as they would occur less frequently. Similarly, the PNS provides the most protection of breeding and

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Biological Resources *Vegetation, Wildlife, and Protected Species* (cont'd)	such actions as initiating haying at the center of fields to allow for escape to either side, and following the outer most tracks of the previous pass. Provided established provisions, standards, and guidelines are followed, and the Conservation Plan is adapted to resource conditions, no significant impacts to reptiles or amphibians are expected under Alternative A. Longer periods between managed haying and grazing are outside the historic disturbance interval for maintaining grassland health and vigor. This translates into a reduction of a mosaic environment that is most beneficial to invertebrate abundance and diversity. Decreases in grazing frequency would also reduce the amount of manure deposited, a food source for many invertebrates. Potential direct impacts would not occur as frequently, reducing invertebrate mortality. This potential is further minimized because the annual period of greatest species diversity and richness is protected by the	Alternative A; no significant negative impacts are expected for amphibians and reptiles. The impacts of haying and grazing to vegetation derived from the proposed frequency (once every five and three years respectively) either positively or negatively impacts species of invertebrates depending upon their life-style and habitat preference. The potential for direct impacts is greatest at these frequencies than either Alternatives A or D. The shorter PNS period still protects the greatest florescence of invertebrates. Positive effects of managed haying and grazing on vegetation benefits invertebrates by increasing the structural diversity and productivity of	Alternative C. Impacts to invertebrates would most likely be the same as described for Alternative B. The shorter PNS period still protects the greatest florescence of invertebrates; therefore, no significant negative impacts are expected under Alternative C.	nesting than the other action alternatives. Provided established provisions, standards, and guidelines are followed and the Conservation Plan is adapted to resource conditions, Alternative D would have no significant negative impact on amphibians or reptiles. The decreased frequency of managed haying and grazing under Alternative D (once every five years) is within the optimal disturbance frequency for rejuvenation of grasslands and provides benefits for invertebrates through increased structural diversity and productivity of grassland plants, as well as the increased amount of manure. The potential for direct impacts is decreased under this alternative. Likewise, the longer time period between disturbances allows for more time for field recolonization. No significant negative impacts to invertebrates are expected

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Biological Resources *Vegetation, Wildlife, and Protected Species* (cont'd)	PNS. Impacts to invertebrates under this alternative are not expected to be significant.	grassland plants, as well as the increased amount of manure, a food source. The areas of the field that are not hayed, and the recovery period between haying and grazing events, provide a source for field recolonization. Provided the Conservation Plan is adapted to resource conditions and applicable provisions, standards, and guidelines are followed, no significant negative impacts to invertebrates are anticipated under Alternative B.		under this alternative if the Conservation Plan is adapted to resource conditions and established provisions, standards, and guidelines are followed.
	Wyoming conservation species respond differently to managed haying and grazing frequency and the effect on vegetation structure. The effects of this alternative would reduce the diversity in vegetation structure allowing tall vegetation to regain dominance. This in turn reduces habitat quality for black-tailed prairie dogs and western hognose snakes, two of the conservation species evaluated. The resulting vegetation would benefit the white-tailed prairie dog and Great Basin pocket mouse due to the increased vegetation height	American Bison may occur on CRP fields; however their primary habitat occurs in areas that are not eligible for managed haying and grazing. The shorter vegetation would benefit the black-tailed prairie dog and western hognose snake, while providing less benefit to white-tailed prairie dog and Great Basin pocket mouse, which prefer taller vegetation. The PNS would expose part of the breeding season for meadow jumping mouse and western hognose snake. However, the	Impacts to State conservation species under this alternative would be similar to Alternative B as the frequencies are the same. The shorter PNS would further expose the reproductive periods of the meadow jumping mouse and the western hognose snake. Again, the primary habitat of the meadow jumping mouse would be protected, thus the increased exposure would not likely be significant. The provision of only haying half a field and the utilization of a reduced stocking rate would	Impacts to State conservation species under this alternative would be similar to Alternative B as the frequency of haying would be the same. The decrease frequency in grazing to once in every five years would allow vegetation to become taller and reduce the diversity in structure; thus reducing the benefit to black-tailed prairie dogs and western hognose snakes. However, the white-tailed prairie dog and Great Basin pocket mouse would benefit. The longer PNS

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Biological Resources *Vegetation, Wildlife, and Protected Species* (cont'd)	and density. The taller vegetation would also benefit the meadow jumping mouse, providing more protective cover in its upland foraging areas. The American Bison would not likely be impacted by this alternative as their primary habitat would not be eligible for managed haying and grazing. Potential direct impacts would occur primarily from haying. These could be reduced by the provision of only haying half a field and initiating haying in the middle of the field and leaving habitat available for escape. Similarly, the reduced stocking rate would reduce potential impacts from grazing. A site-specific evaluation would identify the presence of conservation species and consultation with the State would ensure impacts are avoided or minimized. Prior to managed haying or grazing, a site-specific evaluation would be performed to determine if there are any protected species present or suspected of being present. If such species are potentially present, informal	meadow jumping mouse is primarily found along water-bodies, thus their exposure would not be significant. The western hognose snake's breeding season would primarily be protected by the PNS, thus the impact is not anticipated to be significant. Direct impacts would be reduced through procedures discussed for Alternative A. A site-specific evaluation would identify the presence of conservation species and consultation with the State would ensure impacts are avoided or minimized. Prior to managed haying or grazing, a site-specific evaluation would be performed to determine if there are any protected species present or suspected of being present. If protected species are present or	reduce the potential impact on the western hognose snake. Additionally, direct impacts would be reduced through procedures discussed for Alternative A; no significant negative impacts are expected for any conservation species. A site-specific evaluation would identify the presence of conservation species and consultation with the State would ensure impacts are avoided or minimized. Prior to managed haying or grazing, a site-specific evaluation would be performed to determine if there are any protected species present or suspected of being present. If protected species are present or	of May 15 to August 1 would provide the most protection for the reproductive periods of all conservation species analyzed. Potential direct impacts would be further reduced by the techniques discussed for Alternative A. A site-specific evaluation would identify the presence of conservation species and consultation with the State would ensure impacts are avoided or minimized. Prior to managed haying or grazing, a site-specific evaluation would be performed to determine if there are any protected species present or suspected of being present. If protected species are present or

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Biological Resources *Vegetation, Wildlife, and Protected Species* (cont'd)	consultation with the U.S. Fish and Wildlife Service (USFWS) would occur during the site-specific environmental evaluation to ensure the protection of these species. Formal consultation with USFWS would be completed in the event a practice may affect a listed species. If negative impacts to listed species are identified, it is not likely the land would be approved for managed haying or grazing.	suspected of being present, informal consultation with the USFWS would occur during the site-specific environmental evaluation to ensure the protection of these species. Formal consultation with USFWS would be completed in the event a practice may affect a listed species. If negative impacts to listed species are identified, it is not likely the land would be approved for the managed haying or grazing.	suspected of being present, informal consultation with the USFWS would occur during the site-specific environmental evaluation to ensure the protection of these species. Formal consultation with USFWS would be completed in the event a practice may affect a listed species. If negative impacts to listed species are identified, it is not likely the land would be approved for the managed haying or grazing.	suspected of being present, informal consultation with the USFWS would occur during the site-specific environmental evaluation to ensure the protection of these species. Formal consultation with USFWS would be completed in the event a practice may affect a listed species. If negative impacts to listed species are identified, it is not likely the land would be approved for the managed haying or grazing.
Water Resources *Surface Water Quality*	Under Alternative A, direct impacts to surface water quality are minimized by restricting managed haying and grazing to no closer than 120 feet of a permanent surface waterbody and confining livestock with fencing. Indirect impacts to water quality can occur from soil loss. NRCS Conservation Practice Standard 511 Forage Harvest Management and NRCS Plant Materials Technical Notes 10 and 53 require leaving a two to six inch stubble height after harvest (depending on species), thereby leaving vegetative cover in place and allowing vegetation to recover	Direct and indirect negative effects to surface water quality are minimized under Alternative B by following the same provisions of Alternative A. Although the frequency of Alternative B is increased to once every five years for managed haying and once every three years for grazing, the vegetative cover would continue to reduce potential soil erosion, sedimentation and nutrient deposition into nearby water-bodies. Changing the PNS to end two weeks earlier would protect the health and vigor of cool season grasses, but may	Direct impacts to surface water from managed haying and grazing would be the same as described for Alternative B. However, cutting cool and warm season grasses too close to the end of a shortened PNS period could harm the health and vigor of these plants. As specified by NRCS Practice Code 511 Forage Harvest Management, plants should be cut at a stage of maturity or harvest interval that leaves adequate food reserves, and basal or auxiliary tillers for regrowth without loss of plant vigor. Furthermore, the minimal	Under Alternative D the frequency of managed haying is increased to once every five years, while the frequency of managed grazing and the PNS stays the same as Alternative A. Direct and indirect impacts from managed haying and grazing, and provisions to prevent loss of vegetative cover are the same as described for Alternative A. The PNS under this alternative protects the reproductive period of both cool and warm season grasses. Provided established provisions standards, and guidelines are followed, and the Conservation

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Water Resources *Surface Water Quality* (cont'd)	before frost. Alternative A has little impact on the vegetative stand except the short-term, localized removal during haying or grazing. Maintenance of the vegetative cover reduces the potential for soil erosion, sedimentation and nutrient indirect deposition into nearby waterbodies. Alternative A would allow longer intervals of vegetation recovery between these activities than the action alternatives, especially beneficial if precipitation is not ideal the following growing season. Similarly, the PNS protects the reproductive period of both cool and warm season grasses. There are no significant negative impacts to water quality under Alternative A if the Conservation Plan and established standards, provisions and guidelines are followed.	impact warm season grasses. As specified by NRCS Practice Code 511 Forage Harvest Management, forage should be cut at a stage of maturity not to hinder regrowth. Furthermore, minimal stubble heights contained in NRCS Practice Code 511 Forage Harvest Management Specifications and Plant Materials Technical Note 53; as well as the reduced stocking rate specified in NRCS Practice Code 528 Prescribed Grazing Specifications would ensure the survival of warm season plants. Adherence to the Conservation Plan and established conservation standards, provisions, and guidelines ensures Alternative B would have no significant negative impact on water quality.	remaining stubble heights presented in NRCS Practice Code 511 and NRCS Plant Materials Technical Notes 10 and 53 would ensure survival of both cool and warm season plants. Provided established provisions standards, and guidelines are followed, and the Conservation Plan is adapted to resource conditions, no significant negative effects are expected to water resources.	Plan is adapted to resource conditions, no significant negative effects are expected to water resources.
Soil Resources	Potential direct impacts to soil include altering soil surface roughness, soil biomass, and soil consolidation. However, limiting the stocking rate to 75% of determined total capacity, limiting the total number of days that haying or grazing may take place,	The direct impacts of Alternative B on soil would be similar to Alternative A and may be minimized by employing the same BMPs. The indirect impact of managed haying and grazing under this alternative's frequency is more	Alternative C would have the same frequency-related impacts on soil as Alternative B. However, cutting cool and warm season grasses too close to the end of a shortened PNS period could harm the health and vigor of these plants. As	Direct impacts from managed haying and grazing for Alternative D would be similar to those described for other action alternatives. These impacts may be minimized by employing the same BMPs described for Alternative A. If

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Soil Resources (cont'd)	and employing best management practices (BMPs) to ensure adequate dispersion of livestock minimize this potential. Use of heavy machinery may increase soil compaction, but the longer frequency interval of this alternative and use of BMPs decreases this potential. Alternative A would not indirectly increase soil erosion since it maintains vegetative cover. The PNS protects the reproductive period of both cool and warm season grasses. Similarly, NRCS Conservation Practice Standard 511 Forage Harvest Management and Plant Materials Technical Note 10 require a minimum stubble height of two to six inch stubble height (depending on species) remain after harvest, which would maintain vegetative cover and allow regrowth by the first frost. Longer intervals between managed haying and grazing allow more time for vegetative recovery than the action alternatives, especially beneficial during dry periods. No significant impacts to soil resources are	beneficial for maintaining the health and vigor of the vegetative cover, limiting the potential for increasing soil erosion through vegetative loss. If less than ideal precipitation conditions arise between periods of harvesting, the increased frequency of Alternative B would reduce the potential recovery period more than Alternative A; however, the use of BMPs reduce impacts by maintaining adequate ground cover or litter. An increase in managed haying and grazing frequency over Alternative A may alter cover management subfactors of groundcover, soil surface roughness, soil biomass, and soil consolidation. However, the effects would be minimal, and in the case of soil biomass, may even be beneficial as dead biomass is added to the soil and negative impacts of thatch accumulation would be controlled by more frequent disturbance. Changing the PNS to end two weeks earlier would protect the health and vigor of cool season grasses, but may	specified by NRCS Practice Code 511 Forage Harvest Management, plants should be cut at a stage of maturity or harvest interval that leaves adequate food reserves, and basal or auxiliary tillers for regrowth without loss of plant vigor. Furthermore, the minimal remaining stubble heights presented in NRCS Practice Code 511 and NRCS Plant Materials Technical Notes 10 and 53 would ensure survival of both cool and warm season plants. Provided established standards and procedures to preserve vegetative cover are followed, and the Conservation Plan is adapted to resource conditions, no significant negative effects are expected to soil resources.	less than ideal precipitation conditions arise between periods of harvesting, the increased frequency of Alternative D would reduce the potential recovery period more than Alternative A; however, BMPs would be utilized to reduce impacts through maintaining adequate ground cover or litter. The PNS under this alternative protects the reproductive period of both cool and warm season grasses. No significant impacts to soil resources are expected under this alternative if the Conservation Plan is followed and adapted to resource conditions just prior to haying or grazing.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Soil Resources (cont'd	expected under Alternative A.	impact warm season grasses. As specified by NRCS Practice Code 511 Forage Harvest Management, forage should be cut at a stage of maturity not to hinder regrowth. Furthermore, minimal stubble heights contained in NRCS Practice Code 511 Forage Harvest Management Specifications and Plant Materials Technical Note 53; as well as the reduced stocking rate specified in NRCS Practice Code 528 Prescribed Grazing Specifications would ensure the survival of warm season plants. No significant impacts to soil resources are expected under this alternative if the Conservation Plan is followed and adapted to resource conditions just prior to haying or grazing.		
Air Quality *Carbon Sequestra-tion*	The modeled carbon sequestration rates under Alternative A result in a net increase in carbon accumulation over agricultural production and are not appreciably different from the action alternatives. Alternative A would reduce atmospheric carbon, thereby improving air quality,	Modeling indicates implementing Alternative B sequesters carbon at a rate similar to the other alternatives analyzed, and increases carbon sequestration over agricultural production, benefiting air quality similar to the other alternatives analyzed. No	Alternative C sequesters the same amount of carbon as Alternative B, and increases carbon sequestration over agricultural production, benefiting air quality similar to the other alternatives analyzed. No significant negative impact to air quality is expected from	Modeling indicates implementing Alternative D sequesters carbon at a rate similar to the other alternatives analyzed, and increases carbon sequestration over agricultural production, benefiting air quality. No significant negative impact to air quality is expected

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Air Quality *Carbon Sequestra-tion* (cont'd)	helping mitigate other carbon emissions, and provide a negligible positive impact on global warming. No significant negative impact to air quality is expected under this alternative.	significant negative impact to air quality is expected from Alternative B.	Alternative C.	from Alternative D.
Socio-economics	Analysis of this alternative established that the maximum annual percentage of use for managed haying and grazing activities would be approximately 9% of the economically viable acreage. This equates to an estimated 0.4% increase in beef production and 1.2% increase in hay production. This would generate a small positive increase over the total value of beef and hay production. Under this alternative, the mourning dove (a game species) could experience a mortality of 1% once every ten years if all eligible acreage was hayed. However, if only the economically viable acreage is hayed the mortality decreases to less than 0.2%. These impacts are	Analysis of this alternative established that the maximum annual percentage of use for managed haying and grazing activities would be approximately 18% of the economically viable acreage. This equates to an estimated 0.7% increase in beef production and 2.6% increase in hay production. This would generate a small positive increase over the total value of beef and hay production. Under this alternative, the mourning dove (a game species) could experience a mortality of 2% once every five years if all eligible acreage was hayed. However, if only the economically viable acreage is hayed the mortality decreases to 0.4%. These impacts are	Alternative C impacts are slightly greater that those described for Alternative B since the PNS is reduced by two weeks. The maximum annual percentage of use for managed haying and grazing activities would be approximately 22.3% of the economically viable acreage. This equates to an estimated 0.8% increase in beef production and 3.3% increase in hay production. This would generate a small positive increase over the total value of beef and hay production. Potential for mortality to principal grassland game birds is similar to that of Alternative B. Estimated mortality to the mourning dove is 2% every five years. If only economically viable acreage is hayed the mortality decreases to 1%. These impacts to grassland birds	Alternative D impacts are slightly lower than those described for the other action alternative. The maximum annual percentage of use for managed haying and grazing activities would be approximately 14% of the economically viable acreage. This equates to an estimated 0.4% increase in beef production and 2.3% increase in hay production. This would generate a small positive increase over the total value of beef and hay production. Alternative D has the least potential of the action alternatives for mortality to principal grassland game birds. Estimated mortality to the mourning dove is 1% every five years. If only economically viable acreage is hayed the mortality decreases to 0.2%.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES (CONT'D)				
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Socio-economics (cont'd)	negligible and there would be no significant negative impact to the State recreational economy.	negligible and there would be no significant negative impact to the State recreational economy.	from Alternative C are not considered to be significant and the recreational economy would not be significantly impacted.	Impacts to principal grassland game birds are not significant; hence no significant impact to the State economy is expected.

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ACRONYMS AND ABBREVIATIONS

ACS	American Community Survey
ARMS	Agricultural Resource Management System
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
BMP	Best Management Practice
BNA	Birds of North America
CAA	Clean Air Act
CCC	Commodity Credit Corporation
CEAP	Conservation Effect Assessment Program
CEC	Commission for Environmental Cooperation
CEQ	Council On Environmental Quality
CEPD	Conservation and Environmental Programs Division
CFR	Code of Federal Regulations
CFWCS	Comprehensive Fish and Wildlife Conservation Strategy
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COC	County Committees
COMET-VR	Voluntary Reporting of Greenhouse Gases Carbon Management Evaluation Tool
CP	Conservation Practice
CRIA	Civil Rights Impact Analysis
CRP	Conservation Reserve Program
CSRA	Carbon Sequestration Rural Appraisal
CSU	Colorado State University
CWA	Clean Water Act
DAFP	Deputy Administrator For Farm Programs
EA	Environmental Assessment
EI	Erodibility Index

ACRONYMS AND ABBREVIATIONS (cont'd)

EO	Executive Order
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentive Program
ERS	Economic Research Service
ESA	Endangered Species Act
FAPRI	Food and Agricultural Policy Research Institute
Farm Bill	Farm Security and Rural Investment Act Of 2002
FOTG	Field Office Technical Guide
FSA	Farm Service Agency
GAP	Gap Analysis Program
GIS	Geographical Information System
HEL	Highly Erodible Land
KDWP	Kansas Department of Wildlife and Parks
KSU	Kansas State University
lbs/ac/yr	Pounds Per Acre Per Year
MHI	Median Household Income
MDEQ	Montana Department of Environmental Quality
MFG	Montana Field Guide
MFWP	Montana Fish, Wildlife and Parks
MSU	Montana State University
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NASS	National Agricultural Statistic Service
NEPA	National Environmental Policy Act
NGDP	Nominal State Gross Domestic Product
NO_2	Nitrogen Dioxide
NPWRC	Northern Prairie Wildlife Research Center
NRCS	Natural Resources Conservation Service
NWF	National Wildlife Federation
O_3	Ozone

ACRONYMS AND ABBREVIATIONS (cont'd)

PARC	Partners In Amphibian and Reptile Conservation
Pb	Lead
PCI	Per Capita Income
PEIS	Programmatic Environmental Impact Statement
PNS	Primary Nesting Season
PM	Particulate Matter
ROI	Region Of Influence
RUSLE	Revised Universal Soil Loss Equation
SER	State Ecological Region
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SOC	Soil Organic Carbon
SOM	Soil Organic Matter
STC	State Committee
TES	Threatened And Endangered Species
TMDL	Total Maximum Daily Load
TSP	Technical Service Provider
UMC	University Of Missouri-Columbia
USACE	U. S. Army Corps of Engineers
USC	U.S. Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USDC	U.S. Department of Commerce
USDL	U.S. Department of Labor
USDOI	U.S. Department of The Interior
USFWS	U.S. Fish and Wildlife Service
USFS	U.S. Forest Service
YNP	Yellowstone National Park

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 CONSERVATION RESERVE PROGRAM

The United States Department of Agriculture (USDA) Commodity Credit Corporation (CCC) oversees the Conservation Reserve Program (CRP), the Federal government's largest private land environmental improvement program. Farm Service Agency (FSA) administers CRP on behalf of the CCC. CRP is a voluntary program authorized by the Food Security Act of 1985, as amended, that supports the implementation of long-term conservation measures designed to improve the quality of ground and surface waters, control soil erosion, and enhance wildlife habitat on environmentally sensitive agricultural land.

In exchange for annual rental payments and cost-share assistance, producers take lands out of agricultural production and establish approved resource conserving covers (conservation practices or CPs) to accomplish the goals of CRP: improve water quality, control erosion, and enhance wildlife habitat. The land is enrolled in long-term contracts of ten to 15 years. Prior to contract approval, a site-specific conservation plan must be developed by the USDA Natural Resource Conservation Service (NRCS) or a Technical Service Provider (TSP) following the NRCS Field Office Technical Guide (FOTG).

1.1.1 Eligible Land

To be eligible for enrollment in CRP, lands are required to meet cropland or marginal pastureland eligibility criteria in accordance with policy set forth by the Farm Security and Rural Investment Act of 2002 (2002 Farm Bill) and detailed in the FSA Handbook*: Agricultural Resource Conservation Program for State and County Offices* (USDA/FSA 2003a). Eligible cropland must be planted or considered planted to an agricultural commodity during four of the six crop-years from 1996 to 2001 (as of the 2002 Farm Bill), and must be physically and legally capable of being planted in a normal manner to an agricultural commodity as determined by the County Committee. In addition, eligible cropland must fall into one or more of the following secondary categories:

- Cropland for a field or a portion of a field where the weighted average Erodibility Index (EI) for the three predominant soils on the acreage offered is eight or greater (highly erodible soils);
- Land currently enrolled in CRP scheduled to expire September 30 of the fiscal year the acreage is offered for enrollment; or
- Cropland located within a National- or State-designated Conservation Priority area.

1.1.2 Contract Maintenance, Management and Fire Prevention

Conservation Reserve Program participants must maintain the CRP cover in accordance with their Conservation Plan to control erosion, noxious weeds, rodents, insects, etc. Specific maintenance activities, timing, and duration are developed in consultation with NRCS or TSP and may consist of mowing, burning, and/or spraying. Periodic mowing and mowing for cosmetic purposes is prohibited.

Mid-contract management activities must be a part of the conservation plan and designed to ensure plant diversity and wildlife benefits, while ensuring protection of soil and water resources. Management activities are site specific and must occur before the end of year six of a ten year contract, or the end of year nine of a 15 year contract. Appropriate management is developed with NRCS or TSP and can include light disking, inter-seeding, and other components applicable to the practice installed.

Participants must also manage CRP land for potential fire hazards. Firebreaks may be installed around CRP and must meet NRCS Practice Code 394 standards and be included in the Conservation Plan. Barren firebreaks are only allowed around high-risk areas such as transportation corridors, rural communities, or adjacent farmsteads.

1.2 HAYING AND GRAZING PROVISIONS

The 2002 Farm Bill allowed producers to implement managed haying and grazing on CRP lands with certain practices to improve the quality and performance of the CRP cover. The practice must be fully established for at least one year prior to haying and grazing. Eligible conservation practices for managed haying and grazing are any of the following:

- CP 1: Introduced grasses and legumes
- CP 2: Permanent native grasses
- CP 4B: Permanent wildlife habitat (corridors)(limited to non-easement lands)
- CP 4D: Permanent wildlife habitat (limited to non-easement lands)
- CP 10: Vegetative cover – grass-already established
- CP 18B: Permanent covers reducing salinity (limited to non-easement lands)
- CP 18C: Permanent salt tolerant covers (limited to non-easement lands)

Managed haying and grazing is not authorized for any other CRP practices, land enrolled in useful life easements, or land within 120 feet of a permanent body of water. Prior to implementing managed haying and grazing, a producer must submit a request to the local FSA office and obtain a modified conservation plan. The allowable frequency of haying and grazing varies by State, but can be no more frequent than one out of every three years.

Managed haying and grazing cannot occur on the same acreage in the same year and cannot be conducted on the same acreage used for emergency haying and grazing in the same year. A producer implementing managed haying and grazing is assessed a 25 percent payment reduction of their annual rental rate for the year in which haying or grazing occurs. Managed haying is allowed on 50 percent of a CRP field or contiguous fields for a single period of up to 90 days. Managed grazing is allowed on 100 percent of a field at up to 75 percent of the stocking rate established by the NRCS for a single period of 120 days or two 60-day periods. Managed haying and grazing must be complete by September 30.

1.3 PRIMARY NESTING SEASON

Managed haying and grazing is not allowed during the primary nesting season (PNS). The PNS is established by the State Technical Committee to protect nesting birds and other important wildlife and varies by State. The State Technical Committee typically consists of representatives from local FSA offices, NRCS, and Federal and State fish and wildlife agencies. The PNS is established to allow sufficient time for nesting and chick rearing periods for grassland birds important to the State. These seasons typically last approximately three to four months during the spring and summer.

1.4 PURPOSE AND NEED

On September 26, 2006, a legal settlement was signed between the National Wildlife Federation (NWF) (National office and various State offices) and the FSA that mandated allowable frequencies for managed haying and grazing on CRP lands in some States and established PNS dates during which no haying or grazing could occur. The settlement applies to new contracts, including re-enrollments, signed after September 25, 2006, or existing contracts that had not had any managed haying and grazing approved prior to that date. The settlement stipulated that if a State wanted to change these mandated terms, an Environmental Assessment (EA) would have to be developed to address the potential impacts associated with managed haying and grazing.

The State Technical Committee and the National Office of FSA propose to change the settlement provisions for managed haying and grazing in the State. The need for these proposed changes are to (1) effectively manage CRP covers and improve their performance to meet their conservation purpose, and (2) make CRP an attractive program to landowners. Managed haying and grazing has been an important and attractive component of CRP for landowners, many of which have established haying and grazing into their farming operations and improved their CRP fields in the process.

1.5 THE PROPOSED ACTION

The proposed action is to change the allowable frequencies of managed haying and grazing for the State. Currently in the State under the settlement, managed haying is allowed once every ten years and managed grazing is allowed once every five years; and the PNS is May 15 to August 1 (Table 1.5-1). Prior to the settlement, managed haying and grazing was allowed every three years and the PNS was May 15 to July 15.

Table 1.5-1. Managed Haying and Grazing Frequencies and Primary Nesting Season for Montana

	Pre-Settlement *	Settlement Terms *
Managed Haying	1/3	1/10
Managed Grazing	1/3	1/5
Primary Nesting Season	May 15-July 15	May 15-August 1

*1/*n* Once out of every *n* years

1.6 REGULATORY COMPLIANCE

This EA is prepared to satisfy the requirements of the National Environmental Policy Act (NEPA; Public Law 91-190, 42 U. S. Code [USC] 4321 et seq.); implementing regulations adopted by the Council on Environmental Quality (CEQ; 40 Code of Federal Regulations [CFR] 1500-1508); and FSA implementing regulations, Environmental Quality and Related Environmental Concerns – Compliance with NEPA (7 CFR 799). The intent of NEPA is to protect, restore, and enhance the human environment through well-informed Federal decisions. A variety of laws, regulations, and Executive Orders apply to actions undertaken by Federal agencies and form the basis of the analysis presented in this EA.

1.7 COOPERATING AGENCIES

The development of this EA was a collaborative effort between FSA (lead agency), NRCS, and the U. S. Fish and Wildlife Service (USFWS). Each agency provided input on the development of alternatives to address in this EA, as well as comments on internal and public versions of this EA to ensure adequate coverage and analysis of environmental resources.

1.8 ORGANIZATION OF THE EA

This EA assesses the potential impacts of the Proposed Action and the Alternatives, including the No Action Alternative, on potentially affected environmental and economic resources. Chapter 1.0 provides background information relevant to the Proposed Action, and discusses its purpose and need. Chapter 2.0 describes the Proposed Action and Alternatives. Chapter 3.0 describes the existing conditions (i.e., the baseline conditions against which potential impacts of the Proposed Action and Alternatives are measured) for each of the potentially affected resources. Chapter 4.0 describes potential environmental consequences on these resources. Chapter 5.0 describes potential cumulative impacts and irreversible and irretrievable resource commitments. Chapter 6.0 discusses mitigation measures utilized to reduce or eliminate impacts to protected resources. Chapter 7.0 lists the preparers of this document. Chapter 8.0 contains a list of the persons and agencies contacted during the preparation of this document, and Chapter 9.0 contains references.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

FSA proposes to change the managed haying and grazing provisions in the State. These changes would adjust the allowable frequency of managed haying and grazing. The No Action Alternative is included in this analysis to serve as an environmental baseline. This alternative would allow managed haying and grazing to continue under the current provisions (settlement terms).

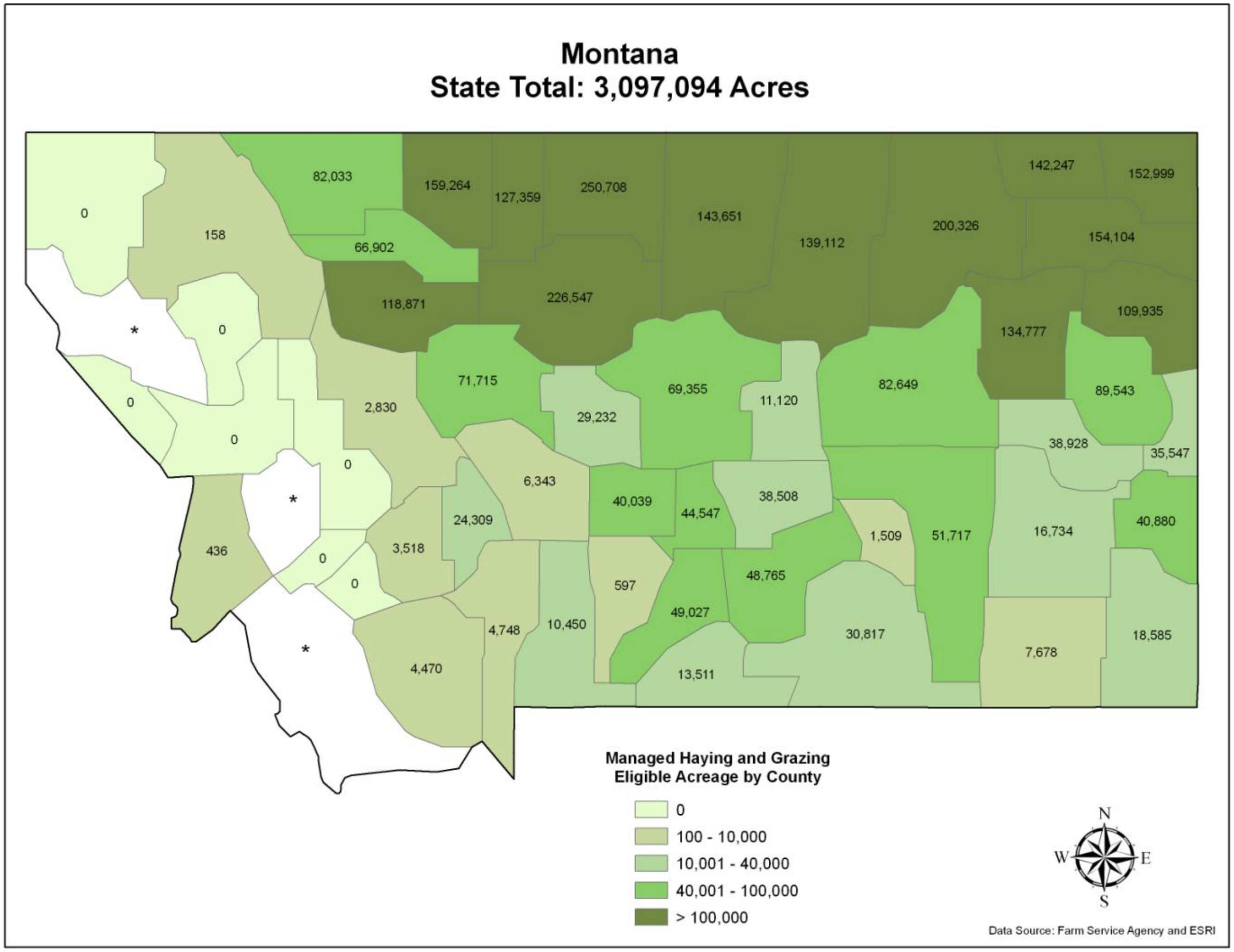
As of August 31, 2008, Montana had over three million acres enrolled in the CRP. Table 2.1-1 lists the number of CRP acres eligible for managed haying and grazing in Montana by the specific CP authorized for these activities. The majority of the eligible acres (47 percent) are enrolled in CP10, vegetative cover – grass-already established. Figure 2.1-1 presents the eligible acreage by county for the State. Total acreage in Figure 2.1-1 is slightly lower than that of Table 2.1-1 as the table is based on total statewide enrollment, while the acreage in the figure is based on county enrollment data. Due to provisions of the 2002 Farm Bill, some counties do not report acreage enrolled in CRP. The figure shows that most of the lands eligible for managed haying and grazing are in eastern and central Montana; whereas several counties in the western Montana do not have any land in conservation practices eligible for managed haying and grazing.

Table 2.1-1. Acreage Eligible for Managed Haying and Grazing by Practice in Montana

Conservation Practice		Montana Acres in Practice	Total Acres in Practice
1	Introduced grasses and legumes	639,715.8	1,680,008.7
2	Permanent native grasses	851,540.7	5,488,997.7
4B	Permanent wildlife habitat (corridors)(limited to non-easement lands)	174.6	4,123.9
4D	Permanent wildlife habitat (limited to non-easement lands)	33,610.3	1,131,866.9
10	Vegetative cover – grass-already established	1,466,572.0	9,653,665.5
18B	Permanent covers reducing salinity (limited to non-easement lands)	102,690.9	125,623.1
18C	Permanent salt tolerant covers (limited to non-easement lands)	3,018.7	118,422.5
Total Eligible for managed haying and grazing		3,097,323.0	18,202,708.3

Source: USDA/FSA 2008a

Figure 2.1-1. CRP Acreage Eligible for Managed Haying and Grazing



(*Data not available due to privacy restrictions required by the Farm Security and Rural Investment Act of 2002)

2.2 DEVELOPMENT OF ALTERNATIVES

A public scoping meeting and a 30-day public comment period were held prior to development of this EA to determine viable options for implementing the proposed changes to managed haying and grazing provisions for the State of Montana. The issues and concerns identified during scoping were assessed by the State Technical Committee, FSA National Office, NRCS, and USFWS to develop the alternatives for adjusting the managed haying and grazing provisions. Table 2.2-1 and the following sections outline the alternatives that would be carried forward in this analysis.

Table 2.2-1. Alternatives to be Addressed in the EA

	Alternative A*	Alternative B*	Alternative C*	Alternative D*
Managed Haying Frequency	1/10	1/5	1/5	1/5
Managed Grazing Frequency	1/5	1/3	1/3	1/5
Primary Nesting Season	May 15 to August 1	May 15 to July 15	May 15 to July 1	May 15 to August 1

*1/*n* Once out of every *n* years

2.2.1 No Action Alternative –Alternative A

The No Action Alternative, or Alternative A, is carried forward in this EA in accordance with the 40 CFR 1502.14(d) to represent the environmental baseline against which to compare the other alternatives. The No Action Alternative would allow managed haying and grazing provisions to continue as they are currently administered in Montana. Currently, haying can occur once every ten years and grazing can occur once every five years; the PNS is from May 15 to August 1.

2.2.2 Alternative B

Alternative B would allow managed haying to occur once every five years and grazing to occur once every three years, and would shorten the PNS to May 15 to July 15. This alternative reverts the frequency of grazing and PNS back to what they were prior to the settlement with NWF.

2.2.3 Alternative C

Alternative C would allow managed haying and grazing at the same frequency as Alternative B, but would shorten the PNS to May 15 to July 1. This alternative would allow producers to start haying or grazing roughly 30 days earlier than current provisions, when the conservation cover presumably has a higher nutrient value.

2.2.4 Preferred Alternative – Alternative D

Alternative D changes the haying frequency to once every five years, leaving the grazing frequency at once every five years and the PNS as May 15 to August 1 as in Alternative A.

2.3 RESOURCES ELIMINATED FROM ANALYSIS

CEQ Regulations (40 CFR 1501.7) state that the lead agency shall identify and eliminate from detailed study the issues that are not important or that have been covered by prior environmental review, narrowing the discussion of these issues in the document to a brief presentation of why they would not have a dramatic effect on the human or natural environment. Managed haying and grazing is a component of the CRP associated with certain practices. The effects associated with implementing these practices were analyzed in a final Programmatic Environmental Impact Statement (PEIS) for the Conservation Reserve Program (USDA/FSA 2003b) and some resource areas may be eliminated based on that environmental evaluation. This analysis focuses on the potential effects of adjusting the provisions of managed haying and grazing on CRP land. For this proposed action the following resource areas have been eliminated from detailed analysis:

2.3.1 Noise

Implementing the action alternatives would not permanently increase ambient noise levels at or adjacent to the project area. Slight increases in noise levels associated with haying would be minor, temporary, and would cease once haying was complete. This equipment noise would not be any different than what is normally experienced on farmland.

2.3.2 Cultural Resources

Prior to enrollment into CRP, site-specific environmental evaluation to identify cultural resources must be completed. Since managed haying and grazing can only occur on CRP fields, an impact to cultural resources is not expected.

2.3.3 Wetlands, Groundwater, Floodplains, Sole Source Aquifers

Water resources for this analysis have been restricted to surface water quality. Managed haying and grazing on CRP land would not create different or additional impacts than those described in the CRP PEIS for wetlands, groundwater, floodplains, or sole source aquifers (USDA/FSA 2003b).

2.3.4 Coastal Zones and Barriers

The proposed actions or alternatives would occur within the interior United States; therefore, coastal zones would not be affected.

2.3.5 National Natural Landmarks

Managed haying and grazing would occur on privately owned CRP lands only. There is no potential for this activity to occur on National Natural Landmarks.

2.3.6 Prime and Unique Farmland

Managed haying and grazing occurs on CRP land that has already been taken out of agricultural production; therefore, prime and unique farmland would not be affected.

2.3.7 Environmental Justice

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was issued by President Clinton in 1994. The potential impacts of CRP to environmental justice were evaluated in the 2003 CRP PEIS (USDA/FSA 2003b). Managed haying and grazing does not increase the total acreage that may be enrolled in the CRP and does not introduce any new impacts that have not been previously assessed, thus environmental justice is eliminated from analysis in this EA.

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3.0 AFFECTED ENVIRONMENT

3.1 BIOLOGICAL RESOURCES

3.1.1 Definition of the Resource

Biological resources include plant and animal species and the habitats in which they occur. For this analysis, biological resources are divided into the following categories: vegetation; wildlife; protected species and their critical habitat. Vegetation and wildlife refer to the plant and animal species, both native and introduced, which characterize a region. For this analysis, noxious weeds are not discussed since CRP contracts require Conservation Plans that include control of such species. Protected species are those federally designated as threatened or endangered and protected by the Endangered Species Act (ESA) and those designated by the State of Montana as threatened or endangered under Montana Statue 87-5-101-132. Critical habitat is designated by the USFWS as essential for the recovery of threatened and endangered species (TES), and like those species, is protected under ESA.

The Commission for Environmental Cooperation (CEC) Ecoregion Level I map (CEC 1997) was used to identify major ecoregions within Montana to organize and evaluate the biological resources of the State in context with the managed haying and grazing on CRP lands. Ecoregions are areas of relatively homogenous soils, vegetation, climate, and geology, each with associated wildlife adapted to that region. Montana lies within two CEC Level I ecoregions: the Great Plains, covering the majority of the State; and the Northwest Forested Mountains in the western third of the State. Potentially affected wildlife species were identified by consulting Montana Fish, Wildlife and Parks ([MFWP] 2008a, 2008b). Species of greatest conservation need were identified using Montana's Comprehensive Fish and Wildlife Conservation Strategy (CFWCS) (MFWP 2005). The CFWCS is the result of a coordinated effort by natural resource managers, non-government groups, universities, and the public to identify and rank species and areas within the State that are in need of conservation. Grassland bird species to be evaluated were identified by reviewing the Northern Prairie Wildlife Research Center (NPWRC) document, *Effects of Management Practices on Grassland Birds* (Johnson et al. 2004), which contains a synthesis of the literature on North American grassland birds. Protected species were identified using the USFWS TES system website (U.S. Department of the Interior [USDOI]/USFWS 2008a).

Scientific names for plant and wildlife species discussed in this document are provided in Appendix A.

3.1.2 Affected Environment

3.1.2.1 Vegetation

Climate greatly affects vegetation type and the health and vigor of plants. Climatic variations in Montana are large, as indicated by the large range in elevation and topography – from high mountains in the west (generally, the Northwestern Forested Mountain ecoregion) to relatively flat plains in the east (the Great Plains ecoregion). The Continental Divide traverses the State from north to south in the western half. West of the divide, winters are milder, precipitation is more evenly distributed throughout the year, summers are cooler and winds are lighter than on the eastern side. There is more cloudiness west of the divide, humidity is higher and the growing season is shorter. On the eastern side of the State, in the agricultural area, the climate is continental and the growing season is typically four months or more in length. Much of the State has freeze-free periods longer than 130 days, but some of the higher valleys in the western mountains have no freeze-free periods. Average annual precipitation varies widely and depends largely on topographical influences, ranging from less than 15 inches per year over much of the central and eastern plains (about half of the precipitation comes in the warm months) to over 60 inches in the high mountain peaks (most of which is snowfall). Rainfall is concentrated in the warm months, from May to July. Thunderstorms are common, particularly during July and August (Western Regional Climate Center [WRCC] 2008).

The vegetation in the two ecoregions of Montana is structurally very different. The Great Plains ecoregion is dominated by grass species, while the Northwestern Forested Mountains ecoregion contains a mixture of trees, shrubs, and grasses. Most of the current CRP lands in Montana are in the Great Plains ecoregion, with very little CRP in the Northwestern Forested Mountain ecoregion.

Great Plains Ecoregion

The Great Plains ecoregion extends across a large section of the center of the North American continent. It is distinguished by relatively little topographic relief, grasslands and a paucity of forests, and subhumid to semiarid climate (CEC 1997). In Montana, the Great Plains primarily consists of short grass prairie, due to the rain shadow effect of the Rocky Mountains and the short growing season. Native cool season grasses are a dominant component of the grasslands in Montana. Cool season grasses (brome, wheatgrass, and wildrye) actively grow during cooler temperatures and are tolerant of cold temperatures. Warm season grasses also occur, which are generally perennial bunchgrasses (grama grass, bluestem, and switchgrass) and peak growth occurs from June through August. These prairies have historically experienced a natural disturbance at an interval of three to five years in the form of fire. However, through settling and development of these prairies this historical disturbance has been suppressed (Umbanhowar 1996).

The plains in northeastern Montana consist of gently undulating to rolling continental glacial till plains with areas of kettle holes, kames, and moraines. The natural prairie vegetation is characterized by western wheatgrass, needle and thread, green needlegrass, and blue grama. Little bluestem occurs on sloping and thin soils. Prairie cordgrass, northern reedgrass, and slim sedge occur on wet soils. Western snowberry and prairie rose are common shrubs. Dryland farming and livestock grazing occur on most of the area (McNab and Avers 1994).

The plains in southeastern Montana consist of gently sloping to rolling, moderately dissected shale plains. There are some steep, flat-topped buttes. Most of the area has natural prairie vegetation, which includes western wheatgrass, green needlegrass, blue grama, needle and thread, and buffalograss. Bluebunch wheatgrass, little bluestem, and sideoats grama occur on shallow soils. Common shrubs in draws and along streams include buffaloberry, chokecherry, snowberry, and sagebrush. Fire and drought are the principal natural sources of disturbance. Dryland farming and livestock grazing occur on about 85 percent of the area (McNab and Avers 1994).

Northwestern Forested Mountains Ecoregion

This ecoregion extends from Alaska through northern California and into Nevada, and includes western Montana. It is defined by its topography, i.e., the chain of mountains that traverses its whole length. It contains the highest mountains of North America and some of the continent's most diverse mosaics of ecosystem types, ranging from alpine tundra to dense conifer forests to dry sagebrush and grasslands. The extensive mountains and plateaus are separated by wide valleys and lowlands. Vegetative cover is extremely diverse: alpine environments contain various herb, lichen and shrub associations; whereas, the subalpine environment has tree species such as lodgepole pine, subalpine fir, silver fir, grand fir, and Engelmann spruce. With decreasing elevation, the vegetation of the mountainous slopes and rolling plains turns into forests characterized by ponderosa pine, Douglas fir, lodgepole pine, trembling aspen, western hemlock, western red cedar, and western white pine. Shrub vegetation found in the drier areas includes big sagebrush, rabbit brush and antelope brush. Most of the natural grasslands that were found in drier areas have vanished, replaced by urban settlement and agriculture.

CRP Practices

The CRP practices that are eligible for managed haying and grazing have been planted with a variety of species, depending upon the conservation goal of the management applied to the field. These CPs include permanent native grasses, grasses already established, permanent wildlife habitat, and permanent covers to reduce salinity and permanent salt tolerant covers. Table 3.1-1 presents those species that are typically utilized for the respective CRP practices.

Table 3.1-1. Plant Species Typically Used for Grassland CRP Practices in Montana

GRASS SPECIES	
Cool Season	
Altai wildrye	Indian ricegrass
Basin wildrye	Kentucky bluegrass
Beardless wildrye	Mammoth wildrye
Bottlebrush squirreltail	Meadow bromegrass
Canada bluegrass	Meadow foxtail
Canada wildrye	Mountain bromegrass
Canby bluegrass	Needle and thread
Creeping foxtail	Nuttall alkaligrass
Dahurian wildrye	Orchard grass
Green needlegrass	Perennial ryegrass
Hard fescue	Prairie junegrass
Idaho fescue	Reed canarygrass

Table 3.1-1. Plant Species Typically Used for Grassland CRP Practices in Montana (cont'd)

GRASS SPECIES	
Cool Season	
Russian wildrye	Spike fescue
Sandberg bluegrass	Tall fescue
Sheep fescue	Timothy
Smooth bromegrass	Tufted hairgrass
Warm Season	
Alkali sacaton	Prairie cordgrass
Big bluegrass	Prairie sandreed
Big bluestem	Sand bluestem
Blue grama	Sand dropseed
Buffalograss (bur)	Sideoats grama
Indiangrass	Switchgrass
Little bluestem	
LEGUME SPECIES	
Introduced Legume Species	**Native Forb And Legume Species**
Alfalfa	Globe mallow
Alsike clover	Indian blanket flower
Birdsfoot trefoil	Lewis flax
LEGUME SPECIES	
Introduced Legume Species	**Native Forb And Legume Species**
Cicer milkvetch	Dotted gayfeather
Red clover	Maximilian sunflower
Sainfoin	Prairie coneflower
Small burnet	Purple prairieclover
Strawberry clover	Rocky Mountain penstemon
White clover (ladino)	Western yarrow
White sweetclover	White prairieclover
Yellow sweetclover	

Source: USDA/NRCS 2007a

3.1.2.2 *Wildlife*

Montana encompasses a wide array of plant communities and associated topography that support a diverse wildlife population. The following is a discussion of wildlife organized by major groupings.

Mammals

Montana is home to breeding populations of over 110 species of mammals. Among them are elk, black bears, grizzly bears, antelope, bighorn sheep, mountain goats, moose, caribou, American Bison and mountain lions. The preferred habitat for many Montana mammals is either grassland or includes a grassland component (e.g., feeds in grasslands). Small mammals commonly found in Montana grasslands that could use CRP lands include prairie dogs, rabbits, mice, and voles.

Birds

It is estimated that Montana has over 250 species of birds that breed in the State (MFWP 2008b). Additionally, over 170 bird species migrate through Montana during the spring and fall. Based on range information in the *Breeding Bird Survey* (Sauer et al. 2008) and the *Birds of North America* (BNA) accounts (Poole 2005), 62 bird species were identified as obligate or facultative grassland bird species that occur in Montana, some of which potentially breed in the State (Vickery et al. 1999) (Table 3.1-2, Appendix D).

Table 3.1-2. Grassland Bird Species that Potentially Occur in Montana

Waterfowl	**Nightbirds**
American wigeon	Common nighthawk
Blue-winged teal	Common poorwill
Gadwall	**Passerines**
Green-winged teal	American pipit
Mallard	Baird’s sparrow
Northern pintail	Bobolink
Northern shoveler	Brewer’s blackbird
Upland Gamebirds	Brown-headed cowbird
Gray partridge	Cassin's kingbird
Ring-necked pheasant	Chestnut-collared longspur
Sharp-tailed grouse	Clay-colored sparrow
Waterbirds	Common yellowthroat
American bittern	Dickcissel
Hawks and Falcons	Eastern bluebird
American kestrel	Eastern kingbird
Ferruginous hawk	Grasshopper sparrow
Merlin	Horned lark
Northern harrier	Lark bunting
Prairie falcon	Lark sparrow
Swainson’s hawk	Le Conte’s sparrow
Cranes	Loggerhead shrike
Sandhill crane	McCown’s longspur

Table 3.1-2. Grassland Bird Species that Potentially Occur in Montana (cont'd)

Shorebirds	**Passerines** (cont'd)
Killdeer	Mountain bluebird
Long-billed curlew	Red-winged blackbird
Marbled godwit	Savannah sparrow
Mountain plover	Say's phoebe
Upland sandpiper	Sedge wren
Willet	Sprague's pipit
Wilson's phalarope	Vesper sparrow
Wilson's snipe	Western bluebird
Owls	Western kingbird
Barn owl	Western meadowlark
Burrowing owl	**Dove**
Long-eared owl	Mourning Dove
Short-eared owl	

Each grassland bird species has unique habitat requirements but general requirements are provided in Table 3.1-3. These are the basic requirements that should be evaluated when management of birds is being considered (USDA/NRCS 1999a).

Amphibians and Reptiles

Amphibians and reptiles in Montana include salamanders, toads, frogs, turtles, lizards, and snakes. Montana is home to breeding populations of an estimated 15 amphibian species and 17 reptile species (MFG 2008).

Invertebrates

A wide diversity of terrestrial insects exists throughout Montana (MFG 2008). Adequate inventory and distribution information is unavailable for predicting status and trends for most invertebrates (Mac et al. 1998). Limited information on the insect species of Montana indicates that the following insect orders may be affected to some extent by changed grazing and haying practices: butterflies and moths, grasshoppers and locusts, mayflies, springtails, dragonflies and damselflies, and true bugs such as leafhoppers and cicadas. Although these orders cover a large number of species and widely varying life cycles, most are active through the summer months from as early as April into October and later in some cases.

3.1.2.3 Conservation and Protected Species

The CFWCS evaluates all vertebrate and some invertebrate species known to occur in Montana of greatest conservation need within the State (MFWP 2005). These species include amphibians, birds, fish, invertebrates, mammals, and reptiles, and have been prioritized into four levels based

Table 3.1-3. Grassland Habitat Preferences of Common Nesting Birds in Montana

Habitat Component	Habitat Requirements
General	• Grasslands, crop/grassland/forb-mixed communities, prairies, meadows, hayfields, grazed pastures and rangelands, reverted agricultural fields, idle pastures and old fields, utility and roadway right-of-ways and other strip habitats, coastal grasslands, and other open herbaceous habitats.
Food	• Insects and other invertebrates • Fruits, seeds, and cultivated crops: wild berries, weed seeds, exotic grass seeds, seeds of sedges, corn, oats, wheat, barley, other small grain crops • Native grasses seeds: big bluestem, little bluestem, switchgrass, Indiangrass, green needlegrass, western wheatgrass, side-oats grama
Grassland Obligate Species	• Mixture of short, medium, and tall grass areas in large, unbroken grassland blocks with less than 5% woody vegetation cover. Native grasses provide optimal conditions, but introduced cool season grasses may also provide suitable habitats for many grassland birds.
Minimum Habitat Size	• Minimum size of suitable nesting and breeding habitat required to support a breeding population of grassland birds varies among species. Depending on species habitat objectives, minimum habitat size may range from as little as ten acres to as much as 500 acres or more. For grassland bird management, at least 40 acres of grassland should be available unless adjacent to larger grass habitat blocks.

Source: USDA/NRCS 1999a

on criteria outlined in the CFWCS. For purposes of this assessment, only Tier 1 species (the highest priority species) are considered and only species that could occur in CRP lands, for example, no fish are considered. Additionally, because the bird analysis for this EA comprehensively evaluates grassland bird species that potentially occur on CRP land, birds are not addressed in this section. The Tier 1 species of greatest conservation need evaluated include 15 mammals, five reptiles, and three amphibians (Appendix D).

Federal and State listed species are protected at the Federal level by the ESA and at the state level the Montana Statue 87-5-101-132. In Montana, eleven wildlife species and three plant species are considered endangered or threatened by the USFWS in accordance with the ESA. Three of the Federally protected wildlife species are fish (aquatic species) and thus eliminated from this evaluation. Montana Statue 87-5-101-132 only considers wildlife species, which closely follows the Federal listed species, with two exceptions: exclusion of the Eskimo curlew and inclusion of the bald eagle as threatened. A total of nine species were evaluated in this assessment (MFWP 2008b; USDOI/USFWS 2008a) (Appendix E).

Critical habitat, as defined by ESA, is designated in Montana for piping plover and has been proposed for Canada lynx. Designated critical habitat for the piping plover includes prairie alkali wetlands and surrounding shoreline; river channels and associated sandbars and islands; and reservoirs and inland lakes and their sparsely vegetated shorelines, peninsulas, and islands. Areas within 120 feet of a permanent water body have been excluded from managed haying and grazing; therefore, these critical habitat areas would not be affected. Areas proposed as critical habitat for Canada lynx include boreal forest landscapes that provide one or more of the following beneficial habitat elements: snowshoe hares for prey, abundant large woody debris piles that are used as dens, and deep, loose-packed snow for extended periods in the winter. CRP does not occur in boreal forest habitats; therefore, proposed critical habitat areas for Canada lynx would not be impacted.

3.2 WATER QUALITY

3.2.1 Definition of the Resource

Water resources within the United States are protected by the Clean Water Act (CWA) (33 USC 26 parts 1251 et seq., 2000). The Act is jointly enforced by the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE), with final authority resting with the EPA. The Act was created to protect stream and wetland water quality. It established the basic structure for regulating discharges of pollutants into the waters of the U.S. It gave the EPA authority to implement pollution control programs such as setting wastewater standards for industry. The CWA also continued requirements to set water quality standards for all contaminants in surface waters. The CWA made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions. In conjunction with this broad goal, the 404b(1) guidelines require that all projects avoid or minimally impact waters of the United Sates in rivers, streams, estuaries, coastal waters, and wetlands (wet meadows, swamps, bogs, etc.).

3.2.2 Affected Environment

3.2.2.1 Surface Water Quality

This section characterizes existing water resources, focusing on water quality statewide and highlighting impaired and notable waterbodies. Information for this section was compiled from data assessments prepared by the EPA Water Quality Criteria Program and the Montana Water Quality Planning Bureau. Montana contains headwater streams of the Clark Fork-Pend, Oreille-Columbia, Missouri-Yellowstone-Mississippi, and St. Mary-Saskatchewan-Nelson watersheds. For administrative purposes, the Montana Department of Environmental Quality (MDEQ) has grouped the State's sixteen sub-major basins into four administrative basins: Columbia, Upper Missouri, Lower Missouri, and Yellowstone, as further described below (MDEQ 2006). Data on the impaired water bodies and individual use support is presented in Appendix B.

Montana River Basins

The Columbia administrative basin includes all of Montana's west-draining waters, including the Upper and Lower Clark Fork, Flathead, and Kootenai rivers drainage basins. The Columbia basin consist of 16,997 miles of perennial streams, 12,522 miles of ephemeral and intermittent streams, 1,022 miles of ditches and canals, and 226,986 miles of lakes, reservoirs and wetlands (MDEQ 2006).

The Upper Missouri administrative basin is comprised of the Upper Missouri and Missouri-Sun-Smith drainage basins. The drainage basins include the Missouri River drainage downstream to the confluence with the Marias River. The Upper Missouri administrative basin includes 14,603 miles of perennial streams, 17,858 miles of ephemeral and intermittent streams, 2,504 miles of ditches and canals and 101,613 miles of lakes, reservoirs and wetlands (*Ibid*).

The Lower Missouri administrative basin includes the remaining Missouri River drainage in the State (Middle Missouri and Lower Missouri basins), the Marias, Musselshell, and Milk river basins and the Montana headwaters of the St. Mary drainage. The Lower Missouri administrative basin includes 8,872 miles of perennial streams, 47,713 miles of ephemeral and intermittent streams, 1,637 miles of ditches and canals and 344,163 miles of lakes, reservoirs and wetlands (*Ibid.*).

The Yellowstone administrative basin is comprised of all waters of the Yellowstone River in Montana, including the Upper, Middle and Lower Yellowstone drainage basins. The waters of the Little Missouri drainage in southeast Montana are also included in this basin. The Yellowstone administrative basin includes 9,171 miles of perennial streams, 38,972 miles of ephemeral and intermittent streams, 1,951 miles of ditches and canals and 22,064 miles of lakes, reservoirs and wetlands (*Ibid.*).

3.2.2.2 Montana Water Quality Standards, Water Classification System, and TMDLs

Montana's Water Quality Standards, known as the Circular DEQ-7, developed in compliance with the Montana Water Quality Act and Section 303(c) of the Federal CWA, contains numeric water quality standards for Montana's surface water. The standards are designed to protect the designated beneficial uses of State waters, such as the support of aquatic life, public water supplies, recreation, or agriculture. The numeric water quality standards in the Circular have been established for parameters that are categorized as toxic, carcinogenic, bioconcentrating, radioactive, nutrient, or harmful.

Montana's waterbodies are classified according to the present and future beneficial uses that the waterbody should be capable of supporting according to the Montana Water Quality Act. The State surface water Classification System identifies the following beneficial uses:

- Drinking, culinary use, and food processing
- Aquatic life support for fishes and associated aquatic life, waterfowl, and furbearers
- Bathing, swimming, recreation, and aesthetics
- Agriculture water supply
- Industrial water supply

Montana's surface water use classification system categories have associated beneficial uses based primarily on water temperature, fish, and associated aquatic life (MDEQ 2006). Appendix B describes the designated beneficial uses by waterbody class. A waterbody is considered to support its beneficial uses when it meets the water quality standards established to protect those uses. A waterbody is considered to be impaired when there is a violation of the water quality standards established to protect any of the applicable beneficial uses.

In 2000, nonpoint source pollution (pollution generated from diffuse sources, rather than a concentrated discharge) accounted for 90 percent of the stream and 80 percent of the lake impairments in Montana. Based on 2000 Impaired Waters List (303 (d)), the five leading causes of water quality impairments in Montana for rivers and streams were:

1. Agriculture
2. Hydrologic modification
3. Resource extraction
4. Habitat modification
5. Construction

The five leading causes of water quality impairments in Montana for lakes were:

1. Atmospheric deposition
2. Agriculture
3. Resource extraction
4. Debris and bottom deposits due to agriculture, resource extraction, construction, etc.
5. Hydrologic modification

The MDEQ is developing Total Maximum Daily Loads (TMDLs) for impaired or threatened waterbodies. An impaired waterbody is defined as "A waterbody or stream segment for which sufficient credible data shows that the waterbody or stream segment is failing to achieve compliance with applicable water quality standards (nonsupport or partial support of beneficial uses)." The 2006 Montana Impaired Waters List (i.e., 303(d) list) contains 651 streams and 26 lakes. High priority TMDL Planning areas are listed in Appendix B.

3.2.2.3 Water Quality Monitoring Program

The Montana Water Quality Planning Bureau Monitoring Program consists of eight monitoring projects which are described below (MDEQ 2006).

1. Reassessment Monitoring.
2. Reference Site Monitoring.
3. Environmental Monitoring and Assessment Program.
4. Lakes and Reservoirs Monitoring.
5. Large Rivers Monitoring.
6. Fixed Station Monitoring.

7. Biological Monitoring.
8. Wetlands Monitoring Program

3.3 SOIL RESOURCES

3.3.1 Definition of the Resource

Soil taxonomy was established to classify soils according to the relationship between soils and the factors responsible for their character (USDA/NRCS 1999b). Soil taxonomy has ordered soils into four levels of classification, the highest being the soil order. For the purposes of this analysis, soil resources include all soil orders within the State of Montana.

3.3.2 Affected Environment

The affected environment for soil orders includes the entire State of Montana. The western portion of Montana has been classified by the NRCS as part of the Rocky Mountain Range and Forest Region. This region contains soils that are dominantly Alfisols, Entisols, Inceptisols, and Mollisols (USDA/NRCS 2006a, 2008c). The major soil resource concerns in the region are water erosion, steep slopes, shallow and rocky soils, and a short growing season (USDA/NRCS 2006a).

The southeastern portion of Montana has been classified by NRCS as part of the Western Great Plains Range and Irrigated Region. The dominant soils in this region are Entisols and Mollisols; although Alfisols, Aridisols, Inceptisols, and Vertisols are markedly present as well (USDA/NRCS 2006a, 2008a, 2008b). The main soil resource concerns in the region are overgrazing and wind and water erosion (USDA/NRCS 2006a).

The northern part of Montana in the middle and eastern portions is classified by NRCS as part of the Northern Great Plains Spring Wheat Region, in which the predominant soils are Mollisols (USDA/NRCS 2006a, 2008a). Major soil resource concerns in this region include reduced nutrient content, increasing salinity, and wind and water erosion (USDA/NRCS 2006a).

A very small area in the middle south of the State is classified by NRCS as part of the Western Range and Irrigated Region. Soils in this region are mainly composed of Aridisols, Entisols, and Mollisols (USDA/NRCS 2006a, 2008a). The main soil resource concerns in this region include soil productivity, as well as the salt and sodium content of the soils (USDA/NRCS 2006a).

NRCS soil taxonomy maps demonstrate that Andisols are present along the Idaho border in northwestern Montana. There are also small areas in which Histosols and Spodosols are present in the southwestern quadrant of the State (USDA/NRCS 2006a, 2008a, 2008b).

The section below provides a more detailed description of each soil order within the State excerpted from *The Nature and Property of Soils* by Brady (1990) and *Soil Taxonomy: A Basic System of Soil Classification for Making and Interpreting Soil Surveys* by USDA/NRCS (1999b).

3.3.3 Soil Orders

Alfisols

Alfisols are moist mineral soils having no mollic epipedon or oxic or spodic horizons. They have gray to brown surface horizons, medium- to high-base status, and contain an illuvial horizon in which silicate clays have accumulated. Alfisols are formed in cool to hot humid areas but are also found in the semiarid tropics. Most often Alfisols are developed under native deciduous forests, although in some cases grass is the native vegetation. In general, Alfisols are productive soils. In the United States these soils rank favorably with the Mollisols and Ultisols in their productivity. Alfisols within Montana are primarily in the western and northern areas of the State, with some presence in the southeastern part of the State.

Andisols

Andisols are composed of material deposited within recent geologic time by volcanoes and are found in areas with significant depths of volcanic material accumulation. The volcanic materials have weathered in place to produce amorphous or poorly crystallized minerals with the colloidal fraction of at least the upper 35 centimeters of the soil dominated by silicate minerals. Andisols occur in some very productive wheat growing soils in the northwestern States. Within Montana, Andisols are found along the northern part of the State's western border, which is shared with Idaho.

Aridisols

Aridisols are dry soils which are characterized by a generally light colored, low in organic matter, ochric epipedon. Calcium carbonate, gypsum, soluble salts, and sodium commonly accumulate in these soils. Conventional crop production generally cannot be carried out in Aridisols due to low moisture during most of the year, except in areas with groundwater or irrigation. Even in areas with groundwater, Aridisols are not often productive for crops due to the accumulation of soluble salts to levels that most crop plants cannot tolerate. However, in carefully managed areas with irrigation, Aridisols may be highly productive. Aridisols within Montana are found primarily in the southern portion of Montana.

Entisols

Entisols are weakly developed mineral soils without natural genetic (subsurface) horizons or with only the beginnings of such horizons. The only features common to all soils of the order are the virtual absence of diagnostic horizons and the mineral nature of the soils. Soils of this order are found in a wide variety of environmental conditions. The agricultural productivity of Entisols varies greatly depending upon their location and properties. With adequate fertilization and a controlled water supply, some Entisols are quite productive; in fact, Entisols developed on alluvial floodplains are among the world's most productive soils. However, restrictions on the depth, clay content, or water balance of most Entisols limit the intensive use of large areas of these soils. Entisols are found scattered throughout Montana, but are found in the greatest concentrations in the eastern half of the State.

Histosols

Histosols are soils with a high organic carbon content. The minimum organic carbon content is 12 percent, with the higher requirement of 18 percent organic carbon in soils that are 50 percent or more clay. Histosols can form in any climate as long as there is a water-saturated environment, such as a peat bog. However, Histosols may never have permafrost within 100 centimeters of the soil surface or within 200 centimeters of the soil surface when gelic materials are present within 100 centimeters of the soil surface. When artificially drained, Histosols are one of the most productive soils for vegetable crops. Within Montana, Histosols are found in a very small area in the southwestern part of the State.

Inceptisols

Inceptisols are soils that are of cool to very warm, humid and subhumid regions, with a cambic horizon and an ochric epidedon. The order of Inceptisols includes a wide variety of soils. In some areas, Inceptisols are soils with minimal development, while in other areas they are soils with diagnostic horizons that merely fail the criteria of the other soil orders. The horizons of Inceptisols are thought to form quickly and result mostly from the alteration of parent materials. These soils range from very poorly drained to excessively drained. Inceptisols commonly occur on landscapes that are relatively active, such as mountain slopes, where erosional processes are actively exposing unweathered materials, and river valleys, where relatively unweathered sediments are being deposited. Inceptisols in Montana occur throughout the State, with the exception of the area included in the Northern Great Plains Spring Wheat Region along the middle and eastern portions of the northern State border.

Mollisols

Mollisols commonly are the very dark colored, base-rich, mineral soils of the steppes. Many of these soils developed under grass at some time, although many apparently were forested at an earlier time. This soil order characterizes a larger land area in the United States than any other soil order and includes one of the world's most important agricultural soils. In frigid or warmer areas where slopes are not too steep, Mollisols are used mainly for small grain in the drier regions and maize (corn) or soybeans in the warmer, humid regions. Mollisols are found throughout Montana, particularly along the middle and eastern portions of the northern State border and in the southwestern quadrant of the State.

Spodosols

Spodosols feature a subsurface horizon, called the spodic horizon, in which organic matter and aluminum oxides, sometimes along with iron oxides, accumulate. These mineral soils primarily form on coarse-textured, acidic parent materials that are subject to ready leaching. Spodosols occur only in moist to wet areas, and commonly in cold or temperate climates. Most Spodosols developed under forests and remain under forest vegetation, as they are not naturally fertile. A very small area of Spodosols is found in the middle portion of Montana's western boundary.

Vertisols

The Vertisols order of mineral soils is characterized by a high content (greater than 30 percent) of sticky or swelling-and-shrinking-type clays to a depth of one meter, which in dry seasons causes the soils to develop deep, wide cracks. A significant amount of material from the upper part of the profile may slough off into the cracks, giving rise to a partial "inversion" of the soil. Vertisols make up a relatively homogeneous order because of the amounts and kinds of clay common to them. Vertisols are found mostly in subhumid to semiarid environments and where the average soil temperatures are higher than eight degrees Celsius. These soils generally are sticky in the wet season and hard in the dry season, so they require special cultivation practices regardless of whether modern equipment or traditional implements, such as a hoe or bullock-drawn plow, are used. Despite their limitations, Vertisols are widely tilled, but the yields are generally low. Vertisols are found in a few areas in the middle of the State.

3.4 AIR QUALITY (CARBON SEQUESTRATION)

3.4.1 Definition of Resource

The Clean Air Act (CAA) requires the maintenance of National Ambient Air Quality Standards (NAAQS). NAAQS, developed by the EPA to protect public health, establish limits for six criteria pollutants: ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), lead (Pb), and inhalable particulates (course particulate matter (PM) greater than 2.5 micrometers and less than ten micrometers in diameter [PM_{10}] and fine particles less than 2.5 micrometers in diameter [$PM_{2.5}$]). The CAA requires States to achieve and maintain the NAAQS within their borders. Each State may adopt requirements stricter than those of the national standard. Each State is required by EPA to develop a State Implementation Plan (SIP) that contains strategies to achieve and maintain the national standard of air quality within the State. Areas that violate air quality standards are designated as non-attainment areas for the relevant pollutants. Areas that comply with air quality standards are designated as attainment areas for relevant pollutants. The CRP PEIS (USDA/FSA 2003b) evaluated the effects of the program on air quality. This EA tiers from the CRP PEIS and limits the analysis of air quality to the impacts of managed haying and grazing on carbon sequestration, the aspect of air quality with the most potential to be affected by the alternatives considered.

3.4.2 Affected Environment

3.4.2.1 Carbon Sequestration

Air quality in the broadest sense is the atmosphere's capability to sustain healthy life directly through respiration of living organisms and indirectly by buffering the earth from extreme temperature variations. As scientists and the public became more concerned with climate change and the impact that human derived air pollutants were having on global temperature, the EPA identified carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) as the key greenhouse gases effecting warming temperatures. While each of these gases occurs naturally in the atmosphere, human activity has significantly increased the concentration of these gases since the beginning of the industrial revolution. The level of human produced gases accelerated even more so after the end of the Second World War, when industrial and consumer consumption flourished. With the advent of the industrial age, there has been an increase 36 percent in the concentration of CO_2, 148 percent in CH_4, and 18 percent in N_2O (EPA 2008).

Since CO_2 and CH_4 are two of the key gases most responsible for the "Greenhouse Effect," scientists and policy makers are interested in carbon gases and how they may be removed from the atmosphere and stored. The process of carbon moving from atmosphere to the earth and back is referred to as the carbon cycle. Simplified components of the carbon cycle are: (1) conversion of atmospheric carbon to carbohydrates through the process of photosynthesis; (2) the consumption of carbohydrates and respiration of CO_2; (3) the oxidation of organic carbon creating CO_2; and (4) the return of the CO_2 to the atmosphere. Carbon can be stored in four main pools other than the atmosphere: (1) the earth's crust (locked up in fossil fuels and sedimentary rock deposits); (2) the oceans where CO_2 is dissolved and marine life creates calcium carbonate shells; (3) in soil organic matter (SOM); and (4) within all living and dead organisms that have not been converted to SOM. These pools can store or sink carbon for long periods, as in the case of carbon stored in sedimentary rock and in the oceans. Conversely, carbon may be held for as short a period as the life span of an individual organism. Humans can affect the carbon cycle through activities such as the burning of fossil fuels, deforestation, or releasing soil organic carbon (SOC) through land disturbing activities.

The process of storing of carbon in the ecosystem is called carbon sequestration. Carbon sequestration includes storing carbon in trees, plants and grasses (biomass) in both the above ground and the below ground plant tissues, and in the soil. Soil carbon can be found in the bodies of microorganisms (fungi, bacteria, etc), in non-living organic matter, and attached to inorganic minerals in the soil.

Currently, the carbon cycle is skewed with more carbon being released to the atmosphere than being removed from the atmosphere. It is estimated that atmospheric carbon is increasing at a rate of 6.1 gigatons per year. Kansas State University (KSU) researchers state that approximately 61 to 62 gigatons of carbon are released back into the atmosphere each year from the oxidation of SOM while approximately 60 gigatons of carbon are sequestered in the soil from the atmosphere. This leads to a net gain of approximately one to two gigatons of carbon per year into the atmosphere. This increase exacerbates the problem of carbon gases and their affect on global temperatures (Rice 2002).

Soil organic carbon is primarily lost to the atmosphere through the oxidation of SOM exposed to the air through land tillage operations. Soil erosion is another potential source of carbon loss. The total amount of carbon stored in the soil as organic carbon is estimated to be about equal to the sum of the carbon in the atmosphere and in all plant and animal life combined. Soil capacity to sequester carbon plays a significant role in reducing greenhouse gases.

Soil carbon is exchanged between the soil and the atmosphere in a cycle that is overwhelmingly driven by photosynthesis. Soil carbon increases cation exchange capacity, water holding capacity, and the structural stability of clays and silt containing soils. Soil organic matter buffers the soil from major swings in pH. The amount of carbon stored in the soil depends on the balance between the addition of carbon (plant tissue) and the loss of carbon back to the atmosphere through mineralization and oxidation as well as microbial respiration. Of the carbon returned to the soil as plant residue, about five to 15 percent becomes tied up in the bodies of organisms and 60 to 75 percent is respired as CO_2 back to the atmosphere. Only ten to 25 percent is converted to SOM. Increasing photosynthesis rates result in more carbon sequestration; however, increasing carbon fixation alone is not enough as carbon must be fixed in long-lived pools.

Soil carbon losses can be lessened through reductions in soil disturbance (reduced tillage), vegetative cover fertilization, irrigation, improved grazing practices and proper haying. Vegetative cover fertilization increases biomass and subsequently increases total photosynthesis activity. Irrigation results in more biomass and photosynthesis activity in areas of insufficient rainfall for maximum vegetative growth. Improved grazing practices that do not stunt plant growth by the excessive loss of leaf area and subsequent reduction in stored carbohydrates can induce new leaf growth, which have a higher photosynthesis efficiency than older leaves. Proper haying can have a similar positive effect on carbon sequestration if the haying does not stress the vegetation by removal of excessive leaf tissue, damage the apical meristem or result in excessive removal of stored energy reserves. More frequent forage removal keeps plants from reaching a slower growth phase associated with leaf maturation (Gifford and Marshall 1973). Approximately 50 percent of the SOC has been lost over the last 100 years due to soil cultivation practices (Rice 2002). In general, tillage disturbances decrease SOC, permanent grass increases SOC, and the use of legumes increases SOC even more (Bremer et al. 2002).

Individuals can implement management and conservation practices that enhance carbon sequestration on their own properties; however, carbon sequestration needs to take place at the landscape scale to have an impact on greenhouse CO_2 reduction. Large scale agricultural sector adoption of carbon sequestration practices can significantly offset CO_2 emissions caused by fossil fuel burning. CRP contract lands provide the optimal conditions for landscape level ecosystem carbon sequestration to occur. The total carbon sequestration potential of United States cropland is estimated to be 170 million tons of carbon per year (USDA/Economic Research Service [ERS] 2004).

For CRP, current literature documents carbon sequestration rates derived from modeled simulations. Modeling estimates indicate rates of carbon sequestration for the western and central United States are less than 90 to 360 pounds per acre per year (lbs/ac/yr) of SOM and 220 to 1,200 lbs/ac/yr of total below ground carbon, including roots. Some estimates suggest that about 450 and 580 lbs/ac/yr below ground carbon are sequestered under the CRP as SOC in the zero to two and zero to four inch depths, respectively. The USDA funded study conducted by the Food and Agricultural Policy Research Institute (FAPRI) of the University of Missouri-Columbia (UMC), reported an average gain of soil carbon rate of 1,400 lbs/ac/yr (FAPRI/FSA 2007). Using a conservative value of 220 pounds per acre (lbs/ac) of SOC the Montana managed haying and grazing eligible acres would result in the addition of 14,078 tons of sequestered carbon each year.

The potential for carbon sequestration is generally correlated positively with increasing rainfall. It follows that the potential for carbon sequestration in North Dakota increases from west to east. Soil texture impacts the carbon sequestration potential of the land. Finer textured soils can sequester more carbon than coarse textured soils; therefore, sandy soils have a lower potential for carbon sequestration than finer textured soils. Landscape position influences the location of the fine textured soils and the moisture regime. Silt and clay fractions of the soil (the fines) tend to be found at the lower position in the landscape. These areas are found along floodplains. These same areas of the landscape typically have more available water for plant utilization, generally resulting in an environment with a higher carbon sequestration potential than lands found higher in the landscape.

Soils inherently have a fixed capacity for carbon sequestration. All other things being equal, the greatest potential for increased carbon sequestration rates is on lands that have been mismanaged and therefore experienced excessive depletion of stored soil carbon (Conant 2008). Soils falling into the highly erodible land (HEL) category, which is necessary for enrollment into CRP, often fit this description. Given the potential for carbon sequestration in HEL soils and the large acreage of CRP lands, the CRP program offsets significant levels of carbon emissions resulting in cleaner air, and consequently, contributes to the reduction of global warming.

3.5 SOCIOECONOMICS

3.5.1 Definition of the Resource

Socioeconomic analyses generally include detailed investigations of the prevailing population, income, employment, and housing conditions of a community or Region of Influence (ROI). The socioeconomic conditions of a ROI could be affected by changes in the rate of population growth, changes in the demographic characteristics of a ROI, or changes in employment within the ROI caused by the implementation of the proposed action.

Socioeconomic resources within this document include total population, rural population, total number of farms, and acreage eligible for the managed haying and grazing provisions within the State. These areas identify the components essential to describe the broad-scale demographic and economic components of the statewide effected agricultural population. Information in this section is being tiered from the 2003 PEIS for the CRP and updated as necessary for a complete evaluation (USDA/FSA 2003b). Additionally, outdoor recreational activities within the State of Montana are being identified as to their overall monetary and non-monetary societal benefits.

3.5.2 Affected Environment

3.5.2.1 General Population Characteristics

Population

Montana had a population of approximately 900,000 persons in 2000 with approximately 54 percent (487,465 persons) living in urban areas (U.S. Department of Commerce/U.S. Census Bureau [USDC/USCB] 2002). Of the population living in rural areas, 9.6 percent (39,930 persons) lived on farms. The 2006 American Community Survey (ACS) (USDC/USCB 2006) indicated that the population of Montana had increased approximately 4.7 percent between 2000 and 2006.

Personal Income and Earnings

Economic characteristics from the 2006 ACS indicate a median household income (MHI) of $33,024 (78.6 percent of the nationwide MHI) and a per capita income (PCI) of $17,151 (79.5 percent of the nationwide PCI), both slightly lower than the nationwide levels. Table 3.5-1 illustrates data from the Bureau of Economic Analysis (BEA) for earnings by place of work 2001 and 2006. The BEA defines earnings as the sum of three components of personal income-wage and salary disbursements, supplements to wages and salaries, and proprietors' income. Personal income across the State has increased approximately 30.4 percent from 2001 and 2006 at an average annual rate of approximately 5.5 percent (USDC/BEA 2008a). Farm proprietors’ income has fluctuated widely during the period, while nonfarm proprietors’ income has increased at an average annual rate of 3.8 percent. Likewise, farm earnings have also fluctuated. The agriculture and forestry support activities earnings have maintained a growth in earnings at an average annual rate of 8.5 percent.

Employment

The Bureau of Labor Statistics (BLS) compiles current and historic data on the labor force, the number of persons employed, the number of person unemployed, and the unemployment rate. Montana, between 2000 and 2007, increased the total nonfarm labor force by approximately 3.7 percent to approximately 605,000 persons (United States Department of Labor [USDL]/BLS 2008). During this period the labor force grew at an average annual rate of approximately 0.97 percent per year. The unemployment rate decreased 1.7 percentage points to 3.1 percent in 2007 (USDL/BLS 2008). This was a decline from the higher levels between 2002 and 2005, when the unemployment rate was between 3.8 to 4.8 percent.

The BEA also tracks employment characteristics at the farm and nonfarm levels. Table 3.5-2 illustrates the employment levels from 2001 to 2006 for the State of Montana. This data indicates a continuing loss of farm employment during this period, while nonfarm employment has increased since 2001.

3.5.2.2 General Agricultural Characteristics

The National Agricultural Statistics Service (NASS) estimated that there were approximately 28,300 farms with approximately 60 million acres of land in farms in Montana in 2007 (USDA/NASS 2008a, 2008c). The FSA detailed in their 2007 Annual Summary of the CRP that there were 6,877 Montana farms (24.3 percent of the total number of farms) with 3.5 million acres (approximately 5.8 percent of the total land in agriculture) in CRP practices (USDA/FSA 2008b). As detailed previously, there are a subset of accepted practices that are eligible for inclusion under the managed haying and grazing provisions. As of August 2008, there were approximately 3.1 million acres of CRP eligible practices in Montana (USDA/FSA 2008b). Based on data from 2004 to 2006, there were approximately 218,000 acres enrolled in managed haying and grazing contracts on eligible CRP acreage in Montana (USDA/FSA 2008c). This accounted for roughly 6.2 percent of total CRP enrolled acres in 2008.

Table 3.5-1. Personal Income and Earnings for Selected Categories in the State of Montana from 2001-2006

Earning Measures	2001	2002	2003	2004	2005	2006
	($000) unless otherwise indicated					
Personal income	22,359,183	22,818,994	24,177,191	25,812,886	27,308,593	29,151,987
Population (persons)	906,098	910,282	917,453	926,721	935,784	946,795
Per capita personal income (dollars)	24,676	25,068	26,353	27,854	29,183	30,790
Farm proprietors' income	127,542	791	196,558	267,058	293,812	-2,164
Nonfarm proprietors' income	2,544,055	2,275,551	2,293,616	2,660,188	2,871,564	3,011,897
Farm earnings	286,085	179,587	356,957	439,511	490,961	204,880
Nonfarm earnings	15,294,811	15,793,599	16,600,982	17,921,796	19,274,159	20,679,169
Agriculture and forestry support activities	82,309	82,114	105,595	92,718	102,417	118,955

Note: BEA definitions.
Farm Earnings are comprised of the net income of sole proprietors, partners and hired laborers arising directly from the current production of agricultural commodities, either livestock or crops. It includes net farm proprietors' income and the wages and salaries, pay-in-kind, and supplements to wages and salaries of hired farm laborers; but specifically excludes the income of non-family farm corporations.
Source: USDC/BEA 2008a. Adapted from Table CA05N - Personal Income and Detailed Earnings by Industry – Montana.

Table 3.5-2. Farm and Non-Farm Employment in the State of Montana between 2001 and 2006

Type of Employment	2001	2002	2003	2004	2005	2006
Total	565,989	572,349	579,135	597,974	615,864	637,401
Farm	32,047	32,535	31,627	31,655	31,579	31,567
Nonfarm	533,942	539,814	547,508	566,319	584,285	605,834

Source: USDC/BEA 2008b – Adapted from Table CA25N – Total Employment by Industry – Montana

In 2007, Montana produced an estimated $1.9 billion in value of production in field and miscellaneous crops on approximately 9.0 million acres (USDA/NASS 2008a). Table 3.5-3 adapted from the 2007 Montana Agricultural Statistics Bulletin (USDA/NASS 2008b) indicates the various ranking for agricultural products produced in the State. Based on the 2002

Agricultural Census, Montana was ranked as the 32nd largest State in terms of total agricultural products sold with a value of $1.9 billion (USDA/NASS 2008a). In 2005, the value of cash receipts for all agricultural products was $2.3 billion ranking Montana as the 33rd largest State producer (USDA/NASS 2008b).

In terms of the Montana nominal state gross domestic product (NGDP), from 2004 to 2006 the agricultural industry generated an average of $1.3 billion to the Montana NGDP, approximately 4.3 percent of the total (USDC/BEA 2008c). Crop and livestock production accounted for approximately $1.1 billion (3.5 percent of the total Montana NGDP). The agricultural industry had an average rank of 11 out of 19 major industry groups in Montana in terms of contribution to the NGDP.

Table 3.5-3. Montana 2007 Agricultural Facts

Rank	Commodity and Date	Number (000)	Unit	% of US Total
30	Livestock Cash Receipts, 2005	1,286,171	dollars	1.0
13	All Cattle and Calves	2,400	head	2.5
9	All Cows	1,400	head	3.3
7	Beef Cows	1,382	head	4.2
24	Cattle on Feed	55	head	0.4
7	All Sheep and Lambs	290	head	4.7
13	All Hay	4,320	tons	3.0
8	Alfalfa Hay	3,255	tons	4.5
23	All Other Hay	1,065	tons	1.5

Sources: USDA/NASS 2008a, 2008b, 2008c, 2008d, 2008e, 2008f

According to the 2007 Montana Agricultural Statistics Bulletin, Montana ranked as the 13th largest producer of cattle in the United States in 2006, with an approximate inventory of 2.4 million head (USDA/NASS 2008b). The State was ranked as the 9th largest cow producer in the United States with 1.4 million head of cows in 2006, with approximately 12,200 cattle operations in the State. This was a decline of approximately 7.6 percent from 2002. Approximately 41.0 percent of the operations (5,000 operations) had less than 50 head of cattle per operation in 2006. The next largest category was operations that had between 100 to 499 head of cattle (33.6 percent). The primary decline between 2002 and 2006 in cattle operations occurred in the less than 50 head category with a decline of approximately 14.0 percent with operations of between 100 to 499 head declining by approximately 8.9 percent. All other categories increased between 2002 and 2006 in the State by at least 2.2 percent.

The 2003 National Resources Inventory indicated that the State contained approximately 43.5 million acres of private grazing lands (USDA/NRCS 2007b). Private grazing fees have increased from $16.30 to $18.30 per head during the period from 2002 to 2006 (12.3 percent increase) while grazing fees per animal unit have increased approximately 7.3 percent from $15.10 to $16.20 per animal unit (USDA/NASS 2008b).

In 2007, approximately 2.6 million acres were harvested for hay with an average production of 2.0 tons per acre (USDA/NASS 2008a). Approximately 5.1 million tons of hay was produced in 2007 with an estimated value of production at $393.2 million, ranking Montana as the 11th largest hay producer in the United States (*Ibid.*).

The USDA/NASS (2008b) estimates that the average value per acre of pasture and rangeland in the State was $850 in 2007 with an average rental rate of $6.50 per acre. Cropland was valued at an average of $1,000 per acre with average rent for irrigated acreage at $68 per acre and non-irrigated of $19.50 per acre.

3.5.2.3 General Outdoor Recreation Characteristics

In 2008, the USDOI and USDC sponsored the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (USDOI and USDC 2008). Surveys were conducted at national and State levels. The 2006 Survey found that approximately a million Montana residents and nonresidents older than 16 participated in fishing, hunting, or wildlife watching activities. It was estimated that 0.5 million persons either fished, hunted, or both and that 0.8 million persons took part in wildlife watching activities. These participants spent approximately $1.1 billion on wildlife related recreation in the State. Anglers spent on average $735 per person with a per trip expenditure per day of $51. Hunters spent on average $1,556 per person with an average per trip expenditure of $62 per day. Wildlife watching participants spent on average $497 per person with an average per trip expenditure per day of $98. The 2006 survey indicated that most hunters (42 percent) participated in hunting activities on public lands alone. Approximately 31 percent of hunters hunted on a combination of public and private lands and 23 percent hunted on private lands alone. The 2006 survey indicated that the vast majority of hunters (92 percent) participated in hunting activities for big game, while only about 22 percent of the hunters participated in small game hunting, including upland bird species, with only eight percent hunting migratory birds. Data indicates that a subset of hunters hunted more than one class of game during the year.

Big game species in Montana include white-tail deer, mule deer, elk, antelope, bighorn sheep, mountain goat, moose, bison, black bear, and mountain lion. Small game species include rabbits and squirrels. Migratory waterfowl include a wide list of species, including ground nesting species such as gadwall, American wigeon, mallard, blue-winged teal, northern shoveler, northern pintail, green-winged teal, canvasback, redhead, lesser scaup, Canada geese, tundra swan, and others. Other game bird species include gray (Hungarian) partridge, chukar, ring-necked pheasant, sharp-tailed grouse, sage grouse, mountain grouse, Wilson's snipe, mourning dove, and wild turkey. Matrices listing game species and the potential impact of managed haying and grazing are found in Appendix D.

Southwick Associates, Inc. and D.J. Case & Associates (Southwick et al. 2008) surveyed 4,000 randomly selected CRP participants throughout the United States to understand how CRP acreage was being used for recreational purposes. A response rate of 74 percent was recorded for these surveys. The study found that 57 percent of the respondents allowed some portion of their CRP acreage to be used for recreational purposes. Within those that allowed their CRP acreage to be used for recreational purposes, the most common uses were hunting (89 percent), wildlife viewing (44 percent), hiking (23 percent), fishing (seven percent), and various other recreational uses. Ten percent of the affirmative CRP participants received income from the recreational use of their CRP acreage. The survey also found that CRP enrollment has an indirect effect in determining whether to lease property for recreational purposes. It was also found that on average CRP participants received $1.90 per acre before enrollment and after enrollment that average increased to $6.13 per acre. The study extrapolated this result to indicate that if all CRP acreage was used to generate recreational income the approximately 36.0 million acres would generate $28.9 million. Without CRP, this study estimates that value to be approximately $7.6 million, approximately $21 million less than the CRP enrollment.

Sullivan et al. (2004) indicated that CRP wildlife related practices in the Mountain States was estimated to generate approximately $6 million in nonmarket benefits to wildlife at an average benefit of $1.00 per acre. This was built on the general idea that CRP practices associated with permanent and temporary wildlife habitat factors generated a more favorable environment for both game and non-game species. They also indicated that Mountain States contain approximately 19.3 percent of the total CRP acreage, but only 12.0 percent of the CRP acreage enrolled in wildlife practices. This study concluded that the estimated wildlife benefits included approximately $3 million per year for wildlife viewing and $2 million per year in pheasant hunting.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 BIOLOGICAL RESOURCES

Impacts to biological resources would be considered significant if implementation of an action removes land with unique vegetation characteristics, reduces wildlife populations to a level of concern, or results in incidental take of a protected species or critical habitat.

4.1.1 Vegetation

4.1.1.1 Background and Methodology

Environmental consequences to vegetation were determined qualitatively by compiling existing data from a sample of CRP fields eligible for managed haying and grazing, and extrapolating the data on a statewide level. Two counties within Montana were selected to provide a representative description of the diversity in agricultural production, climate, wildlife habitat, topography and other landscape characteristics within the Great Plains ecoregion where the majority of CRP occurs in the State, namely Big Horn and Hill Counties. The Great Plains ecoregion is described in Chapter 3. Ten CRP fields in each county were selected by USDA FSA/NRCS county personnel that represent the diversity of the CRP fields in the county. The vegetation data was collected along with the data utilized by the socioeconomic analysis, the methodology of which is presented in detail in Appendix C. The data on current species of grass cover present, age of stand, condition of stand, and percent of forage that is removable were gathered and provided by USDA/FSA county offices. For those fields where haying and/or grazing options exhibit the potential for implementation of managed haying and grazing, the impact of the change in quantity, quality and diversity of the vegetative cover is estimated based upon the haying or grazing management parameters of the alternatives (e.g. frequency and duration of haying and grazing) and the NRCS technical guides for conservation practice standards, forage harvest management, and prescribed grazing.

The Great Plains grasslands have a well-documented history of grazing by native herbivores (Holechek et al. 1989; Milchunas and Laurenroth 1993) and periodic large-scale disturbances (such as wildfire) occurring at an average frequency of once every three to five years (Umbanhowar 1996). Physiological adaptations in grasses resulting from grazing pressure include higher proportion of stemless shoots, greater delay in elevation of apical buds, sprouting more freely from basal buds after defoliation, and higher ratios of vegetative to reproductive stems (Holechek et al. 1989). Growth for these plants is actually stimulated by defoliation and increases the vigor of the plant (*Ibid.*). However, heavy grazing can be detrimental to these plants and plant communities. Possible effects due to grazing are presented in Table 4.1-1 for forage plants.

The timing of defoliation of range plants is important when assessing the response of a plant or plant community to grazing or haying. Most range plants can withstand defoliation during the dormant periods when plants are inactive; at the onset of growth as conditions continue for growth; and during active growth. A critical time for plants is from floral initiation through the

Table 4.1-1. Possible Effects of Grazing on Range Plant Physiology

Heavy Grazing	Light to Moderate Grazing
Decreased photosynthesis	Increased photosynthesis
Reduced carbohydrate storage	Increased tillering
Reduced root growth	Reduced shading
Reduced seed production	Reduced transpiration losses
Reduced ability to compete with ungrazed plants	Inoculation of plant parts with growth-promoting substances
Reduced mulch accumulation. This decreases soil water infiltration and retention. Mulch is also necessary to prevent soil erosion.	Reduction of excessive mulch accumulations that may physically and chemically inhibit vegetative growth. Excessive mulch can provide habitat for pathogens and insects that can damage forage plants.

Source: Holechek et al. 1989

seed development post bloom, generally from mid-June to mid-July, when plants have high energy requirements for seed production (Holechek et al 1989). In Montana, cool season grasses are most representative of CRP fields in the State. Grass growth begins in spring when the soil warms. Cool season grasses continue to grow while temperatures are on average between 40 and 75 °F. When temperatures exceed 75 °F they become semi-dormant, which typically occurs in the summer months around July. Reproductive growth for cool season grasses occurs prior to the semi-dormant period during the summer, typically around the end of June. However, cool season grasses regrow in the fall, usually in September when temperatures decrease, provided there is adequate precipitation, and continue to grow until the first frost. In Montana, warm season grasses complete most of their growth in May, June and July (USDA/NRCS 2009a). It is recommended that warm season grasses planted in eastern Montana be grazed early enough in the mid-summer to allow re-growth prior to cold temperatures and frost (USDA/NRCS 2006b).

If the vigor of a plant stand is reduced through grazing or haying, there is greater potential for desirable plants, identified by the conservation practice, to be replaced by invasive species. In some areas undesirable woody species encroach upon CRP lands. Haying to manage woody plant encroachment is practical if conducted every three years, otherwise woody plants become too large at any other interval to allow future haying (Bidwell 2008, personal communication, October 2, 2008). Grazing alone cannot control woody plant encroachment without overgrazing the native plants; the recommended approach for controlling woody plant encroachment involves burning followed by grazing (Bidwell and Weir 2002; Weir et al. 2007). Light to moderate defoliation as discussed above would improve range plants abilities to compete against invasive species.

There are many factors that affect forage quality, including leaf to stem ratio, maturity stage at harvest, and cool season versus warm season grass species. Light to moderate grazing increases forage quality by increasing the proportion of stemless shoots. In Montana, most CRP lands are planted in cool season grasses. Cool season species generally have higher digestibility and more crude protein for grazers than warm season species. Hay quality is lowest in mid July for cool season plants, begins to increase with the onset of growth in September, and continues to increase until winter dormancy.

The NRCS Practice Code 511 Forage Harvest Management Specifications (UDSA/NRCS 2009b) and NRCS Plant Materials Technical Note 10 (USDA/NRCS 2008d) requires that a minimum stubble height of two to six inches (depending on species) remain at the end of the growing season, thus it is anticipated that the effects from defoliation resulting from haying on the plant stand would be recovered within the next growing season assuming normal precipitation. NRCS Practice Code 511 Forage Harvest Management (USDA/NRCS 2004a) stipulates that haying of upland range sites would not occur more than every other year to allow forage adequate recovery of vigor. The minimum stubble heights maintained at the end of the growing season would ensure plant survival as well as the health of the desired plant community (*Ibid.*).

NRCS Practice Code 528 Prescribed Grazing (USDA/NRCS 2009a) identifies that target utilization levels, which are site-specific and stated in the associated grazing plan, must ensure the plant has adequate leaf area and growth for photosynthesis and recovery following grazing. Native species have varying grazing tolerances due to physiology and morphology, season of use, soil, climate, vigor and health of the plants and competition with other species. Generally, native plants are not negatively affected when 50 percent or less of total current year's aboveground productivity is removed through grazing during the growing season (*Ibid.*). However, as specified in NRCS Practice Code 528, in areas that receive ten inches or less of annual precipitation, utilization levels would not exceed 35 percent during the growing season on key species (*Ibid.*). When prescribed grazing is applied to forage plants the stubble heights identified in NRCS Practice Code 511 (USDA/NRCS 2009b) are recommended to ensure full and vigorous recovery (*Ibid*.). Similarly, it is recommended that proper grazing of warm season grasses would result in a minimum stubble height of two to six inches (depending upon species) (USDA/NRCS 2006b). These stubble heights are also stated in Plant Material Technical Note 63 Tame Pasture Grass and Legume Species and Grazing Guidelines (USDA/NRCS 2007c), along with plant heights that should be obtained prior to grazing to ensure full recovery and vigorous growth.

A key variable in assessing wildlife habitat is vegetation structure. One measure of habitat structure that can be derived from end of the season data is height. Other components of habitat structure such as density (stems/unit area), canopy cover (percent ground cover, percent canopy cover, etc.), and diversity (heterogeneity) cannot be derived from end of season standing crop. However, the list of species planted in each CRP field can be considered an index to plant diversity. As the number of plant species increases, the compositional and structural diversity also increases.

Some differences in habitat structure and hay/forage quality would occur depending on whether a field is hayed or grazed. Haying would result in a uniform structure, whereas grazing would likely result in greater structural habitat diversity, particularly by grazing at a light stocking rate rather than rotational grazing with internal fencing. Grazing without internal fencing but with a partial field burn (burn one third of the field per year) would also increase structural habitat diversity (Bidwell and Weir 2002; Weir et al. 2007). Because of variation in both the amount and timing of precipitation, vegetation height would vary from year to year. To meet specific habitat requirements for nesting species of concern, flexibility to remove cattle from the field when residue height reaches a minimum threshold is needed and is provided by NRCS Conservation Practice Standards 511 Forage Harvest Management and 528 Prescribed Grazing.

As noted in Table 4.1-1, excessive mulch or thatch build up (accumulation of dead plant matter) can be a problem on some CRP fields, but usually not to the degree that the conservation cover fails entirely. Accumulation of thatch has been managed through mid-contract management practices, such as the use of prescribed burning and disking in some States (Kansas Department of Wildlife and Parks [KDWP] 2008). Grazing has also been documented to help reduce thatch (USDA/NRCS 2006c). Excessive thatch physically and chemically inhibits vegetative growth, harbors plant pathogens, reduces the success of natural re-seeding and interseeding management efforts, inhibits water infiltration to soil, makes it difficult to control noxious weeds and insect pests, and contributes to the potential for catastrophic fire. Retention of some mulch is beneficial for retaining soil moisture and ameliorating the effects of cold temperatures on plant roots, but studies have shown accumulations of more than ten centimeters are detrimental (USDA/NRCS 2006d).

4.1.1.2 Alternatives

Alternative B

Under Alternative B, managed haying would occur once every five years and grazing would occur once every three years, with activities occurring outside the PNS dates of May 15 to July 15. The results of the vegetation data analysis suggest that haying or grazing at these frequencies in accordance with NRCS conservation practice standards would have long-term benefits on the plant community with few negative effects. The removal of plant material through haying or grazing stimulates the vigor of plants resulting in a plant stand that would be capable of maintaining the desired species composition in accordance with the goals of the conservation plan. The loss of vegetation would be a short-term impact which would, when adequate leaf area is reserved, recover through plant re-growth after completion of haying or following the removal of livestock provided there is sufficient time and precipitation prior to frost. The PNS would allow haying or grazing to occur after July 15, which would protect the reproductive growth of cool season grasses. However, with the shortened PNS, warm season grasses would likely be in their reproductive growth period when haying or grazing would be permitted, possibly diminishing the health and vigor of these plants. This impact is reduced by the NRCS Practice Code 511 Forage Harvest Management provisions to cut at a stage of maturity that does not hinder growth (USDA/NRCS 2004a). Similarly, the minimal stubble height specifications of NRCS Practice Code 511 Forage Harvest Management Specification (USDA/NRCS 2009b) and Eastern Montana Plant Materials Technical Note 53 (USDA/NRCS 2006b); and the reduced stocking rate provision of NRCS Practice Code 528 Prescribed Grazing (USDA/NRCS 2009a) would also ensure the survival and long-term viability of grassland plants.

The frequency of haying of once every five years would potentially allow woody species to encroach onto CRP fields if invasive woody species are already present in the immediate area. The specific impact of potential woody encroachment is dependent on the goals of the CP. The planned or allowable degree of use for browse species differs from grass species. The degree of use applies to the annual growth of twigs and leaves within reach of animals. If deciduous browse species are used during the dormant season, the degree of use suggested applies to annual twig growth only.

Haying would occur after July 15 under this alternative and since most Montana CRP fields are planted in cool season grasses, hay quality would be low. Hay quality in cool season grasses begins to increase with the onset of growth in September and continues to increase until winter dormancy. Additionally, the hay quality would be reduced because of a mixture of the previous year's and current year's growth. Grazing would also occur after July 15, yet initially forage quality would not be optimal at this time for the same reasons specified above. Grazing would end on September 30 or when minimal stubble heights occur; to meet specific habitat requirements for nesting bird species of concern, timing of haying and grazing to allow for sufficient re-growth must be considered for adequate cover to be present for the following grassland bird nesting season. This is provided for in NRCS guidance for managing forage harvests.

In summary, managed haying and grazing on eligible CRP practices is likely to enhance vegetation through increased plant stand health and vigor, diversity in structure, increased productivity of grassland plans, and reduced accumulation of mulch (thatch). The shortened PNS would not likely affect cool season species, but may diminish the health and vigor of warm season species. However, if adequate plant stubble remains at the end of the growing season, warm season plants would likely recover the following growing season assuming normal precipitation. Both haying and grazing conducted as proposed would result in an increase in structural diversity on a landscape level, while grazing would also increase structural diversity within the field. The anticipated responses from plants would result in maintaining the desired species composition in accordance with the goals of the Conservation Plan. The frequency of haying once every five years and grazing once every three years is within the historical period of three to five years for disturbance (Umbanhowar 1996) that rejuvenates grasslands. No significant negative impacts to vegetation are expected from Alternative B if it is implemented in accordance with applicable conservation provisions, standards, and guidelines, and the Conservation Plan is adapted to take into account resource conditions on the land just prior to beginning managed haying or grazing.

Alternative C

Under Alternative C, managed haying and grazing would occur at the same frequency as Alternative B; however, the PNS would be shortened to May 15 to July 1. Alternative C would produce similar benefits to vegetation described for Alternative B (increased health and vigor, increased productivity of range plants, and reduced accumulation of mulch) as the frequency of the managed haying and grazing would remain the same. The shortened PNS would permit haying or grazing to occur as early as July 1. Cutting or grazing warm and cool season species close to the end of the shortened PNS may diminish the health and vigor of these plants. This impact is reduced by the NRCS Practice Code 511 Forage Harvest Management provisions to cut at a stage of maturity in which there are adequate food reserves and when auxiliary buds or tillers are present in order for regrowth to occur without loss of plant vigor (USDA/NRCS 2004a). Likewise, the minimal stubble height specifications of NRCS Practice Code 511 Forage Harvest Management Specifications (USDA/NRCS 2009b) and Plant Materials Technical Notes 10 and 53 (USDA/NRCS 2006b, 2008d); and the reduced stocking rate provision of NRCS Practice Code 528 Prescribed Grazing (USDA/NRCS 2009a) would also ensure the survival and long-term viability of grassland plants. The provision of haying only half a field would further reduce the potential impacts to cool and warm season species. Therefore, provided applicable conservation provisions, standards, and guidelines are followed, and the Conservation Plan is adapted to take into account resource conditions on the land just prior to the beginning managed haying or grazing, no significant negative impacts to vegetation are expected.

Preferred Alternative - Alternative D

Under Alternative D, managed haying and grazing would occur once every five years with a PNS of May 15 to August 1. The consequences to vegetation under Alternative D would be similar to those described for Alternative B. The benefits to vegetation described for Alternative B (increased plant health and vigor, and reduced accumulation of mulch) would also apply under Alternative D; however, the benefits of grazing would be realized once every five years. The frequency of haying or grazing once every five years is within the historical period of three to five years for disturbance (Umbanhowar 1996), beyond which some of the positive responses for the plant community would likely be reduced. The frequency of haying of once every five years would potentially allow woody species to encroach onto CRP fields if invasive woody species are already present in or adjacent to the fields. The impact of potential woody encroachment would be determined by the goals of the CP. The PNS period under this alternative would protect the reproductive period of both cool and warm season grasses, thus maintaining or improving their health and vigor. No significant negative impacts to vegetation are expected from Alternative D if it is implemented in accordance with applicable conservation provisions, standards, and guidelines, and the Conservation Plan is adapted to take into account resource conditions on the land just prior to beginning managed haying or grazing.

No Action – Alternative A

Under Alternative A, managed haying would occur once every ten years and managed grazing once every five years, with PNS dates of May 15 to August 1. The potential benefits to vegetation for managed haying and grazing in general would be similar as described for Alternative B; however, the frequency of haying (once every ten years) would be outside the historic interval that has been identified as being beneficial to plant productivity and vigor (Umbanhowar 1996). The frequency of grazing would be within the recommended interval, thus potentially achieving the benefits described for Alternative B. The PNS period under this alternative would protect the reproductive period of both cool and warm season grasses, thus maintaining or improving their vigor. However, the longer interval between disturbances would potentially allow woody species to become established in areas where they are unwanted, and achieve increased growth, thus preventing future haying. The impact of the presence of woody species is dependent on the goal of the CP. Additionally, thatch accumulations would potentially increase to densities that threaten the health and vigor of the vegetative stand. However, these impacts would not likely be significant. Similar to the action alternatives, continuance of Alternative A conservation provisions, standards and guidelines, along with adaptation of the Conservation Plan to resource conditions on the land just prior to beginning managed haying and grazing would ensure impacts to vegetation would not be significantly negative.

4.1.2 Wildlife

4.1.2.1 Background and Methodology

Recently, USDA has sponsored, under the Conservation Effects Assessment Project (CEAP), a series of quantitative studies estimating wildlife response to USDA conservation programs (USDA/NRCS 2008c), including specifically native and non-native CRP grassland conservation covers (Riffell et al. 2006; USDA/NRCS 2007b, 2008c). A broader review of fish and wildlife response to Farm Bill conservation practices was recently undertaken in a series of papers published by the Wildlife Society in partnership with the CEAP, including several concerning grasslands (Haufler and Ganguli 2007; Jones-Farrand et al. 2007). The latter provides a useful summary of the issues surrounding estimating the benefits of CRP to wildlife, including: the potential impacts of planting particular conservation practices and vegetation management, how problems with existing datasets have structured analyses, and the complexity of addressing the habitat needs of many different types of wildlife that are often conflicting. The major conclusions are: (1) design conservation plans for individual priority wildlife species for specific lands best suited to meet that particular species' need; (2) the benefits for a particular species depend in part on the management of surrounding sites as well; and (3) the benefits of grassland establishment and management are location- and species-specific, hence, in order to benefit the most wildlife with the CRP program, the timing and frequency of management actions should be planned to create and maintain diversity of grassland successional stages over large areas.

No quantitative studies of the effects on wildlife of various frequencies of haying and grazing conducted on particular types of vegetative stands have been conducted to date. In the absence of specific quantitative studies, this analysis qualitatively assesses the impacts of varying frequencies of managed haying and grazing on wildlife, using the best available data. The analysis focuses on wildlife most likely to inhabit the CRP lands eligible for managed haying and grazing, and their predicted responses (negative/positive) to the alternatives' managed haying and grazing provisions. The data collected have been organized in matrices that are included in the appendices of this EA, referred to individually in the sections below.

Potential effects include indirect (effects associated with alterations to the vegetation), direct (effects associated with reproductive success and mortality of individuals and populations), and cumulative (effects over time and due to other or foreseeable actions) impacts. Potential cumulative impacts are addressed in Chapter 5. Changes in vegetation structure relate to changes in cover for wildlife, most importantly, cover associated with reproduction success (nesting and rearing young), and food sources (Klute 1994; Horn and Koford 2000; Hughes et al. 2000; Madden et al. 2000). The results of the vegetation impact analysis in Section 4.1.1 is relied upon to assess indirect impacts to wildlife. Direct impacts to wildlife are related to mortality sustained by individual animals from conflicts with machinery, and the direct impacts of machinery on nesting and rearing of young (Labisky 1957; Gates 1965; Calverley and Sankowski 1995; Renner et al. 1995; Reynolds 2000). Ground-nesting grassland birds are particularly susceptible to direct impacts of haying, and less so to grazing (USDA/NRCS 2006d). Very few studies quantify the mortality impacts of haying or grazing on grassland birds (as discussed further below), much less present data that can be extrapolated to a statewide population. In the absence of comprehensive data, this analysis of direct impacts on grassland birds assesses what percentage of the analyzed grassland bird species' peak reproductive season is exposed by the PNS as established in the alternatives analyzed. The most exposed species is then analyzed as the worst case scenario. A principal assumption of the analysis is that percent of nesting season exposed equates to percentage of mortality. It is argued that assessing the potential magnitude of the impact on grassland bird habitat provides a proximate measurement of potential mortality. Then, based upon certain additional assumptions, the impact of the alternatives is quantified on a statewide basis by assessing the percent of available habitat that may be hayed under the alternatives analyzed, and the percentage of exposed nesting season. A detailed description of the methodology employed is provided in Section 4.1.2.4, Birds.

4.1.2.2 Large Mammals

Large mammals in Montana that are likely to occur in CRP lands include bighorn sheep, pronghorn antelope, elk, mule deer, white-tailed deer, moose, black bear, mountain lion, and American bison (bison are discussed in Section 4.1.3.1, Conservation Species). Potential impacts to these species were evaluated using existing literature, with the analysis organized in a series of matrices (Appendix D). In general, the indirect effects of grazing on large mammal species would be negative if wildlife must compete with livestock for forage, primarily in the late summer and winter (Coe et al. 2001). The benefits of haying or grazing are limited to pronghorn antelope, since their diets are more compatible with cattle; however, if stocking rates are set too high, cattle shift to consuming forbs and competing directly with pronghorn antelope (Hall 1985). NRCS Practice Code 528 Prescribed Grazing (USDA/NRCS 2009a) that applies to managed grazing requires the stocking rate include ruminant wildlife; therefore, reducing the potential for competition. Managed grazing limits the stocking rate to 75 percent of the calculated NRCS stocking rate, further reducing any impact. Potential benefits of haying and grazing include removal of unpalatable old plant growth and stimulating growth of grassland plants. Haying and grazing conducted at a time that allows plant re-growth can improve forage for wildlife by stimulating growth of forbs and removal of old growth of grasses (Clark, P.E., et al. 1998a, 1998b).

Bighorn sheep, moose, black bear, and mountain lion do not use grassland as their primary habitat, but may be seen moving through grasslands or foraging along the edges where grasslands are adjacent to wetlands, forests, and rough, mountainous areas. These large mammal species would not be affected by managed haying and grazing activities on CRP lands since they are highly mobile and do not depend on CRP lands for food/prey sources, or as habitat for bearing/rearing young or taking shelter.

Pronghorn antelope fawn from mid-May to early June with fawns remaining in their birthing areas for the following three weeks. When fawning, does seek areas with greater shrub cover in depressions or areas with taller grass and forbs. Above average fawning success in Colorado was attributed to the diverse habitat available (shrub component and depressions) and grass and forb height of 9.8 inches (Howard 1995). Another study concluded the highest use of CRP fields by pronghorn occurs during the early summer and winter (Coe et al. 2001).

Elk habitat varies seasonally, but primarily contains grasslands interspersed with forests providing large amount of edges. In the summer, elk seek cover in higher elevation woodlands with open meadows and grasslands and limited human activity. Winter ranges are generally wooded areas at lower elevations. Elk calve late May to early June on summer ranges, and it is recommended that calving areas not be disturbed from May 1 to July 1 (USDA/NRCS 1999c).

Mule deer and white-tailed deer range throughout Montana (Montana Field Guide [MFG] 2008). Both deer species are browsers; however, white-tailed deer are relatively more adaptable to disturbances. Deer are dependent upon forest and shrub landscapes for escape and thermal cover during severe winter periods. The birthing period for deer begins in May and can extend into August (Synder 1991).

It is not likely that there would be significant losses from direct impacts of haying and grazing on large mammals. Large mammals are highly mobile and can move out of harm's way. Pronghorn antelope and elk birthing periods would conclude prior to haying or grazing activities. Deer could possibly be birthing as haying or grazing is initiated; but it is unlikely that deer would utilize CRP fields for fawning, unless the field has sufficient old growth or shrub cover. Individual young may collide with haying equipment, but it is not likely to occur at a level that would result in an impact to a population. However, in an attempt to minimize such collisions it is recommended that haying activities be initiated in the middle of the field rather than the edges, allowing time for mobile wildlife species to move into the protective cover.

Fence construction would likely occur on many CRP fields to confine livestock. It is recommended that fencing follow the guidelines set forth in NRCS Practice Code 382 Fence to ensure travel of large mammals would not be inhibited (USDA/NRCS 2006e). These guidelines include consideration of spacing of the top and bottom wires to provide adequate movement of wildlife and the use of a smooth wire on top to allow deer to jump without harm.

Alternative B

Alternative B includes a frequency of managed haying once every five years and grazing once every three years, with the PNS interval from May 15 to July 15. As stated above, large mammals are expected to easily avoid any direct mortality impacts from use of machinery used in association with haying or grazing. The potential for indirect impacts of Alternative B on large mammals rests on changes to vegetation that would be related to the frequency of managed haying and grazing. Under this alternative, woody plant encroachment would be reduced, reducing benefits to large mammals that are browsers. However, if shrubs and forbs are part of the species composition identified for a conservation practice, then the increased vigor and health of the conservation stand achieved through moderate to light defoliation would benefit the browser species. Also, the increased health and vigor of grassland and forbs of Alternative B is more beneficial for grazers such as antelope. It is likely that with the mitigation measures described above, the application of conservation provisions, standards, and guidelines, and adaptation of the Conservation Plan to resource conditions on the land just prior to managed haying and grazing, there would be no significant negative impact to large mammals.

Alternative C

Alternative C would be conducted at the same frequency as Alternative B, with managed haying once every five years and grazing once every three years, but the PNS would be reduced to May 15 to July 1. This alternative would have similar results as presented for Alterative B in regards to frequency, primarily that there would likely be little benefit for browsers due to the increase in grassland productivity. The change in PNS would not likely impact large mammals as pronghorn antelope and elk would have completed fawning/calving prior to July. Deer would potentially still be fawning after July 15, but are known to prefer riparian or areas covered in dense shrubs for fawning; therefore, the change in PNS would not likely interfere with deer fawning. Through adherence to the procedures discussed in Alternative B, there would be no significant negative impacts to large mammals under Alternative C.

Preferred Alternative - Alternative D

Under Alternative D, managed haying and grazing would be allowed once every five years with a PNS of May 15 to August 1. Alternative D is likely to be less beneficial for antelope compared to the other action alternatives as it would allow more encroachment of woody vegetation, while being more beneficial to browsers such as deer and elk (Umbanhowar 1996). The decreased frequency of grazing would reduce competition with livestock and the longer PNS would reduce direct impacts during fawning/calving periods. It is likely that with adherence to the procedures outlined in Alternative B there would be no significant negative impact to large mammals under Alternative D.

No Action –Alternative A

Under the No Action Alternative, managed haying would occur once every ten years and grazing would occur once every five years, with PNS dates of May 15 to August 1. Alternative A would potentially provide some benefit to large mammals. Under this alternative haying would be permitted once in ten years while grazing would be conducted every five years. At this longer interval between disturbances, shrubs are more likely to invade grassland areas resulting in a possible increased food supply for browsers. However, the potential to improve the grass and forb component of the vegetative stand would be reduced and be less beneficial for pronghorn antelope. With the mitigation measures described above, the application of conservation provisions, standards, and guidelines, and adaptation of the Conservation Plan to resource conditions on the land just prior to managed haying and grazing, no significant negative impacts to large mammals are expected under Alternative A.

4.1.2.3 Small Mammals

Small mammals are an important component of the grassland ecosystem, including CRP grasslands, primarily due to their intermediate trophic position and high dispersal abilities (Colorado State University [CSU] 2008). Prairie rodents are omnivorous, consuming significant numbers of arthropods, while rabbits and other small mammals are the most important prey of hawks, eagles, owls and coyotes. Small mammals alter the vegetative structure through consumption of vegetation, the dispersal of seeds, and the construction of mounds and colonies. Burrowing small mammals also enhance the soil by increasing water retention and providing refuges for other small animals, as well as aerating soil and moving soil nutrients.

Indirect effects of haying and mowing on small mammals that inhabit CRP fields include habitat changes, which in turn can result in a change in abundance, diversity, and composition of small mammal species. General composition of grassland small mammal communities is determined primarily by structural attributes of the habitat (Grant et al. 1982). Some species, such as voles, require more cover and litter, others require a mosaic landscape, and others prefer the more open structure provided by haying and grazing (Clark, B.K., et al. 1998; Yarnell et al. 2007). Haying or grazing a CRP field changes the structure of the vegetation. Species that do not favor reduced cover would potentially find refuge in non-hayed areas or populations would decrease, at least temporarily. As long as weather patterns and other factors are favorable, grassland usually recovers within a year of treatment, and research has shown that herbivorous litter-dwellers, such as voles, re-established themselves in tall grass prairie one year after grazing (Grant et al. 1982). Movement of voles, and possibly other small mammal species, would likely be restricted by mowing. Jacob (2003) found that mowing did not remove voles from a treatment area, but Cole (1978) found that mowed strips (six centimeters high) were an effective barrier to movement of voles. Some species, such as deer mice and jackrabbits, prefer reduced cover or mosaic landscapes and populations of these species may increase following grazing or haying (Rickel 2005a). Reduced cover would also increase the access of predators to small mammal prey species, but the effects are not entirely clear, since one study evaluating differences between grazed and ungrazed areas did not find a significant effect on small mammals in the grazed area (Torre et al. 2007).

Diversity is widely used as a criterion for assessment of conservation potential and ecological value (Hall and Willig 1994). One study that compared species diversity and composition of small mammals between CRP grasslands and native shortgrass prairie found small mammal diversity on CRP grassland declined after the third year (*Ibid.*). The authors concluded that this was to be expected in an environment in which species have evolved around frequent (every one to three years), large-scale disturbances such as fire (Denslow 1985; Loucks et al. 1985; Umbanhowar 1996). Thus, they suggested that in order to restore small mammal species composition on CRP lands, grazing or fire-induced disturbances should be considered, based on the potential for declining diversity on older vegetative stands (Hall and Willig 1994). The proposed use of managed haying and grazing would potentially restore the species diversity of small mammals on CRP at the disturbance frequency recommended by Hall and Willig (1994).

Direct effects of haying and grazing on small mammals are associated with reproductive success and mortality of individuals and populations. Generally, rabbit, hares and jackrabbits produce multiple litters in a year, based on environmental conditions. Typically, the first litter is in the spring with a second litter later in the summer, with potential for four to five litters within a single year (Whitaker 2001). Chipmunks, ground squirrels, and pocket gophers have the potential to have multiple litters as well, with the first occurring in the spring. Most rodents are active year-round, but hibernation and inactivity during hot, dry seasons (estivation) are also common. While some hibernators seldom wake, living off of stored fat reserves, other species, such as many chipmunks, are semi-active and wake to feed from cached food reserves (*Ibid.*).

Direct impacts to small mammals from haying or grazing include mortality due to collisions with vehicles or trampling by livestock. Small mammals are mobile and are likely able to escape from machinery and cattle in many instances, but some mortality is still likely. The method in which haying would be permitted (only 50 percent of a field in a single year) would provide some reduction in direct impacts as there would be remaining habitat for small mammals to escape. Similarly, the reduced stocking rate (75 percent of the NRCS recommendations) would reduce to some degree the potential impact from trampling. Techniques recommended to minimize direct impacts to other wildlife would likely benefit small mammals as well, and include initiating mowing at the center of a treatment area, progressively mowing out from the center to allow wildlife to flee in all directions and not become trapped to one side. To reduce the area impacted by the mower tires, efforts should be made to follow the outermost tire track of a previous pass which would reduce animal mortality and soil compaction (USDA/NRCS 2006d).

Alternative B

Alternative B includes a frequency of managed haying once every five years and grazing once every three years, with the PNS interval from May 15 to July 15. The potential for direct mortality to small mammals is greater under this alternative; however, it is not expected to be at the population level, and is thus not significant. The potential for indirect impacts of Alternative B on small mammals would be dependent upon changes to vegetation that may be related to the frequency of managed haying and grazing. As discussed in the vegetation section, positive benefits of haying and grazing to vegetation derived from this proposed frequency that also benefit small mammals are an increase in structural diversity and productivity of grassland plants correlating to an increase in small mammal diversity. It is likely that, with the mentioned management, the application of CRP conservation provisions, standards, and guidelines, and adaptation of the Conservation Plan to resource conditions on the land just prior to engaging in managed haying or grazing, negative indirect impacts to small mammals would not be significant and there would be a potential increase in the diversity of the small mammal population under Alternative B.

Alternative C

Alternative C would be conducted at the same frequency as Alternative B, with managed haying once every five years and grazing once every three years, but the PNS would be reduced to May 15 to July 1. Potential indirect impacts on small mammals would be the same as under Alternative B. The change in the PNS would not likely affect small mammals of Montana as most breed in spring and have litters in the early summer, with the possible exception of Ord's kangaroo rat whose reproductive habits in Montana are unknown (Grondahl, no date; MFG 2008). However, with the same procedures discussed in Alternative B, Alternative C would not have significant negative impacts to small mammals and also has the potential to increase small mammal diversity

Preferred Alternative - Alternative D

Under Alternative D, managed haying and grazing would be allowed once every five years and the PNS would be May 15 to August 1. While the frequency of managed haying and grazing under Alternative D is within the historic frequency of disturbance; the slightly longer interval would not provide the optimum habitat that promotes small mammal diversity and may reduce species diversity (Hall and Willig 1994). However, since the amount of CRP acreage eligible for managed haying and grazing is relatively small, this impact is not considered significant. It is likely that, with the mentioned management, the application of CRP conservation provisions, standards, and guidelines, and adaptation of the Conservation Plan to resource conditions on the land just prior to engaging in managed haying or grazing, negative indirect impacts to small mammals would not be significant and there would be a potential increase in the diversity of the small mammal population under Alternative D.

No Action – Alternative A

The No Action alternative, with longer intervals between managed haying and grazing (once every ten years for haying and once every five years for grazing), would likely reduce species diversity of small mammals as occurs in older vegetative stands. This is undesirable because small mammals serve many roles in the grassland ecosystem, such as prey and predator. However, this impact is not considered significant since CRP acreage eligible for managed haying and grazing is relatively small. With the mitigation measures described above, the application of conservation provisions, standards, and guidelines, and adaptation of the Conservation Plan to resource conditions on the land just prior to managed haying and grazing, no significant negative impacts to small mammals are expected under Alternative A.

4.1.2.4 Birds

Grazing and haying produce indirect and direct impacts to grassland bird species. Indirect impacts are related to vegetation changes as a result of haying or grazing and include altering the food abundance (seeds, insects), foraging site conditions (food availability); and cover for protection (thermal), escape, or breeding (courtship, nests) (USDA/NRCS 1999a). The manure from grazing animals attracts insects and increases their diversity, which are food sources for grassland birds. Direct impacts from haying or grazing potentially affect the presence of bird species (avoidance

[Grandfors et al. 1996; Warner et al 2000]); their reproductive success (destruction of nests, eggs, or young [Lokemoen and Beiser 1979; Wooley et al. 1982; Grandfors et al. 1996]); increase in predation (Lokemoen and Beiser 1979; Best et al. 1997; Horn and Koford 2000); increase in brood parasites (Grandfors et al. 1996); and individual collisions with farm equipment and vehicles (Wooley et al. 1982; USDA/NRCS 2006d).

Grassland bird species respond to habitat manipulations (e.g., grazing, mowing, etc.) in a variety of ways (reviews by Saab et al. 1995, Johnson et al. 2004, Ryan et al. 1998) based on many factors (Figure 4.1-1). For example, sedge wren avoid recently mowed CRP fields (preferring idled CRP habitat), but savannah sparrow abundance increases the year after haying (Horn and Koford 2000). Thus, changing the managed haying and grazing frequencies in Montana would likely have a variety of both positive and negative impacts on grassland birds.

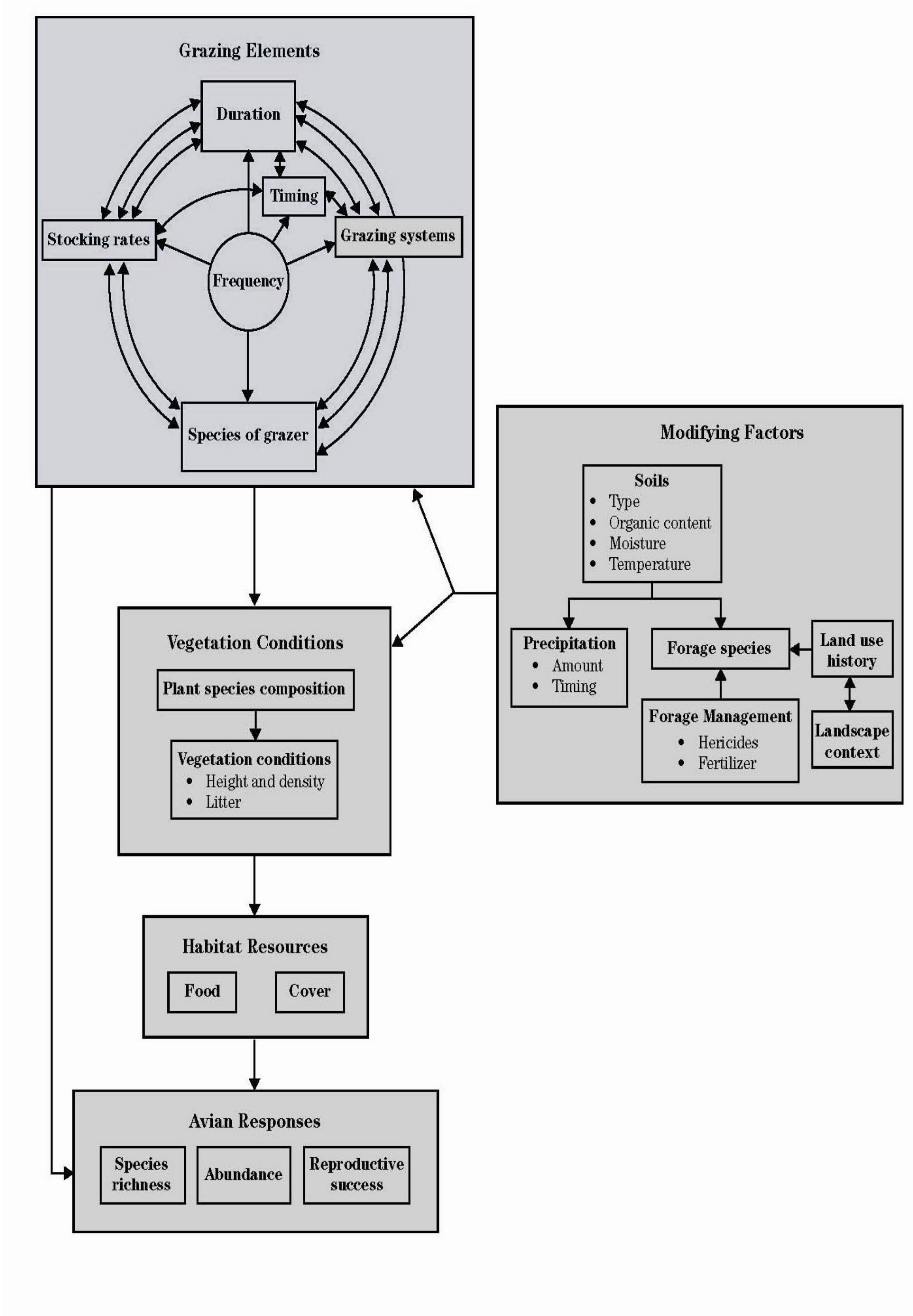
Methodology and Results for Indirect Impacts of Haying and Grazing

The indirect impacts associated with the alternatives on grassland bird species in Montana would result principally from changes in the vegetation. The vegetation analysis concluded that changes would be primarily to structure (refer to Section 4.1.1). Because haying is only permitted on a maximum of 50 percent of a field and the stocking rate for grazing is permissible only up to 75 percent of the NRCS stocking rate, the resulting plant community would potentially consist of a mosaic landscape.

Grassland bird species (obligate and facultative following Vickery et al. [1999]) of Montana were identified and evaluated using existing literature reviews (Saab et al. 1995; Ryan et al. 1998; Johnson et al. 2004) to predict their response to haying or grazing (Appendix D). The evaluation was based on a single (or periodic, but not annual) haying or grazing event. Based on the vegetation analysis, except for excess thatch accumulation and woody vegetation encroachment, little impact would occur on the plant community outside of the year the haying or grazing occurs, therefore potential effects on grassland birds is likely to be similar to a single year event as analyzed. Predicted responses were categorized as follows based on changes to vegetation and habitat:

- ***Potential for negative impacts*** include species that appear to avoid all recently grazed habitats;
- ***Potential for short-term negative but long-term positive impacts*** includes species that avoid recently disturbed habitat, but also avoid the older, densely vegetated habitat that CRP produces in the absence of periodic disturbance;
- ***Potential for short-term and long-term positive impacts includes*** birds that require a mosaic of successional stages in close proximity created by periodic disturbance, prefer shorter vegetation created by disturbance, or are associated with grazing;
- ***Potential positive impacts*** for grazing tolerant/dependent species which require very short grass with bare ground and are associated with heavily grazed grasslands; and
- ***Unknown impacts*** include species where empirical information is lacking.

Figure 4.1-1. Grazing Effects on Avian Populations Including Factors That May Modify Avian Responses (Extracted from USDA/NRCS 2006d)



Twenty-seven species were identified as part of a representative suite of grassland birds that are likely to use and/or nest in CRP lands in Montana and were carried forward for analysis in this EA. Six species were classified with potential for negative impacts, 11 species with potential for short-term negative but long-term positive impacts, seven species as potential for short-term and long-term positive impacts, six species considered grazing tolerant/dependent (with species overlap with other impact groups), and two with unknown responses (Table 4.1-2). Results indicate that a majority (19 of 27) of nesting species would have a mostly positive long-term response.

Table 4.1-2. Predicted Impacts to Grassland Bird Species Likely to Nest on CRP Lands in Montana for the Following Breeding Seasons after Haying or Grazing

Potential for Negative Impacts	
Mallard	Sharp-tailed grouse
American bittern	Common yellowthroat
Ring-necked pheasant	Clay-colored sparrow
Potential for Short-term Negative but Long-term Positive Impacts	
Blue-winged teal	Baird's sparrow
Northern harrier	Le Conte's sparrow
Short-eared owl	Dickcissel
Sedge wren	Bobolink
Vesper sparrow	Red-winged blackbird
Grasshopper sparrow	
Potential for Short-and Long-term Positive Impacts	
Upland sandpiper	McCown's longspur
Mourning dove	Chestnut-collared longspur
Horned lark	Western meadowlark
Savannah sparrow	
Potential Positive Impacts for Grazing Tolerant/Dependent Species	
Mourning dove	Lark bunting
Horned lark	McCown's longspur
Vesper sparrow	Chestnut-collared longspur
Unknown Impacts	
Green-winged teal	Northern pintail

Methodology and Results for Direct Impacts of Haying and Grazing

The managed grazing and haying program in Montana would be conducted outside of the NWF lawsuit settlement terms PNS (May 15 to August 1) in two of the four Alternatives (Alternative B and C). Alternative B proposes to reduce the PNS to May 15 to July 15 and Alternative C proposes to reduce the PNS to May 15 to July 1. Estimates of peak breeding dates for species likely to nest on CRP fields in Montana were determined using the peak breeding activity dates in BNA accounts (Cornell Lab of Ornithology 2008) (Table 4.1-3). Precocial species (hatchlings leave nest shortly after birth) peak breeding period was determined using the beginning and end "egg" time period. For altricial species (hatchlings with an extended nesting period) the peak breeding time was determined using the beginning of "egg" period and end of "young" time period to capture the time period when the young birds are vulnerable to trampling or haying. Most estimated peak breeding periods do not adequately correspond with the defined PNS, thus leaving a portion of the estimated peak breeding time period exposed for certain species to direct impacts from haying or grazing. The percentage of exposure is based on the length of time beyond the defined end of the PNS that the estimated peak breeding period for a particular species extends, as it is not anticipated that haying or grazing would occur prior to May 15. The PNS for Alternatives A and D (May 15 to August 1) exposes the peak breeding periods by an estimated range of zero percent to 28 percent, while the PNS defined in Alternative B (May 15 to July 15) exposes peak breeding periods by an estimated range of zero percent to 51 percent, and the range of exposure under Alternative C is zero percent to 70 percent (Table 4.1-3).

The potential effects of the exposed peak breeding periods are of more concern and not known. To determine the magnitude of the potential effects would require field studies and extensive modeling. It is not reasonable to anticipate that re-nesting would occur at a rate to nullify the potential impact that would likely be incurred by some species (e.g., savannah sparrow exposure of up to 70 percent, see Table 4.1-3) The method in which haying would be permitted (only 50 percent of a field in a single year) would provide some reduction in the direct impacts as there would be some remaining habitat for nesting. Estimation of potential mortality also includes calculating the impacts of haying on 100 percent of the economically viable acreage specified in Section 4.5. Similarly, the reduced stocking rate (75 percent of the NRCS recommendations) would reduce the impact to some degree; still the net effect to a species is unknown. However, CRP fields eligible for managed haying and grazing are an estimated eight percent of the total grassland habitat within the State of Montana calculated from the data provided from the Montana GAP analysis project (Fisher et al. 1998). The only way to completely avoid this direct impact is to extend the proposed PNS further (ending September 10) to include the entire peak breeding for all species likely to nest on CRP fields in Montana.

Other principal assumptions of the analysis are: (1) the analyzed birds are equally distributed across the State; (2) the defined peak breeding period captures most annual fluctuations in response to weather; (3) the impacts to reproduction are distributed evenly across the peak breeding period; and (4) haying could occur on 50 percent of the CRP fields across the State within any given single year. The first assumption is the most problematic because not all birds

Table 4.1-3. Peak Breeding Periods and Related Exposure for Potentially Nesting Grassland Birds in Montana

Common Name	Peak Breeding Dates	Percent Exposed by PNS*		
		A & D	B	C
Mallard	15 April - 15 July	0	0	15
Blue-winged teal	15 May - 20 July	0	8	29
Northern pintail	5 April - 10 July	0	0	9
Green-winged teal	1 May - 15 July	0	0	19
Ring-necked pheasant	15 April - 20 July	0	5	20
Sharp-tailed grouse	25 April - 25 June	0	0	0
American bittern	15 April - 31 July	0	15	28
Northern harrier	20 April - 10 September	28	40	50
Upland sandpiper	10 May - 10 June	0	0	0
Mourning dove	15 May - 31 August	28	44	56
Short-eared owl	1 April - 31 May	0	0	0
Horned lark	15 May - 10 July	0	0	16
Sedge wren	5 June - 20 July	0	11	42
Common yellowthroat	25 May - 15 July	0	0	27
Clay-colored sparrow	1 June - 31 July	0	27	50
Vesper sparrow	15 May - 25 July	0	14	34
Lark bunting	20 May - 30 June	0	0	0
Savannah sparrow	10 June - 20 August	27	51	70
Grasshopper sparrow	5 June - 31 July	0	29	54
Baird's sparrow	10 June - 15 August	21	47	68
Le Conte's sparrow	1 June - 15 August	19	41	60
McCown's longspur	10 May - 5 August	5	24	40
Chestnut-collared longspur	10 May - 31 July	0	20	37
Dickcissel	25 May - 25 July	0	16	39
Bobolink	20 May - 30 June	0	0	0
Red-winged blackbird	15 April - 31 July	0	15	28
Western meadowlark	10 May - 5 August	5	24	40

Percent exposure calculations: (100[end breeding date – PNS end date])/days in breeding period range across the entire State; some birds may preferentially nest in CRP grasslands during the nesting season over other grassland types, or have higher reproductive success in CRP relative to other grasslands. However, some species have shown no significant difference in preference between CRP grasslands and other grasslands (Farrand and Ryan 2005). Further, in areas where little quality habitat for wildlife exists, the potential negative effects of mortality loss on CRP lands may be more pronounced on a geographic scale smaller than a State or region. Recent studies undertaken as part of the CEAP have made gains in quantifying grassland bird use of CRP (Riffell et al. 2006; USDA/NRCS 2007b, 2008c); however, little research has been done comparing bird use of CRP versus alternative grassland types, and "direct comparisons of avian abundance in CRP and alternative grassland vegetation have been rare" (Farrand and Ryan 2005). More often, CRP wildlife observations have been compared to those observed on cropland. Calculating bird density on a per acre basis and extrapolating that to CRP is a difficult enterprise since for most species, high-quality estimates of population density are few. Applicability of population densities is limited for some studies because the data was collected at few sites at different seasons, sex ratios were not recorded, they are conducted for short periods, were completed in habitats that do not occur on CRP, or the studies do not differentiate CRP practices (Dobbs 2007). Further, the few state of the art studies conducted (such as the CEAP short and mixed grass prairie bird study [USDA/NRCS 2007b]) focus on priority bird species that do not necessarily have the most PNS exposure to direct impacts from managed haying.

In light of the lack of data, the current analysis has focused on defining acreage of a generic "grassland" habitat and utilizing percent of PNS exposure to direct haying impacts in order to approximate the potential grassland bird mortality of the alternatives being considered

Alternative B

Alternative B includes a frequency of managed haying once every five years and grazing once every three years, with the PNS interval from May 15 to July 15. The magnitude of the potential direct impacts of Alternative B to the reproductive success of grassland bird species and their specific population numbers is not entirely clear, as no detailed field studies have been conducted measuring impacts of the frequencies of haying or grazing on grassland bird populations. However, it is argued that assessing the potential magnitude of the impact on grassland bird habitat provides a proximate measurement. The activity with the most potential to directly impact the reproductive success of grassland birds is haying. This analysis evaluates the direct impacts of haying on the savannah sparrow. Out of the grassland bird species evaluated in this assessment, the savannah sparrow would potentially have the greatest exposure to direct impacts since an estimated 51 percent of its peak breeding period is not encompassed by the Alternative B PNS period. It was calculated that all CRP acres eligible for participation in managed haying and grazing contribute an estimated eight percent of the possible overall grassland habitat available in Montana. If habitat acres of CRP lands eligible for haying are eight percent of available habitat within the State, and only 50 percent of that may be hayed once every five years, and assuming haying is possible on all eligible CRP acreage in any single year, then four percent of available habitat may be hayed. If 51 percent of savannah sparrow peak nesting is exposed by the definition of the Alternative B PNS, then once every five years an estimated two percent (four percent of 51 percent) mortality could occur. These calculations were conducted using total grassland acres provided by the Montana GAP analysis project (Fisher et al. 1998). This analysis is based upon the assumptions that: savannah sparrows are equally distributed across Montana during the breeding season; the Montana GAP acres were the best available data for estimating total habitat acres; the impacts to reproduction are distributed evenly across the peak breeding period; and haying could occur on 50 percent of the CRP fields across Montana within any given single year. If only economically viable acreage is hayed as discussed in Section 4.5 Socioeconomics, the mortality rate is decreased to one percent every three years.

As noted previously, excessive thatch accumulations can occur on older grasslands. Thatch can negatively impact brood rearing habitat requirements for certain grassland birds as it makes it difficult for chicks to travel (USDA/NRCS 2006d; KDWP 2008). Managed grazing at intervals that mimic historic disturbance regimes on the Great Plains of three to five years removes the older vegetation, alleviating this problem (*Ibid.*).

No significant negative impacts to grassland birds are expected from implementation of Alternative B if established conservation practices, procedures and guidelines are followed, and the Conservation Plan is adapted to resource conditions on the land just prior to engaging in managed haying and grazing.

Alternative C

Alternative C would be conducted at the same frequency as Alternative B, but the PNS would be reduced to May 15 to July 1. Indirect impacts to grassland birds would be the same as for Alternative B, benefiting a majority of the grassland breeding bird species (Table 4.1-2). However, breeding grassland birds would have greater exposure to direct impacts since the defined PNS would cover less of their actual peak breeding periods. Savannah sparrow again would potentially have the greatest exposures to direct impacts since an estimated 70 percent of its peak breeding period is not encompassed by the Alternative C PNS period. Using the CRP acres eligible for managed haying and grazing as described under Alternative B, an estimated three percent (four percent of 70 percent) mortality could occur once every five years for this species. If only economically viable acreage is hayed the reduction in impact is slightly less than 2.5 percent once every five years.

No significant negative impacts to grassland birds are expected from implementation of Alternative C if established conservation practices, procedures and guidelines are followed, and the Conservation Plan is adapted to resource conditions on the land just prior to engaging in managed haying and grazing.

Preferred Alternative - Alternative D

Under Alternative D, managed haying and grazing would be allowed once every five years and the PNS would be May 15 to August 1. This frequency of disturbance to vegetation is within the recommendations (once every three to five years) (Johnson et al. 2004) for most grassland bird species, except for those species in the negative impact category (see Table 4.1-2). Therefore, the overall indirect impact would be positive over time for a majority of the bird species analyzed.

Breeding bird exposure to direct impacts would be lower under Alternative D compared to the other action alternatives. Mourning dove and northern harrier would have the greatest percent exposure of their peak breeding periods at 28 percent. Using CRP acres eligible for managed haying and grazing as described under Alternative B, an estimated one percent (four percent of 28 percent) mortality could occur for these species every five years. If only economically viable acreage is hayed the impact would be reduced to less than one half of one percent once every five years.

No significant negative impacts to grassland birds are expected from implementation of Alternative D if established conservation practices, procedures and guidelines are followed, and the Conservation Plan is adapted to resource conditions on the land just prior to engaging in managed haying and grazing.

No Action – Alternative A

The frequency of the No Action alternative is once every ten years for haying and once every five years for grazing, with the PNS from May 15 to August 1. This frequency of disturbance of haying to grassland vegetation is not within the recommendations of once every three to five years as proposed by Johnson et al. (2004) and the frequency of grazing would be at the maximum recommended interval. Thus, the needs of the majority of nesting grassland bird species that benefit from the recommended disturbance regime would not be met. Only the few species in the negative impact category (see Table 4.1.2) would benefit from a less frequent interval. Therefore, the overall indirect impact would be negative for a majority of the bird species as analyzed.

The potential direct impacts associated with the No Action Alternative are clear insofar as it is reasonable to assume that haying or grazing at a lower frequency would result in less potential to impact the reproductive success of many grassland birds. Again, in an attempt to evaluate the magnitude of the impact from haying on ground nesting grassland birds the mourning dove and northern harrier are considered. Using the calculations above, the estimated potential impact to mourning dove and northern harrier of one percent mortality would be reduced to once every ten years under this alternative, which is more beneficial for reproductive success of these species. If only economically viable acreage is hayed as discussed in section 4.5, the mortality rate is reduced to less than one half of one percent once every ten years. With the mitigation measures described above, the application of conservation provisions, standards, and guidelines, and adaptation of the Conservation Plan to resource conditions on the land just prior to managed haying and grazing, no significant negative impacts to birds are expected under Alternative A.

4.1.2.5 Amphibians and Reptiles

Reptiles and amphibians (collectively referred to as herptiles or herptofauna) associated with prairie grassland habitat may include prairie rattlesnake, gopher snake, Plains spadefoot toad, and tiger salamander (MFG 2008). Herptofauna would potentially have positive and negative responses to haying and grazing. Grasslands that have been hayed or grazed may be used more frequently because the variable habitat structure provides more microsites (i.e. sunning and shading spots) for herptofauna (Partners in Amphibian and Reptile Conservation [PARC] 2008).

Additionally, some reptiles and amphibians, especially members of the genus *Phrynosoma* (horned lizard), may benefit from grazing due to the reduction of dense vegetation increasing the open areas for foraging (Pianka 1966; Fair and Henke 1997). By increasing the native vegetation the invertebrate population may increase, indirectly increasing the herptofauna that may forage upon them (PARC 2008). Herptofauna need various stages of vegetative succession within their habitat which historically was achieved through natural disturbance regimes (USDA/NRCS 2006f).

According to a review of species included in NatureServe (2008), reptiles in Montana are active from March through October, with egg laying occurring from April to July, and hatching in June to September. One or more clutches may be laid per year, but one clutch per year is the norm (*Ibid.*).

Lizards in Montana are active typically from June through September with the active late-summer individuals being primarily hatchlings; while turtle species lay one or more clutches a year, occurring from May to July (NatureServe 2008). The turtle hatchlings do not leave the nest after hatching, but enter into hibernation in the nest and emerge in the spring, usually March to April. Snakes of Montana are typically active from March to October, with the activity peaking June to September (*Ibid.*). Oviparous (egg-laying) snake species typically clutch in June to July, but laying can occur as early as April if conditions allow, while viviparous (live-bearing) snake species typically produce young from August-September with some species producing young biennially (*Ibid.*).

Populations may experience short-term losses the year that haying or grazing occurs as a result of trampling from livestock, crushing, and fatalities from agricultural equipment, and increased predation due to increased exposure. Many herptofauna are not fast enough to move out of the way of potential danger. However, these potential impacts would not significantly impact breeding and reproduction of amphibians because amphibians found in Montana generally breed in early spring, laying eggs in wetlands and other aquatic habitats, and then moving to terrestrial areas to winter. Managed haying and grazing is not permitted within 120 feet of a waterbody, thus protecting the breeding areas associated with amphibians. There are terrestrial salamanders within Montana that do not require an aquatic habitat for breeding and reproduction; however, these are found on moist talus slopes or in coniferous forests with plentiful woody debris and leaf litter (NatureServe 2008) and would not be impacted by managed haying and grazing. Reptiles breed in a variety of habitats, including uplands, riparian areas, and in the soil, thus it is anticipated that there would be some loss of resident reptiles.

Techniques that may be implemented to reduce negative impacts to herptofauna include initiating mowing at the center of a treatment area, progressively mowing out from the center to allow wildlife to flee in all directions and not become trapped to one side. To reduce the area impacted by the mower tires, efforts should be made to follow the outermost tire track of a previous pass which would reduce animal mortality and soil compaction. The highest potential for mortality due to site management occurs during spring and fall migrations to and from breeding or wintering habitats (USDA/NRCS 2006f).

Alternative B

Alternative B includes a frequency of managed haying once every five years and grazing once every three years, with the PNS interval from May 15 to July 15. The potential for indirect impacts of on amphibians and reptiles is directly connected to changes to vegetation that may be related to the frequency of managed haying and grazing. As discussed in the vegetation section, benefits of haying and grazing to vegetation derived from the proposed frequency that also benefits amphibians and reptiles are an increase in diversity in structure; this provides microsites that can be maintained with the proposed frequencies. It is likely that with the mentioned mitigation, adherence to applicable conservation provisions, standards, and guidelines, and adapting the Conservation Plan to take into account resource conditions on the land just prior to managed haying and grazing, there would be no significant negative impact to amphibians and reptiles from Alternative B.

Alternative C

Alternative C would be conducted at the same frequency as Alternative B, with managed haying once in five years and grazing once in three years, but the PNS would be reduced to May 15 to July 1. Reptiles in Montana generally lay eggs through July; therefore, the change in PNS increases the potential for direct impacts to nests. However, the long egg laying period (April to July) reduces exposure, and practices such as following the outside tracks of the previous pass during haying operations decreases the potential for crushing. Most amphibians in Montana nest in areas not eligible for managed haying and grazing; therefore, no negative impacts from the shorter PNS are expected. Benefits from the vegetative changes that would be anticipated at this frequency would be the same as those under Alternative B. With the previously mentioned mitigation, adherence to applicable conservation provisions, standards, and guidelines, and adapting the Conservation Plan, there would be no significant negative impact to amphibians and reptiles from Alternative C.

Preferred Alternative - Alternative D

Under Alternative D, managed haying and grazing would be allowed once every five years and the PNS would be May 15 to August 1. The change in frequency is within the three to five year natural disturbance interval which would provide microsites that are beneficial to amphibians and reptiles. With the decreased frequency of managed haying and grazing over that of the other action alternatives, the potential for direct impacts is reduced. There would likely be no impacts to amphibians or reptile reproductive success as these species breed early spring. Through adherence to the procedures outlined in Alternative B, there would be no significant negative impacts to amphibians and reptiles under Alternative D.

No Action –Alternative A

Under Alternative A managed haying would occur once every ten years and managed grazing every five years, with the PNS from May 15 to August 1. This alternative would result in less potential impacts as the frequency of haying or grazing would be every ten and five years respectively. At the lower frequencies of disturbance microsites may not be maintained since diversity in vegetation structure decreases with age. However, these impacts are not expected to be significant due to the relatively small amount of acreage enrolled in CRP that is eligible for managed haying and grazing. With the mitigation measures described above, the application of conservation provisions, standards, and guidelines, and adaptation of the Conservation Plan to resource conditions on the land just prior to managed haying and grazing, no significant negative impacts to herpetofauna are expected under Alternative A.

4.1.2.6 Invertebrates

Invertebrate community studies have indicated that the diversity of invertebrates is often related to plant species diversity, structural diversity, patch size, and density (Jonas et al. 2002; McIntyre and Thompson 2003). Species richness in invertebrate communities appears to be greatest in mid to late June in temperate regions of the United States (Burke and Goulet 1998; Jonas et al. 2002). Total biomass of invertebrates has been documented to be significantly greater in grazed pastures compared to ungrazed CRP fields (Klute 1994) with the greater forb coverage being the contributing factor.

Invertebrate species response to haying and grazing correlates to the life-style and habitat preferences for a species. Managed haying would create a uniform plant height and remove smaller topographical features, such as grass tussocks (Morris 2000). This would result in a decrease in plant structural diversity within a field and thus a potential decrease in invertebrate diversity based on a species preference for structure. However, long-term abandonment of management in formerly mowed or hayed fields can also lead to insect declines, primarily resulting from floristic changes (Swengel 2001). Managed grazing would not result in a uniform height of plants but would likely increase the structural diversity and increasing the available niches for invertebrates. Several studies have shown a generally positive relationship between grazing and invertebrates. For example, grazing has been shown to increase insect abundance and diversity (Klute 1994). The manure from grazing animals has been shown to attract beneficial insect invertebrates (Purvis and Curry 1984; Reinecke and Krapu 1986). Mosaic landscapes, such as those created by grazing, are recommended for the maintenance of diverse insect fauna (Swengel 2001). Although these generalizations can be made, there is a lack of cohesive understanding of the tie between insect populations and management practices.

Direct mortality to invertebrates from mowing and grazing is dependent upon the degree to which a species is exposed, specifically if the species is a below ground insect, and to mobility of the species or life stage (Swengel 2001). For example, haying results in insect mortality particularly during the egg or larval stages (DiGiulio et al. 2001). Arthropod populations have been documented to decline immediately after mid-summer mowing, but only for a two week period (Bulan and Barrett 1971). Roadside habitats that are maintained by cutting have shown a decline in butterflies (Lepidoptera) after midsummer mowing, but are reoccupied afterward by mobile and non-native species (Munguira and Thomas 1992). Impacts to invertebrates from grazing include destruction of potential nest sites, existing nests, and contents; direct trampling of invertebrates; and removal of food resources (Sugden 1985).

Haying impacts to invertebrates can be reduced if the haying occurs when flowers are not in bloom, haying is conducted in a manner that would produce a mosaic of vegetation patches, and a single area is not hayed more than once a year (DiGiulo et al. 2001). Generally, grazing impacts can be mitigated by using moderate to light stocking levels and permitting recovery periods which allow recolonization to occur (Black et al. 2007).

Pollinator invertebrate species include butterflies, moths, bees and wasps, beetles and flies, and are a critical component of the grassland ecosystem as well as crop production. Pollinators include generalists that forage from a range of plants and specialists that are limited in their sources for nectar and pollen. Two primary habitat needs for all pollinators include a diverse native plant community and egg laying or nesting sites. Management techniques, such as grazing, haying, prescribed fire and insecticides can be both beneficial and detrimental to pollinators and no single management plan benefits all pollinators (Black et al. 2007). It is suggested that prior to any implementation of management techniques a biological inventory be conducted to identify important plant resources and pollinator habitat for generalist and specialized pollinator species (*Ibid.)*. Black et al. (2007) emphasizes that some areas remain untreated when implementing management techniques to promote recolonization of the treated areas. Furthermore, disturbance of a site in multi-year cycles provides a source from which pollinators can spread (*Ibid.*). Specific recommendations relating to haying and grazing include; delay technique until most flowering plants have died back and a majority of the pollinators are in diapauses (a state of dormancy) or have successfully laid eggs, which typically occurs in late summer or early fall (*Ibid.*).

Alternative B

Alternative B includes a frequency of managed haying once every five years and grazing once every three years, with the PNS interval from May 15 to July 15. The potential for indirect impacts of Alternative B on invertebrates rests on changes to vegetation that may be related to the frequency of managed haying and grazing. As discussed in the vegetation section, benefits of haying and grazing to vegetation derived from this frequency that also benefits invertebrates are an increase in the structural diversity and productivity of grassland plants. Some species may be negatively impacted from the change in vegetation structure depending upon their life-style and habitat preference; however, managed haying or grazing would occur after mid to late June when species richness is the greatest. The requirement for haying only half of a field and the reduced NRCS stocking rate would result in the recommended mosaic environment that would provide niches for a variety of invertebrates as opposed to haying an entire field, thus reducing the impacts to invertebrate species. Additionally, the areas of the field that are not hayed and the recovery period between haying and grazing events would provide a source for recolonization. Adherence to applicable conservation provisions, standards, and guidelines, and adapting the Conservation Plan to take into account resource conditions on the land just prior to managed haying and grazing would ensure no significant negative impact to invertebrates from Alternative B.

Alternative C

Alternative C would be conducted at the same frequency as Alternative B, but the PNS would be reduced to May 15 to July 1. Impacts to invertebrates from the shorter PNS period would likely be the same as under Alternative B since haying and grazing activities would still commence after the period of greatest species richness for invertebrates (mid to late June). With the previously mentioned mitigation, adherence to applicable conservation provisions, standards, and guidelines, and adapting the Conservation Plan, there would be no significant negative impact to invertebrates from Alternative C.

Preferred Alternative - Alternative D

Under Alternative D, managed haying and grazing would be allowed once every five years and the PNS would be May 15 to August 1. The decreased frequency would reduce direct impacts; moreover, the PNS avoids the period of greatest species richness, and minimizing the number of species potentially affected. Likewise, this frequency would provide habitat beneficial to invertebrates if it is accomplished in a manner that allows for vegetative structural diversity and the opportunity for recolonization from undisturbed habitat. With the previously mentioned mitigation, adherence to applicable conservation provisions, standards, and guidelines, and adapting the Conservation Plan, there would be no significant negative impact to invertebrates from Alternative D.

No Action – Alternative A

Potential for indirect impacts of the No Action on invertebrates is determined by the changes to vegetation, primarily vegetation structure. Potential changes in vegetation structure would be the same for the No Action as for the action alternatives, but they would occur at a less frequent interval (once in ten years for haying; once every five years for grazing), which is outside the recommended disturbance intervals for maintaining grassland health and vigor. At this frequency of management the mosaic environment providing niches for more invertebrate species only occurs once every ten or five years, therefore, maximum benefit to invertebrates would not be achieved. Longer intervals between grazing periods would reduce the amount of manure as a food source for invertebrates, which would potentially result in minor reductions of invertebrate abundance and diversity. Potential direct impacts to invertebrates would not occur as frequently under this alternative reducing potential mortality to invertebrate species. The No Action alternative would not likely result in a significant negative impacts to invertebrates if applicable conservation provisions, standards, and guidelines are followed and the Conservation Plan is adapted to current resource conditions on the land just prior to managed haying and grazing.

4.1.3 Conservation and Protected Species

4.1.3.1 Conservation Species

Seven Tier 1 species of greatest conservation need in Montana were identified as potentially inhabiting CRP fields: American bison, black-footed ferret, black-tailed prairie dog, white-tailed prairie dog, meadow jumping mouse, Great Basin pocket mouse, and western hognose snake.

Potential impacts of managed haying and grazing to conservation species were evaluated using existing literature and are organized in a matrix (Appendix D). Black-footed ferret is a Federal listed endangered species and is addressed in the Federal and State Protected Species section.

Bison in Montana are only found in and around Yellowstone National Park (YNP). They migrate out of YNP in the winter in search of forage, but their presence outside of the YNP boundaries is not well tolerated due to concerns about the spread of brucellosis to cattle herds. Bison are not likely to use CRP lands as their primary habitat; their occurrence on CRP would be limited to when they migrate out of YNP in the winter. Haying and grazing activities may reduce forage available to bison during the winter.

The black-tailed prairie dog prefers vast expanses of open shortgrass and clip existing vegetation around their colonies so that grass and forbs are very short or non-existent. For these reasons, fields occupied by black-tailed prairie dogs would be unlikely candidates for haying or grazing. However, it is possible that when fields are hayed, black-tailed prairie dogs may move into the areas if they are in the adjoining lands. Therefore, indirect effects are likely to be minimal, as a decrease in vegetative height from haying would be beneficial to these species and cattle are expected to preferentially graze in areas where the grasses have not been clipped short by prairie dogs. Direct impacts to the species would be limited because breeding is restricted to a single litter per year, usually born between March and May (Whitaker 2001), and the timing of the proposed haying and grazing would occur outside of the breeding period. Additionally, management for haying discussed for small mammals and herptofauna would reduce the potential direct impacts to black-tailed prairie dogs.

White-tailed prairie dogs also inhabit open grass and shrublands, but white-tailed prairie dogs do not clip vegetation as do black-tailed prairie dogs (Tileston and Lechleitner 1966) and may compete with cattle for grasses. However, selective grazing by cattle may allow them to expand their habitat due to improved forage quality (Loft et al. 1987, 1991; NatureServe 2008). Potential impacts would also be dependent on haying height as this species does not prefer the open, short grasslands (Baker et al. 1999; Putten and Miller 1999; Truett et al. 2001). Direct impacts to the species would be limited since a single litter per year is usually born in early May (Tileston and Lechleitner 1966) and management for haying discussed in Section 4.1.2.3, Small Mammals would reduce the potential direct impacts. Vegetation height from cattle grazing would likely not be even across the colony providing vegetative cover from predators such as badgers and golden eagles (Campbell and Clark 1981). This species preferentially burrows in stands of sagebrush, and use nearby grassy areas for feeding (*Ibid.*); therefore, haying would likely be precluded in most suitable white-tailed prairie dog habitat. If haying does occur where white-tailed prairie dogs occur, maintaining the height of remaining vegetation to provide cover from predators would prevent significant impacts to the colonies.

The meadow jumping mouse prefers moist grassland near streams, but also forages in nearby grasslands; food sources include seeds, insects, and fungi. Meadow jumping mice hibernate in protected areas such as under pieces of wood, underground, or in nests constructed of vegetation (Whitaker 1972). The peak breeding period for this species is June through August. Managed grazing activities are unlikely to have an effect on meadow jumping mice due to the restriction of managed haying and grazing within 120 feet of waterways and the through use of reduced stocking rates.

Great Basin pocket mouse use grass and shrublands of intermediate height and density in areas with sandy soils (MFG 2008). In Montana, they only occur in the southwest quarter of the State where there are few eligible CRP acres for managed haying and grazing. The Great Basin pocket mouse is reproductively active in the spring and into the summer. Haying and grazing activities would likely maintain vegetation characteristics that are beneficial to this species. Additionally, this species is crepuscular and nocturnal, and therefore less likely to be active when farm equipment is present. The management techniques for haying discussed for small mammals would reduce the potential direct impacts to the Great Basin pocket mouse.

The western hognose snake is found in open prairies with exposed sand or gravel patches, which managed haying and grazing would likely maintain by preventing woody encroachment. Western hognose snakes peak breeding season is June through August and the peak clutch period extends from June through July. Western hognose snake prey base is primarily herptofauna and small mammals, which would have a varied response to haying and grazing. The same management techniques for haying discussed for small mammals would reduce potential direct impacts to this species.

Alternative B

Under Alternative B, managed haying would be permitted once every five years and grazing once every three years, with PNS dates of May 15 to July 15. This alternative would not likely affect American bison, due to their limited potential to utilize CRP fields. The vegetative response to this frequency that would affect the remaining conservation species includes increased plant productivity and changes in vegetation structure. The black-tailed prairie dog and western hognose snake would likely benefit from the changes in vegetation structure as they prefer open areas. However, the change in the vegetation would likely result in a negative impact for Great Basin pocket and the white-tailed prairie dog since these species prefer taller vegetation with a shrub component. Indirect negative impacts are not expected to be significant due to the requirements of limiting haying to 50 percent of a field and reducing the stocking rate. The meadow jumping mouse’s primary habitat of moist grasslands would be protected by the provision restricting managed haying and grazing from occurring within 120 feet of permanent waterbodies. This provision would also reduce the potential for direct impacts. The proposed frequencies of this alternative would result in increased plant productivity benefiting the meadow jumping mouse. The PNS would expose a portion of the reproductive periods of the western hognose snake and meadow jumping mouse potentially impacting the reproductive success of these species the year that haying or grazing occurs. However, with management practices discussed for other wildlife related to haying, this potential impact would be reduced.

A site-specific environmental evaluation prior to contract approval would identify the presence of species of greatest conservation need, and consultation would be undertaken with the State to ensure impacts are avoided or minimized. Adherence to applicable conservation provisions, standards, and guidelines, and adapting the Conservation Plant to take into account resource conditions on the land just prior to managed haying and grazing under this alternative would not have significant negative impacts to conservation species.

Alternative C

Alternative C would be conducted at the same frequency as Alternative B, but the PNS would be reduced to May 15 to July 1. The frequencies of haying and grazing would be the same as Alternative B, thus the potential impacts to the majority of conservation species would be the same under this alternative. The change in PNS would increase the potential exposure of the reproductive period for of the meadow jumping mouse and western hognose snake. Meadow jumping mouse nesting would most likely occur within moist grasslands near streams, and direct impacts are not expected to be significant due to the restriction of managed haying and grazing within 120 feet of a permanent waterbody. The western hognose snake's peak clutch period of June through July would not be protected; however, with provisions of only haying half a field and reduced stocking rates it is unlikely the change in PNS would not result in a significant impact to western hognose snakes.

A site-specific environmental evaluation prior to contract approval would identify the presence of species of greatest conservation need, and consultation would be undertaken with the State to ensure impacts are avoided or minimized. Adherence to applicable conservation provisions, standards, and guidelines, and adapting the Conservation Plan to take into account resource conditions on the land just prior to managed haying and grazing under this alternative would not have significant negative impacts to conservation species.

Preferred Alternative - Alternative D

Under Alternative D, managed haying and grazing would be allowed once in five years and the PNS would be May 15 to August 1. As described in Alternative B, changes to vegetation structure and productivity would determine the potential indirect impacts to these species. The potential impacts from haying would be the same as the other action alternatives. Effects of the longer grazing interval would likely benefit the Great Basin pocket mouse and white-tailed prairie dog as they prefer intermediate vegetative density and structure that would likely occur under this Alternative. The longer interval between grazing events would provide more protective cover for foraging for the meadow jumping mouse. The black-tailed prairie dog would be less likely to move into CRP fields under this alternative as the additional vegetative growth between disturbance intervals would not create or maintain optimal habitat. In grazed CRP fields, the western hognose snake may experience slightly fewer open patches of sand and gravel. Likewise, potential prey diversity may be somewhat lower since the vegetation stand would have less structural diversity, leading to lower small mammal diversity. However, these impacts are not considered significant since CRP acreage eligible for managed haying and grazing is relatively small. The PNS associated with this alternative would provide the greatest amount of protection for reproduction periods of the conservation species evaluated.

A site-specific environmental evaluation prior to contract approval would identify the presence of species of greatest conservation need, and consultation would be undertaken with the State to ensure impacts are avoided or minimized. If significant negative impacts from managed haying or grazing are identified, these activities would not likely be authorized on the affected lands. Adherence to applicable conservation provisions, standards, and guidelines, and adapting the Conservation Plan to take into account resource conditions on the land just prior to managed haying and grazing under this alternative would not have significant negative impacts on Montana's conservation species.

No Action – Alternative A

Alternative A, with longer intervals between managed haying and grazing, would reduce the diversity in vegetation structure allowing tall vegetation to regain dominance. This would reduce habitat quality for black-tailed prairie dogs and potential prey base diversity for western hognose snake that prefer low to medium height vegetation. As with the action alternatives, the American bison would not be impacted by under this alternative. White-tailed prairie dogs, meadow jumping mouse and Great Basin pocket gopher prefer more intermediate vegetation structure, which at the longer interval for haying would not likely be maintained. Similar to Alternative D, the longer PNS associated with Alternative A would provide the greatest amount of protection for conservation species' reproduction periods.

A site-specific environmental evaluation prior to contract approval would identify the presence of species of greatest conservation need, and consultation would be undertaken with the State to ensure impacts are avoided or minimized. If significant negative impacts from managed haying or grazing are identified, these activities would not likely be authorized on the affected lands. Adherence to applicable conservation provisions, standards, and guidelines, and adapting the Conservation Plan to take into account resource conditions on the land just prior to managed haying and grazing under this alternative would not have significant negative impacts on Montana's conservation species.

4.1.3.2 Federal and State Listed Species

Two Federally and State endangered wildlife species, the black-footed ferret and whooping crane, and one Federally and State threatened plant species, Spalding's catchfly, have potential to occur on CRP fields in Montana (Appendix E).

Black-footed ferrets prefer open shortgrass prairies with sparse vegetation. They are closely associated with prairie dogs; therefore, if there are no prairie dogs on a CRP field, ferrets would be highly unlikely to be present. Fields with prairie dog colonies would likely not be considered for managed haying or grazing since black-tailed prairie dogs clip vegetation and would leave little vegetation available for grazing or haying. Furthermore, the black-footed ferret is likely extirpated from Montana. Managed haying and grazing on CRP fields in Montana would likely have no impact to the black-footed ferret.

The whooping crane is a migrant through Montana and uses open shores, sandbars, and wetlands associated with rivers and other permanent water bodies. Managed haying and grazing would not occur within 120 feet of waterways; therefore, these areas would not be impacted. Whooping cranes also use cultivated grain fields where they feed on left-over grain during migration stopovers. It is very unlikely that whooping cranes would use CRP fields due to the relatively lower density of available food.

Spalding's catchfly is a perennial forb that grows in mesic bunchgrass communities and sagebrush steppe in the northwest part of Montana. The plant usually takes two or three years to reach its reproductive stage, and may remain dormant even longer. Flowering occurs in July and August with fruit maturing August through September, and the above-ground parts die back in the fall (USDOI/USFWS 2007). Where plants are known to occur, grazing and trampling by livestock are considered a threat (*Ibid.*). Late summer haying would likely harm the plant as it would remove flowering stalks before seeds can disperse.

Alternative B

Alternative B includes a frequency of managed haying once in five years and grazing once in three years, with the PNS interval from May 15 to July 15. Black-footed ferrets and whooping cranes are extremely unlikely to occur in CRP fields in Montana that are eligible for managed haying or grazing, incurring no impact to the species.

Spalding's catchfly would be directly impacted by haying activities if present. Since this plant species flowers and fruits in late summer and early fall, plants would lose reproductive shoots to haying after the PNS ends on July 15. Grazing effects may not be as detrimental to the plants since light grazing would maintain open habitats and remove plant litter; however, the timing of grazing would expose the plants to trampling and loss of reproductive shoots, flowers, and seeds.

Prior to enrollment in CRP and as part of the Conservation Plan development, a site-specific inventory would identify the potential presence of any protected species. Formal consultation with USFWS would be completed in the event a CP, including managed haying and grazing, may affect a listed species. If negative impacts to listed species are identified, it is not likely the land would be approved for managed haying or grazing. No significant negative impacts to protected species are expected with the implementation of Alternative B if applicable conservation provisions, standards, and guidelines are followed, and a Conservation Plan is adapted.

Alternative C

Alternative C would be conducted at the same frequency as Alternative B, with managed haying once every five years and grazing once every three years, but the PNS would be reduced to May 15 to July 1. Impacts to black-footed ferret and whooping crane would be the same as Alternative B. Impacts to Spalding's catchfly would be the same as Alternative B, but the plants would have even more of their reproductive season exposed to direct impacts by haying and grazing.

Prior to enrollment in CRP and as part of the Conservation Plan development, a site-specific inventory would identify the potential presence of any protected species. Formal consultation with USFWS would be completed in the event a CP, including managed haying and grazing, may affect a listed species. If negative impacts to listed species are identified, it is not likely the land would be approved for managed haying or grazing. No significant negative impacts to protected species are expected with the implementation of Alternative C if applicable conservation provisions, standards, and guidelines are followed, and a Conservation Plan is adapted.

Preferred Alternative - Alternative D

Under Alternative D, managed haying and grazing would be allowed once every five years and the PNS would be May 15 to August 1. Alternative D is likely to have similar impacts as Alternative B and C, except at a less frequent interval for haying. No impacts are expected for black-footed ferrets and whooping cranes since they are highly unlikely to occur on CRP lands. Impacts to Spalding's catchfly would be similar to Alternative B, but the frequency associated with Alternative D would allow the two-year maturation and reproductive cycles to occur between disturbances. The PNS would expose less of the plant's reproductive period to loss from haying and grazing activities, however fruit maturation would still remain exposed (generally August to September).

Prior to enrollment in CRP and as part of the Conservation Plan development, a site-specific inventory would identify the potential presence of any protected species. Formal consultation with USFWS would be completed in the event a CP, including managed haying and grazing, may affect a listed species. If negative impacts to listed species are identified, it is not likely the land would be approved for managed haying or grazing. No significant negative impacts to protected species are expected with the implementation of Alternative D if applicable conservation provisions, standards, and guidelines are followed, and a Conservation Plan is adapted.

No Action – Alternative A

Alternative A would have no impacts on black-footed ferret or whooping crane. Impacts to Spalding's catchfly would be similar to Alternative D as the frequency associated with Alternative A would also allow several two-year maturation and reproductive cycles to occur between disturbances. In addition, the PNS would protect most of the reproductive period of this species; however, the mature fruit would be exposed to losses.

Prior to enrollment in CRP and as part of the Conservation Plan development, a site-specific inventory would identify the potential presence of any protected species. Formal consultation with USFWS would be completed in the event a CP, including managed haying and grazing, may affect a listed species. If negative impacts to listed species are identified, it is not likely the land would be approved for managed haying or grazing. No significant negative impacts to protected species are expected with the implementation of Alternative A if applicable conservation provisions, standards, and guidelines are followed, and a Conservation Plan is adapted.

4.2 WATER RESOURCES

Impacts to water resources would be considered significant if implementation of an action resulted in changes to water quality, threatened or damaged unique hydrologic characteristics, or violated established laws or regulations.

4.2.1 Background and Methodology

As stated by the UMC's FAPRI and the USDA/FSA: "Water Quality is affected by soil and nutrients transported off the field in water. Both field and buffer practices affect these processes" (FAPRI/FSA 2007).

FAPRI/FSA research indicates "across all assessed soil types, the amount of soil moving off the field in runoff is 99 percent lower for CRP conservation cover than for crop production that might otherwise occur" (*Ibid.*). These reduced amounts of soil erosion also correlate to reduced nitrogen and phosphorus (overall losses are 95 percent lower and 86 percent lower respectively when comparing CRP and without CRP scenarios) (*Ibid.*). Aside from covering highly erodible soils with conserving vegetative stands, the CRP often creates buffers between waterbodies and actively farmed fields. Buffer actions also reduce sediment and nutrients helping to avoid water quality impacts from agricultural practices.

Haying and grazing in general has the potential to directly and indirectly affect surface water quality. Livestock having access to surface waterbodies may pollute water with nutrients mobilized by damage to streambanks and vegetation from trampling, and the addition of manure. However, managed haying and grazing provisions limit these activities to no closer than 120 feet of a permanent surface waterbody and these areas are fenced to confine livestock, minimizing this potential. The primary potential of haying and grazing to affect water quality rests in possible increased soil erosion caused by loss of vegetation which could lead to increased sedimentation of surface water. In addition, soil compaction from livestock can lead to excessive runoff, if not controlled. Potential negative effects on water quality not directly related to the frequency of haying and grazing are currently addressed by NRCS Conservation Practice Standards and are included within the Conservation Plan prepared for specific lands, prior to managed haying and grazing being approved. Measures to eliminate, minimize or mitigate any potential impacts to a less than significant level include restricting livestock access to surface waterbodies, designing an appropriate stocking rate, limiting haying to 50 percent of a field in any given year, ensuring adequate measures are taken so that vegetation recovers prior to frost, ensuring livestock are adequately dispersed to prevent soil compaction and concentration of excess nutrients that could runoff into surface water. These measures are described in greater detail in Chapter 6, Mitigation.

The State of Montana has identified impaired waterbodies as described in Section 3.2.2.1. The addition of pollutants from haying and grazing activities could add to further impairment of these waterbodies which would be a significant impact. However, since the managed haying and grazing provisions limit these activities within 120 feet of any permanent surface waterbody and livestock is confined by fencing, further impairment of the listed waterbodies is not likely to occur,

For this analysis, the potential impacts of managed haying and grazing frequencies on vegetation and soils that may lead to diminished water quality form the basis for the water quality impact assessment. Since the vegetation and soil impact analyses are qualitative, this analysis is as well. Under managed haying and grazing activities, impacts to surface water would most likely result from changes to rates of erosion, sedimentation, and nutrient loading from manure.

4.2.2 Alternatives

Alternative B

Alternative B intends to alter the frequency and timing of managed haying and grazing of once every five years and once every three years respectively, outside a PNS of May 15 to July 15. As noted in Section 4.1.1 Vegetation, haying or grazing once every five or three years respectively has little impact on the plant community except during the haying or grazing period. Therefore, although the vegetative cover height would be altered (cut by at least two to eight inches for most grasses and legumes), and given hat NRCS Conservation Practice Standard 511 Forage Harvest Management Specifications (USDA/NRCS 2009b) and Plant Materials Technical Note 10 (USDA/NRCS 2008d) requires a minimum two to six inch stubble height remains (depending on species), vegetative cover would remain in place and exhibit regrowth between four and eight inches by the frost period (USDA/NRCS 2005a). This vegetative cover would continue to reduce the potential for soil erosion and subsequent sedimentation and nutrient deposition into nearby waterbodies. Overall, even though haying and grazing frequency would increase compared to Alternative A, the potential impact on water quality under this alternative is not expected to be significant if applicable conservation provisions, standards, and guidelines are followed and the Conservation Plan is adapted to current resource conditions on the land just prior to managed haying and grazing. Although haying and grazing would occur 15 days earlier when compared to the No Action Alternative, this shift in timing would not affect water quality. Vegetative cover would remain the same and may even increase since grasses and other cover would have an additional 15 days to grow before the frost.

Therefore, implementation of Alternative B would maintain reductions in overall sedimentation and nutrient loading into the Montana river basins gained by enrolling agricultural lands into CRP.

Alternative C

Alternative C would implement the frequency for managed haying and grazing as Alternative B, yet shortens the PNS to May 15 to July 1. Potential impacts related to frequency would be identical to Alternative B. Shortening the PNS by another two weeks would not impact warm season conservation covers. However, cutting dormant cool season grasses close to the end of the shortened PNS could harm the health and vigor of these plants. NRCS Conservation Practice Standard 511 Forage Harvest Management specifies that forage should be cut at a stage of maturity in which there are adequate food reserves and when auxiliary buds or tillers are present in order for regrowth to prevent loss of plant vigor, thereby maintaining the vegetative cover (USDA/NRCS 2004a). The additional two weeks provided by the shortened PNS allows additional time for warm season vegetation to recover prior to frost. No significant negative impacts to water resources are expected under this alternative if established conservation practices, provisions, and guidelines are implemented and the vegetative cover is maintained.

Preferred Alternative - Alternative D

Alternative D would implement the managed haying and grazing practices on a once in five year frequency for both while maintaining the settlement PNS of May 15 to August 1. As noted in Section 4.1.1 Vegetation, haying or grazing would have little impact on the plant community except during the haying or grazing period. The long-term viability and health of the vegetative cover would remain and continue to reduce the potential for soil erosion and subsequent sedimentation and nutrient deposition into nearby waterbodies. The decreased frequency of managed grazing over the other action alternatives would allow for a greater period for vegetative recovery, especially if precipitation is not ideal. Overall, even though haying frequency would increase compared to the No Action Alternative, water quality should remain the same as with the No Action alternative. Therefore, implementation of Alternative D would maintain reductions in overall sedimentation and nutrient loading into Montana river basins, with no significant negative impacts to water quality.

No Action – Alternative A

Alternative A would continue to implement the managed haying and grazing practices on a once every ten and once every five year frequency respectively, outside the PNS of May 15 to August 1. As discussed above, the impacts of managed haying and grazing has little negative impact on the plant community except during the haying or grazing period. This vegetative cover would continue to reduce the potential for soil erosion and subsequent sedimentation and nutrient deposition into nearby waterbodies. The longer intervals between managed haying or grazing under the current provisions would allow longer periods than the action alternatives for vegetation to recover after harvesting, especially if precipitation is not ideal the following growing season. No significant negative impacts to water quality are expected to occur from continuance of the current provisions under Alternative A if applicable conservation provisions, standards, and guidelines are met, and the Conservation Plan is adapted to accommodate current resource conditions on the land prior to managed haying and grazing.

4.3 SOIL RESOURCES

Significant impacts to soils would occur if implementation of an action resulted in permanently increasing erosion and stream sedimentation, or affected unique soil conditions.

4.3.1 Background and Methodology

In order to measure soil loss the USDA has developed the Revised Universal Soil Loss Equation (RUSLE). This equation is A = RKLSCP and takes into account rainfall/runoff (R), soil erodibility (K), slope length (L), slope steepness (S), cover management (C), and supporting practices (P).

Changing the frequency of managed haying or grazing would not cause changes to any factor except the cover management factor:

- Rainfall/runoff (R) would remain the same regardless of changing the frequency intervals of managed haying and grazing.

- Soil erodibility is independent of management; therefore, it would remain the same with or without changes to frequency intervals.
- Slope length and slope steepness would not be altered as a result of increasing the frequency of haying or grazing.
- Supporting practices such as contouring and terracing would remain the same with or without changing frequency intervals.

Therefore, a qualitative discussion of changes to the cover management factor would be used to determine impacts. This discussion would include alterations to each subfactor associated with cover management as noted below.

Cover Management Factor (c) and Subfactors

The cover management equation is:

$C = c_c g_c s_r r_h s_b s_c s_m$

Where:

C = daily cover management factor

c_c = daily canopy subfactor

g_c = daily ground (surface) cover subfactor

s_r = daily soil surface roughness subfactor

r_h = daily ridge height subfactor

s_b = daily soil biomass subfactor

s_c = daily soil consolidation subfactor

s_m = daily antecedent soil moisture subfactor

The daily canopy subfactor refers to the height and percent coverage of the daily canopy and how it affects water drop impact energy. A higher canopy allows water drops to collect and fall from a greater height increasing water drop energy. The gradient of canopy (location and density of canopy material) affects how waterdrops interact and the energy they maintain. Finally, canopy shape (triangle, inverted triangle, rectangle, etc.) affects what percent of the surface is covered by the canopy.

The ground cover subfactor includes the cover directly in contact with the soil surface that primarily affects rain drop impact and soil runoff. Ground cover can help with infiltration, slowing runoff and can reduce rain drop impact energy. Of note – canopy over ground cover is considered to be non-effective and is given no credit in the calculations.

The soil surface roughness subfactor is based on random roughness created by mechanical disturbance. It usually ranges from zero to three inches. Increased roughness generally creates depressions and weather resistant clods, increases infiltration, and increases hydraulic roughness that slows runoff.

The ridge height subfactor takes into account the height and orientation of ridges. The higher the ridges the more surface area available for soil erosion. Additionally, when ridges are oriented parallel to the overland flow path, rill-interill erosion would be increased.

The soil biomass subfactor estimates how soil biomass affects rill-interill erosion. Live root biomass helps reduce soil erosion in several ways: produce exudates, increases infiltration through transpiration, and mechanically holds the soil in place. Additionally, dead biomass and buried residue can also mechanically hold the soil in place.

The soil consolidation subfactor measures how loose the soil is depending upon soil disturbance. Soils that have been tilled, etc., have a higher susceptibility to erosion.

The antecedent soil moisture subfactor is only used when the RUSLE is applied to the Northwest Wheat and Range Region; therefore, it is not applicable to this State.

4.3.2 Alternatives

Alternative B

The soils in Montana are particularly susceptible to water and wind erosion in the southeast, northeast, and northern middle parts of the State. The implementation of Alternative B would allow these soils to be subject to managed haying and grazing once every five years and once every three years respectively. This increase in frequency would alter the following factors:

1. Because the conservation cover (grass, forbs, legumes, etc.) planted as part of the CRP practices eligible for managed haying and grazing would not change if Alternative B is implemented, only the canopy height would be affected. In grasslands, reducing the canopy height from approximately six to 12 inches to a minimum of two to six inches (the minimum height that must remain after haying or grazing) results in a relatively short interval during which canopy height would be shortened (from haying/grazing to regrowth), providing less canopy cover. In upland wildlife habitat conservation covers, provisions ensuring adequate leaf area of woody shrubs and trees for recovery within the growing season ensure the canopy is preserved. However, canopy cover over groundcover is given no credit in assessing soil erodibility. Therefore, for most conservation covers, this subfactor would not be a factor in soil loss.

2. Groundcover on conservation covers that are primarily grasses and legumes would be close to 100 percent except in areas where a certain amount of bare ground is required in order to target the needs of certain grassland bird species. Regardless of the percentage of existing grassland surface, groundcover would be minimally affected by haying and grazing actions, since NRCS Conservation Practice Standard 511 Forage Harvest Management Specifications (USDA/NRCS 2009b) and NRCS Plant Materials Technical Note 10 (USDA/NRCS 2008d) require a two to six inch stubble height remains (depending on species)after either activity. Haying would reduce the canopy cover, but leave the groundcover. Grazing may also temporarily reduce groundcover through hoof action where livestock concentrate. However, both of these effects would be localized, temporary and minimal.

3. As with groundcover, soil surface roughness may be minimally affected during haying and grazing in areas where equipment or livestock hooves alter the soil surface. In most cases, hooves and mechanical equipment may increase random roughness by creating depressions from tires and hooves throughout fields.

4. Any existing ridges across CRP lands should not be affected by an increased frequency of haying or grazing activities. Haying or grazing activities should not create or destroy any existing ridges as hay is harvested or livestock graze fields. Therefore, the ridge height subfactor would not be affected by implementation of Alternative B.

5. Live biomass in soils would not be affected by implementation of more frequent haying and grazing routines. Dead biomass may be increased, particularly during haying, as some cut hay is lost during the harvesting process. Also, dead biomass may accumulate on soil surfaces as a layer of thatch. However, the increased frequency of disturbance associated with Alternative B would adequately control thatch accumulation under average conditions.

6. Soil consolidation should remain unaffected by an increase in haying or grazing frequency. Because neither haying nor grazing require tilling or other soil disturbance actions (aside from minimal disturbance due to equipment or livestock hooves), the soil consolidation factor would be minimally affected by implementation of Alternative B

An increase in haying or grazing frequency over Alternative A may alter cover management subfactors of groundcover, soil surface roughness, soil biomass, and soil consolidation. In most cases, these would be short term, localized adverse effects. In the case of soil biomass, benefits may be realized as dead biomass is added to the soil and negative impacts of thatch accumulation are controlled by more frequent disturbance. If less than ideal precipitation conditions arise between periods of harvesting, the increased frequency of managed haying and grazing Alternative B reduces the potential recovery period more than Alternative A. In order to help reduce or avoid adverse effects, mitigation measures in Chapter 6 require the development of a Conservation Plan prior to any managed haying or grazing. Portions of this Conservation Plan would place maximum haying and grazing limits and include best management practices (BMPs) to help reduce soil erosion. These BMPs include, but are not limited to, measures to maintain adequate ground cover, litter, and canopy and reduce soil compaction. Additionally, Alternative B would change the PNS dates to May 15 to July 15. Although haying and grazing would begin 15 days earlier when compared to Alternative A, this shift in timing would not affect soils. The PNS would protect the reproductive growth of cool season grasses. However, with the shortened PNS, warm season grasses would likely be in their reproductive growth period when haying or grazing would be permitted, possibly diminishing the health and vigor of these plants. This impact is reduced by the NRCS Practice Code 511 Forage Harvest Management provisions to cut at a stage of maturity that does not hinder growth (USDA/NRCS 2004a). Similarly, the minimal stubble height specifications of NRCS Practice Code 511 Forage Harvest Management Specification (USDA/NRCS 2009b) and Eastern Montana Plant Materials Technical Note 53 (USDA/NRCS 2006b); and the reduced stocking rate provision of NRCS Practice Code 528 Prescribed Grazing (USDA/NRCS 2009a) would also ensure the survival and long-term viability of grassland plants.

Adherence to established BMPs and adaptation of the Conservation Plan prior to managed haying and grazing to accommodate current resource conditions on the land would ensure there are no significant negative impacts to soils under Alternative B.

Alternative C

Alternative C has the same frequency of managed haying and grazing as Alternative B, yet shortens the PNS an additional 15 days to May 15 to July 1. Therefore, most of the impacts of Alternative C are similar to Alternative B. The shortened PNS would permit haying or grazing to occur as early as July 1. Cutting or grazing cool season species close to the end of the shortened PNS may diminish the health and vigor of cool season plants. Similarly, warm season species would be in the reproductive period, possibly diminishing the health and vigor of these plants. This impact is reduced by the NRCS Practice Code 511 Forage Harvest Management provisions to cut at a stage of maturity in which there are adequate food reserves and when auxiliary buds or tillers are present in order for regrowth to occur without loss of plant vigor (USDA/NRCS 2004a). Likewise, the minimal stubble height specifications of NRCS Practice Code 511 Forage Harvest Management Specifications (USDA/NRCS 2009b) and Plant Materials Technical Notes 10 and 53 (USDA/NRCS 2006b, 2008d); and the reduced stocking rate provision of NRCS Practice Code 528 Prescribed Grazing (USDA/NRCS 2009a) would also ensure the survival and long-term viability of grassland plants. As with Alternative B, adherence to established BMPs and adaptation of the Conservation Plan prior to managed haying and grazing to accommodate current resource conditions on the land would ensure there are no significant negative impacts to soils under Alternative C.

Preferred Alternative - Alternative D

Alternative D would implement both managed haying and grazing practices on a once every five year frequency, outside the PNS of May 15 to August 1. As presented in Section 4.1.1 Vegetation, decreasing the frequency of haying or grazing to this interval is not likely to have substantially different impacts on vegetative cover. The PNS period under this alternative would protect the reproductive period of both cool and warm season grasses, thus maintaining or improving their vigor. Therefore, the impacts of this alternative on soil erosion are essentially the same as for the other action alternatives. Adherence to the BMPs discussed in Alternative B and adaptation of the Conservation Plan prior to managed haying and grazing to accommodate current resource conditions on the land would ensure there are no significant negative impacts to soils under Alternative D.

No Action – Alternative A

Alternative A would continue to implement the managed haying and grazing practices on a once in ten and once in five year frequency respectively. Alternative A is expected to help minimize soil erosion within the project area, since land would be planted in a conservation cover crop. This vegetative cover would continue to reduce the potential for soil erosion and subsequent sedimentation and nutrient deposition into nearby waterbodies. Additionally, reduced haying and grazing frequencies would even further reduce effects on cover management subfactors soil surface roughness and soil consolidation. The longer intervals between managed haying or grazing under the current provisions would allow longer periods for vegetation to recover after harvesting, especially if precipitation is not ideal the following growing season. Likewise, the PNS period under this alternative protects the reproductive period of both cool and warm season grasses. Continuance of current managed haying and grazing provisions under Alternative A is not expected to result in significant negative impacts to soil if the Conservation Plan is adapted to current resource conditions and applicable conservation provisions, standards and guidelines are met.

4.4 AIR QUALITY (CARBON SEQUESTRATION)

Impacts to air quality would be deemed significant if implementation of an action reduced the rate of carbon sequestration to below pre-CRP practice levels or resulted in more CO_2 release to the atmosphere than which is sequestered.

4.4.1 Background and Methodology

In general it can be stated that taking land out of cultivation and implementing improved management would result in a net increase in carbon sequestration levels and that the annual rate of increase continues for decades (Conant and Elliot 2001). Scientists also attribute a major portion of the total carbon sequestered on agricultural lands to the CRP program (Ogle 2008). Carbon sequestration changes depend on a number of factors, the dynamics of which are only partially understood. More research across the State on many more sites, soil types, management regimes, landscapes and temperature/precipitation regimes is necessary before there is sufficient detail to inform decision makers on an issue as complex as carbon sequestration (Paul 2008).

Scientists have not measured carbon sequestration levels specifically for the alternatives examined in this EA. Logic would lead to the conclusion that the difference in carbon sequestration levels achieved by the alternatives analyzed in this EA is much less than the level of carbon sequestration achieved by any of the alternatives over conventional farming. One can conclude that the No Action Alternative and the action alternatives result in a net increase in carbon sequestration over traditional crop production practices and both would make a significant reduction in agricultural carbon emissions.

The NRCS has developed the Voluntary Reporting of Greenhouse Gases-Carbon Management Evaluation Tool (COMET-VR), which is available to the public for modeling carbon sequestration under alternative management practices. This tool utilizes information obtained from the Carbon Sequestration Rural Appraisal (CSRA) and the dynamic carbon sequestration model "Century" developed at CSU to simulate carbon acquisition rates based on a variety of management practices. The model accommodates the most common agricultural land uses, tillage methods, and soil types found in each county and State. It also allows simulations of CRP activities (grass and legume cover and 100 percent grass cover). The model does not allow one to select the practices of haying and grazing on CRP at the frequency and intensity identified in the alternatives analyzed.

Two simulations were run using COMET-VR to examine the carbon sequestration rates resulting from changes in land management practices in Hill County, Montana on upland loam, non-hydric soil with no irrigation.

Simulation 1

The first simulation assumes the lands were intensively farmed through 1999 in a winter wheat-fallow rotation. Four post-1999 management practices were run to determine their effect on carbon sequestration rates (Table 4.4-1). The four practices were: (1) annual haying of a grass/legume stand; (2) moderate grazing on a 100 percent grass stand; (3) a 100 percent grass stand with no haying or grazing; and (4) a grass/legume stand with no haying or grazing. The latter two practices are designed to equate to CRP practices.

Table 4.4-1. Carbon Sequestration Level Based on Land Use Since 2000 under Simulation 1

	Grass/Legume (Annual Haying)	**100% Grass Cover** (Moderate Grazing)	**100% Grass Cover** (No Haying or Grazing)	**Grass/Legume** (No Haying or Grazing)
Carbon (lbs/ac/yr)	400	40	40	460

Simulation 1 indicates that the No Action alternative and action alternatives result in increases of sequestered carbon. Notably, the largest increase in carbon accumulation occurred in the grass/legume stand with no haying or grazing, which was followed closely by annual haying of the grass/legume stand. Both management practices of the 100 percent grass cover resulted in similar amounts of sequestered carbon, but considerably less than that of the grass/legume and 100 percent legume stands. The addition of legumes appears to dramatically affect carbon sequestration levels. The large difference in carbon storage capacity demonstrates the importance of range species richness and the role of nitrogen-fixing legumes.

Simulation 2

The second simulation assumes the land was intensively tilled and producing cotton through 1999. All other factors are the same as in the first simulation (Table 4.4-2).

As with Simulation 1, the stands with legumes sequestered considerably more carbon than the 100 percent grass stands. However, opposite of the results of Simulation 1, the 100 percent legume stand that was continuously hayed sequestered slightly more carbon than the grass/legume stand that was neither hayed nor grazed.

Table 4.4-2. Carbon Sequestration Level Based on Land Use Since 2000 under Simulation 2

	Grass/Legume (Annual Haying)	**100% Grass Cover** (Moderate Grazing)	**100% Grass Cover** (No Haying or Grazing)	**Grass/Legume** (No Haying or Grazing)
Carbon (lbs/ac/yr)	520	60	60	440

Alternatives' Simulated Sequestration Rates

In order to better simulate the alternatives discussed in this EA, the results of the two simulations were manipulated to achieve a ten-year carbon sequestration rate. The derived ten year response was then divided by ten in order to achieve an annual carbon sequestration rate for each practice (Table 4.4-3). For example from Simulation 1, using Alternative A grazing frequency of once every five years, the response is calculated as follows:

- SOC for one year grazed = 40 lbs/ac
- SOC for four years not grazed = 160 lbs/ac (40 lbs x 4 yrs)
- Total SOC for five years = 200 lbs/ac (40 lbs + 160 lbs)
- Total SOC for ten years = 400 lbs/ac (200 lbs x 2)
- **Average annual SOC rate =40 lbs/ac (400lbs/10yrs)**

Table 4.4-3. Alternatives' Carbon Sequestration Simulation Results

Alternative Practices	**Simulation 1**	**Simulation 2**
Alternative A Grazing (1/5)	40.0	60.0
Alternative A Haying (1/10)	454.0	466.0
Alternative B and C Grazing (1/3)	39.6	59.4
Alternative B and C Haying (1/5)	448.0	564.0
Alternative D Grazing (1/5)	40.0	60.0
Alternative D Haying (1/5)	448.0	564.0

4.4.2 Alternatives

Alternative B

Studies have shown that during the early growing season, grazing reduces net carbon exchange relative to the reduction in green leaf area, but as the growing season progresses on the grazed area, regrowth produces younger leaves that have apparent higher photosynthesis efficiency. This is supported by the fact that the net CO_2 exchange efficiency was greatest in grasslands when utilization was highest, even though the leaf area was greater in the ungrazed areas. This result is attributed to the reduction in plant respiration induced by the reduction in leaf surface area. The response of grasses to grazing suggests that eliminating grazing entirely in natural grasslands can either increase or decrease the rate of carbon sequestration however, not at a significant level. Alternative B resulted in a net increase in soil carbon ranging from 40 to 564 lbs/ac/yr. The air quality in Montana would benefit by the removal of between 224,880 and 3,202,833 tons of atmospheric CO_2 if this alternative was applied to all managed haying and grazing eligible acreage in the State. Alternative B would result in a net increase in SOC and a reduction in atmospheric carbon resulting in better air quality and a negligible positive impact on global warming. However, the COMET-VR analysis indicates there is no appreciable difference in the rate of carbon sequestration between Alternative B and the other alternatives analyzed.

Alternative C

Modeling Alternative C results in the same net increases in soil carbon and removal of atmospheric carbon as those of Alternative B. Studies have shown that annual haying and grazing of permanent vegetated fields result in similar levels of carbon sequestration; therefore, Alternative C resulted in the same levels of carbon sequestration as Alternative B. Grazing or haying warm season grasses after July 1 versus July 15 gives the vegetation a significant period to initiate regrowth and replace stored non-structural carbohydrates. In theory, this allows for higher carbon sequestration levels; however, modeling results vary and are not conclusive. Conversely, cool season grasses cut close to the end of a shorter PNS diminish plant health and vigor, which reduces carbon sequestration. However, the results of modeling of this Alternative show that carbon sequestration levels are higher than that of pre-CRP practices and atmospheric carbon levels would be reduced.

Preferred Alternative - Alternative D

Alternative D would change the frequency of both managed haying and grazing to once every five years. Modeling demonstrated no consistent advantage or disadvantage to any of the alternatives for carbon sequestration. In all cases, the alternatives resulted in an increase in carbon sequestration. Alternative D resulted in a net increase in soil carbon ranging from 40 to 564 lbs/ac/yr. The air quality in Montana would benefit by the removal of between 227,151 and 3,202,829 tons of atmospheric CO_2 if this alternative was applied to all managed haying and grazing eligible acreage in the State. However, the COMET-VR analysis indicates there is no appreciable difference in the rate of carbon sequestration between Alternative D and the other alternatives analyzed.

Alternative A - No Action

Less frequent removal of older (and dead) plant material results in lower rates of photosynthesis. Lower photosynthesis rates results in less CO_2 exchange and a reduction in carbon sequestration. Less frequent grazing would result in a lower level of animal waste (manure and urine) being added to the soil. Manure and urine add nitrogen to the soil resulting in increased plant growth. The addition of manure and urine also affects microbial community dynamics. Soil microbes directly affect carbon cycling and the rate of carbon sequestration. Typically, lower levels of manure and urine would suppress carbon cycling. However, the COMET-VR analysis conducted in this study found little appreciable difference in the rate of carbon sequestration between Alternative A and the action alternatives. Alternative A resulted in a net increase in soil carbon ranging from 40 to 466 lbs/ac/yr. This equates to the removal of between 227,151 and 2,646,309 tons of atmospheric CO_2 if this alternative was applied to all managed haying and grazing eligible acreage in the State. Therefore, this practice would improve air quality, help mitigate for other carbon emissions and provide a negligible positive impact on global warming.

4.5 SOCIOECONOMICS

A significant impact to socioeconomic conditions can be defined as a change that is outside the normal or anticipated range of those conditions that would flow through the remainder of the economy and community creating substantial adverse effects. For small percentage changes in individual attributes, it would be unlikely that the changes would result in significant impacts at the total level of analysis (i.e., statewide). Changes to the statewide economy of greater than agriculture's normal contribution could be considered significant, as this could affect the general economic climate of other industries on a much greater scale.

Additional changes in demographic trends (i.e., population movements) would be considered significant if a substantial percentage of the population were to enter or leave a particular area based on the changing economic conditions associated with the alternatives, rather than projected changes or changes generated by economic activities as a whole.

Also, biological changes associated with managed haying and grazing activities that affect other species (such as ground-nesting species) has ancillary effects to outdoor recreation for both consumptive uses like hunting and non-consumptive uses like wildlife watching. These effects can create both monetary and non-monetary changes, such as less expenditure for outdoor activities.

4.5.1 Background and Methodology

This assessment to determine the potential economic impact of managed haying and grazing alternatives was developed from production budgets and changes in producer income using IMPLAN™ software. Secondary information was collected from existing 2004 to 2006 USDA data sources and the alternative managed haying and grazing frequency is analyzed to estimate the net returns from engaging in these practices. These budgets are then used to determine the probability of producers adopting the managed haying and grazing practices, the increases in outputs and incomes, effects on local, regional and national prices and the economic impacts in the local, regional and national economies. A full description of this methodology is included in Appendix C.

Economic viability was determined to be at least a $5.00 return per acre above the sum of per acre costs of production and a 25 percent CRP rental rate reduction per acre. An average rental rate per acre was determined and used as one of the costs to determine per acre return. When the sample data was extrapolated to a countywide and then statewide profile using expansion factors at each level, it was found that the majority of acreage could produce an economically viable return per acre for both hay production and beef production, thereby indicating that the 25 percent rental rate reduction was less than the economic value of the product generated from each acre of managed haying or grazing activities. It was identified that approximately 155,000 acres of eligible CRP practices were used for managed haying activities between 2004 and 2006 and 63,000 acres were used for managed grazing activities, averaging about 73,000 acres per year. Table 4.5-1 illustrates the amount of acreage of CRP that was used for haying activities from 2002 to 2006 along with yield per acre in tons and total hay production in tons.

Table 4.5-1. Hay Production from CRP Land

Year	Harvested Acres (,000)	Yield (tons per acre)	Production (,000 tons)
2002	550	1.1	605
2003	56	1.0	57
2004	328	1.3	423
2005	156	1.3	204
2006	64	1.1	72

Source: USDA/NASS 2008b

Managed haying and grazing potentially removes habitat used by game species that could impact recreation resources, especially hunting small game species such as small mammals and gamebirds in the fall following haying or grazing. However, which species may be impacted depends upon when hunting is authorized by the State, the type of CP established, when during the growing season the haying or grazing occurs, how long the vegetative stand has to recover after either haying or grazing, and the habitat needs of individual game species. Potential losses of hunting opportunities in the year of managed haying and grazing are partially offset by the long-term benefits to grassland bird habitat and the increase in small mammal species that occurs in response to increased vegetative structural diversity gained for several years following the haying or grazing event (see Sections 4.1.2.3 and 4.1.2.4). Impacts to recreationists and the recreational economy are not likely to be significant given only 50% of a CRP field may be harvested in any given year, and CRP land eligible for managed haying and grazing comprises less than eight percent of grassland habitat in Montana. Given the above, the following analysis assesses the potential impacts of the alternatives on loss of recreational habitat qualitatively based upon the frequency of proposed managed haying and grazing.

4.5.2 Alternative B

Alternative B proposes to allow managed haying once every five years and managed grazing once every three years with the PNS from May 15 to July 15 of each year. This alternative was the previous provision for the State of Montana prior to initiation of the NWF lawsuit settlement terms. The analysis for this alternative is based on a maximum adoption scenario of managed haying and grazing activities on eligible CPs for enrolled CRP acreage. Individual operator adoption of these practices would be based on numerous personal, local, and regional factors, which would likely indicate that the adoption rate would be less than the maximum values calculated under this analysis.

4.5.2.1 General Population Characteristics

Sullivan et al. (2004) looked at the rural economic trends following implementation of the CRP. The data period observed was from 1985 to 2000 as a long-term look at trends with 1985 to 1992 being used to identify any short-term trends. They did find that in the short term, counties having a high level of CRP enrollment in distinctly rural areas tended to experience downward trends in local population and employment, though the significance of these trends varied. They found that there was no significant correlation between CRP enrollment and negative population changes, but did find evidence of correlation with CRP enrollment and job loss in the short term. In the long term, there was no evidence for any correlation on these factors. This study also found that counties with small agricultural service centers experienced sharp reductions in demand for farm-related business services and products as farmland was retired. However, over the long term the studies indicated that the rural economies were adaptable enough to adjust to the changing markets.

Since managed haying and grazing would occur on currently enrolled acreage in the short term, it is anticipated that there would be no substantial changes in population, personal income and off-farm earnings, or employment based on the analyzed data. In the longer term, this alternative could create additional opportunities to farm services providers (i.e., custom farming operations, farm equipment dealers) at the regional level as more producers take advantage of the managed haying and grazing activities. As additional acreage is enrolled in the managed haying and grazing activities, custom haying operators would find new opportunities for their services. The longer term effects would require a widespread adoption of managed haying and grazing activities closer to the maximum levels as illustrated in Table 4.5-2 to generate new opportunities for the entry of new providers.

4.5.2.2 Managed Haying and Grazing Enrollment and Agricultural Production Value Changes

Analysis of this alternative revealed that the maximum annual percentage of use for managed haying and grazing activities would be approximately 18 percent of the economically viable acreage (6.8 percent of managed grazing and 11.2 percent of managed haying) (Table 4.5-2). This determination of economically viable acreage indicates that the 25 percent rate reduction would be less than the economic value of the product generated off each acre of managed haying or grazing activities. This would equate to approximately 212,000 acres using managed grazing and

350,000 acres using managed haying. These activities are estimated to produce approximately $5.1 million additional beef production value (0.7 percent increase over no CRP use) and $8.1 million in hay production value (2.6 percent increase over no CRP use). For the statewide economy the use of these CRP acres for managed haying and grazing activities would produce an estimated additional $9.4 million from beef production (0.04 percent increase over no CRP use) and $13.5 million from hay production (0.05 percent increase over no CRP use) rippling throughout the rest of the State economy. A comparison of the alternatives is illustrated in Table 4.5-2.

Table 4.5-2. Comparison of Conditions and the Alternatives

Parameter	No Action Alternative	Alternative B	Alternative C	Alternative D
Managed Grazing Activities (Beef Production)				
Maximum Percent Economically Viable Acres	4.03	6.80	8.25	4.03
Maximum Number of Acres	125,428	211,633	256,503	125,428
Additional Pounds of Beef	2,867,310	4,837,984	5,863,704	2,867,310
Additional Beef Value	$3,010,675.77	$5,079,883.49	$6,156,888.96	$3,010,675.77
Percent Change in Beef Value	0.38	0.65	0.78	0.38
Economy-wide Value Change	$5,571,437.87	$9,400,632.10	$11,393,695.96	$5,571,437.87
Percent Economy-wide Value Change	0.02136	0.0360	0.0437	0.0214
Managed Haying Activities (Hay Production)				
Maximum Percent Economically Viable Acres	5.0	11.24	14.09	9.98
Maximum Number of Acres	155,246	349,727	438,409	310,492
Additional Tons of Hay	55,067	124,050	155,506	110,133
Additional Hay Value	$3,579,336.42	$8,063,262.48	$10,107,891.93	$7,158,672.83
Percent Change in Hay Value	1.17	2.64	3.31	2.34
Economy-wide Value Change	$5,979,564.77	$13,470,318.13	$16,886,033.45	$11,959,129.54
Percent Economy-wide Value Change	0.02292	0.0516	0.0647	0.0458

If Alternative B frequencies are utilized, and the maximum amount of enrolled acreage authorized for managed haying and grazing is used for these activities, the actively managed hayed and grazed acreage would increase by 6.7 times over the average condition of approximately 73,000 acres per year utilized for managed haying and grazing activities between 2004 and 2006. This would be a substantial increase that would generate a small positive increase over the total value of beef production and hay production given the assumptions of the methodology. The economy as a whole would experience a small positive increase of approximately 0.9 percent from activities occurring on managed haying and grazing acreage. As with any CRP program, the effects vary by location and region.

4.5.2.3 Outdoor Recreation

In general, biological conditions that enhance habitats for wildlife increase the overall societal value for these species. Implementing Alternative B would result in benefits, both monetary and non-monetary, if there were additional opportunities for outdoor recreation activities. If managed haying and grazing activities provide vegetation disturbance similar to natural occurrences, there should be varied positive habitat effects for both game and non-game species. In general, CRP practices have been found to create positive net societal benefits for a variety of resources (e.g., water quality improvements, wildlife habitat, reduced erosion and sediment transport) (Sullivan et al. 2004). An increase in game species could increase the monetary benefits associated with consumptive uses at local and regional levels. Additionally, an increase in non-game species could create both monetary and non-monetary benefits. Overall, enhancement of wildlife habitat would generate small positive values to local and regional communities.

As described in Section 4.1.2.5, a maximum mortality rate of approximately two percent of mourning dove (a game species) in any single year would be expected if all available acreage was hayed within the State at the allowable 50 percent rate. As a worst-case scenario this mortality rate would be experienced once every five years under Alternative B. However, based on the economically hayable acreage, only 11.2 percent of the eligible acreage would be expected to be hayed in any one year by selecting this alternative. This would then indicate a low percentage of potential mortality for the mourning dove, approximately 0.4 percent of the total population per year. As such, it would be unlikely that there would be measurable adverse socioeconomic effect from the use of managed haying practice outside the PNS associated with outdoor recreation activities dependent upon ground nesting bird species. No significant adverse impacts to the recreational economy of the State are expected from implementing Alternative B.

Under Alternative B, loss of small game hunting habitat in the year of managed haying and grazing would only occur once every five years for managed haying and once every three years for managed grazing. This impact is insignificant since the proposed interval is so infrequent, CRP land comprises less than eight percent of available grassland habitat in Montana and only four percent of that may be hayed or grazed in any given year, and managed haying or grazing is not likely to occur on that scale in any given year.

4.5.3 Alternative C

Alternative C proposes to maintain the managed haying and grazing frequencies as Alternative B, but shortens the PNS to May 15 through July 1. The analysis for this alternative is based on a maximum adoption scenario of managed haying and grazing activities on eligible CPs for enrolled CRP acreage. Individual operator adoption of these practices would be based on numerous personal, local, and regional factors, which would likely indicate that the adoption rate would be less than the maximum values calculated under this analysis.

4.5.3.1 General Population Characteristics

Similar to Alternative B, there would be small positive benefits anticipated from selecting Alternative C. These benefits would be anticipated to mimic or slightly increase those of Alternative B, given the similar nature of these alternatives. This would be dependent on the level of adoption of managed haying and grazing activities at the regional levels. If managed haying and grazing activities were adopted at the maximum level, as indicated in Table 4.5-2, then there would more than likely be opportunities for new service providers to enter the marketplace, thereby generating net positive benefits to the economy.

4.5.3.2 Managed Haying and Grazing Enrollment and Agricultural Production Value Changes

Analysis of this alternative revealed that the maximum annual percentage of use for managed haying and grazing activities would be approximately 22.3 percent of the economically viable acreage (8.3 percent of managed grazing and 14.1 percent of managed haying). This determination of economically viable acreage indicates that the 25 percent rate reduction would be less than the economic value of the product generated off each acre of managed haying or grazing activities. This would equate to approximately 257,000 acres using managed grazing activities and 438,000 acres using managed haying activities. These activities are estimated to produce approximately $6.2 million additional beef production value (0.8 percent increase over no CRP use) and $10.1 million in hay production value (3.3 percent increase over no CRP use). For the statewide economy the use of these CRP acres for managed haying and grazing activities would produce an estimated additional $11.4 million from beef production (0.04 percent increase) and $16.9 million from hay production (0.06 percent increase) rippling throughout the rest of the State economy. A comparison of the alternatives is illustrated in Table 4.5-2.

If Alternative C frequencies are utilized, and the maximum amount of enrolled acreage authorized for managed haying and grazing is used for these activities, the actively managed hayed and grazed acreage would increase by 8.6 times over average assumed conditions of approximately 73,000 acres per year utilized for managed haying and grazing activities between 2004 and 2006. This would be a substantial increase which would generate a positive increase over the total value of beef production and hay production hay production given the assumptions of the methodology. The economy as a whole would experience a positive increase of approximately 0.1 percent over the current contribution from these products. As with any CRP program, the effects vary by location and region.

4.5.3.3 Outdoor Recreation

In general, biological conditions that enhance habitats for wildlife increase the overall societal value for these species. Implementing Alternative C would result in benefits, both monetary and non-monetary, if there were additional opportunities for outdoor recreation activities, similar to Alternative B. Overall, enhancement of wildlife habitat would generate small positive values to local and regional communities.

As described in section 4.1.2.5, a maximum mortality rate of approximately two percent of mourning dove in any single year would be expected if all available eligible acreage was hayed within the State at the allowable 50 percent rate. As a worst-case scenario this mortality rate would be experienced once every five years under Alternative C. However, based on the economically hayable acreage, only 14.1 percent of the eligible acreage would be expected to be hayed in any one year by selecting this alternative. This would then indicate a low percentage of potential mortality for the mourning dove (approximately one percent of the total population per year), based on rational economic decision making, which is within the range of the worst-case scenario. As such, it would be unlikely that there would be measurable adverse socioeconomic effect from the use of managed haying practice outside the PNS associated with outdoor recreation activities dependent upon ground nesting bird species. No significant adverse impacts to the recreational economy of the State are expected from implementing Alternative C.

Under Alternative C, loss of small game hunting habitat in the year of managed haying and grazing would only occur once every five years for managed haying and once every three years for managed grazing. This impact is insignificant since the proposed interval is so infrequent, CRP land comprises less than eight percent of available grassland habitat in Montana and only four percent of that may be hayed or grazed in any given year, and managed haying or grazing is not likely to occur on that scale in any given year.

4.5.4 Preferred Alternative - Alternative D

Alternative D proposes to allow both managed haying and grazing activities once every five years with no change to the PNS. The analysis for this alternative is based on a maximum adoption scenario of managed haying and grazing activities on eligible CPs for enrolled CRP acreage. Individual operator adoption of these practices would be based on numerous personal, local, and regional factors, which would likely indicate that the adoption rate would be less than the maximum values calculated under this analysis.

4.5.4.1 General Population Characteristics

Similar to Alternative B, there would be small positive benefits anticipated from selecting Alternative D. These benefits would be anticipated to mimic or be slightly below those of Alternative B, given the similar nature of these alternatives. This would be dependent on the level of adoption of managed haying and grazing activities at regional levels. If managed haying and grazing activities were adopted at the maximum level, as indicated in Table 4.5-2, then there would more than likely be opportunities for new service providers to enter the marketplace, thereby generating net positive benefits to the economy.

4.5.4.2 Managed Haying and Grazing Enrollment and Agricultural Production Value Changes

Analysis of this alternative revealed that the maximum annual percentage of use for managed haying and grazing activities would be approximately 14 percent of the economically viable acreage (4.0 percent of managed grazing and 10.0 percent of managed haying). This determination of economically viable acreage indicates that the 25 percent rate reduction would be less than the economic value of the product generated off each acre of managed haying or grazing activities. This would equate to approximately 125,000 acres using managed grazing activities and 310,000 acres using managed haying activities. These activities are estimated to produce approximately $3.0 million additional beef production value (0.4 percent increase over no CRP use) and $7.2 million in hay production value (2.3 percent increase over no CRP use). For the statewide economy the use of these CRP acres for managed haying and grazing activities would produce an estimated additional $5.6 million from beef production (0.02 percent increase) and $12.0 million from hay production (0.05 percent increase) rippling throughout the rest of the State economy. A comparison of the alternatives is illustrated in Table 4.5-2.

If Alternative D frequencies are utilized, and the maximum amount of enrolled acreage authorized for managed haying and grazing is used for these activities, the actively managed hayed and grazed acreage would increase by five times over average assumed condition of approximately 73,000 acres per year utilized for managed haying and grazing activities between 2004 and 2006. This would be a substantial increase which would generate a positive increase over the total value of beef production and hay production given the assumptions of the methodology. The State economy as a whole would experience a positive increase of approximately 0.07 percent over the current contribution from these products. As with any CRP program, the effects vary by location and region.

4.5.4.3 Outdoor Recreation

In general, biological conditions that enhance habitats for wildlife increase the overall societal value for these species. Implementing Alternative D would result in benefits, both monetary and non-monetary, if there were additional opportunities for outdoor recreation activities; similar to Alternative B. Maintenance of the established PNS reduces the potential for adverse impacts to grassland bird populations, consequently, economic benefits derived from wildlife viewing and hunting grassland bird game would not be negatively impacted. Overall, enhancement of wildlife habitat would generate small positive values to local and regional communities.

Similar to Alternative B, the worst case scenario of mourning dove mortality would be approximately one percent, which would be experienced once every five years under Alternative D. Based on the economically hayable acreage; only ten percent of the eligible acreage would be expected to be hayed in any one year by selecting this alternative. This would then indicate a very low percentage of potential mortality for the mourning dove (approximately 0.2 percent of the total population per year) based on rational economic decision making, which is within the range of the worst-case scenario over the period (five years). As such, it would be unlikely that there would be measurable adverse socioeconomic effect from the use of managed haying practice outside the PNS associated with outdoor recreation activities dependent upon ground nesting bird species. No significant adverse impacts to the recreational economy of the State are expected from implementing Alternative D.

Under Alternative D, loss of small game hunting habitat in the year of managed haying and grazing would only occur once every five years for both managed haying and grazing. This impact is insignificant since the proposed interval is so infrequent, CRP land comprises less than eight percent of available grassland habitat in Montana and only four percent of that may be hayed or grazed in any given year, and managed haying or grazing is not likely to occur on that scale in any given year.

4.5.5 No Action Alternative – Alternative A

Under Alternative A, eligible CRP practices could be used for managed haying activities once every ten years; managed grazing activities once every five years; and the primary nesting season would remain May 15 to August 1. The analysis for this alternative is based on a maximum adoption scenario of managed haying and grazing activities on eligible CPs for enrolled CRP acreage. Individual operator adoption of these practices would be based on numerous personal, local, and regional factors, which would likely indicate that the adoption rate would be less than the maximum values calculated under this analysis.

4.5.5.1 General Population Characteristics

Similar to Alternative B, there would be small benefits anticipated from selecting Alternative A. Though the benefits would be anticipated to be less than Alternative B, benefits could still accrue in the longer term. This would be dependent on the level of adoption of managed haying and grazing activities at the regional levels. If managed haying and grazing activities were adopted at the maximum level, as indicated in Table 4.5-2, then there would more than likely be opportunities for new service providers to enter the marketplace, thereby generating net benefits to the economy.

4.5.5.2 Managed Haying and Grazing Enrollment and Agricultural Production Value Changes

Analysis of the existing provisions for managed haying and grazing revealed that the maximum annual percentage for these activities would be approximately 9.0 percent of the economically viable acreage (4.0 percent of managed grazing and 5.0 percent of managed haying). This determination of economically viable acreage indicates that the 25 percent rate reduction would be less than the economic value of the product generated off each acre of managed haying or grazing activities. This would equate to approximately 125,000 acres using managed grazing activities and 155,000 acres using managed haying activities. These activities are estimated to produce approximately $3.0 million additional beef production value (0.4 percent increase) and $3.6 million in hay production value (1.2 percent increase). For the statewide economy the use of these CRP acres for managed haying and grazing activities would produce an estimated additional $5.6 million from beef production (0.02 percent increase) and $6.0 million from hay production (0.02 percent increase) rippling throughout the rest of the State's economy.

If the No Action alternative were selected and the maximum eligible acreage was subject to managed haring and grazing, the actively hayed and grazed acreage would increase by 2.8 times over average assumed condition of approximately 73,000 acres per year utilized for managed haying and grazing activities between 2004 and 2006. This would be a substantial increase which would generate a small positive increase over the total value of beef production and hay production given the assumptions of the methodology. The economy as a whole would experience a small positive increase of approximately 0.04 percent from activities occurring on managed haying and grazing acreage. As with any CRP program, the effects vary by location and region.

4.5.5.3 Outdoor Recreation

In general, biological conditions that enhance habitats for wildlife increase the overall societal value for these species. Implementing Alternative A would result in positive benefits, both monetary and non-monetary, if there were additional opportunities for outdoor recreation activities, similar to Alternative B. Overall, enhancement of wildlife habitat would generate small positive values to local and regional communities.

Similar to Alternative D, the worst case scenario of mourning dove mortality would be approximately one percent; however, this would only occur once every ten years. Based on the economically hayable acreage, only 5.0 percent of the eligible acreage would be expected to be hayed in any one year by selecting this alternative. This would then indicate a very low percentage of potential mortality for the mourning dove (approximately 0.2 percent of the total population per year), based on rational economic decision making, which is within the range of the worst-case scenario over the period (ten years). As such, it would be unlikely that there would be measurable adverse socioeconomic effect from the use of managed haying practice outside the PNS associated with outdoor recreation activities dependent upon ground nesting bird species. No significant adverse impacts to the recreational economy of the State are expected from implementing Alternative A.

As with the action alternatives, it is not possible to adequately determine the indirect impacts to recreational habitat the year managed haying and grazing occurs due to the unknown variables that must be considered. However, on a statewide basis, indirect impacts are not expected to be significant due to the relatively small amount of recreational land eligible CRP land comprises (e.g., only eight percent of grasslands) and the provision that only 50 percent may be hayed in any given year.

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5.0 CUMULATIVE IMPACTS

5.1 INTRODUCTION

CEQ regulations stipulate that the cumulative effects analysis within an EA should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present and reasonably foreseeable actions regardless of what agency or person undertakes such other actions." Cumulative effects most likely arise when a relationship exists between a Proposed Action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in proximity to the Proposed Action would be expected to have more potential for a relationship than those more geographically separated. Similarly, actions that coincide, even partially, in time tend to have potential for cumulative effects.

Managed haying and grazing allows producers to harvest hay or allow grazing of specific practice acreage at express intervals while maintaining the CRP cover to fulfill its intended conservation purposes. In this EA, the affected environment for cumulative impacts are lands eligible for enrollment in CRP with conservation practices that allow managed haying and grazing. For the purposes of this analysis, other Federal and State conservation programs pertaining to haying and grazing of privately held conservation lands are the primary sources of information used in identifying past, present, and reasonably foreseeable actions.

5.2 OTHER FEDERAL AND STATE HAYING AND GRAZING PROGRAMS ON CONSERVATION LANDS

In addition to managed haying and grazing, there are other types of grazing authorized on CRP lands. Additionally, there are Federal and State conservation and assistance programs that allow producers to hay and graze on private lands. Table 5.2-1 summarizes these Federal and State conservation and assistance programs. The primary purposes for allowing haying and grazing on CRP and privately held conservation lands are vegetation maintenance to enable the conservation cover to fulfill its intended purposes most effectively and economically, and to supplement livestock feed or provide emergency feed during natural disasters.

Federal haying and grazing related programs on privately held conservation lands are voluntary and enrollment cannot be predicted. Under CRP provisions, and all other Federal conservation programs, no producer can receive duplicate Federal payments for the same conservation activity on the same lands, and there is typically a cap on the amount one producer can receive for each program. Further, no other CRP harvesting or grazing may occur on managed hayed or grazed CPs outside of the established frequency interval, except emergency haying and grazing, and no CRP lands may have both managed haying and grazing conducted on the same field in the same season. ***Therefore, with few exceptions, there is limited potential for geographical overlapping of multiple programs or temporal convergence of multiple programs on CRP lands in the same year.***

Table 5.2-1. Federal and State Conservation and Assistance Programs.

Program	Summary
Grassland Reserve Program (FSA/NRCS/U.S. Forest Service [USFS])	This program conserves vulnerable grasslands from conversion to cropland or other uses by helping maintain viable ranching operations. Participants voluntarily limit future use of the land while retaining the right to conduct common grazing practices; produce hay; conduct fire rehabilitation; and construct firebreaks and fences. Participants may enter into permanent or thirty-year easements, leases, rental, or restoration contracts.
The Conservation of Private Grazing Land (NRCS)	This program provides technical assistance to individuals who own private grazing lands and managers of grazing lands. It offers opportunities to conserve and enhance grazing land resources to protect the lands from soil erosion, conserve water and provide habitat for wildlife. In addition, this program utilizes grazing lands as a source of biomass energy and raw materials for industrial products.
Conservation Security Program (NRCS)	This program provides financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on Tribal and private working lands. Lands included under this program include working cropland, grassland, prairie land, improved pasture, and range land. Also included is forested land that is an incidental part of an agriculture operation.
Emergency Haying and Grazing (FSA)	Authorization may be granted for haying and grazing on CRP lands to provide relief to ranchers in areas affected by drought or other natural disaster. Authorization comes through the National FSA office or from the State office for drought relief. Emergency haying and grazing may not be conducted during the PNS and requires an annual rental payment reduction of 10%.
Grassland Easement Program (USFWS)	This is a legal agreement between the U.S. Government through the USFWS, and the property owner in which owner agrees to keep land in native grass, forbs, and shrubs. This is a permanent agreement between the USFWS and all present and future landowners. Payment is based on the fair market value of the property. Grazing is permitted at any time, while haying can only take place after July 15 each year. The acreage enrolled in this program may limit the participation in the USDA programs in which base acres of cropland are used to determine eligibility for enrollment.

Table 5.2-1. Federal and State Conservation and Assistance Programs (cont'd)

Program	Summary
Modification to CRP Contract for Critical Feed (FSA)	Initiated on June 2, 2008, this modification is only authorized through 2008. A subsequent lawsuit and injunction on this program permits only three categories of users who were approved and invested significant funds in preparation to hay or graze after the PNS on lands enrolled in the same CPs as authorized for managed haying and grazing (1, 2, 4B, 4D, 10, 18B and 18C) to allow for critical feed use. Critical feeding restarts the managed haying and grazing waiting period. Primary differences from managed haying and grazing are: no payment reduction is assessed but imposes a $75 administrative fee, can also graze only 75% of a field at 100% of the NRCS stocking rate, and must be complete by certain dates depending on user category.
Partners for Fish and Wildlife Program (USFWS)	This program provides technical and financial assistance to private landowners and Tribes who are willing to work with the USFWS and other partners on a voluntary basis to help meet the habitat needs of Federal Trust Species. The program assists with projects in all habitat types which conserve or restore native vegetation, hydrology, and soils associated with imperiled ecosystems, including native prairies or otherwise provide an important habitat requisite for rare, declining, or protected species. Partners program provides expert technical assistance and cost-share incentives directly to private landowners; a cooperative agreement with a minimum duration of 10 years is signed. The landowner is reimbursed after project completion, based on the cost-sharing formula in the agreement.
Upland Game Bird Habitat Enhancement Program (MFWP)	Private landowners develop upland game bird habitat projects with up to 75 percent of the project costs shared by MFWP. Projects include establishing and maintaining shelterbelts, planting nesting cover and food plots and implementing improved grazing management systems. Projects must provide some free public game bird hunting and typically involve at least 160 contiguous acres.
Habitat Montana(MFWP)	The goal of this program is to preserve and restore important habitat for fish and wildlife. MFWP offers incentives to conserve habitat on private land, including the purchase of conservation easements.

5.2.1 Federal Actions

5.2.1.1 CRP Managed Haying and Grazing in Adjacent States

As is true for many types of wildlife, the range of some grassland bird species listed as likely to nest on CRP lands extends beyond Montana to neighboring States where modifications to CRP managed haying and grazing provisions are also being considered in similar EAs. Table 5.2-2 presents the current and proposed changes to PNS dates and/or managed haying and grazing frequencies for Montana's neighboring States. In addition, for those States proposing changes, the projected cumulative impacts of the alternatives considered on grassland birds, and in some cases, sagebrush birds, are presented. Of Montana's four neighboring states, two have proposed changes to managed haying and grazing that may have a significant cumulative negative impact to grassland or sagebrush birds. In North Dakota, the cumulative impacts of a shortened PNS under Alternative C, combined with haying over two consecutive years under emergency procedures, could have significant negative impacts for bird species. Further, in Idaho, the impacts to grassland and sagebrush birds from the shortened PNS and potential for spring grazing associated with Alternative B may reach significant levels. Similarly, Alternative C in Idaho would have a shortened PNS, potential for spring grazing and extended fall grazing which would likely result in a significant impact to grassland and sagebrush bird species. Under Idaho's Alternatives B and C, haying over two consecutive years under emergency procedures could have significant negative impacts for bird species. However, these alternatives are not the preferred alternatives for either North Dakota or Idaho.

5.2.1.2 Emergency Haying and Grazing

The primary exception to geographical convergence of multiple Federal programs is emergency haying and grazing administered by FSA. Emergency haying and grazing is generally intended for periods of drought or excessive moisture of such magnitude that livestock producers nationally or across wide-ranging areas are faced with culling of herds or livestock losses. It is generally not authorized for situations where livestock producers suffer inconveniences in forage availability or prices, because of less than ideal production or over-utilization of acreage not under CRP contract. Authorization for emergency haying or grazing is granted if either the Deputy Administrator for Farm Programs (DAFP) or FSA State Committee (STC) determines if it is warranted and the FSA Conservation and Environmental Programs Division (CEPD) concur. FSA county committees (COC) may request emergency haying or grazing on a county by county basis if evidence demonstrates a 40 percent or greater loss in normal hay and pasture production has occurred, and:

- drought conditions and/or precipitation levels indicate an average of 40 percent or greater loss of normal precipitation for the four most recent months, plus the days in the current month before the date of request; or
- excessive moisture conditions and/or precipitation levels indicate an average of 140 percent or greater increase in normal precipitation during the four most recent consecutive months, plus the days in the current month before the date of request.

Table 5.2-2. Neighbor States Managed Haying and Grazing Frequencies and PNS

State	Current Frequency	Current PNS	Proposed Frequency		Proposed PNS	Alternatives Projected Impacts
North Dakota	Haying: 1/10	15 April - 1 August	Haying	Alt B: 1/3	Alt B: No Change	Alt B: No Significant Impact
				Alt C: 1/3		
				Alt D: 1/5	Alt C: 15 April - 15 July	Alt C: Significant Cumulative Impact to Grassland Birds
	Grazing: 1/5		Grazing	Alt B: 1/3		
				Alt C: 1/3	Alt D: No Change	Alt D: No Significant Impact
				Alt D: 1/5		
South Dakota	Haying: 1/10	1 May - 1 August	Haying	Alt B: 1/5	Alt B: No Change	Alt B: No Significant Impact
				Alt C: 1/3		
	Grazing: 1/5		Grazing	Alt B: 1/5	Alt C: 1May - 1July	Alt C: No Significant Impact
				Alt C: 1/3		
Wyoming	Haying: 1/10	15 May – 1 August	Haying	Alt B: 1/5	Alt B: No Change	Alt B: No Significant Impact
				Alt C: 1/3		
	Grazing: 1/5		Grazing	Alt B: 1/5	Alt C: 15 May – 1 July	Alt C: No Significant Impact
				Alt C: 1/3		
Idaho	Haying: 1/10	1 April – 1 August	Haying	Alt B: 1/3	Alt B: 15 April – 1 July	Alt B: Significant impact and cumulative impact to grassland and sagebrush birds
				Alt C: 1/3		
				Alt D: 1/5 Restricted Sagebrush Haying	Alt C: 15 April – 15	Alt C: Significant impact and cumulative impact to grassland and sagebrush birds
	Grazing: 1/10		Grazing	Alt B: 1/3		
				Alt C: 1/3 Fall grazing through December 31	Alt D: No Change	Alt D: No Significant Impact
				Alt D: 1/5		

Note: 1/*n* = Once out of every *n* years; Alt. = Alternative; N/A = Not applicable

The COC must submit written monthly reviews of conditions in the county and the basis used to determine whether continued haying or grazing is warranted. ***Emergency haying and grazing must end by September 30, unless determined otherwise as noted below.*** Emergency haying and grazing generally may not be approved during the PNS; however, it may be approved by the USDA under extreme conditions. Emergency haying and grazing is only authorized on the same CPs that are eligible for managed haying and grazing, require a prior written request by the applicant, and modification of the Conservation Plan to include haying or grazing that must be site-specific and reflect the local wildlife needs and concerns. Further restrictions apply as follows:

- designation for emergency grazing may be for up to 90 calendar days, not to exceed September 30;
- one 30-calendar-day extension may be authorized, not to exceed September 30;
- designation for emergency haying may be for up to 60 calendar days, not to exceed September 30;
- emergency haying extensions are not authorized;
- emergency grazing extension up to 15 calendar days may be authorized because of flooding, not to exceed September 30;
- emergency grazing shall leave at least 25 percent of each field or contiguous CRP fields ungrazed for wildlife, or graze not more than 75 percent of the stocking rate determined by NRCS or TSP;
- shall leave at least 50 percent of each field or contiguous fields unhayed for wildlife
- shall not hay or graze the same acreage; and
- haying is limited to one cutting.

Acreage ineligible for emergency haying or grazing include useful life easements, any land within 120 feet of a stream or other permanent waterbody, and any land enrolled in a CP not authorized for emergency haying and grazing. At least 25 percent of the contracts authorized for emergency haying or grazing shall be spot checked by the COC ten days prior to the end date for the authorized activity. Emergency haying and grazing may occur any year before or after managed haying and grazing, and may occur several years in a row. Finally, managed haying and grazing may not be undertaken on acreage that was harvested under emergency provisions until the established frequency interval under managed provisions expires.

5.2.2 State Actions

The State of Montana has two specific programs, Upland Game Bird Habitat Enhancement Program and Habitat Montana, which potentially involve haying or grazing of privately held conservation lands or supplement CRP enrollment in return for management for wildlife that may involve haying or grazing (Table 5.2-1).

Upland Game Bird Habitat Enhancement Program

The Upland Game Bird Habitat Enhancement Program (Enhancement Program) is funded by the sale of hunting licenses and administered by the MFWP (2008a, 2008b). The purpose of the program is to work with private landowners and other conservation partners to manage, protect, improve and restore wildlife habitat on private lands for Montana upland gamebirds, specifically sharp-tailed grouse, sage grouse, mountain grouse, ring-necked pheasant, Hungarian partridge, and wild turkeys. The Enhancement Program requires at least 160 contiguous acres of habitat and can incorporate CRP land. The Enhancement Program provides financial assistance, up to 75 percent of the project costs to landowners to implement projects that benefit upland game birds, which may include establishing and maintaining shelterbelts, planting nesting cover and food plots and implementing improved grazing management systems.

There is potential for haying or grazing to occur on the CRP land enrolled in this program. After the first year mowing would be permitted to control weed invasions with the stipulation that a 12 inch minimum stubble height would remain and the action would occur after July 15. After that one emergency haying or grazing action would be permitted for the life of the contract. However, only 50 percent of the CRP land enrolled would be hayed or grazed. If greater than 50 percent of the CRP land enrolled is hayed or grazed, or more than one emergency practice occurs, then the landowner would repay MFWP a portion of the incentives received.

Habitat Montana

Habitat Montana is a program to preserve and restore important habitat for fish and wildlife. The program offers landowners incentives to conserve habitat on private land, possibly in the form of a conservation easement. CRP land may be included in this program as part of a conservation easement property. A variety of sources, using funds totaling approximately $4 million, fund projects selected by the MFWP.

5.3 CUMULATIVE EFFECTS ANALYSIS

In this EA, the affected environment for cumulative impacts are those privately held or Tribal lands that are currently enrolled or eligible for enrollment in conservation practices that allow haying and grazing. For the purposes of this analysis, the goals and plans of Federal and State programs authorizing haying or grazing on privately held conservation lands are the primary sources of information used in identifying past, present, and reasonably foreseeable actions. Cumulative impacts are assessed for the analyzed resources under all of the alternatives analyzed. Table 5.3-1 summarizes cumulative effects.

5.3.1 Alternative B

Alternative B would increase the interval to once every five years for haying and once every three years for grazing, with a PNS of May 15 to July 15. Long-term benefits to vegetation, wildlife, water quality, soils, carbon sequestration (air quality) and socioeconomic resources are expected from implementation of Alternative B. The mosaic of successional environments that meet most wildlife habitat needs would increase in diversity under Alternative B, since rejuvenation of the vegetative cover through managed haying and grazing would occur at more frequent intervals over the life of the CRP contract. More frequent management of the CRP vegetative stand with managed haying or grazing lessens the need for employing management techniques that have the potential for more negative impacts (such as use of herbicides and pesticides) and are more costly. Managed haying and grazing at the frequency of Alternative B, and in accordance with established USDA conservation practice provisions, standards, and guidelines, are expected to ensure the maximum health and vigor of the conservation cover, preserve wildlife habitat, benefit water quality, soil, and carbon sequestration while providing the CRP participant socioeconomic benefits.

The direct effects of managed haying and grazing on vegetation consist of vegetation removal through these harvesting activities. This direct effect is limited to one hay cutting and no more than a 120 day period for grazing in a single growing season, and is thus short term and localized. Under Alternative B, this effect would occur once every five years for haying and once every three years for grazing. Cutting of warm season vegetation near the end of the shortened PNS under Alternative B may diminish the health and vigor of these plants. However, adherence to established procedures and guidelines would ensure the survival and long-term viability of grassland plants. The vegetation analysis presented in this EA concluded there is no significant negative effect to vegetation from Alternative B. If emergency haying or grazing is conducted on the same acreage hayed or grazed under managed provisions the previous year, and the existing Conservation Plan does not include haying and grazing plans, then a new Conservation Plan is developed that takes into account current resource conditions prior to approval of the activity. If the existing Conservation Plan includes provisions for haying and grazing, it should have a contingency plan for drought or excessive moisture. Even with a Conservation Plan, written approval prior to emergency haying and grazing is still required. If the resource conditions do not permit the Conservation Plan to be implemented as constituted, it would be modified, or the activity would not be approved by NRCS/FSA. Operators are required to monitor resource conditions during the activity to ensure either haying or grazing would not have unacceptable negative impacts to environmental resources. Under Alternative B, once emergency haying or grazing is concluded, managed haying or grazing is not authorized again for another five years for haying and three years for grazing. ***Provided these established provisions, standards, and guidelines are followed, there is no significant cumulative direct adverse effect on vegetation expected under Alternative B.***

Direct effects on wildlife occur from conflicts with haying machinery or trampling by grazing livestock that may result in mortality. This direct effect is limited to one hay cutting and no more than a 120 day period for grazing in a single growing season, and is localized to the specific field on which the activity takes place. As stated previously, there are no quantitative studies of wildlife mortality related to varying frequencies of intervals between haying and grazing on particular CRP conservation covers that are eligible for these harvesting activities. Most quantitative studies conducted to date center on impacts to ground nesting birds. Under managed haying and grazing provisions, neither activity may take place during the PNS as established in Alternative B; however, this period has been shown to not encompass the entire peak nesting and brood rearing season for several species of grassland birds. Haying has more potential to directly impact mortality than grazing; previous studies of mortality impacts of grazing on grassland birds are largely anecdotal and utilized simulated or artificial nests (USDA/NRCS 2006d). As summarized in *Migratory Bird Responses to Grazing* (*Ibid.*), the literature is conflicting; however, clearly the per acre stocking rate would be an important factor, as would the presence of species that nest in high densities.

To represent the worst case possible, the mortality analysis conducted in this assessment selected the ground nesting grassland bird with the greatest portion of its peak nesting and brood rearing period not protected from haying by the defined PNS. A mortality rate of two percent for savannah sparrow was calculated if 50 percent (the maximum specified in current provisions) of all Montana CRP acreage eligible for managed haying was in fact hayed in the same year. This mortality rate would occur under Alternative B once every five years and is not considered significant. If the decision to hay is made on an economically rational basis, the acreage viable for managed haying is less, and the mortality rate is calculated at one percent.

Table 5.3-1. Cumulative Effects Matrix

Resource	Past and Present Actions	Alternative B	Alternative C	Alternative D	Future Actions	Cumulative Effects
Biological Resources *Vegetation, Wildlife, and Protected Species*	Long-term positive impacts to vegetation, wildlife and protected species are expected to result from the activities identified, which would establish vegetative communities and create habitat for wildlife. However, past and present actions would not be as beneficial to biological resources as Alternative D, although no significant negative impacts are expected.	Under Alternative B, long-term benefits to vegetation, wildlife and protected species are expected to occur. This alternative mimics the historic disturbance frequency that rejuvenates grasslands and provides mosaics of wildlife habitat in different successional stages that creates a more beneficial environment for biological resources. The shortened PNS would allow warm season species to be cut or grazed during the reproductive growth period potentially diminishing their health and vigor. Adherence to NRCS Practice Code 511 Specification and Plant Materials Technical Note 53 would ensure adequate vegetation	The long-term benefits of Alternative C would be similar to those of Alternative B except for vegetation and grassland birds. This PNS would potentially permit both warm and cool season grasses to be cut or grazed during their reproductive growth period, thus diminishing their health and vigor. Adherence to NRCS Practice Code 511 Specification and Plant Material Technical Notes 10 and 53 would ensure adequate vegetation remains for a full and vigorous recovery after harvest. Further, since the PNS is shorter, ground-nesting grassland birds may have an increased mortality due to impacts with machinery. There are no significant negative impacts from	Under Alternative D, long-term benefits to vegetation, wildlife and protected species are expected to occur. This alternative's disturbance frequency rejuvenates grasslands and provides mosaics of wildlife habitat in different successional stages that is more beneficial for biological resources and has minimal impacts on grassland bird mortality. The PNS period under this alternative would protect the reproductive period of both cool and warm season grasses. There are no significant negative impacts from implementation of Alternative D.	Continued enrollment of farmland in programs which would restore habitat is expected to benefit biological resources. Future haying or grazing under any alternative managed or emergency procedures would not significantly impact vegetation, wildlife, or protected species if the established conservation practice provisions, standards, and guidelines are followed, and the Conservation Plan is adapted to resource conditions on the land just prior to engaging in either activity.	Long-term benefits to biological resources are expected to result from CRP lands that aim to restore vegetative covers that provide wildlife habitat.

Table 5.3-1. Cumulative Effects Matrix (cont'd)

Resource	Past and Present Actions	Alternative B	Alternative C	Alternative D	Future Actions	Cumulative Effects
Biological Resources *Vegetation, Wildlife, and Protected Species* (cont'd)		remains for a full and vigorous recovery after harvest. There are no significant negative impacts from implementation of Alternative B.	implementation of Alternative C.			
Water Resources *Surface Water Quality*	Direct negative impacts to surface water quality are minimized by past and present provisions of managed haying and grazing since neither activity is allowed within 120 feet of a permanent surface waterbody and livestock must be confined with fencing. Indirect impacts to water quality that can occur from loss of vegetative cover and subsequent soil erosion and increased sedimentation into	Similar to past and present actions, Alternative B direct negative effects to surface water quality are minimized through adherence to established provisions, standards, and guidelines and use of BMPs that maintain the vegetative cover over the long term. Cutting warm season grasses close to the end of the shorter PNS of this alternative may diminish the health and vigor of these species. Reduction	Both direct and indirect impacts to water quality of Alternative C would be similar to Alternative B. However, cutting warm and cool season grasses close to the end of the shorter PNS of this alternative may diminish the health and vigor of these species. As with Alternative B, adherence to Conservation Practice Code 511 Forage Harvest Management and Plant Material Technical Note 10	Impacts of Alternative D are similar to other action alternatives. While the recovery period between episodes of haying is shorter that the present provisions, no significant impact to water quality is expected from implementation of Alternative D, provided established provisions, standards, and guidelines and use of BMPs that maintain the vegetative cover are followed. The PNS period under this alternative	Continued enrollment of farmland in conservation programs is expected to have positive impacts to water quality similar to those described for Alternative B. Future haying or grazing under both managed or emergency procedures would not significantly impact vegetation if established conservation practice provisions, standards, and guidelines are followed, and the	Positive long-term cumulative impacts to surface water quality are expected to result from Alternatives A and D, and other past, present, and reasonably foreseeable actions.

Table 5.3-1. Cumulative Effects Matrix (cont'd)

Resource	Past and Present Actions	Alternative B	Alternative C	Alternative D	Future Actions	Cumulative Effects
Water Resources *Surface Water Quality* (cont'd)	nearby waterbodies are minimized by employment of BMPs that maintain vegetation over the long term. Alternative A would allow longer intervals of vegetation recovery between these activities than the action alternatives analyzed, especially beneficial if precipitation is not ideal the following growing season. There are no significant negative impacts under Alternative A.	of the vegetative cover could lead to increased sedimentation of surface waters through increased soil erosion. Provided Conservation Practice Code 511 Forage Harvest Management and Plant Material Technical Note 53 are adhered to, adequate vegetation would remain for a full and vigorous recovery after harvest and would reduce the potential for soil erosion, sedimentation, and nutrient deposition into nearby water-bodies.	and 53 would ensure adequate vegetation remains for a full and vigorous recovery after harvest, and would reduce the potential for soil erosion, sedimentation, and nutrient deposition into nearby water-bodies.	would protect the reproductive period of both cool and warm season grasses. No significant negative impact to water quality is expected from the implementation of Alternative D.	Conservation Plan is adapted to resource conditions on the land just prior to engaging in either activity.	
Soil Resources	Past and present actions do not directly or indirectly negatively affect soil resources when	The impacts of Alternative B on soil would be similar to Alternative A and may be minimized	Impacts to soil resources from Alternative C would be similar to Alternative B. The	Impacts to soil resources from Alternative D would be similar to the other action	Continued enrollment of agricultural lands in CRP and establishing long-	Positive long-term cumulative impacts to soil resources would be expected to result from

Table 5.3-1. Cumulative Effects Matrix (cont'd)

Resource	Past and Present Actions	Alternative B	Alternative C	Alternative D	Future Actions	Cumulative Effects
Soil Resources (cont'd)	the established conservation provisions, standards, and guidelines are followed and BMPs are employed to minimize impacts. Limiting the stocking rate to 75% of determined total capacity, the total number of days that haying or grazing may take place, and employing BMPs to ensure adequate dispersion of livestock minimize this potential. Long-term maintenance of the vegetative cover minimizes potential for increased soil erosion.	by employing the same BMPs. The indirect impact of managed haying and grazing under this alternative's frequency has been found to benefit the health and vigor of the vegetative cover, limiting the potential for increasing soil erosion through vegetative loss. However, cutting warm season grasses close to the end of the shorter PNS of this alternative may diminish the health and vigor of these species. Reduction of the vegetative cover could lead to increased sedimentation of surface waters through increased soil erosion. Provided Conservation	provisions, standards, and guidelines as described under Alternative A would minimize adverse impacts to soil. However, cutting warm and cool season vegetation close to shortened shorter PNS may harm the health and vigor of these species. As with Alternative B, adherence to Conservation Practice Code 511 Forage Harvest Management and Plant Material Technical Notes 10 and 53 would ensure adequate vegetation remains for a full and vigorous recovery after harvest. Implementation of provisions,	alternatives. While the recovery period between episodes of haying is shorter than the present provisions, Alternative D increases the potential vegetative recovery period over that of the other action alternatives. Similarly, the PNS period under this alternative protects the reproductive period of both cool and warm season grasses. Impacts can be minimized by employing the same BMPs as outlined for Alternative A; therefore, no significant impact to water quality is expected from implementation of Alternative D.	term vegetative covers benefits soil resources. Future haying or grazing under both managed or emergency procedures would not significantly impact soil resources if the established conservation practice provisions, standards, and guidelines are followed, and the Conservation Plan is adapted to resource conditions on the land just prior to engaging in either activity.	Alternatives A and D, and other past, present, and reasonably foreseeable actions.

Table 5.3-1. Cumulative Effects Matrix (cont'd)

Resource	Past and Present Actions	Alternative B	Alternative C	Alternative D	Future Actions	Cumulative Effects
Soil Resources (cont'd)		Practice Standard 511 Forage Harvest Management and Plant Material Technical Note 53 are followed, adequate vegetation would remain for a full and vigorous recovery after harvest. Implementation of provisions, standards, and guidelines as described under Alternative A would minimize adverse impacts to soil.	standards, and guidelines as described under Alternative A would minimize adverse impacts to soil.			
Air Quality -Carbon Sequestra-tion	Past and present actions of managed haying and grazing would result in increased carbon sequestration at higher rates than continual agricultural production on these lands.	Under Alternative B, although managed haying and grazing occurs more frequently, there is no appreciable difference in the amount of carbon sequestered from that of Alternative A. Cutting warm season grasses near	Impacts to air quality under Alternative C would be identical to those of Alternative B for warm season conservation covers. However, cutting warm and cool season grasses near the end of the shorter PNS period	Impacts to air quality under Alternative D would be the same as those of the other action alternatives. However, maintaining the current PNS minimizes the potential impacts to both warm and cool	Continued enrollment of CRP lands and managed haying and grazing is expected to have positive impacts to air quality and carbon sequestration. Future haying or grazing under either managed or	Positive long-term impacts to air quality resources are expected to result from Alternatives A and D, and other past, present, and reasonably foreseeable actions.

Table 5.3-1. Cumulative Effects Matrix (cont'd)

Resource	Past and Present Actions	Alternative B	Alternative C	Alternative D	Future Actions	Cumulative Effects
Air Quality -Carbon Sequestra-tion (cont'd)		the end of the shorter PNS period of this alternative that results in diminishing the health and vigor of these species could result in reduced carbon sequestration.	of this alternative that results in diminishing the health and vigor of these species could result in reduced carbon sequestration.	season grasses over that of the other action alternatives. There is no appreciable difference in carbon sequestration from that of the other alternatives.	emergency procedures would continue carbon sequestration benefits if the established conservation practice provisions, standards, and guidelines are followed, and the Conservation Plan is adapted to resource conditions on the land just prior to engaging in either activity.	
Socio-economics	Past and present managed haying and grazing would result in small positive socioeconomic impacts, and can benefit individual operators. The lower frequency of managed haying and grazing would not offer as much benefit as the action alternatives.	The socioeconomic analysis of Alternative B concludes managed haying and grazing under these provisions in the State has a small positive socioeconomic impact. Likewise, enhancement of wildlife habitat would generate	Managed haying and grazing under the provisions of Alternative C has socioeconomic impacts similar to those of Alternative B. However, due to the shorter PNS, the value of beef and hay production is estimated to be greater than the other alternatives	Alternative D provides the lowest socioeconomic benefits than any of the other action alternatives analyzed because of the reduced frequency of grazing and longer PNS. Benefits from increased outdoor recreational activities to local and regional	Continued enrollment of CRP lands and managed haying and grazing is expected to have a positive socioeconomic impact. Future haying or grazing under both managed and emergency procedures would continue to have positive	Positive long-term impacts to socioeconomic recourses are expected to result from the alternatives analyzed and other past, present, and reasonably foreseeable actions.

Table 5.3-1. Cumulative Effects Matrix (cont'd)

Resource	Past and Present Actions	Alternative B	Alternative C	Alternative D	Future Actions	Cumulative Effects
Socio-economics (cont'd)	Benefits derived from increased outdoor recreational activities are similar to those of the action alternatives. No significant impact to gamebirds is expected from past and present actions.	small economic benefits for local and regional communities from outdoor recreational activities. There are no significant negative impacts to gamebirds from implementation of Alternative B.	analyzed. As with Alternative B, benefits would be gained due to increased opportunities for outdoor recreation activities under Alternative C. No significant negative impacts to gamebirds are expected under Alternative C.	communities would be similar to those of the other action alternatives. No significant negative impacts to gamebirds are expected under Alternative D.	socioeconomic benefits. Likewise, benefits from outdoor recreational activities are expected to continue as a result of continued enrollment in CRP and enhancement of wildlife habitat through managed haying and grazing.	

It is not possible to predict how often or where emergency haying or grazing may be conducted. Emergency haying or grazing can occur any year following managed haying and grazing. Emergency haying in response to excess moisture has more potential to be conducted on land that was hayed under managed provisions the previous year than emergency haying in response to drought: the conservation cover previously hayed followed by drought conditions has not likely recovered adequately to be hayed again. It is most likely that other land not hayed the previous season would be utilized. It is not possible to predict how much acreage may be approved for haying or grazing under emergency provisions. Therefore, this cumulative impact analysis is expansive by assessing impacts on all CRP acreage eligible for emergency haying or grazing. Since the eligible acreage under emergency haying and grazing is the same as that under managed provisions, and only 50 percent of a field may be hayed under emergency provisions as well, similar assumptions to those made to assess the impacts of the managed haying provisions are made to assess potential cumulative grassland bird mortality. Again, the savannah sparrow is selected to represent the worst case possible. If emergency haying is conducted the year after managed haying on the same land, then a four percent mortality rate for savannah sparrow caused by both managed and emergency haying is possible over a two year period. Haying under managed provisions may not resume on land that was hayed under emergency procedures until another five years would lapse. ***No significant cumulative negative effect to grassland bird mortality is expected under Alternative B.***

Direct impacts on other types of wildlife populations are more difficult to assess with existing data. As presented in Chapter 4 of this document, most other types of wildlife are not significantly negatively affected on a population level. Conflicts with large mammals are expected to be minimal since they easily avoid the machinery associated with haying and livestock, and standard provisions and guidelines do not permit haying or grazing in seasonal calving or birthing areas. Smaller animals such as small mammals (rabbits, voles etc.), amphibians or reptiles may experience direct mortality impacts, but these are expected to be minimal and not negatively affected on a population level. Direct effects of haying and grazing to invertebrate mortality have been more closely studied, but it is difficult to extrapolate the data to reproductive success. However, many studies have also shown that particularly grazing increases abundance and diversity of invertebrates (Klute 1994).

Assuming that managed haying and grazing is conducted in accordance with all applicable established USDA conservation practice provisions, standards and guidelines, ***the key to minimizing potential for indirect negative effects from managed haying and grazing to vegetation, wildlife, water, soil and carbon sequestration is adapting the Conservation Plan to take into account resource conditions just prior to authorizing either activity to proceed.*** Most of the time, the reduced stocking rate for grazing, minimal stubble heights limits to ensure adequate vegetative recovery before frost, limiting haying to 50 percent of the CRP field to ensure habitat is available the following year, and precluding either activity within 120 feet of a permanent surface waterbody are adequate measures to protect these resources. However, if not enough precipitation follows the conclusion of managed haying and grazing to enable the recovery of the vegetation by the next growing season, the health and vigor of the plant stand and vegetative structure providing habitat for wildlife may be damaged. Operators are required to monitor resource conditions during haying or grazing to ensure either activity would not have unacceptable negative impacts to environmental resources. In the event a conservation cover fails due to the actions of the operator, the operator is required to re-establish it, or all payments received under the CRP must be re-paid to the government.

The potential for drought after either managed haying or grazing has been completed cannot be predicted. Since CRP lands eligible for managed haying and grazing are approximately eight percent of available habitat within the State, the potential impacts are not likely to reach a significant magnitude statewide. Drought over large areas would cause declines in all wildlife habitat, and many species' reproductive success is correlated with adequate precipitation (for example, see George et al. 1992; Niemuth et al. 2008). Studies have shown that in areas where little quality habitat exists for wildlife, the potential benefits of habitat found on CRP lands are more pronounced (for example, see Riffell et al. 2006). It follows, then, that the potential negative effects on wildlife associated with declining habitat quality on CRP lands could be more amplified in these settings at a local scale, but is not likely to reach a significant magnitude.

Emergency haying and grazing would be authorized after conditions four months prior to the proposed activity are severe enough to meet the required provisions. Before haying or grazing under emergency provisions would be approved for specific land, the condition of resources on the land would be assessed and the Conservation Plan designed to take these conditions into account. It is not likely that land hayed under managed provisions the previous year would be hayed the following year under emergency provisions, minimizing the potential for cumulative indirect negative effects from emergency haying. Emergency grazing may occur on land that was grazed the previous year under managed provisions, but at least 25 percent of the field must be ungrazed or the stocking rate can only be a maximum 75 percent, minimizing the potential for cumulative indirect negative impacts to environmental resources. ***Therefore, no significant cumulative negative indirect effect to vegetation, wildlife, water, soils, or carbon sequestration (air quality) would be expected under Alternative B.***

The socioeconomic analysis of Alternative B concludes managed haying and grazing under these provisions in the State has a small positive socioeconomic impact. Emergency haying and grazing would be slightly more economically beneficial since the payment reduction is ten percent rather than the 25 percent under managed provisions, but this is not expected to be significant. ***No significant cumulative negative impact to the socioeconomy of Montana would be expected under Alternative B.***

5.3.2 Alternative C

Alternative C is identical to Alternative B, except it would shorten the PNS period by two weeks to end on July 1 rather than July 15, allowing an additional two weeks of haying or grazing. The benefits to conservation covers from Alternative C would be similar to Alternative B; however cutting of warm and cool season vegetation near the end of the shortened PNS under Alternative C may diminish the health and vigor of these plants. Providing the health and vigor of the plant stand are maintained in accordance with established procedures and guidelines, ***no significant cumulative negative effect to vegetation is expected under Alternative C.***

Alternative C would increase direct impacts to ground nesting bird mortality. Shortening the PNS would not encompass an estimated 70 percent of savannah sparrow peak breeding season. In a worst case scenario analyzed for managed haying based upon the savannah sparrow, three percent mortality would occur once every five years. The mortality rate is expected to be reduced to 2.5 percent if only economically viable eligible acreage is hayed. However, it is likely the mortality would be less, since the calculations include total percent habitat, as it cannot be assumed that only 50 percent of economically viable eligible acreage would be hayed in a given year. If emergency haying follows managed haying on the same lands the year after haying under managed provisions, then a maximum six percent mortality rate would be expected. ***No significant cumulative negative effect to grassland bird mortality would be possible under Alternative C.***

The indirect impacts of Alternative C to vegetation, wildlife, water, soils, and carbon sequestration are similar to Alternative B, and would occur at the same frequencies. ***Similar to Alternative B, if the resource conditions on the land are assessed and appropriately managed under existing NRCS practices, guidelines, and procedures, no significant cumulative negative indirect effect to most vegetation, wildlife, water, soils, or carbon sequestration (air quality) would be expected under Alternative C.***

The shorted PNS period allows for two additional weeks of haying and grazing over that of Alternative B. These two weeks would be expected to increase the value of beef production and hay production over that of Alternative B; however it is expected that this increase would not be significant. ***No significant cumulative negative impact to the socioeconomy of Montana would be expected under Alternative C.***

5.3.3 Preferred Alternative - Alternative D

Alternative D would maintain the current frequency for grazing of once every five years, yet decreases the frequency of haying to once every five years, while maintaining the current PNS of May 15 to August 1. Impacts on vegetation and wildlife are expected to be similar to Alternative B, yet occur at a less frequent interval relating to grazing. Managed haying and grazing at the frequency of Alternative D, and in accordance with established USDA conservation practice provisions, standards, and guidelines, are expected to ensure the maximum health and vigor of the conservation cover, preserve wildlife habitat, benefit water quality, soil, and carbon sequestration while providing the CRP participant socioeconomic benefits.

A mortality rate of one percent for mourning dove and northern harrier would occur once every five years under this alternative, and is reduced to less than half of one percent every five years if only economically viable eligible acreage is hayed. If emergency haying follows managed haying on the same lands the year after haying under managed provisions, then a maximum of two percent mortality rate would be expected over a two year period. The earliest managed haying would follow emergency haying is five years, an interval over which bird populations would most likely recover. ***No significant cumulative negative effect to grassland bird mortality is expected under Alternative D.***

The haying and grazing frequency of Alternative D is not substantially different from Alternative B. The lengthened interval may allow more woody vegetation encroachment in grasslands due to reduced disturbance intervals, but this is not expected to be significant. The PNS period under this alternative would protect the reproductive period of both cool and warm season grasses. ***No significant cumulative negative effect to vegetation, wildlife, water soils, or carbon sequestration (air quality) is expected under Alternative D.***

The socioeconomic analysis of Alternative D concludes managed haying and grazing under these provisions in the State has a slight positive socioeconomic impact on a statewide scale. Because haying would occur at a more frequent interval than Alternative A, the value of hay production may increase, but this is not expected to be significant. ***No significant cumulative negative impact to the socioeconomy of Montana is expected under Alternative D.***

5.3.4 No Action Alternative – Alternative A

Alternative A allows managed haying once every ten years and managed grazing once every five years, except during the PNS period extending from May 15 to August 1.

Continuation of the No Action provisions would not maximize grassland health and vigor since the disturbance frequency for managed haying and grazing is not often enough. The majority of wildlife habitat needs are met by diversity in successional environments (plant stand structure and composition) that create a mosaic landscape. Over time, CRP fields that have not had adequate rejuvenation management accumulate thatch. Thatch can inhibit vegetative growth, reduces self-seeding, harbors plant pathogens, makes it difficult to control noxious weeds and insect pests, is difficult to penetrate with machinery for mid-contract management tasks, can reduce moisture filtration to the soil, and is fuel for catastrophic wildfires. Inadequate disturbance enables succession to advance through woody plant encroachment into areas where these species are undesired, and prevents lower impact management techniques that are also more cost efficient. Although the impact of managed haying and grazing at the frequency of Alternative A is not significant on a statewide scale, it can be quite significant to individual farm operators.

The direct effect of Alternative A managed haying and grazing to vegetation is similar to the action alternatives, except the impacts would occur once every ten years for haying and once every five years for grazing. The assessment of direct impacts to vegetation under the No Action alternative concluded no significant negative impacts would occur as the established conservation practice provisions, standards, and guidelines, if followed, ensure vegetation recovery. Emergency haying or grazing may follow managed haying or grazing on the same lands as early as the next year. A Conservation Plan would be developed or the existing Conservation Plan would be modified to take into account the condition of resources on the land prior to authorizing the activity to proceed. After emergency haying and grazing, under Alternative A the soonest managed haying would be allowed on the same lands is ten years and for grazing five years, and again, the resource conditions would be evaluated at that time and the Conservation Plan modified accordingly prior to authorizing either activity under the managed provisions.

Vegetation would still have adequate time to recover prior to managed haying or grazing. ***Therefore, no significant cumulative negative direct effect to vegetation is expected under Alternative A.***

The direct effect of managed haying and grazing on grassland bird mortality is expected to occur at a lower frequency under Alternative A in comparison to the action alternatives. Under the worst case scenario analyzed for managed haying based upon the mourning dove and northern harrier, one percent mortality would occur once every ten years. The mortality rate is expected to be even less (reduced to less than half of one percent) since the total number of CRP acres that are economically viable to hay statewide is much less, and the chance that all would be hayed in the same year is even less. If emergency haying follows managed haying on the same lands the year after haying under managed provisions, then a maximum two percent mortality rate would be expected over a two year period. This scenario is also not likely to happen if the emergency is drought related, as the vegetative stand hayed the year before would not produce enough for another harvest. The soonest managed haying could be conducted again on the same land would be another ten years, an adequate interval for the grassland bird population to recover from any impacts. ***Therefore, no significant cumulative negative direct effect to grassland bird mortality would be expected under Alternative A.***

Similar to the action alternatives, ***no cumulative negative indirect effect to vegetation, wildlife, water, soils, or carbon sequestration (air quality) is expected under Alternative A if the Conservation Plan adapts to take into account resource conditions on the land just prior to either managed or emergency haying or grazing, and if all established applicable conservation practice provisions, standards, and guidelines are followed.*** If these conditions are met, vegetation would recover adequately to serve its conservation purpose between managed haying and grazing and emergency haying and grazing episodes.

The socioeconomic analysis of Alternative A concludes managed haying and grazing under these provisions in the State has a very small positive socioeconomic impact on a statewide scale. Emergency haying and grazing would be slightly more economically beneficial since the payment reduction is ten percent rather than the 25 percent under managed provisions, but this is not expected to be significant. ***No significant cumulative negative impact to the socioeconomy of Montana would be expected under Alternative A.***

5.4 UNAVOIDABLE IMPACTS OF THE ALTERNATIVES

5.4.1 Alternative B

Unavoidable impacts of haying and grazing under Alternative B are expected from direct mortality effects on wildlife. Representative probabilistic quantitative studies of potential mortality impacts to wildlife from haying or grazing are lacking. However, CRP lands are not the only habitat available for wildlife, and because managed haying may take place once every five years and grazing once every three years as provided for in Alternative B, the impact is not expected to be significant.

In addition, vegetation removal through harvesting by haying or grazing under Alternative B would unavoidably impact vegetation once every five years for haying and once every three years for grazing. If the Conservation Plan adapts to take into account resource conditions on the land just prior to managed haying or grazing, and if all established applicable conservation practice provisions, standards, and guidelines are followed, this impact would not be significant.

The incremental contribution of impacts of Alternative B, when considered in combination with other past, present, and reasonably foreseeable actions, are expected to result in long-term positive impacts to vegetation, wildlife, surface waterbodies, soil, carbon sequestration, and socioeconomic resources.

5.4.2 Alternative C

Unavoidable impacts of haying and grazing under Alternative C would be similar to those of Alternative B. However, because the PNS period of Alternative C is two weeks to a month shorter than the other alternatives, mortality of ground nesting birds is expected to increase. The shorter PNS period would not encompass an estimated 70 percent of savannah sparrow peak breeding season. An estimated three percent mortality could occur every five years, and if emergency haying occurs on the same land the following year, a six percent mortality over two years could be suffered. This rate would be substantially reduced if only economically viable eligible acreage is hayed.

The incremental contribution of impacts of Alternative C, when considered in combination with other past, present, and reasonably foreseeable actions, are expected to result in long-term positive impacts to vegetation, wildlife, surface waterbodies, soil, carbon sequestration, and socioeconomic resources.

5.4.3 Preferred Alternative - Alternative D

Unavoidable impacts of haying and grazing under Alternative D would be similar to Alternative B, but potential impacts associated with grazing would be reduced to once every five years. Additionally, because the PNS period of Alternative D is two weeks longer than Alternative B, mortality of ground nesting birds is expected to decrease. Under the worst case scenario for bird mortality analyzing the mourning dove and northern harrier, one percent mortality would occur once every five years for managed haying, and would increase to two percent over two years if managed haying is followed by emergency haying on the same lands the next year. If only economically viable eligible acreage is hayed, this is reduced to less than half of one percent. The longer PNS period would protect the peak breeding season for a majority of the grassland bird species. However, because CRP lands are not the only habitat available for wildlife, and managed haying and grazing may take place once every five years as provided for in Alternative D, the impact is not expected to be significant.

Vegetation removal through harvesting by haying or grazing under Alternative D would unavoidably impact vegetation once every five years for haying and grazing. If the Conservation Plan adapts to take into account resource conditions on the land just prior to managed haying or grazing, and if all established applicable conservation practice provisions, standards, and guidelines are followed, this impact would not be significant.

The incremental contribution of impacts of Alternative D, when considered in combination with other past, present, and reasonably foreseeable actions, are expected to result in long-term positive impacts to vegetation, wildlife, surface waterbodies, soil, carbon sequestration, and socioeconomic resources.

5.4.4 No Action Alternative – Alternative A

Similar to the other alternatives analyzed, unavoidable impacts of haying and grazing under the No Action alternative are expected from direct mortality effects on wildlife and direct removal of vegetation through harvesting by managed haying or grazing. However, at the reduced frequency of Alternative A, these impacts are not expected to be significant. Based upon the mourning dove and northern harrier analysis, one percent mortality would be suffered once every ten years. If managed haying is followed by emergency haying on the same lands the next year, mortality could increase to two percent over a two year period. The earliest managed haying could be conducted on lands harvested under emergency provisions would be another ten years.

The incremental contribution of impacts of Alternative A, when considered in combination with other past, present, and reasonably foreseeable actions, are expected to result in long-term positive impacts to vegetation, wildlife, surface waterbodies, soil, carbon sequestration and socioeconomic resources, however, the net benefits are less than the action alternatives analyzed.

5.4.5 Irreversible and Irretrievable Commitment of Resources

NEPA requires that environmental analysis include identification of any irreversible and irretrievable commitments of resources which would be involved should an action be implemented. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources has on future generations. Irreversible effects primarily result from the use or destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action. For the action alternatives analyzed, no irreversible or irretrievable resource commitments are expected.

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6.0 MITIGATION MEASURES

6.1 INTRODUCTION

The purpose of mitigation is to avoid, minimize, or eliminate negative impacts on affected resources to some degree. CEQ Regulations (40 CFR 1508.20) state that mitigation includes:

- avoiding the impact altogether by not taking a certain action or parts of an action;
- minimizing impacts by limiting the degree or magnitude of the action and its implementation;
- rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and
- compensating for the impact by replacing or providing substitute resources or environments

6.2 ROLES AND RESPONSIBILITIES

CEQ Regulations state that all relevant reasonable mitigation measures that could improve a project should be identified, even if they are outside the jurisdiction of the lead agency or the cooperating agencies. This serves to alert agencies or officials who can implement these extra measures, and would encourage them to do so. The lead agency for the alternatives analyzed is FSA.

6.3 MITIGATION RECOMMENDATIONS

For most aspects of managed haying and grazing, there are no expected major negative impacts associated with implementation of any of the action alternatives. The negative impacts of Alternatives B and C on grassland birds from decreasing the length of the PNS are not addressable with mitigation measures; therefore, the following discusses those aspects of the alternatives that may be addressed with specific measures. Prior to installation of CPs, producers must complete site-specific environmental analysis which would reveal any protected resources on or adjacent to the proposed enrolled lands. In those site-specific instances where a wetland, threatened or endangered species, or a cultural resource may be present, consultation with the appropriate regulatory agency would identify specific avoidance, minimization, or mitigation measures required to eliminate or reduce the negative impacts to those sensitive resources.

Prior to implementing managed haying or grazing, a Conservation Plan must be developed that is in compliance with NEPA and all other applicable Federal and State laws and regulations. This plan must be completed by qualified individuals either employed at NRCS or an NRCS-certified TSP. The qualified conservationist would use information from ecological site descriptions, trend determinations, similarity index determinations, assessments of the health of the conservation lands and other information (climatic conditions, appropriate stocking rate) to assist the CRP land manager to ***design a plan for managed haying and grazing on authorized CPs that would not defeat the purposes of the CRP contract***.

These plans require several site-specific inventories, measures to meet specific objectives, the methods and BMPs to control or mitigate impacts, and contingency and monitoring plans. The field numbers, locations, and acreage must be identified. The plan states that no managed haying or grazing may occur during the PNS, may not occur within 120 feet of a permanent waterbody, or in the case of haying, is limited to 50 percent of the field over a period no longer than 90 days, and in the case of grazing, is limited to a maximum 120 days that may be in two 60-day periods. A resource assessment must be conducted that identifies resources present (i.e. vegetative cover, water sources, soils) and their condition, existing structures (fences, natural barriers), and facilities (location of gates, watering areas), accompanied with a site plan as appropriate. An assessment of forage suitability must be completed, identifying the key forage species and associated acreage. The forage quantity and quality would be estimated and documented, and if grazing is proposed, the type of livestock and ruminant wildlife (deer, elk) identified, and the estimated stocking rate calculated in accordance with the NRCS FOTG. ***The 75 percent stocking rate is the maximum allowed for managed grazing; if resource conditions do not support the maximum, a lower, appropriate stocking rate would be calculated and implemented.*** Animal Inventory would document the number and type of ruminant wildlife estimated to utilize the area proposed for grazing, and the livestock that would be grazing. In addition, ***if resource conditions do not support haying the maximum 50 percent of a CRP field, then a lower appropriate rate would be calculated and implemented.***

Other NRCS Conservation Practice Standards must be adhered to and specific guidance incorporated into the Conservation Plan that incorporates mitigation measures. NRCS Practice Code 511 Forage Harvest Management (USDA/NRCS 2004a) stipulates criteria to improve or maintain stand life, plant vigor, and plant diversity. Vegetation must be cut only at a stage of maturity or harvest interval range that would provide adequate food reserves and/or basal or auxiliary tillers or buds for regrowth and/or reproduction to occur without loss of plant vigor. Further, re-seeding annuals must only be cut or harvested at a stage of maturity and frequency that ensures production of viable seed and ample carryover of hard seed to maintain desired plant stand diversity. For managed haying and grazing, a minimum two to six inch stubble height (depending on species) is required by Pasture and Range Seedings Planning-Installation-Evaluation - Management Plant Materials Technical Note 10 (USDA/NRCS 2008d) at conclusion of the activity. Requirements for species typically planted in the Intermountain West, which includes Montana, are found in NRCS Plant Materials Technical Note Number 59 (USDA/NRCS 2007d). However, if particular plants require more of the plant to remain, the appropriate minimum height would be defined in the Conservation Plan. Appendix F contains the forage harvest requirements for plant species consisting of grasses and legumes for grass-related CPs in Montana. The planned or allowable degree of use for browse species differs from grass species. The degree of use applies to the annual growth of twigs and leaves within reach of animals. If deciduous browse species are used during the dormant season, the degree of use suggested applies to annual twig growth only. Guidance on the suitability of forage by species grown in dryland conditions includes estimates of the plant species productivity, the suitability as forage, minimum years a plant must be established prior to suitability for forage, fertilizer needs, soil acidity needs, and drought tolerance is provided. In accordance with managed haying and grazing provisions, authorized CPs must be established a minimum one year prior to scheduling these activities.

Wildlife habitat and corridors (CP4D, CP4B) guidance for implementation are found in NRCS Practice Code 645 Upland Wildlife Habitat Management (USDA/NRCS 2005b). Under these CPs authorized for managed haying and grazing, certain wildlife species, guilds, suites, or ecosystems are targeted for conservation. The grazing plan developed for these CPs must have wildlife management as the primary objective. The Conservation Plan requires habitat evaluation and appraisal to identify habitat-limiting factors, and have developed habitat evaluation tools to achieve habitat conditions for particular species, such as bobwhite quail, the prairie chicken, or ring-neck pheasants. Further, biological technical notes and assessment worksheets offer additional guidance. Application of this practice code alone, or in combination with other supporting and facilitating practices such as grazing and prescribed burns, result in a conservation system to meet the goals of the Conservation Plan. Managed haying and grazing is restricted during critical periods such as the PNS, brood rearing, deer fawning and elk calving seasons.

Management components of the grazing plan specify the schedule and number of days when managed haying and grazing can be conducted. Criteria that maintain or improve water quality and quantity (other than limiting grazing to within no more than 120 feet of a permanent surface waterbody) include: (1) maintain adequate ground cover and plant density to ensure adequate filtering capacity of the vegetation; and (2) employ BMPs to minimize concentrated livestock areas that ensure animal offal is dispersed. The latter would include siting any supplemental livestock feeding, handling, and watering facilities and gates in such a manner to ensure adequate dispersion of animals. This would also assist in reducing potential soil erosion and compaction, which could lead to excess runoff. To maintain soil condition, measures to ensure adequate ground cover, litter, and canopy to maintain or improve infiltration and organic content would be stipulated in the plan. Fencing must be used to control grazing animals' access to other areas adjacent to the grazed field and protect permanent surface waterbodies. Fencing may be designed in accordance with Practice Code 382 (USDA/NRCS 2006e) to minimize impacts to wildlife while serving its purpose to confine livestock. These latter measures include altering the height of the top and bottom wires, and making them smooth rather than barbed. When haying, starting in the middle of the field and proceeding in a parallel back and forth routine enables certain wildlife time needed to temporarily relocate to adjacent areas in advance of machinery. Also, use of a flushing bar would reduce the potential for injuring or killing certain wildlife.

To protect forbs and legumes that benefit native pollinators and other wildlife and provide insect food sources for grassland nesting birds, spraying or other control of noxious weeds would be done on a "spot treatment" basis in accordance with NRCS Practice Code 595 (USDA/NRCS 2004b). All methods of plant and insect pest management must comply with Federal, State, and local regulations.

Site-specific environmental evaluation of lands to be enrolled in CRP in conjunction with either informal or formal consultation with the appropriate USFWS office would protect species included on the TES list and their designated critical habitat. If potential negative impacts of managed haying and grazing on listed species are identified, it is not likely the land would be approved for these activities.

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APPENDIX A

MONTANA VEGETATION AND WILDLIFE SCIENTIFIC NAMES

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Montana Vegetation and Wildlife Scientific Names

COMMON NAME	SCIENTIFIC NAME
PLANTS[1]	
Alfalfa	*Medicago sativa*
Alkali sacaton	*Sporobolus airoides*
Alsike clover	*Trifolium hybridum*
Altai wildrye	*Elymus angustus*
Antelope brush	*Purshia tridentata*
Basin wildrye	*Elymus cinereus*
Beardless wheatgrass	*Pseudoroegneria spicata* spp. *inermis*
Beardless wildrye	*Elymus triticoides*
Big bluegrass	*Poa ampla*
Big bluestem	*Andropogon gerardii*
Birdsfoot trefoil	*Lotus corniculatus*
Blue grama	*Bouteloua gracilis*
Bluebunch wheatgrass	*Pseudoroegneria spicata*
Bottlebrush squirreltail	*Elymus* spp.
Buffaloberry	*Shepherdia* spp.
Buffalograss	*Bouteloua dactyloides*
Canada wildrye	*Elymus canadensis*
Canby bluegrass	*Poa canbyi*
Chokecherry	*Prunus virginiana*
Cicer milvetch	*Astragalus cicer*
Creeping foxtail	*Alopecurus arundinaceus*
Dahurian wildrye	*Elymus dahuricus*
Dotted grayfeather	*Liatris punctata*
Douglas fir	*Psuedotsuga menziesii*
Engelmann spruce	*Picea engelmannii*
Fairway crested wheatgrass	*Agropyron cristatum*
Grand fir	*Abies grandis*
Green needlegrass	*Stipa viridula*
Hard fescue	*Festuca longifolia*
Idaho fescue	*Festuca idahoensis*
Indian blanket flower	*Gaillardia pulchella*
Indian ricegrass	*Achnatherum hymenoides*
Indiangrass	*Sorghastrum nutans*
Intermediate wheatgrass	*Thinopyrum intermedium*
Kentucky bluegrass	*Poa pratensis*
Lewis flax	*Linum lewisii*
Little bluestem	*Schizachyrium scoparium*
Lodgepole pine	*Pinus contorta*
Mammoth wildrye	*Leymus racemosus*
Maximilian sunflower	*Helianthus maximilianii*
Meadow bromegrass	*Bromus biebersteinii*
Meadow foxtail	*Alopecurus pratensis*
Mountain bromegrass	*Bromus marginatus*
Needle and thread grass	*Stipa comata*
Northern reedgrass	*Calamagrostis stricta*

Montana Vegetation and Wildlife Scientific Names (cont'd)

COMMON NAME	SCIENTIFIC NAME
Nuttall alkaligrass	*Puccinellia nuttalliana*
Orchard grass	*Dactylis glomerata*
Perennial ryegrass	*Lolium perenne*
Ponderosa pine	*Pinus ponderosa*
Prairie cordgrass	*Spartina pectinata*
Prairie junegrass	*Koeleria macrantha*
Prairie rose	*Rosa arkansana* var. *suffulta*
Prairie sandreed	*Calamovilfa longifolia*
Purple prairieclover	*Dalea purpurea*
Rabbitbrush	*Chrysothamnus* spp.
Red clover	*Trifolium pratense*
Reed canarygrass	*Phalaris arundinacea*
Rocky Mountian penstemon	*Penstemon strictus*
Russian wildrye	*Psathyrostachys juncea*
Sagebrush	*Artemisia* spp.
Sainfoin	*Onobrychis viciifolia*
Sand bluestem	*Andropogon hallii*
Sand dropseed	*Sporobolus cryptandrus*
Sandberg bluegrass	*Poa secunda*
Sheep fescue	*Festuca ovina*
Sideoats grama	*Bouteloua curtipendula*
Silver fir	*Abies alba*
Slim sedge	*Carex praegracilis*
Small burnet	*Sanguisorba minor*
Smooth bromegrass	*Bromus inermis*
Snowberry	*Symphoricarpos albus*
Spalding's catchfly (campion)	*Silene spaldingii*
Spike fescue	*Leucopoa kingii*
Strawberry clover	*Trifolium fragiferum*
Subalpine fir	*Abies* spp.
Switchgrass	*Panicum virgatum*
Tall fescue	*Festuca arundinacea*
Timothy	*Phleum pratense*
Trembling aspen	*Populus tremuloides*
Tufted hairgrass	*Deschampsia caespitosa*
Western hemlock	*Tsuga heterophylla*
Western red cedar	*Thuja plicata*
Western snowberry	*Symphoricarpos occidentalis*
Western wheatgrass	*Pascopyrum smithii*
Western white pine	*Pinus monticola*
Western yarrow	*Achillea millefolium* var. *occidentalis*
White clover (ladino)	*Trifolium repens*
White prairie clover	*Dalea candida*
White sweetclover	*Melilotus alba*
Yellow sweetclover	*Melitotus officinalis*

Montana Vegetation and Wildlife Scientific Names (cont'd)

COMMON NAME	SCIENTIFIC NAME
MAMMALS²	
American bison	*Bos bison*
Badger	*Taxidea taxus*
Bighorn sheep	*Ovis canadensis*
Black bear	*Ursus americanas*
Black-footed ferret	*Mustela nigripes*
Black-tailed prairie dog	*Cynomys ludocicianus*
Canada lynx	*Lynx canadensis*
Cottontail rabbit	*Sylvilagus* spp.
Coyote	*Canis latrans*
Deer mouse	*Peromyscus maniculatus*
Elk	*Cervus elephus*
Gray wolf	*Canis lupus*
Great Basin pocket mouse	*Perognathus parvus*
Grizzly bear	*Ursus arctos*
Hoary marmot	*Marmota caligata*
Jack rabbit	*Lepus* spp.
Meadow jumping mouse	*Zapus hudsonius*
Moose	*Alces alces* (*Alces americanus*)
Mountain lion (cougar, puma)	*Felis concolor* (*Puma concolor*)
Mule deer	*Odocoileus hemionus*
Northern bog lemming	*Synaptomys borealis*
Ord's kangaroo rat	*Dipodomys ordii*
Pallid bat	*Antrozous pallidus*
Pronghorn antelope	*Antilocapra americana*
Pygmy rabbit	*Brachylagus idahoensis*
Snowshoe hare	*Lepus americanus*
Spotted bat	*Euderma maculatum*
Townsend's big-eared bat	*Corynorhinus townsendii*
Vole	*Microtus* spp.
White-tailed deer	*Odocoileus virginianus*
White-tailed prairie dog	*Cynomys leucurus*
BIRDS	
American bittern	*Botaurus lentiginosus*
American kestrel	*Falco sparverius*
American pipit	*Anthus rubescens*
American wigeon	*Anas americana*
Baird's sparrow	*Ammodramus bairdii*
Bald eagle	*Haliaeetus leucocephalus*
Barn owl	*Tyto alba*
Blue-winged teal	*Anas discors*
Bobolink	*Dolichonyx oryzivorus*
Burrowing owl	*Athene cunicularia*
Cassin's kingbird	*Tyrannus vociferans*
Chestnut-collared longspur	*Calcarius ornatus*
Clay-colored sparrow	*Spizella pallida*
Common nighthawk	*Chordeiles minor*

Montana Vegetation and Wildlife Scientific Names (cont'd)

COMMON NAME	SCIENTIFIC NAME
Common poorwill	*Phalaenoptilus nuttallii*
Common yellowthroat	*Geothlypis trichas*
Dickcissel	*Spiza americana*
Eastern bluebird	*Sialia sialis*
Eastern kingbird	*Tyrannus tyrannus*
Eskimo curlew	*Numenius borealis*
Ferruginous hawk	*Buteo regalis*
Gadwall	*Anas strepera*
Golden eagle	*Aquila chrysaetos*
Grasshopper sparrow	*Ammodramus savannarum*
Gray partridge	*Perdix perdix*
Green-winged teal	*Anas crecca*
Horned lark	*Eremophila alpestris*
Interior least tern	*Sterna antillarum*
Killdeer	*Charadrius vociferus*
Lark bunting	*Calamospiza melanocorys*
Lark sparrow	*Chondestes grammacus*
Le Conte's sparrow	*Ammodramus leconteii*
Loggerhead shrike	*Lanius ludovicianus*
Long-billed curlew	*Numenius americanus*
Long-eared owl	*Asio otus*
Mallard	*Anas platyrhynchos*
Marbled godwit	*Limosa fedoa*
McCown's longspur	*Calcarius mccownii*
Merlin	*Falco columbarius*
Mountain bluebird	*Sialia currucoides*
Mountain plover	*Charadrius montanus*
Mourning dove	*Zenaida macroura*
Northern harrier	*Circus cyaneus*
Northern pintail	*Anas acuta*
Northern shoveler	*Anas clypeata*
Piping plover	*Charadrius melodus*
Prairie falcon	*Falco mexicanus*
Redhead	*Aythya americana*
Red-winged blackbird	*Agelaius phoeniceus*
Ring-necked pheasant	*Phasianus colchicus*
Sandhill crane	*Grus canadensis*
Savannah sparrow	*Passerculus sandwichensis*
Say's phoebe	*Sayornis saya*
Sedge wren	*Cistothorus platensis*
Sharp-tailed grouse	*Tympanuchus phasianellus*
Short-eared owl	*Asio flammeus*
Sprague's pipit	*Anthus spragueii*
Swainson's hawk	*Buteo swainsoni*
Upland sandpiper	*Bartramia longicauda*
Vesper sparrow	*Pooecetes gramineus*
Western bluebird	*Sialia mexicana*

Montana Vegetation and Wildlife Scientific Names (cont'd)

COMMON NAME	SCIENTIFIC NAME
Western kingbird	*Tyrannus verticalis*
Western meadowlark	*Sturnella neglecta*
Whooping crane	*Grus americana*
Willet	*Tringa semipalmata*
Wilson's phalarope	*Phalaropus tricolor*
Wilson's snipe	*Gallinago delicata*
AMPHIBIANS AND REPTILES	
Couer d' Alene salamander	*Plethodon idahoensis*
Gopher snake	*Pituophis melanoleucus*
Milk snake	*Lampropeltis triangulum*
Northern leopard frog	*Rana pipiens*
Plains spadefoot toad	*Spea bombifrons*
Prairie rattlesnake	*Crotalus viridis*
Smooth greensnake	*Opheodrys vernalis*
Snapping turtle	*Chelydra serpentina*
Spiny softshell	*Trionyx spiniferus*
Tiger salamander	*Ambystoma tigrinum*
Western hognose snake	*Heterodon nasicus nasicus*
Western toad	*Bufo boreas*

Sources: [1] USDA/NRCS 2008e, [2] Montana State University (MSU) 2006

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APPENDIX B

MONTANA IMPAIRED WATERBODIES

INDIVIDUAL USE SUPPORT SUMMARY FOR MONTANA RIVERS AND STREAMS (2006)

INDIVIDUAL USE SUPPORT SUMMARY FOR MONTANA LAKES (2006)

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Montana Impaired Waterbodies

Waterbody	Size (Lake Acres or Stream Miles)	Cause of Impairment	Impaired Use
Cedar Creek	16.9	Low flow alterations, nitrate/nitrite, TKN	Aquatic Life, Cold Water Fishery, Industrial, Primary Contact Recreation
Trout Creek	14.7	Alteration in stream-side of littoral vegetative covers, physical substrate habitat alterations, turbidity	Aquatic Life, Cold Water Fishery
Petty Creek	11.6	Alterations in wetland habitats, excess algal growth, low flow alterations, sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
West Fork Petty Creek	7.4	Chlorophyll-a, nitrate/nitrite, phosphorus (total), sedimentation/siltation, TKN	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Grant Creek	18.3	Alteration in stream-side or littoral vegetative covers, excess algal growth, low flow alterations, nitrate/nitrite, sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery, Industrial, Primary Contact Recreation
Nemote Creek	19.8	Low flow alterations, nitrate/nitrite, phosphorus (total), temperature, TKN, chlorophyll-a	Aquatic Life, Cold Water Fishery, Industrial, Primary Contact Recreation
Dry Creek	15.3	Alteration in stream-side or littoral vegetative covers, low flow alterations, nitrate/nitrite, TKN	Aquatic Life, Cold Water Fishery, Industrial, Primary Contact Recreation
Flat Creek	5.6	Arsenic, cadmium, copper, lead, mercury, physical substrate habitat alterations, sedimentation/siltation, antimony	Agricultural, Aquatic Life, Cold Water Fishery, Drinking Water, Industrial, Primary Contact Recreation
St. Regis River	38.6	Alteration in stream-side or littoral vegetative covers, other flow regime alterations, sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery
Twelvemile Creek	13.4	Physical substrate habitat alterations, sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery
Big Creek	3.4	Sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery
Little Joe Creek	3.1	Alteration in stream-side or littoral vegetative covers, physical substrate habitat alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery
North Fork Little Joe Creek	10.7	Sedimentation/siltation	Aquatic Life, Cold Water Fishery
Stony Creek	7.1	Phosphorus, (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery

Montana Impaired Waterbodies (cont'd)

Waterbody	Size (Lake Acres or Stream Miles)	Cause of Impairment	Impaired Use
Flathead River	4.6	Alteration in stream-side or littoral vegetative covers, other flow regime alterations, sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery
Little Bitterroot River	4.9	Chlorophyll-a, nitrate/nitrite, other flow regime alterations, phosphorus (total), sedimentation/siltation, TKN	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Sullivan Creek	3.8	Aluminum, cadmium, zinc, alteration in stream-side or littoral vegetative covers, phosphorus (total), sedimentation/siltation, E coli	Agricultural, Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Lynch Creek	13.7	Alteration in stream-side or littoral vegetative covers, low flow alterations, phosphorus (total), sedimentation/siltation, temperature, TKN	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Prospect Creek	18.9	Alteration in stream-side or littoral vegetative covers, antimony, lead, zinc	Aquatic Life, Cold Water Fishery, Drinking Water
Antimony Creek Drainage	2	Arsenic, lead	Aquatic Life, Cold Water Fishery, Drinking Water
Cox Gulch	3	Lead, zinc	Agricultural, Aquatic Life, Cold Water Fishery, Drinking Water
Bull River	24.7	Physical substrate habitat alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery
Clear Creek	13.7	Alteration in stream-side or littoral vegetative covers, sedimentation/siltation	Aquatic Life, Cold Water Fishery
Dry Creek	4.2	Alteration in stream-side or littoral vegetative covers, chlorophyll-a	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Marten Creek	6.7	Physical substrate habitat alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery
White Pine Creek	11.9	Alteration in stream-side or littoral vegetative covers, sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery
Swamp Creek	5	Alteration in stream-side or littoral vegetative covers, nitrate/nitrite, phosphorus (total), sedimentation/siltation, TKN	Aquatic Life, Cold Water Fishery, Primary Contact Recreation

Montana Impaired Waterbodies (cont'd)

Waterbody	Size (Lake Acres or Stream Miles)	Cause of Impairment	Impaired Use
Henry Creek	6.7	Alteration in stream-side or littoral vegetative covers, low flow alterations, phosphorus (total), sedimentation/siltation, TKN	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Dry Creek	3.5	Sedimentation/siltation	Aquatic Life, Cold Water Fishery
McGregor Creek	6.7	Other flow regime alterations, phosphorus (total), sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Little Thompson River	20.3	Alteration in stream-side or littoral vegetative covers, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
Lazier Creek	7.4	Alteration in stream-side or littoral vegetative covers, nitrate/nitrite, phosphorus (total), sedimentation/siltation, TKN	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
McGinnis Creek	5.1	Fish passage barrier, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
Lake Creek	19.6	Salinity, cadmium, other flow regime alterations, sedimentation/siltation, selenium, zinc	Agricultural, Aquatic Life, Drinking Water, Industrial, Primary Contact Recreation, Warm Water Fishery
Birch Creek	34.1	Low flow alterations, nitrate/nitrite	Aquatic Life, Primary Contact Recreation
Dupuyer Creek	37.6	Low flow alterations, nitrate/nitrite, sedimentation/siltation, temperature	Aquatic Life, Primary Contact Recreation
Old Maids Coulee	16.4	Chloride, specific conductance, TDS, ammonia (total), nitrate/nitrite, phosphorus (total)	Agricultural, Aquatic Life, Industrial, Primary Contact Recreation
Cut Bank Creek	23.1	Low flow alterations, nitrate/nitrite, temperature	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Pondera Creek/Coulee	118.5	Alteration in stream-side or littoral vegetative covers, physical substrate habitat alterations, salinity	Aquatic Life, Cold Water Fishery
Corral Creek	19.2	Phosphorus (total	Aquatic Life, Cold Water Fishery
Eagle Creek	45.7	Alteration in stream-side or littoral vegetative covers, nitrogen (total), phosphorus (total), physical substrate habitat alterations	Aquatic Life, Cold Water Fishery
Oilmont Wetland	9	Alteration in stream-side or littoral vegetative covers, other flow regime alterations, arsenic	Aquatic Life, Drinking Water

Montana Impaired Waterbodies (cont'd)

Waterbody	Size (Lake Acres or Stream Miles)	Cause of Impairment	Impaired Use
Little Pipestone Creek	12	Alteration in stream-side or littoral vegetative covers, nitrogen (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
Warm Springs Creek	14.5	Alteration in stream-side or littoral vegetative covers, arsenic, copper, lead, low flow alterations, physical substrate habitat alterations	Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Cable Creek	3.2	Chlorophyll-a, other anthropogenic substrate alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Storm Lake Creek	11	Alteration in stream-side or littoral vegetative covers, chlorophyll-a, low flow alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Mill Creek	11	Arsenic, cadmium, chromium (total), copper, lead, zinc	Aquatic Life, Cold Water Fishery
Mill Creek	8.7	Aluminum, arsenic, cadmium, copper, iron, lead, zinc, alteration in stream-side or littoral vegetative covers, low flow alterations	Agricultural, Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Willow Creek	5.5	Alteration in stream-side or littoral vegetative covers, cadmium, copper, lead, phosphorus (total), sedimentation/siltation, arsenic	Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Willow Creek	7.4	Alteration in stream-side or littoral vegetative covers, arsenic, cadmium, copper, lead, low flow alterations	Aquatic Life, Cold Water Fishery, Drinking Water
Lost Creek	15.9	Alteration in stream-side or littoral vegetative covers, arsenic, iron, low flow alterations, manganese, nitrate/nitrite, physical substrate habitat alterations, sulfates	Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Modesty Creek	14.1	Arsenic, low flow alterations	Drinking Water, Primary Contact Recreation
Dempsey Creek	9.2	Alteration in stream-side or littoral vegetative covers, low flow alterations, nitrate/nitrite, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Mill-Willow Bypass	4.2	Copper, lead, arsenic	Aquatic Life, Cold Water Fishery, Drinking Water
Peterson Creek	6.4	Alteration in stream-side or littoral vegetative covers, copper, low flow alterations, nitrogen (total), phosphorus (total), sedimentation/siltation, TKN	Aquatic Life, Cold Water Fishery, Primary Contact Recreation

Montana Impaired Waterbodies (cont'd)

Waterbody	Size (Lake Acres or Stream Miles)	Cause of Impairment	Impaired Use
Peterson Creek	6.9	Alteration in stream-side or littoral vegetative covers, low flow alterations, physical substrate habitat alterations, temperature	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
German Gulch	8.4	Selenium	Aquatic Life, Cold Water Fishery
Beefstraight Creek	5.1	Cyanide	Aquatic Life, Cold Water Fishery
Little Blackfoot River	26.2	Alteration in stream-side or littoral vegetative covers, copper, lead, low flow alterations, nitrate/nitrite, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Little Blackfoot River	21.6	Alteration in stream-side or littoral vegetation covers, arsenic, cyanide, sedimentation/siltation	Aquatic Life, Cold Water Fishery
Spotted Dog Creek	10	Alteration in stream-side or littoral vegetative covers, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
Telegraph Creek	4.9	Alteration in stream-side or littoral vegetative covers, arsenic, beryllium, cadmium, copper, iron, sedimentation/siltation, zinc	Aquatic Life, Cold Water Fishery, Drinking Water
Telegraph Creek	2.4	Lead, mercury,	Drinking Water
Monarch Creek	4.5	Arsenic, copper, lead, mercury, pH, selenium	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Dog Creek	4.2	Alteration in stream-side or littoral vegetative covers, arsenic, lead, sedimentation/siltation, zinc	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Dog Creek	12.4	Alteration in stream-side or littoral vegetative covers, nitrate/nitrite, sedimentation/siltation	Aquatic Life, Cold Water Fishery
Snowshoe Creek	10.7	Alteration in stream-side or littoral vegetative covers, low flow alterations, nitrate/nitrite, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Dunkleberg Creek	3.6	Alteration in stream-side or littoral vegetative covers, cadmium, lead, zinc	Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Dunkleberg Creek	4.7	Alteration in stream-side or littoral vegetative covers, lead, nitrogen (total)	Aquatic Life, Cold Water Fishery
Hoover Creek	5.6	Sedimentation/siltation, turbidity	Primary Contact Recreation

Montana Impaired Waterbodies (cont'd)

Waterbody	Size (Lake Acres or Stream Miles)	Cause of Impairment	Impaired Use
Hoover Creek	6	Low flow alterations, nitrogen (total), physical substrate habitat alterations	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Gold Creek	8	Alteration in stream-side or littoral vegetative covers, lead	Aquatic Life, Cold Water Fishery, Drinking Water
Gold Creek	7.2	Low flow alterations, nitrogen (total)	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Brock Creek	12	Sedimentation/siltation	Primary Contact Recreation
Warm Springs Creek	8.8	Alteration in stream-side or littoral vegetative covers, sedimentation/siltation	Aquatic Life, Cold Water Fishery
Warm Springs Creek	5.2	Alteration in stream-side or littoral vegetative covers, low flow alterations, physical substrate habitat alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Ontario Mine Wetland	20	Cadmium, zinc, arsenic, copper, lead, mercury, pH	Agricultural, Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Clark Fork River	53	Alteration in stream-side or littoral vegetative covers, arsenic, cadmium, copper, iron, lead, nitrogen (total), phosphorus (total), zinc, chlorophyll-a	Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
East Fork Rock Creek	8.7	Alteration in stream-side or littoral vegetative covers, chlorophyll-a, low flow alterations, nitrogen, nitrate, sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
West Fork Rock Creek	23.9	Mercury	Drinking Water
Brewster Creek	4.5	Fish-passage barrier, low flow alterations, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
South Fork Antelope Creek	2.8	Alteration in stream-side or littoral vegetative covers, nitrate/nitrite, phosphorus (total), sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Quartz Gulch	3	Alteration in stream-side or littoral vegetative covers, mercury, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Drinking Water
Eureka Gulch	0.6	Alteration in stream-side or littoral vegetative covers, sedimentation/siltation, solids, arsenic, mercury	Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation

Montana Impaired Waterbodies (cont'd)

Waterbody	**Size** (Lake Acres or Stream Miles)	**Cause of Impairment**	**Impaired Use**
Scotchman Gulch	7.1	Phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
Sluice Gulch	6.1	Alteration in stream-side or littoral vegetative covers, nitrate/nitrite, sedimentation/siltation, arsenic	Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Flat Gulch	2.9	Phosphorus (total), sedimentation/siltation, TKN	Aquatic Life, Cold Water Fishery
Miners Gulch	5.4	Sedimentation/siltation	Aquatic Life, Cold Water Fishery
Flint Creek	28	Alteration in stream-side or littoral vegetative covers, antimony, arsenic, cadmium, copper, lead, low flow alterations, mercury, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Flint Creek	15.7	Alteration in stream-side or littoral vegetative covers, arsenic, cadmium, copper, iron, lead, nitrogen (total), phosphorus (total), turbidity	Aquatic Life, Cold Water Fishery, Drinking Water, Industrial, Primary Contact Recreation
Douglas Creek	6.4	Nitrogen, nitrate, physical substrate habitat alterations	Aquatic Life, Cold Water Fishery
North Fork Douglas Creek	3.1	Copper, alteration in stream-side or littoral vegetative covers, arsenic, cadmium, copper, sulfates, zinc	Agricultural, Aquatic Life, Cold Water Fishery, Drinking Water
Fred Burr Creek	10.1	Alteration in stream-side or littoral vegetative covers, arsenic, lead, mercury	Aquatic Life, Cold Water Fishery, Drinking Water
South Fork Lower Willow Creek	12.5	Copper, lead, mercury	Aquatic Life, Cold Water Fishery, Drinking Water
Boulder Creek	13.8	Arsenic, lead, mercury, physical substrate habitat alterations, zinc	Aquatic Life, Cold Water Fishery, Drinking Water
Barnes Creek	8.3	Iron, nitrate/nitrite, phosphorus (total), sedimentation/siltation, TKN, chlorophyll-a	Agricultural, Aquatic Life, Cold Water Fishery, Drinking Water, Industrial, Primary Contact Recreation
Princeton Gulch	3.9	Nitrates, physical substrate habitat alterations	Aquatic Life, Cold Water Fishery
Douglas Creek	5.1	Arsenic, cadmium, copper, iron, lead, mercury, zinc, physical substrate habitat alterations, sedimentation/siltation	Agricultural, Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Smart Creek	11.2	Alteration in stream-side or littoral vegetative covers, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
Camp Creek	1.8	Alteration in stream-side or littoral vegetative covers, arsenic, copper, lead, zinc, fish-passage barrier	Aquatic Life, Cold Water Fishery, Primary Contact Recreation

Montana Impaired Waterbodies (cont'd)

Waterbody	Size (Lake Acres or Stream Miles)	Cause of Impairment	Impaired Use
Wallace Creek	3.8	Copper, zinc	Aquatic Life, Cold Water Fishery
Cramer Creek	11	Arsenic, barium, cobalt, copper, lead, mercury, physical substrate habitat alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Tenmile Creek	4.9	Alteration in stream-side or littoral vegetative covers, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
Mulkey Creek	5.7	Sedimentation/siltation	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Rattler Gulch	7.8	Alteration in stream-side or littoral vegetative covers, chlorophyll-a, low flow alterations, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery, Industrial, Primary Contact Recreation
Deep Creek	5	Chlorophyll-a, low flow alterations, nitrate/nitrite, sedimentation/siltation, TKN	Aquatic Life, Cold Water Fishery, Industrial, Primary Contact Recreation
Blackfoot River	21.9	Nitrogen (total), phosphorus (total), temperature	Aquatic Life, Cold Water Fishery
Blackfoot River	23.9	Nitrogen (total), phosphorus (total), temperature	Aquatic Life, Cold Water Fishery
Sandbar Creek	1.9	Aluminum, copper, iron, manganese, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Drinking Water
Nevada Creek	18.3	Alteration in stream-side or littoral vegetative covers, cadmium, lead, mercury, physical substrate habitat alterations, solids, TKN	Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Nevada Creek	24.9	Low flow alterations, phosphorus (total), physical substrate habitat alterations, sedimentation/siltation, TKN	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Jefferson Creek	3.6	Alteration in stream-side or littoral vegetative covers, sedimentation/siltation	Aquatic Life, Cold Water Fishery
Jefferson Creek	3	Alteration in stream-side or littoral vegetative covers, aluminum, iron, low flow alterations, phosphorus (total), sedimentation/siltation, solids	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Gallagher Creek	3.1	Alteration in stream-side or littoral vegetative covers, low flow alterations, phosphorus (total), sedimentation/siltation, TKN	Aquatic Life, Cold Water Fishery, Primary Contact Recreation

Montana Impaired Waterbodies (cont'd)

Waterbody	Size (Lake Acres or Stream Miles)	Cause of Impairment	Impaired Use
Braziel Creek	2.8	Alteration in stream-side or littoral vegetative covers, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
Mcelwain Creek	2	Alteration in stream-side or littoral vegetative covers, low flow alterations, nitrate/nitrite, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Black Bear Creek	7.5	Alteration in stream-side or littoral vegetative covers, phosphorus (total), sedimentation/siltation, solids, TKN	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Washington Creek	4.3	Low flow alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Douglas Creek	12.6	Alteration in stream-side or littoral vegetative covers, chlorophyll-a, low flow alterations, nitrate/nitrite, phosphorus (total), sedimentation/siltation, temperature, TKN, arsenic	Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Nevada Spring Creek	2.3	Alteration in stream-side or littoral vegetative covers, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Murray Creek	8.6	Alteration in stream-side or littoral vegetative covers, chlorophyll-a, low flow alterations, nitrate/nitrite, phosphorus (total), sedimentation/siltation, temperature, arsenic, TKN	Aquatic Life, Cold Water Fishery, Drinking Water, Primary Contact Recreation
Buffalo Gulch	6.3	Physical substrate habitat alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery
Wales Creek	2	Alteration in stream-side or littoral vegetative covers, chlorophyll-a, low flow alterations, phosphorus (total), sedimentation/siltation, nitrate/nitrite	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Ward Creek	9.8	Physical substrate habitat alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery
Yourname Creek	9.5	Alteration in stream-side or littoral vegetative covers, fish-passage barrier, low flow alterations, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Rock Creek	9	Alteration in stream-side or littoral vegetative covers, low flow alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery

Montana Impaired Waterbodies (cont'd)

Waterbody	Size (Lake Acres or Stream Miles)	Cause of Impairment	Impaired Use
Kleinschmidt Creek	1.5	Alteration in stream-side or littoral vegetative covers, copper, sedimentation/siltation, temperature, arsenic	Aquatic Life, Cold Water Fishery, Drinking Water
Richmond Creek	3.7	Sedimentation/siltation	Aquatic Life, Cold Water Fishery
Deer Creek	10.3	Sedimentation/siltation	Cold Water Fishery
West Fork Clearwater River	14.3	Chlorophyll-a	Primary Contact Recreation
Blanchard Creek	2.3	Alteration in stream-side or littoral vegetative covers, low flow alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Union Creek	19.4	Arsenic, copper, phosphorus (total), physical substrate habitat alterations, solids, temperature	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
West Fork Ashby Creek	3.1	Alteration in stream-side or littoral vegetative covers, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
Elk Creek	8.4	Cadmium, nitrogen, nitrate, physical substrate habitat alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery
East Fork Ashby Creek	3.9	Alteration in stream-side or littoral vegetative covers, nitrate/nitrite, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
Camas Creek	1	Low flow alterations, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
Belmont Creek	10.5	Sedimentation/siltation	Aquatic Life, Cold Water Fishery
Washoe Creek	6.1	Nitrate/nitrite, phosphorus (total), sedimentation/siltation, TKN, chlorophyll-a	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Nevada Lake	352.6	Dissolved oxygen, phosphorus (total), sedimentation/siltation, TKN	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Bitterroot River	24.3	Alteration in stream-side or littoral vegetative covers, copper	Aquatic Life, Cold Water Fishery
East Fork Bitterroot River	29.9	Alteration in stream-side or littoral vegetative covers, copper, lead, sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery
Reimel Creek	7.4	Alteration in stream-side or littoral vegetative covers, sedimentation/siltation	Aquatic Life, Cold Water Fishery

Montana Impaired Waterbodies (cont'd)

Waterbody	Size (Lake Acres or Stream Miles)	Cause of Impairment	Impaired Use
Meadow Creek	9.7	Alteration in stream-side or littoral vegetative covers, sedimentation/siltation	Aquatic Life, Cold Water Fishery
Laird Creek	5.7	Alteration in stream-side or littoral vegetative covers, sedimentation/siltation	Aquatic Life, Cold Water Fishery
Gilbert Creek	2.3	Alteration in stream-side or littoral vegetative covers, sedimentation/siltation	Aquatic Life, Cold Water Fishery
West Fork Bitterroot River	39.4	Physical substrate habitat alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery
Bitterroot River	14.7	Temperature	Cold Water Fishery
Hughes Creek	17.6	Alteration in stream-side or littoral vegetative covers, physical substrate habitat alterations, sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery
Overwhich Creek	19.1	Sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery
Bass Creek	5.3	Low flow alterations, TKN	Aquatic Life, Cold Water Fishery
Mill Creek	8	Alterations in stream-side or littoral vegetative covers, low flow alterations, temperature	Cold Water Fishery, Primary Contact Recreation
Tin Cup Creek	7	Alteration in stream-side or littoral vegetative covers, TKN	Aquatic Life, Cold Water Fishery
Sleeping Child Creek	23.9	Nitrogen (total), phosphorus (total), sedimentation/siltation, temperature	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Shalkaho Creek	25.1	Mercury, low flow alterations	Drinking Water, Primary Contact Recreation
Willow Creek	16.3	Alteration in stream-side or littoral vegetative covers, sedimentation/siltation, temperature, TKN, chlorophyll-a	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Ambrose Creek	11.4	Nitrogen (total), phosphorus (total), physical substrate habitat alterations	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Miller Creek	16.8	Alterations in stream-side or littoral vegetative covers, chlorophyll-a, nitrate/nitrite, sedimentation/siltation, temperature, phosphorus (total)	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Threemile Creek	17.3	Low flow alterations, nitrate/nitrite, phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
McClain Creek	5.3	Sedimentation/siltation	Aquatic Life, Cold Water Fishery

Montana Impaired Waterbodies (cont'd)

Waterbody	Size (Lake Acres or Stream Miles)	Cause of Impairment	Impaired Use
Lick Creek	6.2	Alteration in stream-side or littoral vegetative covers, sedimentation/siltation, TKN, chlorophyll-a, phosphorus (total)	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Rye Creek	5.6	Alteration in stream-side or littoral vegetative covers, nitrogen (total), phosphorus (total), sedimentation/siltation	Aquatic Life, Cold Water Fishery
North Burnt Fork Creek	10.4	Bottom deposits, phosphorus (total), TKN	Aquatic Life, Cold Water Fishery
Sweathouse Creek	11.3	Alteration in stream-side or littoral vegetative covers, low flow alterations, phosphorus (total)	Aquatic Life, Cold Water Fishery, Primary Contact Recreation
Lolo Creek	2.8	Low flow alterations, physical substrate habitat alterations, sedimentation/siltation	Aquatic Life, Cold Water Fishery, Primary Contact Recreation

Individual Use Support Summary for Montana Rivers and Streams (2006) (Reported In Miles)

Designated Use	Total Size	Size Assessed	Size Fully Supporting	Size Fully Supporting and Threatened	Size not Supporting	Size not Assessed
Aquatic Life	20,459	16,922	3,145	0	13,776	3,242
Coldwater Fishery	11,824	10,246	1,658	0	8,588	1,085
Warm Water Fishery	8,925	6,486	1,150	0	5,336	2,014
Drinking Water	14,717	11,191	7,759	0	3,432	3,228
Primary Contact Recreation	20,459	14,803	9,034	136	5,632	4,925
Agricultural	14,765	12,450	11,124	0	1,326	2,091
Industrial	14,765	12,599	11,227	0	1,372	1,961

Individual Use Support Summary for Montana Lakes (2006) (Reported In Acres)

Designated Use	Total Size	Size Assessed	Size Fully Supporting	Size Fully Supporting and Threatened	Size not Supporting	Size not Assessed
Aquatic Life	606,291	332,905	114,860	6,030	212,015	273,386
Coldwater Fishery	550,861	273,300	219,815	6,030	47,456	277,561
Warm Water Fishery	55,430	51,921	25,940	0	25,981	3,509
Drinking Water	596,332	532,204	227,329	0	304,965	64,128
Primary Contact Recreation	606,291	565,744	250,889	0	314,855	40,547
Agricultural	594,723	308,809	254,234	0	54,575	285,914
Industrial	594,723	312,914	305,217	0	7,697	281,810

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APPENDIX C

SOCIOECONOMIC ANALYSIS METHODOLOGY

MONTANA SOCIOECONOMICS SUMMARY REPORT

MONTANA SOCIOECONOMICS SUMMARY STATISTICS

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Socioeconomic Analysis Methodology

Data Needs and Analysis Format
Socioeconomic and Environmental Components
Michael R. Dicks and Terrance Bidwell

OVERVIEW

Major components of the environmental assessments include the environmental impacts and the socio-economic impacts of implementation of the managed haying and grazing provision of CRP. The impacts stem from the development of permitted and required management practices for the haying and grazing and the economic opportunity that may be provided.

Thirteen States have been identified for inclusion in the analysis including New Mexico, Texas, Oklahoma, Kansas, Wyoming, Nebraska, South Dakota, North Dakota, Montana, Idaho, Utah, Oregon and Washington. The overall effort objective would be to attempt to assess the effect of moving from non-use to prescribed haying or grazing on farm, local and regional economic activity, environmental quality, wildlife habitat and market (e.g. recreation) and non-market (e.g. visual) amenities. Two different procedures are possible depending on data availability and ability of USDA personnel to assist with data collection. The best analysis method would rely on **primary data** collection from a sample of CRP fields. The alternative method would be to rely on historic haying and grazing or **secondary data**. The first method provides the best set of data for both the environmental and socioeconomic analysis while the second method would provide sufficient data for the socio-economic analysis, but may limit the ability to accurately measure the environmental impacts. The following collection and analysis procedures represent general procedures to assist in deciding which procedure to choose. Of course a third alternative is to use secondary where possible to reduce the need for primary data. The limiting factor is gathering sufficient data to measure the changes in environmental factors. The socio-economic analysis can use either the primary or secondary data equally. The main constraint to the o socio-economic analysis is to arrive at a measure of the amount of haying and grazing likely to occur and the change in associated farm income.

PRIMARY DATA COLLECTION

Data Collection Procedure

Each State would be disaggregated into ecological regions. For each State Ecological Region (SER), three counties are identified that provide a representative description of the diversity in agricultural production, climate, wildlife habitat, topography and other landscape characteristics. For each county in each State ecological region ten CRP fields would be selected by FSA/NRCS county personnel that represent the diversity of the CRP fields in the county. This diversity includes availability of water on site, fencing, cover type, and diversity of fields within close proximity in the landscape. A data information sheet (below) is completed on each CRP field, in each county, in each SER.

The socio-economic impact assessment is straightforward and is developed from production budgets and changes in producer income. The resource economic impact is more complicated and more difficult to arrive at quantitatively. Few of the natural resources impacts (e.g., change in water or air quality, wildlife habitat, or soil quality) have no economic measures and thus are often discussed in terms of physical quantity changes or qualitative changes.

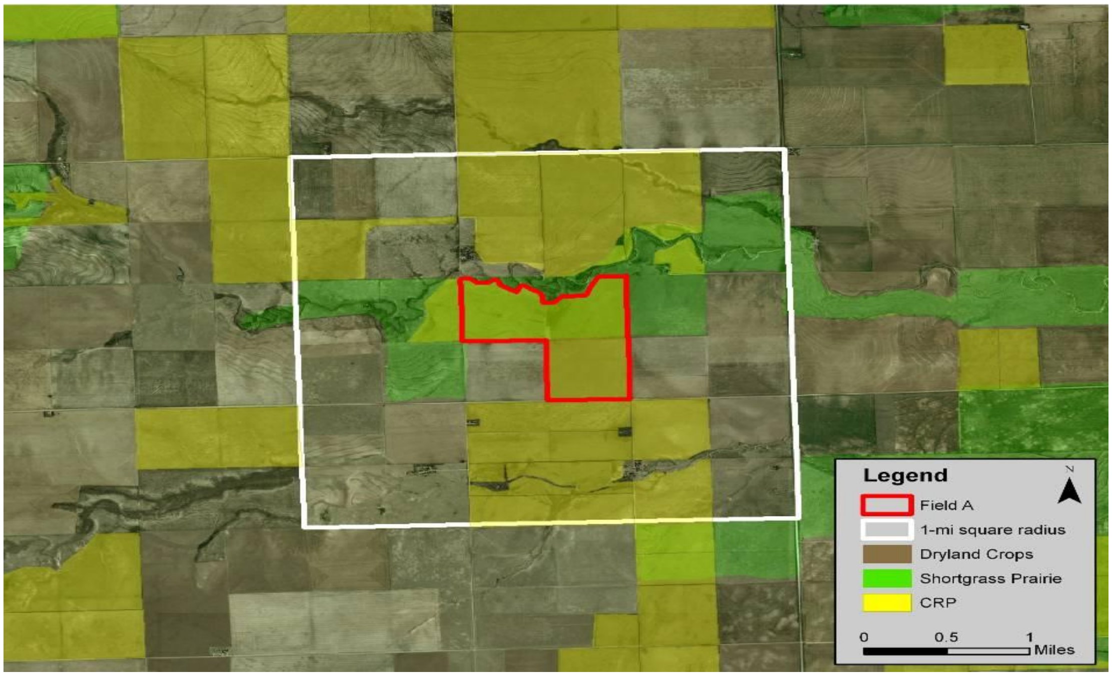
Figure 1. Data Information Sheet for CRP Fields.

OSU- Research Hay vs. Grazing Management					
Your Name			County, State	CRP- Field ID	
Legal Description of CRP field					
Field Location					
Acreage		Shape i.e. square/irregular		Perimeter in Feet	
Fence	Y N	Type of Fence		Any Cross Fencing?	Y N
Water Available	Y N	Type of Water Source		Distance t	
Used for Grazing?		Y N	Which Months Available f		
Used for Haying?			Which Months Available f		
Details/Restrictions					
Estimated Capacity for Grazing (given in # of animal units)					
Types of Grass Present					
Remarks/Additional Information:					
Additional Items to Include			For Questions Please Contact		
GIS photo map of field					
Soil Map					
EQIP Cost share sheets for the county			Dr. Mike Dicks	email: michael.dicks@okstate.edu	

However, the NRCS has developed Resource Conservation Technical Guides to assist producers in the management of resources in agricultural production activities to minimize the adverse impacts of production on the various resources. Constraining the haying and grazing activity on CRP land to these management schemes should minimize any adverse impacts on the local resources.

A Geographical Information System (GIS) map of the field within a three square mile area showing land use on surrounding tracts, a soil map of the CRP field and a county Environmental Quality Incentive Program (EQIP) cost share sheet would also be provided.

Figure 2. Example of a GIS Map of the CRP Field.



Each field would have an expansion factor representing the total acres of CRP in the county and the total acres of CRP in the SER.

From the information we can develop prescribed haying and grazing management schemes and estimate the net returns from engaging in the prescribed practices. These budgets can be used to determine the probability of producers adopting the prescribed practices, the increases in outputs and incomes, effects on local, regional and national prices and the economic impacts in the local, regional and national economies.

Specific Data Needs

1. CRP field data
    a. Current species of grasses
    b. Age of stand
    c. Condition of stand
    d. Pounds of forage harvestable (grazing or haying)
    e. Availability of water on site or distance to nearest source
    f. Proximity of cattle operations
        i. Type (cow calf/stocker)
    g. Common protein supplementation practice
    h. Haying and grazing restrictions
        i. Months available
        ii. % of forage removable
        iii. Nutrient needs
    i. Water availability/limitation
        i. Hauling distance

   j. Fencing needs
      i. Type
      ii. Perimeter (straight line or creek)
   k. Include a map identifying the field(or GIS coordinates of the field -both would be preferable)
2. County data
   a. Number of CRP fields
   b. Total Acres of CRP
   c. Total acres of cropland
   d. Total Acres of hay production and quantity
      i. Average tons of production
   e. Total number of cattle
      i. Average pounds of production
3. SER data
   a. Number of CRP fields
   b. Total Acres of CRP
   c. Total acres of cropland
   d. Total Acres of hay production and quantity
      i. Average tons of production
   e. Total number of cattle
      i. Average pounds of production
4. State data
   a. Number of CRP fields
   b. Total Acres of CRP
   c. Total acres of cropland
   d. Total Acres of hay production and quantity
      i. Average tons of production
   e. Total number of cattle
      i. Average pounds of production
5. General
   a. NRCS management schemes from the technical guides

Analytic Procedure

Farm Level Impacts

CRP Field Selection

The CRP fields to be used to generate the information required for the analysis should be selected by the USDA FSA County Executive Director in cooperation with counterparts from the county NRCS. Fields should be selected as representative of the size, shape, cover type, and ecological conditions of the CRP fields in the county. While ten fields may not provide a statistically valid sample in most counties, proper selection of representative fields can provide a good measure of the relative magnitude of the potential impacts from changing management practices and can be accomplished within the budget constraints of the environmental assessment.

The counties selected within the State can be determined by the USDA/FSA and NRCS State personnel based upon the same criteria used to select the fields within counties. A minimum of three counties per State is required to ensure that the diversity between counties is captured. If possible more than one county per ecological region could be identified and used in the analysis.

Weighting of Acres

Analysis would be based on the data collected from 30 specific and actual CRP fields (three counties X ten fields per county). These fields would be weighted by the percent of CRP acres represented. A county expansion factor would be determined for each field by dividing the total CRP acres in the county by the acres in the specific CRP field. A State expansion factor would be determined for each county by dividing the total CRP acres in the State by the CRP acres in the county. Because the fields would be used to evaluate the implications of specific potential haying and grazing management schemes, the selection of these fields as “representative” of the diversity of CRP fields in each county and the diversity of each county in the State is extremely important.

Haying and Grazing Management Practices

For each of the CRP fields a haying and/or grazing management scheme would be developed based on the NRCS Technical Guides and the limitations imposed by this study (e.g., frequency and duration of haying and grazing).

Budgets

Production budgets would be developed for haying and/or grazing activities for each field. A standard set of haying equipment would be used across all sites and the value of the output would be based upon local markets including the potential negative price impacts of increased hay output.

The grazing activity budget would assume management of a stocker operation and would include the annualized cost of fencing (two-strand electric) or water delivery systems where required. For any required management activities (e.g. fencing) costs would be based upon the local Environmental Quality Incentives Program (EQIP) cost-share sheets. These sheets provide the local conservation committees estimate of the cost of specific practices in their district.

We would assume that the alternative production activity must provide a return that is at least $5.00 per acre greater than the per acre reduction in the annual rental payment for the field to be considered as exhibiting the potential for implementing the haying or grazing options.

For those fields where the haying and/or grazing options exhibit the potential for implementation, we would estimate the impact of the change in quantity, quality and diversity of the vegetative cover. These changes may induce a change in associated resource attributes including surface and ground water quality and quantity, soil quality and movement, wildlife habitat (and hence wildlife species diversity and quantity), air quality.

Local Impacts

The degree to which the haying and grazing activities are implemented on CRP acres would increase the local output of hay and cattle. Because we have restricted the haying and grazing activities to only those fields that provide a positive economic gain, the implementation of these activities would have a positive impact on producer's incomes and the local economies. The impact of this change in producer income on the local economy can be measured using IMPLAN, and input-output model widely used for analyses of this type in the United States. More difficult to assess is the change in economic activity associated with changes in recreation activities (e.g., hunting, bird watching), environmental quality or visual amenities. However, we can identify as positive or negative the change in wildlife habitat and potential air and water quality from changing land use patterns.

Impacts on Non-participating producers

The use of CRP fields to produce additional tons of hay or pounds of beef may affect local, regional or national markets. The extent of this impact would depend on how large of an output increase is generated by the use of CRP fields relative to current levels of output. Hay markets are particularly sensitive to local conditions since the cost of transport excludes broader market impacts except in period of great scarcity such as occurs with droughts. Price elasticities have been developed and are well documented that can be used to anticipate price impacts associated with output changes in regional and national markets.

SECONDARY DATA COLLECTION

Data Collection Procedure

The prescribed haying and grazing option has been available to CRP contract holders since 2002. USDA/FSA would have a contract file that indicates the payments received annually and thus would indicate a 25 percent payment reduction in a year when the haying or grazing option was elected. Using this data a much larger set of CRP fields could be identified and the total number of haying and grazing acres as a percent of total CRP acres in each county could be easily determined to establish the potential participation rate in the prescribed haying and grazing activity.

From the CRP contract file it is possible to collect information on cover type and previous crop yields. Using National Agriculture Statistics Services (NASS) county data for hay production and stocking rates could be changes in output and incomes could be estimated to determine farm, local and regional level changes in income and economic activity. However, this procedure would require a number of assumptions that may be easily challenged with respect to the environmental impacts. These impacts depend on the changes to fields within the context of the overall landscape and efforts that do not include the landscape concept have and would continue to be challenged.

The benefits of using this approach is that rather than working with a sample of fields as in the primary data approach it would be possible to use the population of CRP fields for the analysis.

Specific Data Needs

1. County data
    a. Number of CRP fields
    b. Total Acres of CRP

   c. Total acres of cropland
   d. Total Acres of hay production and quantity
      i. Average tons of production
   e. Total number of cattle
      i. Average pounds of production
   f. Average rental rate
2. State data
   a. Number of CRP fields
   b. Total Acres of CRP
   c. Total acres of cropland
   d. Total Acres of hay production and quantity
      i. Average tons of production
   e. Total number of cattle
      i. Average pounds of production
3. General
   a. NRCS management schemes from the technical guides

Analytic Procedure

Farm Level Impacts

Determination of Land Use Decision

Aggregate data on the number of contracts and acres of CRP haying and grazing are available by county for 2002 through 2007. Using USDA Economic Research Service (ERS) Agricultural Resource Management System (ARMS) data contains costs and returns for these both haying and livestock production activities. The FSA haying and grazing data can be used to measure the potential use of total county CRP lands for haying or grazing. The percent of land hayed or grazed under the current program is indicative of the percent of land facing infrastructure constraints (e.g., fencing, water) that are cost prohibitive with the current haying and grazing restrictions (e.g., one in three year use, stocking rate, time activity is allowed).

Change in Farm Income

The use of the haying and grazing options requires a 25 percent reduction in the annual CRP rental rate. The ARMS data can be used to provide a projected net income from the hay and livestock production enterprise and thus the resulting change in net income.

Local Impacts

The degree to which the haying and grazing activities are implemented on CRP acres would increase the local output of hay and cattle. Economic activity would increase due to the production activities (e.g. required purchase of inputs and output services) and may increase or decrease according to the net change in income (e.g., increased income from production, reduced income from loss of 25 percent of annual rental payment). The impact of this change in producer income on the local economy can be measured using IMPLAN, and input-output model widely used for analyses of this type in the United States. More difficult to assess is the change in economic activity associated with changes in recreation activities (e.g., hunting, bird watching), environmental quality or visual amenities. Because we have not collected any field level data in this approach there is little that can be said about any positive or negative change in wildlife habitat or air and water quality from changing land use patterns.

Impacts on Non-Participating Producers

The use of CRP fields to produce additional tons of hay or pounds of beef may affect local, regional, or national markets. The extent of this impact would depend on how large of an output increase is generated by the use of CRP fields relative to current levels of output. Hay markets are particularly sensitive to local conditions since the cost of transport excludes broader market impacts except in period of great scarcity such as occurs with droughts. Price elasticities have been developed and are well documented that can be used to anticipate the price impacts associated with output changes in regional markets.

Montana Socioeconomics Summary Report

Main points

Eligible Acres - Those CRP acres with a CP that allows landowner the option of the managed haying and grazing practice.
Economically Feasible Acres - Those CRP acres that are eligible and can be hayed or grazed with a positive net return (including the 25% rental rate reduction cost).
Potential Acres - Those CRP acres that are eligible and economically feasible with landowners that are likely to participate in the managed haying and grazing.

0.94	**Percent of CRP acres eligible for H&G.**	From the haying and grazing file this is the percent of acres with a CP (cover and practice) that is eligible to be hayed or grazed.
26.09	**2006 State GDP (in billions).**	State Economic Growth, USDC/BEA, BEA 08-24.
	County and Field Data Summary	
0.00	**Percent of CRP acres that are economically grazable.**	Percent of Acres from field level that have a positive net return to grazing.
0.00	**Percent of CRP acres that are economically hayable.**	Percent of Acres from field level that have a positive net return to haying.
0.00	**Pounds of beef per acre of economically grazable acres.**	Average (weighted) pounds of beef produced from economically grazable acres.
0.00	**Tons of hay per acre on economically hayable acres.**	Average (weighted) tons of hay produced from economically hayable acres.
0.00	**Value of beef per acre of economically grazable acres.**	Current price value of per acre beef produced.
0.00	**Value of hay per acre on economically hayable acres.**	Current price value of per acre hay produced.
	Aggregate Data Summary	
NA	**Percent of economically grazable acres current grazed.**	Total 2004-2006 acres grazed as a percent of total acres economically grazable.
NA	**Percent of economically hayable acres currently hayed.**	Total 2004-2006 acres hayed as a percent of total acres economically hayable.
0	**Total maximum State CRP acres economically grazable.**	Total CRP acres in the State that could be grazed.
0	**Total maximum State CRP acres economically hayable.**	Total CRP acres in the State that could be hayed.
20.16%	**Maximum percent of CRP acres likely to be grazed.**	This assumes that there may be economically grazable and hayable acres in other counties based upon.
49.90%	**Maximum percent of CRP acres likely to be hayed.**	The actual haying and grazing history for 2004-2006. The annual average acreage is assumed. To be available and used in each year over a ten year contract period. Less than 2/3rds of those eligible.

Montana Socioeconomics Summary Report (cont'd)

Scenario A	MH: 1/10 MG: 1/5 PNS: 15MAY-1AUG	
4.03%	**Maximum annual percent of economically grazable acres.**	The percent of acreage potentially available that can be grazed each year under the scenario constraints.
4.99%	**Maximum annual percent of economically hayable acres.**	The percent of acreage potentially available that can be hayed each year under the scenario constraints.
125,428	**Maximum annual economically grazable CRP acres.**	The total State acreage potentially available that can be grazed each year under the scenario constraints.
155,246	**Maximum annual economically hayable CRP acres.**	The total State acreage potentially available that can be hayed each year under the scenario constraints.
2,867,310	**Maximum pounds of beef produced.**	Total annual State beef production produced on potentially available acres.
55,067	**Maximum tons of hay produced.**	Total annual State hay production produced on potentially available acres.
$3,010,676	**Maximum value of beef produced.**	Total annual State value of beef production on potentially available acres.
$3,579,336	**Maximum value of hay produced.**	Total annual State value of beef production on potentially available acres.
0.38%	**Potential increase in State value of beef production.**	Total annual State value of beef production on potentially available acres as a percent of total annual State beef production on all lands.
1.17%	**Potential increase in State value of hay production.**	Total annual State value of hay production on potentially available acres as a percent of total annual State beef production on all lands.
$5,571,438	**Potential increase in economy-wide impacts from beef production on CRP.**	Total value of State output from the direct, indirect and induced impacts of the potential increase in beef output.
$5,979,565	**Potential increase in economy-wide impacts from hay production on CRP.**	Total value of State output from the direct, indirect and induced impacts of the potential increase in hay output.
0.0214%	**Potential percent increase in economy-wide impacts from beef production on CRP**	Size of the increased value of State output from the potential haying and grazing as a percent of total State output (State GDP).
0.0229%	**Potential percent increase in economy-wide impacts from hay production on CRP**	Size of the increased value of State output from the potential haying and grazing as a percent of total State output (State GDP).

Montana Socioeconomics Summary Report (cont'd)

Scenario B	MH: 1/5 MG: 1/3 PNS: 15MAY-15JUL	
6.80%	**Maximum annual percent of economically grazable acres.**	The percent of acreage potentially available that can be grazed each year under the scenario constraints.
11.24%	**Maximum annual percent of economically hayable acres.**	The percent of acreage potentially available that can be hayed each year under the scenario constraints.
211633	**Maximum annual economically grazable CRP acres.**	The total State acreage potentially available that can be grazed each year under the scenario constraints.
349727	**Maximum annual economically hayable CRP acres.**	The total State acreage potentially available that can be hayed each year under the scenario constraints.
4837984	**Maximum pounds of beef produced.**	Total annual State beef production produced on potentially available acres.
124050	**Maximum tons of hay produced.**	Total annual State hay production produced on potentially available acres.
$5,079,883	**Maximum value of beef produced**	Total annual State value of beef production on potentially available acres.
$8,063,262	**Maximum value of hay produced**	Total annual State value of beef production on potentially available acres.
0.65%	**Potential increase in State value of beef production.**	Total annual State value of beef production on potentially available acres as a percent of total annual State beef production on all lands.
2.64%	**Potential increase in State value of hay production.**	Total annual State value of hay production on potentially available acres as a percent of total annual State beef production on all lands.
$9,400,632	**Potential increase in economy-wide impacts from beef production on CRP.**	Total value of State output from the direct, indirect and induced impacts of the potential increase in beef output.
$13,470,318	**Potential increase in economy-wide impacts from hay production on CRP.**	Total value of State output from the direct, indirect and induced impacts of the potential increase in hay output.
0.0360%	**Potential percent increase in economy-wide impacts from beef production on CRP.**	Size of the increased value of State output from the potential haying and grazing as a percent of total State output (State GDP).
0.0516%	**Potential percent increase in economy-wide impacts from hay production on CRP.**	Size of the increased value of State output from the potential haying and grazing as a percent of total State output (State GDP).

Montana Socioeconomics Summary Report (cont'd)

Scenario C	MH: 1/5 MG: 1/3 PNS: 15MAY-1JUL	
8.25%	Maximum annual percent of economically grazable acres.	The percent of acreage potentially available that can be grazed each year under the scenario constraints.
14.09%	Maximum annual percent of economically hayable acres.	The percent of acreage potentially available that can be hayed each year under the scenario constraints.
256,503	Maximum annual economically grazable CRP acres.	The total State acreage potentially available that can be grazed each year under the scenario constraints.
438,409	Maximum annual economically hayable CRP acres.	The total State acreage potentially available that can be hayed each year under the scenario constraints.
5,863,704	Maximum pounds of beef produced.	Total annual State beef production produced on potentially available acres.
155,506	Maximum tons of hay produced.	Total annual State hay production produced on potentially available acres.
$6,156,889	Maximum value of beef produced.	Total annual State value of beef production on potentially available acres.
$10,107,892	Maximum value of hay produced.	Total annual State value of beef production on potentially available acres.
0.78%	Potential increase in State value of beef production.	Total annual State value of beef production on potentially available acres as a percent of total annual State beef production on all lands.
3.31%	Potential increase in State value of hay production.	Total annual State value of hay production on potentially available acres as a percent of total annual State beef production on all lands.
$11,393,696	Potential increase in economy-wide impacts from beef production on CRP.	Total value of State output from the direct, indirect and induced impacts of the potential increase in beef output.
$16,886,033	Potential increase in economy-wide impacts from hay production on CRP.	Total value of State output from the direct, indirect and induced impacts of the potential increase in hay output.
0.0437%	Potential percent increase in economy-wide impacts from beef production on CRP.	Size of the increased value of State output from the potential haying and grazing as a percent of total State output (State GDP).
0.0647%	Potential percent increase in economy-wide impacts from hay production on CRP.	Size of the increased value of State output from the potential haying and grazing as a percent of total State output (State GDP).

Montana Socioeconomics Summary Report (cont'd)

Scenario D	MH: 1/5 MG: 1/5 PNS: 15MAY-1AUG	
4.03%	Maximum annual percent of economically grazable acres.	The percent of acreage potentially available that can be grazed each year under the scenario constraints.
9.98%	Maximum annual percent of economically hayable acres.	The percent of acreage potentially available that can be hayed each year under the scenario constraints.
125,428	Maximum annual economically grazable CRP acres.	The total State acreage potentially available that can be grazed each year under the scenario constraints.
310,492	Maximum annual economically hayable CRP acres.	The total State acreage potentially available that can be hayed each year under the scenario constraints.
2,867,310	Maximum pounds of beef produced.	Total annual State beef production produced on potentially available acres.
110,133	Maximum tons of hay produced.	Total annual State hay production produced on potentially available acres.
$3,010,676	Maximum value of beef produced.	Total annual State value of beef production on potentially available acres.
$7,158,673	Maximum value of hay produced.	Total annual State value of beef production on potentially available acres.
0.38%	Potential increase in State value of beef production.	Total annual State value of beef production on potentially available acres as a percent of total annual State beef production on all lands.
2.34%	Potential increase in State value of hay production.	Total annual State value of hay production on potentially available acres as a percent of total annual State beef production on all lands.
$5,571,438	Potential increase in economy-wide impacts from beef production on CRP.	Total value of State output from the direct, indirect and induced impacts of the potential increase in beef output.
$11,959,130	Potential increase in economy-wide impacts from hay production on CRP.	Total value of State output from the direct, indirect and induced impacts of the potential increase in hay output.
0.0214%	Potential percent increase in economy-wide impacts from beef production on CRP.	Size of the increased value of State output from the potential haying and grazing as a percent of total State output (State GDP).
0.0458%	Potential percent increase in economy-wide impacts from hay production on CRP.	Size of the increased value of State output from the potential haying and grazing as a percent of total State output (State GDP).

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Montana Socioeconomics Summary Statistics

Hay

Montana (Fixed)	Managed Haying Acres	Managed Grazing Acres	CRP ACRES	Total Acres Sampled	ACRES GRAZED	ACRES HAYED	Wheat Yields	BEEF Output lbs/acre	HAY Output tons/acre	Average Wheat Yield	Total County Harvested Hay Acres	Yield tons/acre	Total County Hay Production(tons)	Sample total wheat output (bu)	Sample total economic beef output	Sample total economic hay output	Total County Wheat Acres	Total County Wheat Production	Total County Hay Acres	Total County Hay Production
Beaverhead											141166.6667		300533.3333				6566.666667	308866.6667	141166.6667	300533.3333
Big horn			31,812.30	2100.1	0	0	21.59116	19.04184	0.303681		58000		110533.3333	45343.6	39989.76923	637.7615	112600	2636166.667	58000	110533.3333
Blaine	8687.8	6876.6	141,134.20								68666.66667		145100				185766.6667	3576033.333	68666.66667	145100
Broadwater	85.5	470.5	24,284.50								36333.33333		126300				36966.66667	1198400	36333.33333	126300
Carbon	0	185.2	13,009.90								43333.33333		106766.6667				6700	114033.3333	43333.33333	106766.6667
Carter	106.3	934.7	18,485.00								57500		51766.66667				32733.33333	434300	57500	51766.66667
Cascade	2299.4	1234.8	66,078.70								94166.66667		165766.6667				135166.6667	3899700	94166.66667	165766.6667
Chouteau	4487.2	3693.6	267,878.60								38600		64466.66667				517900	16134533.33	38600	64466.66667
Custer	0	0	16,601.20								61666.66667		120433.3333				22633.33333	359033.3333	61666.66667	120433.3333
Daniels	7448.6	1261.4	125,737.30								25766.66667		35366.66667				240433.3333	3815400	25766.66667	35366.66667
Dawson	7018.4	1604.2	90,020.20								42400		54100				156866.6667	2065833.333	42400	54100
Fallon	1339	2034.1	40,430.90								11833.33333		25900				37833.33333	535800	11833.33333	25900
Fergus	2665	1882	61,434.70								48066.66667		49700				183533.3333	5090033.333	48066.66667	49700
Flathead			201.60								182166.6667		236600				20600	800133.3333	182166.6667	236600
Gallatin			4,751.60								34666.66667		86500				53900	2114400	34666.66667	86500
Garfield	4483.4	4435.6	79,198.70								79666.66667		276966.6667				94200	1633300	79666.66667	276966.6667
Glacier	6503.2	1268.2	78,452.60								44233.33333		46633.33333				131733.3333	2583433.333	44233.33333	46633.33333
Golden valley	369.3	671.5	44,049.20								38666.66667		66933.33333				23033.33333	505133.3333	38666.66667	66933.33333
Hill	4009.7	3062.7	274,309.20	2247.7	0	0	28.93309	26.42784	0.402379		19666.66667		24566.66667	65032.9	59401.84615	904.428	435933.3333	9274233.333	19666.66667	24566.66667
Jefferson	350.4	136.4	2,833.90								29166.66667		69066.66667				88500	1000	29166.66667	69066.66667
Judith basin	1689.3	764.4	29,337.80								16066.66667		21066.66667				60733.33333	2073833.333	16066.66667	21066.66667
Lake			170.00								24500		59700				13100	508066.6667	24500	59700
Lewis & Clark	0	231.8	2,822.00								82166.66667		118400				91833.33333	400866.6667	82166.66667	118400
Liberty	893	1471.6	140,827.60								37833.33333		99700				158100	4745733.333	37833.33333	99700
Mccone	9368.3	1661.5	134,736.60								45666.66667		118600				83700	454833.3333	45666.66667	118600
Madison			5,055.70								14166.66667		23233.33333				158233.3333	3856100	14166.66667	23233.33333
Meagher	199.8	0	6,342.90								8000		15400				7133.333333	193133.3333	8000	15400
Missoula			40.00								77333.33333		204900				11833.33333	51233.33333	77333.33333	204900
Musselshell	862.5	171.3	37,475.80								33100		45100				23466.66667	422900	33100	45100
Park	150	0	10,489.40								62000		142266.6667				12166.66667	234866.6667	62000	142266.6667
Petroleum	411.2	561	9,904.30								2500		3566.666667				55533.33333	451533.3333	2500	3566.666667
Phillips	3804.7	9641.6	137,490.10								17000		40200				137966.6667	2112166.667	17000	40200
Pondera	7217.2	1484.1	71,470.00								28000		42666.66667				115600	4769400	28000	42666.66667
Powder river	0	0	7,503.30								70000		161733.3333				21266.66667	237566.6667	70000	161733.3333
Powell			128.80								17833.33333		25666.66667				16566.66667	431866.6667	17833.33333	25666.66667
Prairie	3444.6	978.2	38,532.50								62333.33333		105200				51233.33333	43000	62333.33333	105200
Ravalli			560.60								30833.33333		71166.66667				218366.6667	2835633.333	30833.33333	71166.66667
Richland	12973.4	1259.4	103,892.90								56666.66667		72333.33333				238666.6667	5963733.333	56666.66667	72333.33333
Roosevelt	11431.7	804	166,839.30								51666.66667		115000				135166.6667	748766.6667	51666.66667	115000
Rosebud	1369.1	2487.2	43,685.60								26266.66667		40833.33333				166400	13200	26266.66667	40833.33333
Sanders			0.00								39333.33333		112733.3333				121133.3333	5202900	39333.33333	112733.3333
Sheridan	13713.3	1434.3	151,900.70								54333.33333		96800				59833.33333	547633.3333	54333.33333	96800
Stillwater	491.7	0	46,897.50								63000		93333.33333				130100	42066.66667	63000	93333.33333
Sweet grass			624.10								64166.66667		135466.6667				124200	4222433.333	64166.66667	135466.6667
Teton	8171.9	3379	106,136.80								24000		38933.33333				170833.3333	4710500	24000	38933.33333
Toole	9614.5	198.9	159,315.40								39833.33333		51966.66667				113066.6667	309533.3333	39833.33333	51966.66667
Treasure			1,508.90								9000		20400				126600	5089300	9000	20400
Valley	13900.6	2877.7	192,300.50								37166.66667		48433.33333				56766.66667	607166.6667	37166.66667	48433.33333
Wheatland	1561	1259.5	40,092.40								41500		79100				40933.33333	463300	41500	79100
Wibaux	2731.6	657.3	35,068.10								63500		166333.3333				26900	1589800	63500	166333.3333
Yellowstone	1393.6	1639.7	49,004.50								26500		36666.66667						26500	36666.66667

Montana Socioeconomics Summary Statistics (cont'd)

Hay																				
Montana (Fixed)	**Managed Haying Acres**	**Managed Grazing Acres**	**CRP ACRES**	**Total Acres Sampled**	**ACRES GRAZED**	**ACRES HAYED**	**Wheat Yields**	**BEEF Output lbs/acre**	**HAY Output tons/acre**	**Average Wheat Yield**	**Total County Harvested Hay Acres**	**Yield tons/acre**	**Total County Hay Production(tons)**	**Sample total wheat output (bu)**	**Sample total economic beef output**	**Sample total economic hay output**	**Total County Wheat Acres**	**Total County Wheat Production**	**Total County Hay Acres**	**Total County Hay Production**
Totals	155,246.20	62,714.00	3,110,858.40	4,347.80	0.00	0.00					2,240,833.33	1.905705	4,270,366.67	110,376.50	99,391.62	1,542.19	5,264,466.67	110,103,966.67	2,240,833.33	4,270,366.67
Percent	4.99%	2.02%			0.00%	0.00%					14.43406237			25.38674732	22.8602087	0.354705713		20.91455291		1.905704723
State Expansion Factor			715.501725										277573833.3							
								Hay adjustment index	1											
								Wheat adjustment index	1.213832											

APPENDIX D

POTENTIAL GAME SPECIES FOUND ON MONTANA CRP GRASSLANDS

MONTANA GAME SPECIES PREDICTED RESPONSE TO MANAGED HAYING AND GRAZING

MONTANA TIER 1 MAMMAL, REPTILE, AND AMPHIBIAN SPECIES OF GREATEST CONSERVATION NEED

PREDICTED RESPONSE TO MANAGED HAYING AND GRAZING FOR MONTANA TIER 1 MAMMAL, REPTILE, AND AMPHIBIAN SPECIES OF GREATEST CONSERVATION NEED POTENTIALLY OCCURRING ON CRP LANDS

MONTANA GRASSLAND BIRDS

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Potential Game Species Found on Montana CRP Grasslands

Common Name	Scientific Name	Potentially Present? (Y/N)	Comment/Justification
MAMMALS			
Bighorn sheep	*Ovis canadensis*	Y	Primarily an alpine dweller, but may also utilize deserts, grasslands, shrublands, and woodlands.
Bison	*Bos bison*	Y	Primarily a grassland species, but may also use woodlands, plains, openings in boreal forests, meadows, and river valleys.
Elk	*Cervus elephus* or *Cervus canadensis* (*C. elephus* in some sources, *C. elephus* now refers to the European species in current literature)	Y	Primarily feeds in alpine pastures, marshes, meadows, riparian river bottoms, clear cuts, brushy areas, and forest edges. Wooded hillsides are the preferred habitat in summer, grasslands in winter. Grazes, but may also feed on forbs, willow, and aspen if grass is not available.
Moose	*Alces alces* (*Alces americanus*)	Y	Preference for woodlands, riparian areas, bogs and fens, but may also utilize shrublands and forest openings.
Mountain goat	*Oreamnos americanus*	N	Alpine species. While it may utilize alpine meadows, this species preference is for alpine and subalpine habitat at the timberline or above, usually near cliffs, talus, or rockslides.
Mule deer	*Odocoileus hemionus*	Y	Prefers riparian, cropland/hedgerow, deserts, forests, grasslands, old fields, savannas, and shrublands. Often associated with successional vegetation, especially near agricultural lands.
Pronghorn antelope	*Antilocapra americana*	Y	Prefers deserts, grasslands, sagebrush plains, and foothills.
White-tailed deer	*Odocoileus virginianus*	Y	Habitat preference of prairie and lightly wooded riparian bottomlands, especially woodlands interspersed with grasslands and pastures.
Black bear	*Ursus americanas*	Y	Habitats include forests, swamps, and woodlands, but also feed on grasses in the spring and forage in meadows. May also prey on or scavenge livestock.
Mountain lion (cougar, puma)	*Felis concolor* (*Puma concolor*)	Y	Primarily inhabits mountainous or remote areas, but may also be found in woodlands, riparian areas, swamps, shrublands, canyons, and deserts, and may utilize other habitats as immigration corridors.
Badger	*Taxidea taxus*	Y	Prefers scrub, rangeland, and grasslands.
Beaver	*Castor canadensis*	N	Prefers riparian habitats.
Bobcat	*Lynx rufus*	Y	Inhabits forested wetlands, riparian areas, talus slopes, woodlands, forests, shrublands, deserts, and old fields.

Potential Game Species Found on Montana CRP Grasslands (cont'd)

Common Name	Scientific Name	Potentially Present? (Y/N)	Comment/Justification
Coyote	*Canis latrans*	Y	Prefers croplands, desert, urban areas, deserts, forests, old fields, prairies, rangelands, savannas, grasslands, and shrublands.
Fisher	*Martes pennanti*	N	Distinct preference for large interior forests habitats, primarily dense coniferous, mixed, and deciduous upland and lowland forests. Generally avoids areas with little forest cover and/or significant human disturbance.
Marten	*Martes americana*	N	Prefers dense coniferous upland and lowland forests also may use deciduous or mixed forest, or rocky alpine areas.
Mink	*Mustela vison* (*Neovison vison*)	N	Prefers riparian and forested wetlands.
Muskrat	*Ondatra zibethicus*	N	Prefers riparian habitats.
Raccoon	*Procyon lotor*	Y	Prefers riparian areas, woods or shrubland, but may be found in grasslands, rangeland, and cropland.
Red fox	*Vulpes vulpes*	Y	Inhabits open and semi-open habitats and utilize open woodlands.
River otter	*Lontra canadensis* (*Lutra canadensis*)	N	Preferred habitat composed of riparian areas, rivers and streams, lakes and ponds, sloughs, backwaters, and marshes.
Skunks	*Mephitis* and *Spilogale* spp.	Y	Primarily forest edge and forest dwelling species; however, may use corridors during dispersal.
Spotted skunk	*Spilogale putorius*	Y	Prefers forest edges and woodlands, but may use corridors during dispersal.
Swift fox	*Vulpes velox*	Y	Prefers shortgrass prairie, western mixed-grass prairie, and grasslands.
Weasels	*Mustela* spp.	Y	Inhabits bog, wetlands, brushland, open woodlands, forests croplands, old fields, and grasslands.
Wolverine	*Gulo gulo*	N	Habitat preference is primarily for tundra, and coniferous boreal and mountain forests. Mostly limited to mountains in wilderness areas, riparian areas may be heavily utilized in winter. May disperse through or feed in atypical habitat.
BIRDS			
Canvasback	*Aythya valisineria*	N	Nests in dense vegetation in wetlands and riparian areas, also feeds and rests in riparian and wetland areas.
Ducks	*Anas* spp., *Clangula* spp., *Bucephala* spp., *Histrionicus* spp., *Aythya* spp., and *Aix* spp.	Y	Many species nest in cropland, grasslands, old fields, pastures, and rangeland.

Potential Game Species Found on Montana CRP Grasslands (cont'd)

Common Name	Scientific Name	Potentially Present? (Y/N)	Comment/Justification
Goose (brant, Canada, Ross's, white-fronted, snow)	*Branta bernicla, B. canadensis, B. hutchinsii, Chen rossii, Anser albifrons,* and *C. caerulescens*	Y	Non-breeding Ross' goose, greater white-fronted goose, cackling goose, and snow goose are resident in US, but do not breed in US. Migrants, resting birds, and resident birds graze in grasslands and pastures, feed on grain fields, and foraging for insects, grass, shoots, and seeds in fields, pastures, and grasslands. Breeding and non-breeding populations of Canada goose are present in the US; nests are usually built in riparian areas or wetlands. Canada goose feed on grasses, sprouts, grains, clover, invertebrates, and riparian and aquatic plants in parks, fields, marshes, grasslands, and pastures.
Greater scaup	*Aythya marila*	Y	May nest among grass or shrubs.
Mallard	*Anas platyrhynchos*	Y	Upland nesting duck species.
Mergansers	*Mergus* and *Lophodytes* spp.	Y	Hooded and common mergansers are cavity nesters, but young must travel to brood rearing areas. Red-breasted merganser nests in riparian areas and wetlands.
Northern pintail	*Anas acuta*	Y	Upland nesting duck species.
Redhead	*Aythya americana*	N	Nests in dense vegetation in wetlands and riparian areas, also feeds and rests in riparian and wetland areas.
Scaup	*Aythya* spp.	Y	Upland nesting duck species.
Swans	*Cygnus* spp.	N	Mute swan (*Cygnus olor*) is an exotic. Trumpeter swan (*Cygnus buccinator*) nests in the US. Tundra swan (*Cygnus columbianus*) does not nest in the US, but migrates through the US and may be a nonbreeding resident in the US. Trumpeter swans are riparian and wetland feeders and nesters. Tundra swans are riparian and wetland feeders and may nest as far as a half-mile from water, but do not nest in US.
Wood duck	*Aix sponsa*	Y	Cavity nesters, but young must travel to brood rearing areas.
American coot	*Fulica americana*	N	Inhabits wetlands and riparian areas.
Blue grouse (dusky grouse, fool hen)	*Dendragapus obscurus*	Y	Primarily inhabits coniferous forests, but also utilizes grasslands and shrublands in parts of its range.
Chukar	*Alectoris chukar*	Y	Preference is for open and flat habitats, such as plateaus, sage steppe, deserts, and grasslands, as well as rocky hillsides and mountain slopes and foothills.
Gray partridge	*Perdix perdix*	Y	Inhabits grasslands, old fields, savanna, pastures, steppe and pastures. Nests in grasslands, hayfields or in grain fields.
Ring-necked pheasant	*Phasianus colchicus*	Y	Feeds in and nests in grassland habitats and cropland.

Potential Game Species Found on Montana CRP Grasslands (cont'd)

Common Name	Scientific Name	Potentially Present? (Y/N)	Comment/Justification
Ruffed grouse	*Bonasa umbellus*	Y	Inhabits forests, woodlands, and riparian areas. May use old fields.
Sage grouse	*Centrocercus urophasianus*	Y	Inhabits deserts, savannas, grasslands, and shrublands. Depends on sagebrush.
Sharp-tailed grouse	*Tympanuchus phasianellus*	Y	Inhabits riparian areas, croplands, grasslands, shrublands, and woodlands.
Spruce grouse (Franklin's grouse)	*Falcipennis* (*Dendragapus*) *canadensis*, *F. canadensis*, or *F. franklinii*	N	Inhabits coniferous forests with substantial understory and cover.
Wild Turkey	*Meleagris gallopavo*	Y	Habitats include croplands, grasslands, forests, old fields, shrublands, and woodlands.
Sandhill crane	*Grus canadensis*	Y	Inhabits and feeds in bogs and wetlands, croplands, grasslands, and tundra.
Wilson's (common) snipe	*Gallinago delicata* (*G. gallinago*)	N	Inhabits wetlands and riparian areas.
Doves (mourning dove)	*Zenaida macroura*	Y	Habitats include deserts, old fields, forests, woodlands, grasslands, shrublands, savanna, and old fields.

Montana Game Species Predicted Response to Managed Haying and Grazing.

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Bighorn sheep	*Ovis canadensis*	Predator evasion tactics involve bighorn sheep utilizing escape cover in the form of rough, broken, and steep ground. Grazing should be limited especially where grazed pasture is close to broken ground the sheep may utilize. Bighorns do not compete well with livestock, grazing in sheep habitat not recommended.	Restrict grazing to areas where this species is not located, light rotational grazing near broken land, or no grazing allowed, especially during late summer. Controlled grazing can improve habitat quality, but only if at controlled low levels.	Anderson and Scherzinger 1975; Bailey 1980; Clark et al. 2000; NatureServe 2008	Forage can be improved through selected haying as haying can be used to maintain younger growth of grasses and forbs, improving the nutrition. Mowing would allow the sheep clear sightlines for predators.	Hay CRP during appropriate periods, allowing for new growth in spring. Periodic haying can be utilized as part of the long-term management of CRP fields.	Bailey 1980; Clark, P.E., et al. 1998a, 1998b
Bison	*Bos bison*	Possible increased competition for food resources, but the segregation of cattle from bison range due to brucellosis concerns would likely limit the effects.	Restrict grazing to areas where the bison are not located, rotational grazing, or no grazing allowed.	Holecheck et al. 1982; MFWP 2005; Willers 2002	Possible increased competition for food resources. Depending on the time of year haying occurs; if hayed too late, new growth that can be utilized by bison would not occur.	Hay CRP during appropriate periods, allowing for new growth in spring. Periodic haying can be utilized as part of the long-term management of CRP fields.	USDOI/ USGS 2008a; USDOI/ USFWS 2005

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Elk	*Cervus elephus* or *Cervus canadensis*	Possible increased competition for food resources. Cattle compete with elk, especially during late summer.	Restrict grazing to areas where this species is not located, rotational grazing, or no grazing allowed, especially during late summer. Spring grazing can improve habitat quality, but only if at low levels.	Anderson and Scherzinger 1975; Clark, P.E., et al. 2000; Coe et al. 2001; NatureServe 2008	Early spring clipping improves forage for elk on winter range. If mowed, grazing must not be allowed in the growing season following.	For use as elk winter range, recommend spring mowing followed by no grazing by cattle during growing season.	Clark, P.E., et al. 1998a, 1998b
Moose	*Alces alces* (*Alces. americanus*)	While this species is primarily a browser, feeding on leaves, twig, and bark of aspen, willow and conifers, with a large portion of aquatic plants, moose also feed on grasses. However, cattle grazing can improve spring forage on fields moose may graze on. Direct forage competition between cattle and moose is limited as much of the diet of moose consists of browse and they preferentially feed in riparian habitats. Restrict stocking where cattle may browse on willows if forbs and grasses are scarce or unpalatable to prevent direct forage competition with moose.	Restrict grazing to areas where this species is not located, rotational grazing, or no grazing allowed. Some grazing can improve habitat quality, but only if cattle do not feed on preferred moose food stocks.	Dorn 1970; USDOI/ USFWS 2008b	Haying can be used to maintain younger growth of grasses and forbs, improving the nutrition. However, as moose are primarily browsers, haying may not impact moose.	Hay CRP during appropriate periods, allowing for new growth in spring. Periodic haying can be utilized as part of the long-term management of CRP fields.	NatureServe 2008; USDOI/ USFWS 2008b

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Mule deer	*Odocoileus hemionus*	Possible increased competition for food resources, grazing may expose fawns to predation. Cattle compete with mule deer for food, especially during late summer.	Restrict grazing to areas where this species is not located, rotational grazing, or no grazing allowed, especially during late summer and when fawns are being born.	Coe et al. 2001; NatureServe 2008	Deer forage can be improved through selected haying as haying can be used to maintain younger growth of grasses and forbs, improving the nutrition for deer, especially during late summer.	Hay CRP during appropriate periods, allowing for new growth in spring. Periodic haying can be utilized as part of the long-term management of CRP fields.	Clark, P.E., et al. 1998a, 1998b; USDOI/ USGS 2008a; USDOI/ USFWS 2008c
Pronghorn antelope	*Antilocapra americana*	Mostly a browser in the winter, but feed on herbaceous plants and grasses, particularly in the summer. Grazing not incompatible with pronghorn needs as long as cattle feed primarily on grasses. If cattle begin to feed heavily on forbs, direct competition between cattle and pronghorn result. Moderate livestock grazing may remove unpalatable older growth, improving forage for pronghorn.	Restrict grazing to areas where cattle may over utilize forbs, moderate rotational grazing may improve forage. Pronghorn incompatible with sheep as diets are similar and direct competition can result.	Hall 1985; Rickel 2005b; NatureServe 2008	Haying may reduce abundant grasses and forbs during late gestation and early lactation important for fawn survival.	Hay CRP after lactation, allowing for new growth in spring. Periodic haying can be utilized as part of the long-term management of CRP fields.	Rickel 2005b; NatureServe 2008

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
White-tailed deer	*Odocoileus virginianus*	Possible increased competition for food resources, but species also browses. Rotational grazing by cattle in managed grasslands can improve nutrition as grazing would increase new growth and nutritional content for deer species, especially for late summer nutrition.	Restrict grazing to areas where this species is not located, rotational grazing, or no grazing allowed, especially during late summer.	Loft et al. 1987, 1991; NatureServe 2008; USDOI/ USFWS 1983, 2008b	Limited effects to the species as its distribution is limited to mostly riparian corridors. CRP use is likely limited, but may be utilized as travel corridors where present. Deer forage can be improved through selected haying as haying can be used to maintain younger growth of grasses and forbs, improving the nutrition for deer, especially during late summer.	Hay CRP during appropriate periods, allowing for new growth in spring. Periodic haying can be utilized as part of the long-term management of CRP fields.	Clark, P.E., et al. 1998a, 1998b; USDOI/ USFWS 1983, 2008b

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Black bear	*Ursus americanas*	Bears utilize corridors and feed in cropfields, particularly during drought or late summer. May also prey on cattle sheep, and horses. This species is also known to scavenge livestock, leading to an inflated status as a species prone to depredation among ranchers and farmers. Dr. Hal Black of BYU of Utah has data on bears traveling long distances from their home ranges and being killed as depredating animals in rancher's fields, crop fields, and silage fields.	Restrict grazing to areas where this species is not located, rotational grazing, or no grazing allowed, especially where this species has been having conflicts with livestock or crop producers. Generally, management practices which promote food availability in bear habitat may prove beneficial. Maintain corridors for travel.	Black (2000-2008); Litvaitis 2001; Dixon et al. 2006; Beir et al. 2008	Limited effects to the species as its bears tend to be very plastic in their feeding habitats and can utilize hayed areas fairly readily. Likely to be little or no effect as the species is highly mobile.	Haying probably not incompatible with bear management as long as new growth is available for bears to feed on in the spring.	Litvaitis 2001; Dixon et al. 2006

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Mountain lion (cougar, puma)	*Felis concolor* (*Puma concolor*)	Primary prey is deer in the western US, particularly mule deer, but may prey on cattle, sheep, and horses. Rodents and lagomorphs make up the bulk of other prey consumed. This species is also known to scavenge livestock, leading to an inflated status as a species prone to depredation among ranchers and farmers.	Restrict grazing to areas where this species is not located, rotational grazing, or no grazing allowed, especially where this species has been feeding on cervids to prevent conflicts with livestock producers. Generally, management practices which promote prey availability in cougar habitat may prove beneficial.	Ackerman et al. 1984; Yáñez at al. 1986; Beir et al. 2008	Limited effects to the species as its distribution is limited to mostly broken ground, remote areas and extensive cover.	Generally, management practices which promote prey availability in cougar habitat may prove beneficial. Hay CRP during appropriate periods, allowing for new growth in spring. Periodic haying can be utilized as part of the long-term management of CRP fields and to promote preferred prey species.	Ackerman et al. 1984; NatureServe 2008
Badger	*Taxidea taxus*	Badgers feed heavily upon burrowing rodents, especially prairie dogs, which are grazing-tolerant, but compete directly with livestock for grasses and forbs. This often leads to prairie dogs being controlled or locally extirpated. Where badgers are tolerated they often provide rodent control.	Badgers would increase forage available to cattle.	Rickel 2005a; NatureServe 2008	Prefers open brushland and rangeland with limited groundcover.	Haying probably not incompatible with badger management.	Rickel 2005a; NatureServe 2008

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Bobcat	*Lynx rufus*	Feeds primarily on small mammals, especially lagomorphs, but also eats birds, other vertebrates, and occasionally carrion.	Grazing not incompatible with bobcat management as grazing may improve habitat for rabbit species, increasing the bobcat's food supply. Restrict grazing during calving, as bobcats may take small livestock.	Lariviere and Walton 1997; Peterson 2000; Rickel 2005a; NatureServe 2008	May prey more on ground nesting species if they are exposed by haying.	Moderate haying probably not incompatible with bobcat management as haying would expose prey species. Careful haying may improve the habitat of prey species.	Dickson 2003; Rickel 2005a;Nature Serve 2008
Coyote	*Canis latrans*	Control of coyotes can lead to a decrease in rodent species richness and diversity, but also an increase of overall numbers of some rodents and lagomorphs, including those that compete directly with livestock for forage. Coyotes have been known to prey on livestock, but most livestock and big game animals taken have been the young, old, ill, or injured.	Grazing not incompatible with coyote management as long as livestock are not placed on CRP land when coyotes could prey on them, such as during calving or while calves are small.	Bekoff 1977; Henke and Bryant 1999; NatureServe 2008	Not affected by open brushland and rangeland with limited groundcover.	Haying probably not incompatible with coyote management.	NatureServe 2008

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Raccoon	*Procyon lotor*	Plastic omnivore, eating bird eggs and nestlings, fruits, nuts, frog, fish, invertebrates, garbage, and small mammals. Obtains most food on or near ground near water, so riparian feeding grounds may not be affected. Grazing would likely only affect raccoons if prey species were adversely affected or a loss of habitat incurred.	Moderate grazing probably not incompatible with raccoon management. Restrict grazing, moderate rotational grazing, or no grazing.	NatureServe 2008	Population levels may decrease as a result of habitat loss or degradation or loss of prey species.	Moderate haying probably not incompatible with raccoon management as haying would expose prey species. Careful haying may improve the habitat of prey species.	Grant et al. 1982; NatureServe 2008
Red fox	*Vulpes vulpes*	Red foxes feed on carrion, birds, insects, fruit, reptiles, and small mammals such as rodents and lagomorphs. Grazing would only affect fox if prey species were adversely affected or a loss of habitat incurred.	Moderate grazing probably not incompatible with fox management. Restrict grazing, moderate rotational grazing, or no grazing.	NatureServe 2008	Can inhabit open brushland, grasslands, and rangeland with limited groundcover. May prey more on ground nesting species if they are exposed by haying.	Haying probably not incompatible with fox management.	NatureServe 2008
Skunks	*Mephitis* and *Spilogale* spp.	Grazing may result in a decrease in population levels as a result of habitat loss.	Do not allow grazing, or restrict it to specific areas, create travel corridors, or rotational grazing.	NatureServe 2008	Population levels may decrease as a result of habitat loss.	Limit haying activity to certain quantities, limit height of remaining vegetation to provide cover.	NatureServe 2008
Spotted skunk	*Spilogale putorius*	Grazing may result in a decrease in population levels as a result of habitat loss.	Do not allow grazing, or restrict it to specific areas, create travel corridors, or rotational grazing.	NatureServe 2008	Population levels may decrease as a result of habitat loss.	Limit haying activity to certain quantities, limit height of remaining vegetation to provide cover.	NatureServe 2008

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Swift fox	*Vulpes velox*	Moderate grazing may benefit swift foxes as this species prefers short grass prairies. Grazing may affect food sources, as rodents would be in direct competition with cattle for forage.	Moderate grazing probably not incompatible with fox management. Restrict grazing, moderate rotational grazing, or no grazing.	Sovada et al. 2001; Kamler et al. 2003; NatureServe 2008	Haying in moderation may not affect swift fox as it prefers more open landscapes, however if too extreme it would affect the food sources.	Limit haying to a specific height, and ensure appropriate rotation schedules.	Sovada et al. 2001; Kamler et al. 2003; NatureServe 2008
Weasels	*Mustela* spp.	Grazing would likely only affect weasels if prey species were adversely affected or a loss of habitat incurred. Population levels may decrease during periods of grazing as this species may require dense vegetation for protection from larger predators.	Restrict grazing to areas where this species is not located, rotational grazing, or no grazing allowed.	Grant et al. 1982; NatureServe 2008	Predators include various other carnivores, raptors, and possibly snakes. Haying may remove essential cover. Population levels may decrease as a result of habitat loss or degradation or loss of prey species.	Limit haying activity to certain quantities, limit height of remaining vegetation to provide cover.	Grant et al. 1982; NatureServe 2008

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Ducks	*Anas* spp., *Clangula* spp., *Bucephala* spp., *Histrionicus* spp., *Aythya* spp., and *Aix* spp.	As a whole, ducks that nest in grasslands or rangelands are negatively impacted by grazing, primarily due to a loss of nesting cover. Cavity nesting species also benefit from cover as the young may need to travel long distances to brood rearing habitat.	Grazing has less of an impact than haying, but still recommend rotational or very light grazing, or no grazing allowed, as best nest success is typically in undisturbed habitats.	Duebbert and Lokemoen 1976; Higgins 1977; Kantrud 1993; Luttschwager et al. 1994; McKinnon and Duncan 1999; Maisonneuve et al. 2000; Reynolds 2000; Alsop 2001; NatureServe 2008	Haying generally has negative direct and indirect effects on nesting ducks. Most species which utilize grasslands or rangelands typically nest by preference in unmowed fields and suffer less predation in unmowed fields. Nesting success is typically lower in mowed fields.	Haying must leave enough stubble for nesting species and must occur after young have moved to brood-rearing areas. Best recommendation for nesting ducks is no haying.	Duebbert and Lokemoen 1976; Higgins 1977; Kantrud 1993; Luttschwager et al. 1994; McKinnon and Duncan 1999; Maisonneuve et al. 2000; Reynolds 2000; Alsop 2001; NatureServe 2008
Goose (brant, Canada, Ross', white-fronted, snow)	*Branta bernicla, B. canadensis, B. hutchinsii, Chen rossii, Anser albifrons, and C. caerulescens*	Geese preferentially feed in grazed or mowed fields, as well as in agricultural fields.	Moderate grazing probably not incompatible with goose management, but may compete with livestock for grasses. Restrict grazing, moderate rotational grazing, or no grazing.	Grieb 1970; Ely 1992; Pochop et al. 1999; Alsop 2001; NatureServe 2008	Geese preferentially feed in grazed or mowed fields, as well as in agricultural fields.	Haying probably not incompatible with goose management, as geese preferentially feed on short grasses in open fields, such as golf courses, lawns, and hayed fields.	Grieb 1970; Ely 1992; Pochop et al. 1999; Alsop 2001; NatureServe 2008

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Greater scaup	*Aythya marila*	May nest in grass or under shrubs.	Rotational, very light grazing or no grazing. Maintain nesting cover.	Duebbert and Lokemoen 1976; Higgins 1977; Reynolds 2000; NatureServe 2008	Vegetative cover should be left to hide hens than nest in grasslands or under shrubs.	Haying must leave enough stubble for nesting species and must occur after young have moved to brood-rearing areas. Best recommendation for nesting ducks is no haying.	Duebbert and Lokemoen 1976; Higgins 1977; Reynolds 2000; NatureServe 2008
Mallard	*Anas platyrhynchos*	Upland nesting duck species. Nests preferentially in undisturbed fields. Grazing has less of an impact than haying, but grazing can negatively affect nesting ducks due to loss of nesting cover which leads to increased predation.	Rotational and/or very light grazing. Best nest success is on ungrazed land. Early cover must be established for late nesting and re-nesting ducks, as well as maintenance until young have left the nesting areas for brood rearing areas.	Duebbert and Lokemoen 1976; Higgins 1977; Kantrud 1993; Luttschwager et al. 1994; McKinnon and Duncan 1999; Reynolds 2000	Haying has negative direct and indirect effects on nesting upland ducks. Mallard hens nest by preference in unmowed fields and suffer less predation in unmowed fields. Nesting success is very poor in mowed fields.	Haying must leave enough stubble for nesting species and must occur after young have moved to brood-rearing areas. Best recommendation for nesting ducks is no haying, followed by: entire fields left undisturbed; unmowed blocks ≥ 25% of the field left undisturbed; unmowed blocks > 10% of the field; narrow alternating strips left undisturbed; areas near brush left undisturbed (deters crows but not other predators).	Duebbert and Lokemoen 1976; Higgins 1977; Kantrud 1993; Luttschwager et al. 1994; McKinnon and Duncan 1999; Reynolds 2000

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Mergansers	*Mergus* and *Lophodytes* spp.	Young of cavity nesting mergansers must travel to brood rearing areas.	Grazing should leave enough cover to allow cover for mobile young from predators.	Alsop 2001; NatureServe 2008	Haying not likely to directly affect this species.	Haying may destroy young, delay until young are at brood rearing habitats. Haying should leave enough cover to allow cover from predators.	NatureServe 2008
Northern pintail	*Anas aacuta*	Upland nesting duck species. Grazing has less of an impact than haying, but grazing can negatively affect nesting ducks due to loss of nesting cover which leads to increased predation.	Rotational and/or very light grazing. Best nest success is on ungrazed land. Early cover must be established for late nesting and re-nesting ducks, as well as maintenance until young have left the nesting areas for brood rearing areas.	Duebbert and Lokemoen 1976; Higgins 1977; Kantrud 1993; Luttschwager et al. 1994; McKinnon and Duncan 1999; Reynolds 2000	Haying has negative direct and indirect effects on nesting upland ducks. Pintail nest in disturbed fields, but nest predation increases in hayed fields.	Haying must leave enough stubble for nesting species and must occur after young have moved to brood-rearing areas. Best recommendation for nesting ducks is no haying, followed by: entire fields left undisturbed; unmowed blocks ≥ 25% of the field left undisturbed; unmowed blocks > 10% of the field; narrow alternating strips left undisturbed; areas near brush left undisturbed (deters crows but not other predators).	Duebbert and Lokemoen 1976; Higgins 1977; Kantrud 1993; Luttschwager et al. 1994; McKinnon and Duncan 1999; Reynolds 2000

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Scaup	*Aythya* spp.	Upland nesting duck species. Nests preferentially in undisturbed fields. Grazing has less of an impact than haying, but grazing can negatively affect nesting ducks due to loss of nesting cover which leads to increased predation.	Rotational and/or very light grazing. Best nest success is on ungrazed land. Early cover must be established for late nesting and re-nesting ducks, as well as maintenance until young have left the nesting areas for brood rearing areas.	Duebbert and Lokemoen 1976; Higgins 1977; Kantrud 1993; Luttschwager et al. 1994; McKinnon and Duncan 1999; Reynolds 2000	Haying has negative direct and indirect effects on nesting upland ducks. Lesser scaup hens nest by preference in unmowed fields and suffer less predation in unmowed fields. Nesting success is very poor in mowed fields.	Haying must leave enough stubble for nesting species and must occur after young have moved to brood-rearing areas. Best recommendation for nesting ducks is no haying, followed by: entire fields left undisturbed; unmowed blocks ≥ 25% of the field left undisturbed; unmowed blocks > 10% of the field; narrow alternating strips left undisturbed; areas near brush left undisturbed (deters crows but not other predators).	Duebbert and Lokemoen 1976; Higgins 1977; Kantrud 1993; Luttschwager et al. 1994; McKinnon and Duncan 1999; Reynolds 2000
Wood duck	*Aix sponsa*	Young must travel to brood rearing areas, sometimes as much as several kilometers.	Grazing should leave enough cover to allow cover for mobile young from predators.	Alsop 2001; NatureServe 2008	Haying not likely to directly affect this species.	Haying may destroy young, delay until young are at brood rearing habitats. Haying should leave enough vegetation to allow cover from predators.	NatureServe 2008

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Blue grouse (dusky grouse, fool hen)	*Dendragapus obscurus*	Prefers more open country than ruffed grouse. The bulk of the winter diet of this species comes from coniferous needles and buds, particularly those of Douglas fir: but brood forage is of grasses. Grazing may also affect breeding success further as proportions of successful hens are thought to be higher on ungrazed areas rather than grazed areas. Vertical cover is used extensively in areas utilized as brood-rearing habitats, especially grassy and herbaceous cover. Displaying males are probably\ not affected by grazing, but avoid grazing in brood rearing habitats to the extent that vertical cover is lost. Predation of adults, nests, and broods increases when cover is lost.	Rotational grazing, restricted grazing, or no grazing allowed.	Beer 1943; Mussehl 1963; Stauffer and Peterson 1985; Zwickel 1972a; 1972b	Vertical cover required for brood rearing. Herbaceous cover is critical during first six weeks after young have hatched.	Haying should leave enough cover to allow cover from predators, and haying should be done only after broods are reared. Limit haying activity to certain quantities, limit height of remaining vegetation to provide cover. No haying during the first 6 weeks after hatching.	Beer 1943; Mussehl 1963; Stauffer and Peterson 1985; Zwickel 1972a; 1972b

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Chukar	*Alectoris chukar*	Chukars respond positively to light to moderate grazing, as long as cover from predators is sufficient. Chukars are highly mobile and can use heavily grazed areas as well, so chukars are unlikely to be affected negatively by grazing for adult survival. Nesting and brood rearing require cover.	Grazing probably not incompatible with chukar management as long as grazing is deferred during brood rearing. Recommend rotational grazing with deferred areas.	Holechek 1981; Holechek et al. 1982; Knight et al. 1979	Feeds heavily on seeds in all seasons, especially grass seeds.	Haying probably not incompatible with chukar management, especially as this species also dwells in rough and broken country which may preclude the ability to hay these regions. If chukars are utilizing an area, suggest deferred portions for production of seeds and grass leaves for chukars. Avoid haying areas where broods may be present.	Knight et al. 1979

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Gray partridge	*Perdix perdix*	Requires nesting cover and cover in fields in winter. Feeds on grasses.	Very light grazing can help maintain feeding habitat and forage quality. Rotational grazing, restricted grazing, or no grazing allowed.	Knight et al. 1979; Mendel and Peterson 1983	Stubble provides winter cover for partridge. Stubble height should be high enough for the birds to find shelter in the stubble if woody or shrubby areas are not available.	Limit haying activity to certain quantities, limit height of remaining vegetation to provide cover. Hay CRP during appropriate periods, allowing for new growth in spring and leaving enough cover for wintering birds. Permanent cover strips 10-20 m wide should be undisturbed to provide additional shelter.	Mendel and Peterson 1983

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Ring-necked pheasant	*Phasianus colchicus*	Excessive grazing pressure reduces habitat quality and removes cover. Grazing that alters tall and mid-grass community structures to shortgrass community structures should be avoided. Limited periodic grazing can increase production of forbs and mid level grassing, affecting short-term nesting, but can produce long-term improvements to quality of nesting and brood rearing habitat. CRP habitats provide the most benefit to this species.	Light to moderate grazing in rotation every 3-5 years is probably not detrimental over the long term. Very light rotational grazing or no grazing. Maintain cover.	Hagen et al. 2004; King and Savidge 1995; Warner and Etter 1989; Schroeder and Baydack 2001; NatureServe 2008	Haying can negatively affect nesting by indirect means where nest cover is required to avoid predation, to direct means, by which nests and females suffer mortality from machinery. Cumulative losses of fallow and undisturbed fields concentrate pheasants to the point where nesting pheasants suffer even more mortality. Later haying increases the loss of adult females as they are less likely to abandon nests as incubation progresses. Pheasants rarely re-nest where nests have been destroyed and success is lower for pheasants attempting to re-nest in stubble.	Haying may have a negative effect on nest success. Haying should leave enough vegetation to allow cover from predators, and haying should be done only after broods are reared.	Warner and Etter 1989; NatureServe 2008

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Ruffed grouse	*Bonasa umbellus*	Requires openings for breeding and night roosting. Opening with vertical cover are used as brood-rearing habitats. Displaying males are probably not affected by grazing, but avoid grazing in brood rearing habitats to the extent that vertical cover is lost.	Rotational grazing, restricted grazing, or no grazing allowed.	Stauffer and Peterson 1985; Dessecker and McAuley 2001	Roosts in fields and pastures at night. Vertical cover required for brood rearing.	Haying should leave enough cover to allow cover from predators, and haying should be done only after broods are reared. Limit haying activity to certain quantities, limit height of remaining vegetation to provide cover.	Stauffer and Peterson 1985; Dessecker and McAuley 2001
Sage grouse	*Centrocercus urophasianus*	Grouse habitat improves with light and rotational grazing, but livestock can cause nest abandonment. Sheep would cause shift towards more open grasslands, while cattle would cause a shift towards forbs.	Very light grazing, rotational grazing or no grazing allowed. Graze cattle rather than sheep to improve forage for grouse. Graze after young have hatched to prevent trampling and abandonment. Prevent damage to sagebrush in nesting areas.	Klebenow 1969; Beck and Mitchell 2000; NatureServe 2008	Vertical cover required for brood rearing and protection from predation. As grouse typically nest in and under sagebrush, which precludes mowing, haying is unlikely to affect this species.	Haying probably not incompatible with grouse management as long as nesting sagebrush habitat is left intact.	Beck and Mitchell 2000; NatureServe 2008

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Sharp-tailed grouse	*Tympanuchus phasianellus*	Grazing can negatively affect nesting due to loss of nesting cover which leads to increased predation.	Very light rotational grazing or no grazing. Maintain cover or at least 13 cm in height.	Manzer and Hannon 2005	Vertical cover required for brood rearing and protection from predation.	Haying should leave enough cover to allow cover from predators, and haying should be done only after broods are reared. Limit haying activity to certain quantities, limit height of remaining vegetation to provide cover. Recommend 13cm height minimum in strips or patches larger than 50m wide.	Manzer and Hannon 2005
Wild Turkey	*Meleagris gallopavo*	Grazing can negatively affect nesting turkeys due to loss of nesting cover which leads to increased predation.	Grazing may have a negative effect on nest success. Light to moderate grazing in rotation every 3-5 years is probably not detrimental over the long term. Very light rotational grazing or no grazing. Maintain cover.	Cooper and Ginnett 2000; NatureServe 2008	Haying can negatively affect nesting by indirect means where nest cover is required to avoid predation.	Haying may have a negative effect on nest success. Haying should leave enough vegetation to allow cover from predators, and haying should be done only after broods are reared.	Cooper and Ginnett 2000; NatureServe 2008

Montana Game Species Predicted Response to Managed Haying and Grazing (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Sandhill crane	*Grus canadensis*	Pastures and hayfields used to rest, preen, display, and feed. Nesting is usually in wetlands, so nesting is unlikely to be affected. Feeding cranes prefer clear sightlines.	Light to moderate grazing in rotation every 3-5 years is probably not detrimental over the long term.	Lovvorn and Kirkpatrick 1982; Iverson et al. 1987; Littlefield and Paullin 1990; NatureServe 2008	Pastures and hayfields used to rest, preen, display, and feed. Cranes also prefer mowed pastures, possibly for clear sightlines.	Haying probably not incompatible with crane management.	Lovvorn and Kirkpatrick 1982; Iverson et al. 1987; Littlefield and Paullin 1990; NatureServe 2008
Doves (mourning dove)	*Zenaida macroura*	Preference for nesting is tall, sparse bunchgrass; habitat is little ground cover, but tall vertical cover.	Light to moderate grazing in rotation every 5 or more years is probably not detrimental over the long term.	Hughes at al. 2000	Haying would remove tall vegetative cover that doves nest between.	Haying may have a negative effect on nest success.	Hughes at al. 2000

Montana Tier 1 Mammal, Reptile, and Amphibian Species of Greatest Conservation Need

		Potentially Present on lands under CRP Practices?							
Common Name	**Scientific Name**	**CP1**	**CP2**	**CP 4B**	**CP 4D**	**CP 10**	**CP 18B**	**CP 18C**	**Comment/Justification**
MAMMALS									
American bison	*Bison bison*	Y	Y	Y	Y	Y	N	N	Grassland species.
Black-footed ferret	*Mustela nigripes*	Y	Y	Y	Y	Y	Y	Y	Associated with prairie dog towns; open level sparse grass areas.
Gray wolf	*Canis lupus*	N	N	N	N	N	N	N	Inhabits forested areas.
Grizzly bear	*Ursus arctos*	N	N	N	N	N	N	N	Inhabits mountain forests, open meadows, and river valleys.
Canada lynx	*Lynx canadensis*	N	N	N	N	N	N	N	Inhabits forested areas.
Pygmy rabbit	*Brachylagus idahoensis*	N	N	N	N	N	N	N	Sagebrush obligate.
Black-tailed prairie dog	*Cynomys ludocicianus*	Y	Y	Y	Y	Y	Y	Y	Prefers large open expanses of short grass prairies w/ sparse grass.
White-tailed prairie dog	*Cynomys leucurus*	Y	Y	Y	Y	Y	Y	Y	Desert grasslands, shrubland grasslands, not CRP conditions unless grazed heavily each year.
Hoary marmot	*Marmota caligata*	N	N	N	N	N	N	N	Prefers rocky mountain slopes and hillsides in alpine meadows.
Northern bog lemming	*Synaptomys borealis*	N	N	N	N	N	N	N	Inhabits alpine meadows.
Meadow jumping mouse	*Zapus hudsonius*	Y	Y	Y	Y	Y	Y	Y	Prefers moist, mesic area near streams and other water sources; however, feeds in grasslands.
Great Basin pocket mouse	*Perognathus parvus*	Y	Y	Y	Y	Y	N	N	Grassland-shrubland species.
Townsend's big-eared bat	*Corynorhinus townsendii*	N	N	N	N	N	N	N	Prefers ponderosa pine forest and woodland, dry cliff or rock outcrop - requires caves, and crevasses.
Pallid bat	*Antrozous pallidus*	N	N	N	N	N	N	N	Requires rocky outcrops with rock cavities.
Spotted bat	*Euderma maculatum*	N	N	N	N	N	N	N	Associated with prominent rock features.

Montana Tier 1 Mammal, Reptile, and Amphibian Species of Greatest Conservation Need (cont'd)

		Potentially Present on lands under CRP Practices?							
Common Name	***Scientific Name***	**CP1**	**CP2**	**CP 4B**	**CP 4D**	**CP 10**	**CP1 8B**	**CP1 8C**	**Comment/Justification**
REPTILES									
Western hognose snake	*Heterodon nasicus nasicus*	Y	Y	Y	Y	Y	Y	Y	Prefers open prairies with exposed sand/gravel patches.
Smooth greensnake	*Opheodrys vernalis*	N	N	N	N	N	N	N	Prefers undisturbed woodlands, forests, wetlands edges, and wet prairies.
Milk snake	*Lampropeltis triangulum*	N	N	N	N	N	N	N	Prefers woodlands, fields, rocky hillside, and wetland borders.
Snapping turtle	*Chelydra serpentina*	N	N	N	N	N	N	N	Aquatic species.
Spiny softshell	*Trionyx spiniferus*	N	N	N	N	N	N	N	Aquatic species.
AMPHIBIANS									
Coeur d' Alene salamander	*Plethodon idahoensis*	N	N	N	N	N	N	N	Requires springs and seeps, waterfall spray zones and stream edges.
Western toad	*Bufo boreas*	N	N	N	N	N	N	N	Aquatic species.
Northern leopard frog	*Rana pipiens*	N	N	N	N	N	N	N	Mostly aquatic; however, terrestrial when feeding (usually along stream edges).

Predicted Response to Managed Haying and Grazing for Montana Tier 1 Mammal, Reptile, and Amphibian Species of Greatest Conservation Need Potentially Occurring on CRP Lands

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
American bison	*Bison bison*	Limited effects, however there may be increased competition for food resources.	Do not allow grazing, restrict it to areas where the bison are not located, or try rotational grazing.	Holechek et al. 1982; Willers 2002	Depends on the time of year haying occurs; if hayed too late, new growth would not occur, limiting food resources.	Hay CRP during appropriate periods, allowing for new growth in spring.	USDOI/ USGS 2008a; USDOI/ USFWS 2005
Black-footed ferret	*Mustela nigripes*	Dependent upon prairie dog towns, grazing could enhance habitat for prairie dogs.	Allow 1/5 or 1/3 grazing.	Truett et al. 2001; KDWP 2004	Dependent upon prairie dog towns, haying could enhance habitat for prairie dogs.	Allow 1/5 or 1/3 haying.	Truett et al. 2001; KDWP 2004
White-tailed prairie dog	*Cynomys leucurus*	Prefers taller vegetation than other prairie dog species; light to moderate grazing could enhance habitat.	Allow 1/5 or 1/3 grazing.	Loft et al. 1987, 1991; Baker et al. 1999; NatureServe 2008	Haying may remove essential cover that protects from predators such as various carnivores and raptors. Population levels may decrease as a result of exposure to predators.	Manage haying activity to allow protective cover to remain in area.	Tileston and Lechleitner 1966; Campbell and Clark 1981; Grant et al. 1982; NatureServe 2008
Meadow jumping mouse	*Zapus hudsonius*	Grazing would likely have no effect as this species prefers moist grasslands.	Allow 1/5 or 1/3 grazing.	Smith 1999; NatureServe 2008	Haying would likely have no effect as this species prefers moist grasslands.	Allow 1/5 or 1/3 haying.	Smith 1999; NatureServe 2008

Predicted Response to Managed Haying and Grazing for Montana Tier 1 Mammal, Reptile, and Amphibian Species of Greatest Conservation Need Potentially Occurring on CRP Lands (cont'd)

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Great Basin pocket mouse	*Perognathus parvus*	Grazing may enhance habitat depending on the quantity and quality of vegetation remaining after grazing. If the area becomes too dry though, the species would not use it. Grass needs to be intermediate height and density.	Allow moderate grazing, 1/5 or 1/3.	Bock et al. 1984; Sietman et al. 1994; Jones and Longland 1999; Jones et al. 2003	This species prefers intermediate vegetation cover - therefore if haying can create this, haying could benefit this species.	Allow 1/5 or 1/3 haying, but limit height of remaining vegetation.	Bock et al. 1984; Sietman et al. 1994; Jones and Longland 1999; Jones et al. 2003
Western hognose snake	*Heterodon nasicus nasicus*	Grazing may increase habitat quality, as this species prefers more open areas with sand and gravel patches.	Allow 1/5 or 1/3 grazing.	NatureServe 2008	Haying may increase habitat quality, as this species prefers more open areas with sand and gravel patches.	Allow 1/5 or 1/3 haying.	NatureServe 2008

Montana Grassland Birds

Common Name	Grassland Status[1]	Nests in CRP	Grazing Tolerance[2]	Response to Annual Grazing[2]	Response to Periodic Grazing[2]	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Citation(s)
ANSERIFORMES									
Gadwall	Facultative	Yes	Moderately Intolerant			Possibly Positive	USDOI/ USGS 2008b	Possibly Positive	USDOI/ USGS 2008b
American wigeon	Facultative	Yes				Unknown		Unknown	
Mallard	Facultative	Yes	Moderately Intolerant			Possibly Negative	Luttschwager et al. 1994; Williams et al. 1999; Cornell Lab of Ornithology 2008	Possibly Negative	Luttschwager et al. 1994; Williams et al. 1999; Cornell Lab of Ornithology 2008
Blue-winged teal	Facultative	Yes	Moderately Intolerant			Possibly Positive	USDOI/ USGS 2008b	Possibly Positive	USDOI/ USGS 2008b
Northern shoveler	Facultative	Yes				Unknown		Unknown	
Northern pintail	Facultative	Yes	Moderately Tolerant			Positive	USDOI/ USGS 2008b	Positive	USDOI/ USGS 2008b
Green-winged teal	Facultative	Possible				Unknown		Unknown	
GALLIFORMES									
Gray partridge	Facultative	Possible				Unknown	Cornell Lab of Ornithology 2008	Unknown	Cornell Lab of Ornithology 2008
Ring-necked pheasant	Facultative	Yes				Possibly Negative	Cornell Lab of Ornithology 2008	Possibly Negative	Cornell Lab of Ornithology 2008
Sharp-tailed grouse	Obligate	Yes	Moderately Intolerant	Negative	Positive	Possibly Negative	Cornell Lab of Ornithology 2008	Possibly Negative	Cornell Lab of Ornithology 2008
CICONIIFORMES									
American bittern	Facultative	Yes	Moderately Intolerant	Negative	Positive	Possibly Negative	Johnson et al. 2004	Negative	Johnson et al. 2004

Montana Grassland Birds (cont'd)

Common Name	Grassland Status[1]	Nests in CRP	Grazing Tolerance[2]	Response to Annual Grazing[2]	Response to Periodic Grazing[2]	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Citation(s)
FALCONIFORMES									
Northern harrier	Obligate	Yes	Moderately Tolerant	Negative	Positive	Possibly Positive	Johnson et al. 2004	Possibly Positive	Johnson et al. 2004
Swainson's hawk	Obligate	Nest in Trees, Forage Only		Negative	Positive	Unknown	Johnson et al. 2004	Unknown	Johnson et al. 2004
Ferruginous hawk	Obligate	Potentially	Highly Tolerant	Negative	Positive	Positive	Saab et al. 1995; Johnson et al. 2004	Positive	Johnson et al. 2004
American kestrel	Facultative					Unknown	Cornell Lab of Ornithology 2008		Cornell Lab of Ornithology 2008
Merlin	Facultative	No				Positive	Johnson et al. 2004	Possibly similar to grazing	Johnson et al. 2004
Prairie falcon	Facultative	No		Negative	Positive	Unknown - Possibly Positive		Unknown	
GRUIFORMES									
Sandhill crane	Facultative	Unlikely				Unknown	Cornell Lab of Ornithology 2008	Unknown	Cornell Lab of Ornithology 2008

Montana Grassland Birds (cont'd)

Common Name	Grassland Status[1]	Nests in CRP	Grazing Tolerance[2]	Response to Annual Grazing[2]	Response to Periodic Grazing[2]	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Citation(s)
CHARADRIIFORMES									
Killdeer	Facultative	Unlikely	Highly Tolerant	Positive	Negative	Positive	Saab et al. 1995; Ryan et al. 1998	Positive	Ryan et al. 1998
Mountain plover	Obligate	Rarely	Highly Tolerant	Positive	Negative	Positive	Saab et al. 1995; Johnson et al. 2004	Possibly Positive if produce vegetation < 20 cm.	Johnson et al. 2004
Willet	Facultative	Unlikely	Highly Tolerant	Positive	Negative	Positive	Johnson et al. 2004	Unknown, Positive outside PNS	Johnson et al. 2004
Upland sandpiper	Obligate	Occasionally	Moderately Tolerant	Negative	Positive	Positive	Saab et al. 1995; Johnson et al. 2004	Possible Positive	Johnson et al. 2004
Long-billed curlew	Obligate		Moderately Tolerant	Neutral	Positive	Positive	Saab et al. 1995; Johnson et al. 2004	Positive	Johnson et al. 2004
Marbled godwit	Obligate	Potentially	Highly Tolerant	Positive	Negative/ None	Positive	Johnson et al. 2004	Positive	Johnson et al. 2004
Wilson's snipe	Facultative	Unlikely				Positive	Cornell Lab of Ornithology 2008	Positive	Cornell Lab of Ornithology 2008
Wilson's phalarope	Facultative	Occasionally	Moderately Intolerant	Negative	Positive	Positive	Johnson et al. 2004	Positive	Johnson et al. 2004

Montana Grassland Birds (cont'd)

Common Name	Grassland Status[1]	Nests in CRP	Grazing Tolerance[2]	Response to Annual Grazing[2]	Response to Periodic Grazing[2]	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Citation(s)
COLUMBIFORMES									
Mourning dove	Facultative	Yes	Highly Tolerant			Possible Positive	Saab et al. 1995Cornell Lab of Ornithology 2008	Possibly Positive	Cornell Lab of Ornithology 2008
STRIGIFORMES									
Barn owl	Facultative	No				Unknown, Effect relative only to prey	Cornell Lab of Ornithology 2008	Unknown, Effect relative only to prey	Cornell Lab of Ornithology 2008
Burrowing owl	Obligate	Potentially	Highly Tolerant	Positive	Unknown/ None	Positive	Johnson et al. 2004; Saab 1995	Positive	Johnson et al. 2004
Long-eared owl	Obligate	Nest in Trees		Negative	Positive	Unknown, Effect relative only to prey	Cornell Lab of Ornithology 2008	Unknown, Effect relative only to prey	Cornell Lab of Ornithology 2008
Short-eared owl	Obligate	Yes	Moderately Intolerant	Negative	Positive	Positive	Johnson et al. 2004	Positive	Johnson et al. 2004
CAPRIMULGIFORMES									
Common nighthawk	Facultative	Unknown	Highly Tolerant			Unknown	Cornell Lab of Ornithology 2008	Unknown	Cornell Lab of Ornithology 2008
Common poorwill	Facultative	Unknown				Positive	Cornell Lab of Ornithology 2008	Unknown	Cornell Lab of Ornithology 2008

Montana Grassland Birds (cont'd)

Common Name	Grassland Status[1]	Nests in CRP	Grazing Tolerance[2]	Response to Annual Grazing[2]	Response to Periodic Grazing[2]	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Citation(s)
PASSERIFORMES									
Say's phoebe	Facultative	Unlikely, ledge or cavity		Unknown	Unknown	Unknown	Cornell Lab of Ornithology 2008	Unknown	Cornell Lab of Ornithology 2008
Cassin's kingbird	Facultative	Trees				Unknown	Cornell Lab of Ornithology 2008	Unknown	Cornell Lab of Ornithology 2008
Western kingbird	Facultative	Trees		Negative	Negative	Possibly Negative	Cornell Lab of Ornithology 2008	Unknown	Cornell Lab of Ornithology 2008
Eastern kingbird	Facultative	Trees		Negative	Negative	Possibly Negative	Cornell Lab of Ornithology 2008	Unknown	Cornell Lab of Ornithology 2008
Loggerhead shrike	Facultative	Potentially	Moderately Tolerant	Neutral	Positive	Positive	Johnson et al. 2004	Neutral	Johnson et al. 2004
Horned lark	Obligate	Rarely	Highly Tolerant			Positive	Saab et al. 1995; Johnson et al. 2004	Neutral-Positive YEAR AFTER	Johnson et al. 2004; Johnson 2005
Sedge wren	Obligate	Yes	Moderately Intolerant	Negative	Positive	Possibly Positive	Johnson et al. 2004	Possibly Positive/ Negative year after	Johnson et al. 2004; Johnson 2005
Eastern bluebird	Facultative	secondary cavity nester				Unknown, Possibly Neutral	Cornell Lab of Ornithology 2008	Unknown, Possibly Neutral	Cornell Lab of Ornithology 2008

Montana Grassland Birds (cont'd)

Common Name	Grassland Status[1]	Nests in CRP	Grazing Tolerance[2]	Response to Annual Grazing[2]	Response to Periodic Grazing[2]	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Citation(s)
Western bluebird	Facultative	Secondary cavity nester				Unknown, Possibly Neutral	Cornell Lab of Ornithology 2008	Unknown, Possibly Neutral	Cornell Lab of Ornithology 2008
Mountain bluebird	Facultative	Secondary cavity nester		Negative	Positive	Unknown, Possibly Neutral	Cornell Lab of Ornithology 2008	Unknown, Possibly Neutral	Cornell Lab of Ornithology 2008
American pipit	Obligate	High altitudes				Unknown, Possibly Negative	Cornell Lab of Ornithology 2008	Unknown	Cornell Lab of Ornithology 2008
Sprague's pipit	Obligate	Potentially	Moderately Tolerant	Negative	Positive	Possibly Negative	Saab et al. 1995; Johnson et al. 2004	Negative	Johnson et al. 2004
Common yellowthroat	Facultative	Yes	Moderately Intolerant			Negative	Saab et al. 1995; Cornell Lab of Ornithology 2008	Unknown, Possibly Negative	Johnson 2005; Cornell Lab of Ornithology 2008
Clay-colored sparrow	Facultative	Yes	Moderately Intolerant	Negative	Positive	Possibly Positive	Johnson et al. 2004	Negative	Johnson et al. 2004; Johnson 2005
Vesper sparrow	Obligate	Rarely	Highly Tolerant	Positive	None	Possibly Positive	Saab et al. 1995; Johnson et al. 2004	Positive; Possibly Negative Year After	Johnson et al. 2004; Johnson 2005
Lark sparrow	Facultative	Rarely	Highly Tolerant			Positive	Saab et al. 1995; Johnson et al. 2004	Unknown	

Montana Grassland Birds (cont'd)

Common Name	Grassland Status[1]	Nests in CRP	Grazing Tolerance[2]	Response to Annual Grazing[2]	Response to Periodic Grazing[2]	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Citation(s)
Lark bunting	Obligate	Common	Highly Tolerant	Negative	Positive	Positive	Johnson et al. 2004	Possibly Positive; Positive Year After	Johnson et al. 2004; Johnson 2005
Savannah sparrow	Obligate	Common	Moderately Tolerant	Negative	Positive	Positive from Light; Negative from Heavy Grazing	Saab et al. 1995; Johnson et al. 2004	Positive; esp. Year After	Johnson et al. 2004; Johnson 2005
Grasshopper sparrow	Obligate	Common	Moderately Tolerant	Negative	Positive	Positive	Johnson et al. 2004	Positive; Decrease Year After	Johnson et al. 2004; Johnson 2005
Baird's sparrow	Obligate	Yes	Moderately Intolerant	Negative	Positive	Positive from Moderate; Negative from Heavy Grazing	Johnson et al. 2004	Positive	Johnson et al. 2004
Le Conte's sparrow	Obligate	Yes	Moderately Intolerant	Negative	Positive	Unclear	Johnson et al. 2004	Possibly Positive; Negative Year After	Johnson et al. 2004; Johnson 2005
McCown's longspur	Obligate	Potentially	Highly Tolerant	Positive	Negative	Positive	Saab et al. 1995; Johnson et al. 2004	Unknown	Johnson et al. 2004
Chestnut-collared longspur	Obligate	Potentially	Highly Tolerant	Positive	Negative	Positive	Johnson et al. 2004; Saab 1995	Positive; esp. Year After	Johnson et al. 2004; Johnson 2005
Dickcissel	Obligate	Common	Moderately Tolerant	Negative	Positive	Positive from Moderate; Negative from Heavy Grazing	Saab et al. 1995; Johnson et al. 2004	Positive; Decrease Year After	Johnson et al. 2004; Johnson 2005

Montana Grassland Birds (cont'd)

Common Name	Grassland Status[1]	Nests in CRP	Grazing Tolerance[2]	Response to Annual Grazing[2]	Response to Periodic Grazing[2]	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Citation(s)
Bobolink	Obligate	Yes	Moderately Tolerant	Negative	Positive	Possibly Positive from Light Grazing	Saab et al. 1995; Johnson et al. 2004	Positive; Decrease Year After	Johnson et al. 2004; Johnson 2005
Red-winged blackbird	Facultative	Yes				Negative (Mod/Heavy), Possible Positive (light)	Saab et al. 1995	Positive; Decrease Year After	Horn and Koford 2000
Western meadowlark	Obligate	Yes	Moderately Tolerant	Negative	Positive	Positive from Moderate; Negative from Heavy Grazing	Johnson et al. 2004	Positive	Johnson et al. 2004
Brewer's blackbird	Facultative	Possible, if water	Moderately Tolerant			Neutral / Positive	Cornell Lab of Ornithology 2008	Unknown	Cornell Lab of Ornithology 2008
Brown-headed cowbird	Facultative	Yes	Highly Tolerant			Positive	Johnson et al. 2004	Unknown, Or No Effect	Johnson et al. 2004

1. Vickery et al. 1999
2. USDA/NRCS 2006d

APPENDIX E

FEDERAL AND STATE LISTED THREATENED AND ENDANGERED SPECIES IN MONTANA

PREDICTED RESPONSE TO MANAGED HAYING AND GRAZING FOR FEDERAL AND STATE LISTED THREATENED AND ENDANGERED SPECIES POTENTIALLY OCCURRING ON CRP LANDS IN MONTANA

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Federal and State Listed Threatened and Endangered Species in Montana

				Potentially Present on lands under CRP Practices?							
Common Name	**Scientific Name**	**Federal Status***	**State Status***	**CP1**	**CP2**	**CP4B**	**CP4D**	**CP10**	**CP18B**	**CP18C**	**Comment/Justification**
MAMMALS											
Black-footed ferret	*Mustela nigripes*	E	E	Y	Y	Y	Y	Y	Y	Y	Associated with prairie dog towns; open level sparse grass areas.
Gray wolf	*Canis lupus*	E	E	N	N	N	N	N	N	N	Inhabits forested areas.
Grizzly bear	*Ursus arctos*	T	T	N	N	N	N	N	N	N	Inhabits mountain forests, open meadows, and river valleys.
Canada lynx	*Lynx canadensis*	T	T	N	N	N	N	N	N	N	Inhabits forested areas.
BIRDS											
Eskimo curlew	*Numenius borealis*	E		N	N	N	N	N	N	N	Does not breed in or migrate through Montana.
Interior least tern	*Sterna antillarum*	E	E	N	N	N	N	N	N	N	Requires large shorelines along rivers, lakes, etc.
Piping plover	*Charadrius melodus*	T	T	N	N	N	N	N	N	N	Occurs on sandy upper beaches, especially where scattered grass tufts are present and sparsely vegetated shores and islands of shallow lakes, ponds, rivers, and impoundments.
Whooping crane	*Grus americana*	E	E	Y	Y	Y	Y	Y	Y	Y	May use CRP fields during migration.
Bald eagle	*Haliaeetus leucocephalus*		T	N	N	N	N	N	N	N	Primarily a forest and riparian area species. May rarely feed on small mammals and carrion in grass or shrublands, but primary habitat is near rivers, lakes, and streams.
PLANTS											
Water howellia	*Howellia aquatilis*	T	T	N	N	N	N	N	N	N	Annual aquatic.
Ute ladies' tresses	*Spiranthes diluvialis*	T	T	N	N	N	N	N	N	N	Found in wetlands, seeps, and areas with high water tables.
Spalding's catchfly (campion)	*Silene spaldingii*	T	T	Y	Y	Y	Y	Y	N	N	Mesic grasslands species.

*E: Endangered; T: Threatened

Predicted Response to Managed Haying and Grazing for Federal and State Listed Threatened and Endangered Species Potentially Occurring on CRP Lands in Montana

Common Name	Scientific Name	Predicted Response to Grazing 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)	Predicted Response to Haying 1/5 or 1/3 Outside PNS	Recommendations	Citation(s)
Black-footed ferret	*Mustela nigripes*	Dependent upon prairie dog towns, grazing could enhance habitat for prairie dogs.	Allow 1/5 or 1/3 grazing.	Truett et al. 2001; KDWP 2004	Dependent upon prairie dog towns, haying could enhance habitat for prairie dogs.	Allow 1/5 or 1/3 haying.	Truett et al. 2001; KDWP 2004
Whooping Crane	*Grus americana*	Moderate grazing is unlikely to affect this species; however, intensive agriculture has been listed as a possible threat to this species.	Allow moderate grazing; 1/5 or 1/3.	NatureServe 2008	Haying could have minor to no effect on this species since it only passes through during migration.	Allow 1/5 or 1/3 haying.	NatureServe 2008
Spalding's catchfly (campion)	*Silene spaldingii*	Adverse impacts from grazing include short-term loss of reproductive structures, individuals, and habitat degradation from trampling. Potential positive effects include reduced litter in areas where it accumulates. Since plant is green in late summer, it is often preferred by livestock.	Light to moderate grazing could be employed to reduce accumulated litter; heavier grazing might be detrimental to plant populations.	USDOI/ USFWS 2007; NatureServe 2008	Equipment can damage or kill dormant plants, negatively affecting populations.	Avoid haying areas with known plant presence.	USDOI/USFWS 2007

APPENDIX F

MONTANA FORAGE HARVEST REQUIREMENTS FOR PLANT SPECIES

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Montana Forage Harvest Requirements for Plant Species

Common name	Minimum Plant Height (in) Reached Prior to Initiating Grazing or Hay Harvesting	Minimum Stubble Height (in) Recommended to Remain at End of Grazing or Hay Harvesting Season
Grasses		
Rangeland		
Basin wildrye	10	6
Beardless wildrye	5	4
Big bluegrass	6	4
Bluebunch wheatgrass	6	4
Idaho fescue	6	4
Indian ricegrass	6	3
Nebraska sedge	6	3
Needle-and-thread, Columbia, letterman, and thurber	6	3
Needlegrass species	5	3
Nevada bluegrass	5	3
Prairie junegrass	5	3
Sandberg bluegrass mountain brome	4	3
Slender wheatgrass	6	4
Streambank wheatgrass	4	3
Thickspike wheatgrass	6	4
Tufted hairgrass	5	3
Western wheatgrass	4	3
Pastureland		
Annual grasses	3	2
Altai wildrye	6	5
Cereals grains	8	4
Creeping foxtail	6	4
Crested wheatgrass	6	3
Intermediate wheatgrass	8	4
Kentucky bluegrass	5	3
Meadow brome	6	4
Millets	8	4
Orchard grass	6	4
Pubescent wheatgrass	8	4
Reed canary grass	8	4
Russian wildrye	8	4
Siberian wheatgrass	6	3
Smooth brome	6	4
Sudan grass/sorghum	8	4
Tall fescue	6	4
Tall wheatgrass	8	6
Timothy	6	4

Montana Forage Harvest Requirements for Plant Species (cont'd)

Common Name	Minimum Plant Height (in) Reached Prior to Initiating Grazing or Hay Harvesting	Minimum Stubble Height (in) Recommended to Remain at End of Grazing or Hay Harvesting Season
Legumes		
Pastureland		
Alfalfa	6	4
Alsike clover	4	3
Birdsfoot trefoil	5	3
Cicer milkvetch	4	3
Hairy vetch	8	4
Ladino clover	6	3
Red clover	6	3
Sainfoin	12	6
Sweetclover	8	4
White clover	6	3

Source: USDA/NRCS 2008d