DECISION NOTICE:
CHRONIC WASTING DISEASE MANAGEMENT
PLAN FOR FREE RANGING WILDLIFE IN MONTANA

Background

This document details the decision notice (DN) prepared with the environmental assessment (EA) "Chronic Wasting Disease Management Plan for Free Ranging Wildlife in Montana". The original EA and DN were completed in 2005 and intended to serve as a management plan that would outline the FWP responses to Chronic Wasting Disease (CWD) detection in free-ranging wildlife (cervids) in Montana. An Adjusted Decision Notice was issued in February 2013 that suspended the portions of the original decision that mandated local eradication and limited monitoring efforts to symptomatic animals pending this decision notice.

The primary theme of the original Management plan was to take measures to eliminate CWD, by depopulating the local herd, once the disease is detected at a prevalence of 5% or more in free ranging wildlife. During that era, plans from other states included similar goals. CWD would be eradicated by eradication of the host species, typically deer, within some area containing infected individuals, determined with disease testing and herd movements data from radio-collared animals. The specific prescriptions to depopulate infected herds were largely been abandoned as being unfeasible and socially unacceptable in most cases.

CWD was first detected in free-ranging white-tailed deer in Wisconsin in 2002. The state's initial plan included objectives to prevent the spread of CWD and eradicate the disease in the affected areas, by depopulating the infected herds. Hunting regulations were liberalized and included unique hunter incentives in CWD infected areas with the objective of dramatically reducing deer abundance. The plan also included landowner kill permits and agency removal efforts. However, following 8 years of intensive management, deer abundance in the affected areas was only somewhat reduced, and the known distribution of CWD was substantially larger and increasing. Generally, there was a lack of support from hunters that evolved into widespread, vehement opposition to the eradication plan. Wisconsin abandoned the eradication objective although Illinois continued agency sharpshooting along the Wisconsin border.

The current data are still inconclusive as to the best management practice for CWD-infected cervids. Most state wildlife agencies' experience and the preponderance of evidence indicate that eradication is impossible due primarily to the long incubation period and persistence of the causative agent in the environment. There are some data from Illinois and Wisconsin that agency sharpshooting may contain the infection rate at a lower level. However, in a recent survey of landowners and hunters in Montana, that option lacked support from the majority of respondents.

Since there is not a clear prescription for managing CWD, current state plans tend to lean heavily on an "adaptive management approach", using management data and research findings to guide future decisions and management.

Adopting this proposal would direct FWP on surveillance strategies and outline options if CWD is ever detected in Montana.

Proposal

An FWP preferred alternative was not identified in the draft EA and this proposal will draw elements from several alternatives to direct agency management of CWD surveillance and a course of action should CWD be detected. In general, FWP will continue to test symptomatic animals and direct remaining testing funds to high risk areas. If CWD is detected, an adaptive management approach will be employed.

Prevention

FWP will maintain all regulations and policies in effect that are currently in place for prevention of the spread or introduction of CWD. Those include the ban on feeding big game animals, carcass transport from known CWD-positive states and provinces, and prohibition on movement of live cervids within the state. (Alternative 1)

Pre-detection Surveillance

The FWP preferred alternative recommended is a continuation of testing symptomatic deer and elk and focusing remaining funds into 1 high risk area annually. The high risk area will rotate among FWP administrative regions identified via the weighted surveillance strategy unless a CWD-positive is detected. (Alternatives 2 and 3)

Pre-detection Management

Since CWD has a long incubation period and data suggests that population level impacts will take several generations to be detectable, there will be no preemptive changes in deer or elk population management objectives. (Alternative 3)

Post-detection protocols

An internal CWD Action Team consisting of wildlife biologists, managers and wildlife health experts to annually evaluate actions taken. This team will utilize an adaptive management strategy to learn from prior year's activities and review new CWD-related research to improve future direction. The Wildlife Management Bureau Chief will chair the Action Team. (All alternatives)

General Post-detection Surveillance Guidance

If CWD is detected all surveillance will be focused in the hunting district and adjacent district(s) where it was detected. CWD surveillance within the hunting district will be focused using a weighted surveillance strategy to increase likelihood of detecting CWD. Additional funds, if available will be used to sample adjacent hunting districts. Mandatory testing of harvested animals will be considered for a period of time in high risk areas to increase sample size. Surveillance would be continued for a number of years in order to evaluate the success of attempts to minimize spread of CWD. Voluntary CWD testing of hunter harvested animals will be offered at hunters' expense. (Minor modification from Alternative 3)

General Post-detection Management Guidance

Management will be focused on reducing concentrations of animals and the density of susceptible age-sex classes in infected and high risk areas through hunting. Increased harvest quotas may be used in infected areas to reduce population densities below that of adjacent high risk populations. Lower age class structure will be maintained in CWD-positive hunting districts since CWD is more prevalent in deer 1.5 years and older. Management actions in adjacent high-risk areas would be the same as infected areas if prevalence rates exceed 1% in the index hunting district. (Alternative 6)

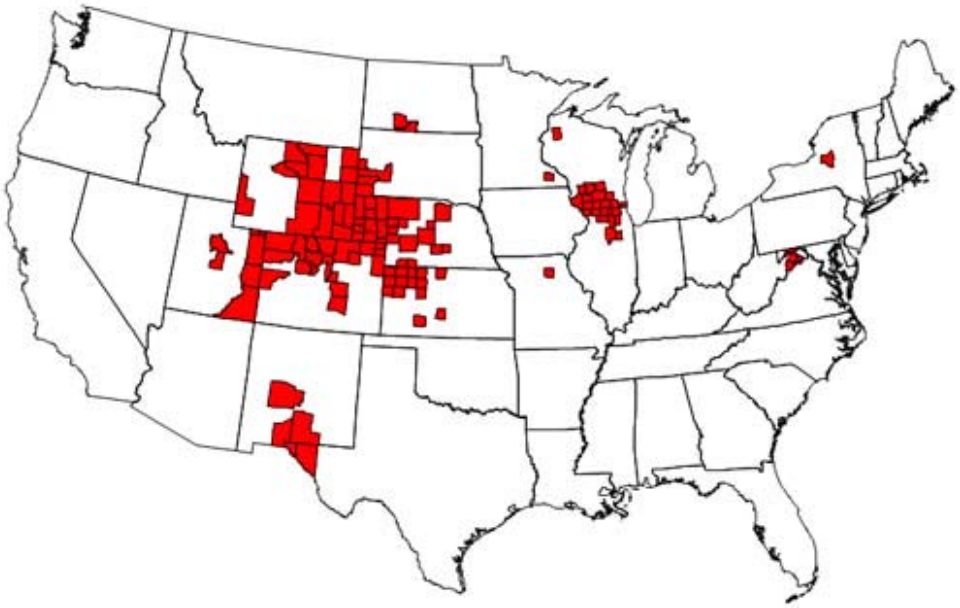

Figure 1. Location, by county, of known CWD presence in free ranging cervids in the United States.

APPROVED:

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Ken McDonald, Wildlife Division Administrator

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Date

Environmental Assessment for Detection and Management of Chronic Wasting Disease (CWD) in Montana

TABLE OF CONTENTS

Chapter 1 Introduction

1.0 Purpose and Need for Action

Chronic Wasting Disease (CWD) is a fatal neurologic disease of elk, deer and moose (cervids) for which there is no known cure. CWD belongs to a group of diseases called transmissible spongiform encephalopathies (TSEs). TSEs are unique in that the causative agent is thought to be an abnormally shaped protein (prion) that has the ability to transform cellular proteins into disease causing forms (Prusiner 1998). The prion associated with CWD produces lesions in the gray matter of the central nervous system resulting in a sponge-like (spongiform) change in an animal showing clinical symptoms for CWD (Williams 2005). Although considered a neurologic disease, CWD prions have been detected in tonsil and lymph tissue of elk, deer (Sigurdson et al. 1999, O'Rourke et al. 2003, Spraker et al. 2004, Williams 2005, Race et al. 2007) and moose (Baeten et al. 2007), the intestinal tract, urinary bladder, blood, and saliva of white-tailed deer (Haley et al. 2011), saliva and blood of mule deer (Mathiason et al. 2006), urine and feces of white-tailed deer (Haley et al. 2009, Haley et al. 2011), feces of mule deer (Tamguney et al. 2009) and elk (Pulford et al. 2012), muscle of mule deer (Angers et al. 2006) and white-tailed deer (Duas et al. 2011), fat from mule deer (Race et al. 2009), and antler velvet (Angers et al. 2009).

CWD can be contracted but animal to animal contact or through contaminated environmental material. The etiology of the disease is not well understood but it is believed that once contracted, CWD has always fatal to any infected captive cervid observed. The disease has an incubation period of 1 to 5 years and is rarely detected in animals less than 14 months of age.

Research of population effects of a disease with such a long incubation is difficult. Some research indicates that population level effects may take as long as 20 years to detect in populations with a high rate of infection. Given the economic and social importance of cervid populations in Montana, it is critical that Montana Fish, Wildlife and Parks (FWP) have a plan in place to prevent CWD from establishing in Montana, monitor for the presence of CWD and predetermined directions should the disease be detected.

1.1 Proposed action

Take reasonable, cost-effective measures to minimize the probability of introduction of CWD into Montana and develop a response plan if detected.

1.2 Objectives of the Action

1. Minimize effects of CWD on ungulate populations.
2. Maximize recreational opportunities.
3. Maintain ungulate populations at objective.
4. Minimize health risks of CWD for humans.
5. Maintain public trust and support.
6. Reduce uncertainty of CWD/effects on populations/human health.
7. Minimize cost.

1.3 Location

This will be a statewide detection and response plan with an initial emphasis on high risk areas and/or infected areas.

1.4 Relevant Plans

The surveillance portion of this plan may impact other wildlife management plans if funding must be diverted from those plans to fund testing at a statistically significant level. CWD surveillance will have no impacts on any existing cervid management plans.

The Montana Department of Livestock recently received approval from the U.S. Department of Agriculture for implementation of the herd certification program for farmed cervids

Higher deer, elk or moose densities may serve to increase the risk of transmission within these cervid populations. Herd reductions, especially the removal of older-aged males, are potential options in controlling the spread of CWD. Many herd management strategies include a reduction in cervid densities. If CWD is detected in Montana, aggressive cervid herd management that results in population reductions (or if a decision is made for preemptive management) could be in direct conflict with species management plans.

1.5 Authority and Responsibility

Several sections of Montana Code Annotated give FWP the responsibility for management of all wild, native cervids. The Department of Livestock has authority for disease management and for the management of “alternative livestock” which includes farmed cervids. Although establishment of new cervid farms was banned via a 2001 citizen initiative, 39 elk farms still exist under the grandfather clause in the law.

Chapter 2 Alternatives

Introduction

From 2004 until just recently, FWP has been operating under CWD plan that directed an aggressive approach to eradicate CWD if detected. The plan required capturing 50 deer or elk; performing tonsil biopsies then radio collaring the animals to determine home range for future planned actions. An effort was then to be made to either control CWD in the immediate area or attempt to eradicate the disease using hunters and agency personnel. Adequate sampling was to be done to provide a 99% confidence level of detection a 1% infection rate. This plan was suspended by the FWP Commission in January, 2013.

In this assessment, all alternatives have the same basic components – prevention, surveillance, management and public education. Alternatives 1 through 4 assume CWD is not present in Montana and addresses actions to be taken to prevent or detect CWD. Alternatives 5 through 8 are possible actions to be taken in the advent that CWD is detected. The final decision/management plan will likely be a compilation of parts of several alternatives both pre- and post-detection. All alternatives will utilize an internal CWD Action Team consisting of wildlife biologists, managers and wildlife health experts to annually evaluate actions taken. This team will utilize an adaptive management strategy to learn from prior year's activities and review new CWD-related research to improve future direction.

2.1 Alternative 1 – **No Action**

This alternative assumes FWP will take no action to detect or prevent CWD in Montana. If no action were considered, CWD would probably reach Montana's wild cervids either from natural migration of the disease or illegal importation but the time frame is completely unknown. An illegal importation would be a random event difficult to predict, prevent or detect. CWD is present approximately 25 miles south of the Montana border in Wyoming, ~50 miles north in Alberta, ~100 miles north in Saskatchewan and 50 miles into the Dakotas. Some literature suggests the disease has a rather slow natural movement however both deer and elk are known to move great distances. Since infected animals may take up to 4 years to show clinical signs, the disease could easily moved by an infected but apparently healthy animal from Wyoming, the Dakotas, Saskatchewan or Alberta in 1 year.

Prevention: Statutes regarding baiting and feeding of wildlife, transport of cervids, carcasses/meat, and carcass disposal would remain unchanged and no additional priority would be given to the enforcement of those statutes.

Surveillance: Testing of cervids will be completed only upon hunter's request at hunter's expense.

Management: Deer, elk and moose management would proceed with no changes in the development of population objectives relative to CWD management.

Public education: CWD information on the FWP website will be maintained and updated when new significant scientific information is discovered or additional states or provinces are determined to be CWD-positive.

Alternative 2 - **Status quo**

This alternative would maintain the 2012/13 policy of testing only symptomatic animals or opportunistically collected samples. For the 2012 season, 4 elk, 4 mule deer, 4 white-tailed deer and 18 moose were sampled, in all of which CWD was not detected.

Prevention: Statutes regarding baiting and feeding of wildlife, transport of cervids, carcasses/meat, and carcass disposal would remain unchanged and no additional priority would be given to the enforcement of those statutes.

Surveillance: Incidental surveillance will occur with testing of symptomatic animals submitted to the wildlife lab or those collected in conjunction with other wildlife projects.

Management: No management actions will be taken.

Public education: FWP will maintain CWD information on FWP website. If CWD is detected, hunter/public education efforts will increase to improve adherence to statutes and to address concerns over human health/domestic animal impacts.

Alternative 3 – **Moderate surveillance**

This alternative will use a surveillance strategy that tests symptomatic animals, road-killed and hunter-harvested cervids at a level to provide a 95% confidence level of detecting a 1% infection rate.

Prevention: Statutes regarding baiting and feeding of wildlife, transport of cervids, carcasses/meat, and carcass disposal would remain unchanged and no additional priority would be given to the enforcement of those statutes.

Surveillance: CWD surveillance will be focused in high risk areas using a weighted surveillance strategy to increase likelihood of detecting CWD (Russell, In Press). Statewide surveillance of symptomatic animals will be maintained. Mandatory testing of harvested animals will be considered for a period of time in high risk areas to increase sample size. Surveillance would be continued for a number of years in order to evaluate

the success of attempts to minimize spread of CWD. Voluntary CWD testing of hunter harvested animals will be offered at hunters' expense.

Sample size goals for the CWD survey will utilize a weighted surveillance scheme (Walsh and Miller 2010, D.P. Walsh ed. 2012) and collect a sufficient number of samples to be 95% confident that we are able to detect one positive animal in a large population at CWD prevalence of 1%. Samples will come from a combination of hunter-killed, road-killed and symptomatic animals. A population of white-tailed deer, mule deer, elk and moose will be delineated based on the best available information for each species.

Management: No herd management processes will change.

Public education: FWP will maintain CWD information on FWP website. If CWD is detected, hunter/public education to improve adherence to statutes and to address concerns over human health/domestic animal impacts.

Alternative 4 - **Aggressive prevention**

This alternative will use all the options discussed in Alternative 3 plus additional measures to increase samples sizes and changes in population management to reduce the likelihood of an infection spreading if established.

Prevention: Statutes regarding baiting and feeding of wildlife, transport of cervids, carcasses/meat, and carcass disposal would be reviewed for strengthening and additional priority would be given to the enforcement of those statutes.

Surveillance: FWP will establish mandatory hunter check-in for sample collection and location information in high risk areas. Additional check-stations will be established to increase hunter harvest sampling in the surrounding areas. Road-killed cervids within high risk areas will be collected and sampled as available. Any deer killed (culled) as part of any CWD management action will be sampled and tested.

Various techniques will be employed to increase sample size including but not limited to incentives to hunters, landowners and meat processors who provide samples for testing.

Management: Along Montana's borders where CWD has been detected in free-ranging cervids, hunter harvest opportunity will be increased in an effort to substantially reduce the number and/or density of those species (deer, elk, and moose) that could potentially be affected by the disease. Lower density ungulate populations will be maintained in high risk areas and borders with CWD infected states/provinces. Seasons may be adjusted to maintain lower age class both male and female (esp. male).

Public education: FWP will increase public information on CWD risks so the public is more likely to follow laws and understand rationale these rules. Annual reports detailing testing results will be published.

Alternative 5 - **Low impact actions to minimize spread among herds**

This alternative assumes a CWD-positive animal(s) has been found in Montana. A new surveillance strategy will be developed based on the location of the index animal and any new research available at the time. There will be no changes to current population management actions.

Prevention: Statutes regarding baiting and feeding of wildlife, transport of cervids, carcasses/meat, and carcass disposal will be re-evaluated and enhanced. Statutes on movement of carcasses will be strictly enforced.

Surveillance: Statewide surveillance will be driven by a weighted surveillance strategy as in Alternative 3. Other adjustments in the sampling strategy will be based on the location of the index case. Mandatory testing of harvested animals will be considered for a period of time in infected and high risk areas to increase sample size. Surveillance will be continued indefinitely to evaluate the success of attempts to minimize spread of CWD. Voluntary CWD testing of hunter harvested animals outside the infected/high risk areas, will be offered at hunters' expense. The focus of surveillance efforts will be to determine prevalence in the affected area and detection in adjacent districts. Whereas the goal of surveillance prior to detection of CWD in MT is early detection, determination of prevalence may be added as an objective after CWD is detected. Landowner and hunter incentives will be considered to increase sample sizes.

Management: No herd management processes will change.

Public education: FWP will produce annual CWD surveillance reports. Hunter/public education will emphasize improved adherence to revised/enhanced statutes and to address concerns regarding human health/domestic animal impacts.

Alternative 6 - **Moderate actions to minimize spread among herds and maintain low prevalence in infected herds**

This alternative assumes a CWD-positive animal(s) has been found in Montana. A new surveillance strategy will be developed based on the location of the index animal and any new research available at the time. Population management will emphasize actions that reduce the possibility of spread and/or increases in prevalence rates.

Prevention: Same as for Alternative 5. Statutes regarding baiting and feeding of wildlife, transport of cervids, carcasses/meat, and carcass disposal will be re-evaluated and enhanced. Statutes also will be strictly enforced.

Surveillance: Surveillance in high risk and infected areas will continue as in alternative 5. Surveillance strategy will be developed to address prevalence rates within CWD infected areas. Mandatory testing for the infected hunting districts and adjacent hunting districts will be conducted indefinitely to increase sample size and improve confidence in prevalence estimates. Surveillance would be continued within CWD infected and high risk areas for a number of years to evaluate the success at minimizing spread and to understand and minimize the effects of CWD on cervid populations given the prevalence of CWD. Voluntary CWD testing of hunter harvested animals will be offered at hunters' expense.

A weighted surveillance strategy developed to detect new cases early and to evaluate spread of CWD will be maintained in high risk areas until it is determined that the CWD plan should be modified. In infected areas, a surveillance strategy will be designed to estimate prevalence and evaluate the effects of management actions with a desired level of confidence. Once this is achieved, weighted surveillance strategy will be initiated in infected areas.

Management: Management will be focused on reducing concentrations of animals and the density of susceptible age-sex classes in infected and high risk areas through hunting. Increased harvest quotas may be used in infected areas to reduce population densities below that of adjacent high risk populations. Lower age class structure will be maintained since CWD is more prevalent in deer 1.5 years and older. Management actions in areas with documented infections would be the same as in high-risk areas.

An acceptable level of CWD prevalence will be agreed upon by FWP and stakeholders within the infected area. Management actions to meet and maintain prevalence at the level will continue until it becomes clear that the prevalence goal is not attainable, management actions are not effective, or until there is no longer social tolerance of the management actions. Management actions will periodically be reviewed. If management actions appear to be effective, the decision may be made to continue. If management actions appear not to be effective or social support of the actions changes significantly, the decision may be made to cease or change the chosen management strategy.

Public education: CWD annual surveillance reports will be continued. Comprehensive hunter/landowner/public education program will be developed to improve adherence

to revised/enhanced statutes, obtain input regarding management actions, and to address concerns regarding human health/domestic animal impacts.

Alternative 7 - **Aggressive efforts to minimize spread among herds and maintain low prevalence in infected herds**

This alternative assumes a CWD-positive animal(s) has been found in Montana. A new surveillance strategy will be developed based on the location of the index animal and any new research available at the time. Population management will emphasize actions that reduce the possibility of spread and/or increases in prevalence rates.

Prevention: Same as for Alternative 5. Statutes regarding baiting and feeding of wildlife, transport of cervids, carcasses/meat, and carcass disposal will be re-evaluated and enhanced. Statutes also will be strictly enforced.

Surveillance: Surveillance strategy similar to that of Alternative 6, with mandatory testing of harvested animals in infected areas. In addition, since hunter harvested sample numbers may not provide a large enough sample size to determine prevalence with a desired level of certainty, FWP will consider agency captures of live deer for CWD testing. Results of surveillance would inform management actions to decrease prevalence to a desired level and minimize effects of CWD on cervid populations in the infected area while minimizing spread to other herds.

Management: Hunting will be used to decrease population densities and maintain lower age structure in infected CWD areas and high risk areas, and to maintain lower population densities in CWD infected areas than in adjacent high risk areas. FWP will work with landowners toward voluntary reduction of populations through hunting, and consider paying/assuming leases that may restrict public access. If desired prevalence cannot be attained through hunter harvest alone, sharpshooting will be considered. Sharpshooting by FWP would occur after hunting season to try to attain the low prevalence goal. Hunting quotas and sharpshooting efforts will be informed by previous years' testing results. There will be an enhanced effort to remove and test symptomatic animals.

A prevalence rate will be identified below which the effect of CWD on the infected populations is minimized and the risk of spread is reduced. Expectations of the public must also be considered in this decision. Experience of other infected states/provinces, modeling efforts and other research studies may help inform the selection of the prevalence goal.

Public education: Same as alternative 3.

Alternative 8 - **Local herd health management**

Prevention: Same as alternative 3

Surveillance: A surveillance strategy will be developed to maximize ability to detect CWD spread and monitor CWD prevalence in infected areas based on chosen management strategy.

Management: A "one size fits all" approach to CWD management will work given the diversity of habitats where cervids exist. FWP personnel and local stakeholder or constituent groups will develop herd or population plans tailored more specifically to circumstances of particular populations/areas. These herd plans would be delivered to the FWP Commission for final decision. Areas of the state may be identified based on their known infection status or estimated risk of infection and these identifiers may be used to determine appropriate management actions to meet stated objectives. Management actions may consist of actions listed in one or more of the alternatives above, or may be unique alternatives that have not been included in this list. The goals of the program should be compatible with management strategies in adjoining areas.

Public education: Same as alternative 3

2.3 Process Used to Develop the Alternatives

Various FWP employees attended a structured decision making (SDM) session in September 2012. The following were determined at that time to be the fundamental objectives for Montana's CWD plan some of which may be in direct conflict with others.

1. Minimize effects of CWD on ungulate populations
2. Maximize recreational opportunities
3. Maintain ungulate populations at objective
4. Minimize health risks of CWD for humans
5. Maintain public trust and support
6. Reduce uncertainty of CWD/effects on populations/human health
7. Minimize cost

During the SDM meeting, the group was divided into 3 teams. Each team was asked to brainstorm alternatives that could potentially be included in a state CWD plan. The types of alternatives generated typically fell into three categories: surveillance, prevention and response

(management). Any combination of these alternatives could become part of a state CWD plan. A selected group of alternatives could include individual alternatives from each category, or a group of alternatives could be proposed that completely eliminates alternatives from any one category. General consensus was that a CWD plan must be flexible and allow for adaptability for different circumstances.

In the spring of 2013, FWP conducted surveys of private landowners and resident big game hunters regarding their perceptions of alternative management actions for preventing Chronic Wasting Disease (CWD) from coming to Montana and managing/controlling the disease if it is ever detected in wild cervid populations (Lewis et al. 2013). Results of this survey indicate that most landowners and hunters are supportive of increasing surveillance for CWD along Montana's borders. To help prevent CWD from coming into the states, both groups are also highly supportive of implementing more restrictive regulations regarding the transportation of out-of-state harvested deer, elk and moose being brought into Montana. Hunters and landowners also appear to be in alignment regarding other potential management actions. In particular, while both groups are not supportive of management actions that would require the use of trained sharpshooters, they are moderately supportive of management actions that would use hunters to help reduce or eliminate populations of deer, elk, or moose affected by the CWD if it is ever detected in the state. The survey results reveal support for establishing a voluntary testing program for hunter-harvested cervids to better estimate and monitor the disease if it is detected. These results show some commonality with states where CWD has been detected where hunters have supported the use of hunting to reduce populations but have not supported sharpshooting. Tolerance with population reduction has shown to have its limits in some states where hunters oppose significant reductions in deer or elk populations.

2.4: Summary Comparison of Impacts of Each Alternative on Objectives.

Objectives	**Alternative 1** No Action	**Alternative 2** Status quo	**Alternative 3** Moderate surveillance	**Alternative 4** Aggressive prevention
Minimize effects of CWD on ungulate populations	Possible long-term impacts (20+ years)	Possible long-term impacts (20+ years)	Possible long-term impacts (20+ years)	Possible long-term impacts (20+ years)
Maximize recreational opportunities	Possible long-term impacts (20+ years)	No impact	No impact	Short-term increase Long-term decrease
Maintain ungulate populations at objective	Possible long-term impacts (20+ years)	No impact	No impact	Probable lower population objectives
Minimize health risks of CWD for humans	No Impacts – currently there is no evidence of human impacts	No Impacts – currently there is no evidence of human impacts	No Impacts – currently there is no evidence of human impacts	No Impacts – currently there is no evidence of human impacts
Maintain public trust and support	Probable loss of public support	No impact	Increased public support	Decreased public support
Reduce uncertainty of CWD/effects on populations/human health	Increased uncertainty	No impact	Slight reduction in uncertainty	Reduced uncertainty
Minimize cost	No direct financial impacts	Low cost	Increased cost	Significantly increased cost

2.4: Summary Comparison of Impacts of Each Alternative on Objectives (con't.).

Objectives	**Alternative 5** Low impact actions to minimize spread among herds	**Alternative 6** Moderate actions to minimize spread among herds and maintain low prevalence in infected herds	**Alternative 7** Aggressive efforts to minimize spread among herds and maintain low prevalence in infected herds	**Alternative 8** Local herd health management
Minimize effects of CWD on ungulate populations	Possible long-term impacts (20+ years)	Some decrease in long-term impacts (20+ years)	Some decrease in long-term impacts (20+ years)	Probable decrease in long-term impacts (20+ years)
Maximize recreational opportunities	No Impact	No impact		
Maintain ungulate populations at objective	No Impact	No impact		
Minimize health risks of CWD for humans	No Impacts – currently there is no evidence of human impacts	No Impacts – currently there is no evidence of human impacts	No Impacts – currently there is no evidence of human impacts	No Impacts – currently there is no evidence of human impacts
Maintain public trust and support	Increased public support	Moderate increased public support	Some increased public support	Increased public support
Reduce uncertainty of CWD/effects on populations/human health	Reduced uncertainty	Reduced uncertainty	Reduced uncertainty	Reduced uncertainty
Minimize cost	Increased costs	Greater cost than Alternative 5	Greater cost than Alternative 6	Moderate increased personnel costs

Chapter 3 Affected Environment

3.1 Introduction

Chapter 3: This section describes the existing conditions of the environmental resources in Montana that could be affected by implementing any of the alternatives presented in Chapter 2. The description of the existing environment in Chapter 3, combined with the predicted effects of the "no action alternative, (Alternative 1) in Chapter 4 will establish the baseline conditions against which the decision maker and the public can compare the potential effects of Alternative 2 through 8 on the environment.

3.2 Description of Relevant Affected Resources

3.2.1 Montana's Native Deer and Elk Populations

Montana is populated by two species of deer: white-tailed deer (Odocoelius virginianus) and mule deer (O. hemionus). The two species have evolved individual attributes that constrain each to its own ecological niche and contribute to differences in habitat selection (Mackie et al. 1998). Mule deer and white-tailed deer are distributed statewide with a 10-year average estimated at 500,000 deer in Montana. Distribution of mule deer is statewide. White-tailed deer are also distributed statewide but generally restricted to lower elevation drainages and agricultural land.

Viable deer populations are directly correlated with the appropriate habitat. Mule deer populations are generally driven by the wide variation in mule deer fawn survival and white-tailed deer populations have considerable less variation due to their preference for river-bottom habitats augmented by irrigated agriculture. For example, mule deer numbers in the prairie/breaks can double in as little as two years during favorable environmental conditions. In such years, fewer than 20 percent of fawns die in their first year of life and only a percentage or two of adults die of natural causes. When conditions are unfavorable, deer numbers can decline up to 50 percent in a single year. During the severest of conditions, 95 % of all fawns may die within their first year and 25-35 % or more of adults can succumb to natural causes of mortality. In contrast, mortality patterns for white-tailed deer in river-bottoms associated with irrigated agriculture in eastern Montana display less annual variation. Fawn survival and recruitment averages 75+/- 20 fawns/100 adult females which are the highest recorded among all deer populations studied in Montana. Because of high fawn recruitment rates, and low to moderate natural losses of adult females (11-16 percent), whitetail populations in these habitats can sustain comparatively high hunter harvest rates (Hamlin and Mackie 1989, Mackie et al 1998). The effects of disease-related mortality on deer population dynamics can only be understood in the ecological context of other more significant factors that influence populations. Pac (2005) and Newell and Lukas (2011) documented the impacts of hunting season regulations on deer population and harvest parameters. In the event of a disease outbreak, these data may be used to select for a population with an age and sex structure conducive to disease management.

Movement and dispersal of mule deer and white-tailed deer are tied directly to the preferred habitats of the species that are in turn tied to the environmental adaptations that the species have acquired through time. Morphological differences such as body size, musculature and gait, coloration, and antler growth make mule deer more suited to life in dry, open, rugged terrain and white-tailed deer are more suited to dense deciduous woodland. Subtle differences in digestive systems and physiology of the two species can also be associated with habitat selection. While mule deer are better adapted to handling larger amounts of coarse forage typical of dry, open areas, white-tailed deer are restricted to more succulent, higher quality food which is evident from the species' close association with agricultural lands in eastern Montana. These and other behavioral and environmental resource issues determine the movement and dispersal of members of each of the species (Mackie et al. 1998).

Mackie et al. (1998) also summarized movement of deer which would prove valuable in developing any regionalized sampling plan. Emigration of deer or elk is probably the most important factor to consider in the nonhuman-caused introduction of CWD prions. In their research they found high variability in the deer movement that was unique to individuals and habitats and urged caution in generalization of the data. Home range ranged from 1.1km^2 to 33.5 km^2. This variability in mobility of deer weakens the statistical reliability of any predetermined disease sampling scheme.

Members of both deer species utilize 2 distinct seasonal home ranges in the summer and winter. Distances between these 2 ranges varied from a few to as much as 130km. When resource requirements cannot be met in one local area, specialized uses and use of home ranges begin to develop. Habitat differences across Montana result in varying home range sizes for mule deer and white-tailed deer depending on the area. In a study of mule deer and white-tailed deer inhabiting a 543 km2 area of eastern Montana prairie, mule deer occupied home ranges varying from 0.5 km2 to 19.7 km2 for winter home range and 0.5 km2 to 6.2 km2 for summer home range. Similarly, white-tailed deer had winter home ranges varying from 1.1 km2 to 13.7 km2 and summer home ranges varying from 0.5 km2 to 8.8 km2 (Wood et al. 1989). Movement patterns for white-tailed deer, however, were not as discreet as those of mule deer and varied in response to the distribution of available forage and cover resources over time. White-tailed deer showed less fidelity to home range with emigration of white-tailed deer, especially females, from home ranges more common than for mule deer. One radio-collared white-tailed doe in a study of eastern Montana prairie populations left the home range at 3 years of age and was shot 2 years later 93 km away.

Rocky Mountain Elk (*Cervus elaphus*) are generally associated with coniferous mountain habitats in western and central Montana. Elk also can be found in coniferous breaks habitat along major drainages. Although elk utilized open grassland habitats in eastern Montana prior to settlement of the prairies, current elk populations use extensive areas of conifer forests for security cover. Consequently, elk are sensitive to cover loss in logged and roaded forests. Elk will often avoid areas intensively grazed by cattle, especially during the growing season. Montana's elk population is estimated at 130,000 to 160,000.

Elk feed on a combination of grass and forbs on a yearlong basis with grass generally dominating the diet. Shrubs can be an important part of the diet during winters of deep snow cover and depleted grass resources. Elk migrate following elevation in mountainous areas of Montana, concentrating on low elevation southerly exposures during the winter. Elk generally winter at slightly higher elevations than mule deer and have a greater tolerance for snow cover. Low elevation elk populations in eastern Montana show some seasonal shifts in distribution from summer to winter. Higher elevation elk of western Montana tend to have favored calving areas usually at the upper elevation portions of their winter range. In general, elk are highly mobile and have large home ranges (Mussehl and Howell 1971).

Seasonal migrations among Montana's elk herds from summer to winter ranges vary depending on habitat resources and topography. Cow elk in the Gravelly-Snowcrest area migrate between 13 and 72 miles with emigration from the herd as far as 121 miles and immigration from as far as 105 miles. Individual bulls in the same herd have shown emigration maximums of 250 miles to near Ten Sleep, Wyoming. Immigration into the area of individual bulls has been as far as 125 miles from the National Elk Refuge in Jackson, Wyoming (Hamlin and Ross 2002). Cow elk from the Lower Clark Fork herd have been documented to migrate from 7 to 30 miles during the year while emigration of both bulls and cows of up to 90 miles has been documented (Henderson and Sterling, et al. 1993). Annual migration movements of elk in the Blackfoot Clearwater – South Fork Flathead herd have been shown to be as much as 27 miles for cows and 51 miles for bulls (Hurley, 1994). Elk in the Gallatin Drainage show maximum migration distances of 35 to 40 miles with at least half the population migrating only about half that far. A 3-year-old bull elk that was shot on the C.M.Russell Wildlife Refuge in the Timber Creek area in November of 2002 had been tagged on the Theodore Roosevelt National Wildlife Refuge in Medora, North Dakota as a calf and had probably traveled in excess of 200 miles. In October of 2003, a bull elk shot north of Hinsdale, Montana was identified as an alternative livestock (game farm) animal that had escaped from an alternative livestock facility in Climax, Saskatchewan; a distance of over 80 miles.

MFWP has been testing the wildlife populations of Montana for the presence of CWD since 1996. An early surveillance program in wild elk was initiated in areas adjacent to Yellowstone National Park in 1996 to determine if the disease might have moved northward out of Wyoming. Increased surveillance activities began in 1998 following a directive from the Governor's Office for Montana Fish, Wildlife & Parks (MFWP) and Montana Department of Livestock (DoL) to work cooperatively on surveillance and control of this disease. MFWP developed and adopted a more detailed surveillance program in October 1999 for wild deer and elk. The purpose of the survey was to determine the presence or absence of the disease in wildlife with some as yet to be determined statistical reliability. Statistical reliability is impacted by sample size, population size, and success of collection. Collection was constrained by access to samples (check stations) and various harvest regulations (opportunity to hunt deer or elk) within each area. This 1999 plan included broad geographic surveys, special collections, and targeted surveys. Initially, the broad geographic surveys emphasized the central and southern portions of Montana where deer and elk are most common and where CWD would naturally spread from Wyoming, South Dakota or Colorado where it was known to occur at that point in

time. After the discovery of CWD in Saskatchewan emphasis was also directed to region 6 along Montana's northern border with Canada. Since 2000, surveys have concentrated on high-risk areas where MFWP considers possibility of detecting CWD in Montana the greatest. The high-risk areas include Saskatchewan border with Montana (region 6) and along the border with Wyoming and South Dakota (regions 3, 5, and 7). An additional high-risk area was added in 2000 and included the area around an alternative livestock ranch where captive cervids had been diagnosed with CWD in late 1999 (region 2). Special sample collections were conducted by FWP outside of hunting seasons as opportunities presented themselves. Targeted surveys emphasized animals with clinical symptoms collected by the field biologists and wardens throughout the state (Anderson, N., and K. Aune 2004). The results of the surveillance surveys conducted since 1998 are presented in Table 2.

Table 2. Chronic Wasting Disease test results 1998 – 2011

Season	Hunter	Road Kill	Target	**Total**
1998	441	1	2	**444**
1999	575	3	4	**582**
2000	240	2	20	**262**
2001	189	1	18	**208**
2002	976	4	17	**997**
2003	2,010	3	47	**2,060**
2004	2,333	68	22	**2,423**
2005	1,970	77	39	**2,086**
2006	1,166	114	84	**1,364**
2007	1,408	86	16	**1,510**
2008	1,806	219	6	**2031**
2009	1,203	110	9	**1,322**
2010	1,053	68	9	**1,130**
2011	768	70	11	**849**
2012	10	0	20	**30**
TOTAL	**15,707**	**825**	**324**	**16,856**

3.2.2 Wildlife Management Tools

Wildlife population dynamics and ecology of deer and elk are more complicated than the cause and effect relationships between available forage and habitat and population numbers. Rather than the balance among a few components including deer density and forage quantity, deer populations function in complex ecosystems and vary in accordance with a balance of the total environment (Mackie et al. 1998). The most influential factors in deer population dynamics seem to be weather, habitat condition, predation and other natural mortality, and hunter harvest. Although harvest of deer and elk by hunting mortality is still the essential and most easily controllable management tool, not only available habitat, but an array of environmental variations affecting fawn recruitment rates and natural mortality rates must also be considered.

Until 2001 Montana's mule deer population was managed as one continuous population across the state. Under Montana FWP's Adaptive Management Plan initiated in 2001, five population management units have been identified based upon mule deer population dynamics and habitat characteristics. Those management units include the Northwest Montane, the Mountain Foothills, the Prairie/Mountain Foothills, the Southern Mountains; and the Prairie Breaks. Population indicators for each of the management units have been established based upon historical population data to define objectives for each unit and to aid the department in developing regulations (standard, liberal, and restrictive) for hunting season recommendations to the FWP Commission (MFWP-Adaptive Harvest Management, 2001). In studying and managing the deer populations, mortality factors, habitat carrying capacity, reproduction and recruitment, and other factors are taken into consideration to provide instructive insight into proper actions required to manage the populations at preferred levels. The goal of the adaptive management plan is to "manage for the long-term welfare of Montana's deer resource and provide recreational opportunities that reflect the dynamic nature of the deer populations." The major components of the Adaptive Management Plan are population objectives, monitoring program, hunting regulation alternatives, and modeling.

The primary management tool used by wildlife professionals is sport hunting. By adjusting harvest quotas in population management units as well as the population segment targeted (antlered vs. antlerless), game management objectives for male:female ratios and for manipulation of total populations numbers have been achieved in most areas. The adaptive harvest management plan employed by FWP for mule deer will provide the same information concerning management.

The annual mule deer harvest in Montana has ranged from about 65,000 to 38,000 animals in the period from 2004 to 2012. The annual white-tailed deer harvest in Montana has ranged from about 69,000 to 43,000 and elk harvest ranged from 20,500 to 26,200 over that same time period.

3.2.3 Wildlife and Montana's Economy

Hunting spent $33.7 billion in the United States in 2011 (USDI, Fish and Wildlife Services and U.S. Department of Commerce, U.S. Census Bureau 2012). In addition to providing funding to MFWP through the sale of hunting licenses, the hunting and wildlife viewing industry in Montana are substantial contributors to the state's overall economic output. In 2011, hunters spent an estimated $627 million in Montana. Wildlife watchers spent an estimated $400 million that same year. (USDI, Fish and Wildlife Services and U.S. Department of Commerce, U.S. Census Bureau 2013)

3.2.4: Human Health

There are a number of transmissible spongiform encephalopathies (TSEs) that affect humans. Most of the TSEs affecting humans occur as a sporadic disease with no identifiable source of infection or as a familial disease linked with mutations on the prion protein gene (Belay, ED, 1999). A notable exception among the human TSEs is the variant form of Creutzfeldt-Jakob disease (vCJD), which is associated with the food-borne transmission of bovine spongiform encephalopathy (BSE or "mad cow") to humans (Will et al. 1996). Unlike sporadic CJD, vCJD, affects a younger population and causes some distinguishing diagnostic characteristics in its victims allowing differentiation from sporadic CJD. As of June 2012, there have been 227 cases from 12 countries with all but 6 had likely exposure to the BSE agent while in the United Kingdom (Centers for Disease Control, 2013).

The prion thought to cause CWD has not been shown to affect humans. There is a perception of risk from CWD, however, due to the association that has been established between mad cow disease, a domestic animal TSE, and vCJD, a human TSE. That perception has caused public concern and heightened public awareness of TSE diseases. Even though there is no evidence that CWD can infect any animal other than a cervid, there is still a considerable level of concern among hunters and landowners that CWD is a risk to human health. In a recent survey by FWP, 39.6% of the hunters and 43.5% of the landowners responding expressed concern or very concerned about the risk to humans. There have been numerous reports by the media of big game hunters who have developed CJD. These reports, for the most part, have not indicated whether the disease diagnosed in the humans has been sporadic CJD or variant CJD. The reports have resulted in investigations by the Center for Disease Control (CDC) evaluating the risk of CWD to hunters or to those consuming venison. A causal relationship, such as a food-borne link between CWD and the human illness, could not be identified in any of the cases investigated. Despite the fact that CWD has been present in free-ranging cervids in Colorado and Wyoming for decades, the incidence of CJD and the age distribution of CJD case-patients in these two states are similar to those seen in other parts of the United States (Belay, et. al., 2004). As mentioned above, there have only been three cases of vCJD reported in the United States. It is believed that exposure in all three cases occurred overseas. Studies done by CDC have not identified a link between CWD and any form of prion disease in humans.

As a means of providing additional protection against any potential risk of human exposure to known and unknown zoonoses, the Montana Department of Fish, Wildlife & Parks has suggested that hunters follow some simple precautions:

- Animals that appear sick should not be harvested or consumed.
- Wear rubber latex gloves when field dressing carcasses.

• Minimize handling and don't eat the brain or spinal cord.
• Bone out the meat and discard the brain, spinal cord, eyes, spleen and lymph nodes.
• Be sure to wash your hands and all utensils after processing your animal.

These precautions provide a degree of protection to individuals not only against any possible exposure to the CWD prion agent, but also against a number of other pathogens that could potentially be carried by wildlife.

3.2.5: Alternative Livestock

Alternative livestock are defined as any privately owned caribou, white-tailed deer, mule deer, elk, moose, antelope, mountain sheep, or mountain goat indigenous to the state of Montana, a privately owned reindeer, or any other cloven-hoofed ungulate as classified by the Department of Fish, Wildlife & Parks (MFWP). An alternative livestock ranch is defined as an enclosed land area upon which alternative livestock may be kept for the purposes of obtaining, rearing in captivity, keeping, or selling alternative livestock. Finally, a person may not operate an alternative livestock ranch in Montana without having first obtained an alternative livestock ranch license from FWP prior to November 7, 2000.

In November, 2000 Montana voters passed Initiative 143 which prohibited the shooting of alternative livestock for a fee, the issuance of any new alternative livestock licenses by MFWP, and the transfer of an alternative livestock license to a third party. As of June, 2013 there were 39 licensed alternative livestock facilities in Montana that reported a total of 1086 alternative livestock animals behind their exterior fences. These facilities generate income from the sale of breeding stock, meat or animal products, and antler velvet. Prior to November, 2000, an additional source of income had involved the charging of a fee to an individual for the opportunity to shoot alternative livestock.

As of June of 2013, CWD has been diagnosed in captive cervids in 13 states and 2 Canadian provinces. In most cases, the infected herds have been depopulated. CWD was diagnosed at a Montana alternative livestock facility in November of 1999. That herd was depopulated and all 87 animals (elk) tested for CWD resulting in the detection of 9 animals positive for CWD. A trace quarantine herd was identified in Montana that had received elk from the original CWD infected herd. All 32 elk from that trace quarantine herd were also killed and the adults were tested for CWD. None of those trace herd animals were positive for CWD.

Currently, the Montana Department of Livestock requires by their administrative rules that any alternative livestock animal over 12 months of age and older that dies on an alternative livestock ranch in Montana be tested for CWD. Since initiation of that program in 1999, more than 5800 samples have been submitted from alternative livestock ranches for CWD testing. Nine samples, all from the 1999 index herd mentioned above, have tested positive for CWD.

Once CWD is found in a captive herd, that herd is quarantined and an epidemiological investigation initiated to identify any trace back and trace forward herds. Any herds identified as CWD positive or CWD exposed are subsequently quarantined and a herd health program established. In the case of a CWD infected herd, depopulation has generally been conducted to enable CWD testing of the entire herd.

USDA/APHIS published the interim final rules for "Voluntary National CWD Herd Certification Program" in June of 2012. That program is intended as a national program to help prevent the spread of CWD within the captive cervid industry in the U.S. The program is no longer voluntary at the national level for interstate movement of captive cervids and 48 states and nine provinces require CWD testing for importation of cervids into their state. The national program requires CWD testing for all animals that die on the premises 12 months of age and older, individual identification of every animal in the herd, and maintenance of complete records concerning date of acquisition, source, date of disposal, and destination of any animal removed from the herd. Following 5 years of compliance with the herd certification program, the herd is given a "certified" status which is maintained as long as the herd stays enrolled in the program and continues to fulfill the requirements. Interim status levels of 1 through 5 are given based on the number of years that the herd has been successfully enrolled in the certification program.

Montana has required the elements of the federal program since 1999 testing approximately 5881 animals from captive facilities. In May 2013, the Montana Department of Livestock received approval of their Herd Certification program from USDA, APHIS and has implemented the national program within Montana.

In establishing their current programs, many states have prohibited the importation of any cervids unless they have originated from out of state facilities that have been successfully enrolled in a CWD surveillance program for anywhere from 3 to 5 years. Montana is one of those states that have not allowed the importation of cervids unless originating from facilities where surveillance programs have been in existence for 5 years. Because of that requirement, Montana has allowed the importation of only 44 cervids since 1999.

3.2.6 Disposal/Environmental Contamination

Disposal

The disposal of domestic or wild animal offal and/or carcasses of is an issue regulated by multiple departments in Montana. In most cases, deer or elk harvested in the field have been field dressed at the site of harvest and the internal organs left for scavengers. The inedible remains of hunter-harvested animals following processing have been disposed of at the discretion of the hunter or processor, but hopefully at municipal solid waste landfills. Due to the "waste of game" statutes in place in Montana, these remains have been composed primarily of skeletal remains and remnants of meat not easily removed from the bones.

Meat processors typically take the material remaining after processing, which may amount to over 35% of the original body weight of the dead animal, to rendering facilities. Rendering facilities retrieve the fat and protein from these remains through heating at 125-135 degrees centigrade followed by extraction procedures. The final products containing the fat and protein are utilized in many domestic products, but primarily in pet feed, poultry feed, and swine feed. Rendering does not affect prions. In a1997 rule designed to prevent the spread of BSE, the FDA prohibited the use of rendered protein and bone meal obtained from ruminants for use in feed for other ruminants. In addition, on November 12 2002 the FDA announced that "the Agency will not permit material from Chronic Wasting Disease (CWD)-positive animals, or animals at high risk for CWD, to be used as an ingredient in feed for any animal species" (FDA, Center for Veterinary Medicine, 2002).

Road-killed wild animals have been disposed of under agreement with the Montana Department of Transportation by highway maintenance crews. These carcasses are disposed of in municipal solid waste landfills. Wild game that dies naturally in the field (either private or public lands) is almost always left to decompose naturally or is consumed by scavengers.

In the case of animals suspected of dying from contagious diseases, the primary goal of carcass disposal is to prevent spread of the disease agent to other animals. In the event of an outbreak of a foreign animal disease, special measures are needed to ensure the disease agent is eradicated to contain the outbreak and prevent its revivification at a future time. In some cases, the agent will not survive long after the death of the infected animal and proper burial is sufficient for the animal carcass. Other diseases can require incineration. Determining the required option to contain the disease and protect future animals from it is addressed on a case-by-case basis by state agencies. It is the owner's responsibility to properly dispose of animals he or she knows to be sick (see Department of Livestock Statutes later in this section). Diseases that agencies are typically concerned with include but are not limited to hoof and mouth disease, anthrax, and transmissible spongiform encephalopathies. Options for disposal in these cases include burial at an engineered and regulated landfill, rendering with controlled disposal, incineration, and digestion by high pressure- high temperature-alkaline hydrolysis.

Modern landfill sites include engineered liners, caps, and leachate and gas collection systems, and provide an excellent capacity for carcass disposal. They are relatively low cost as compared to other methods of disposal. The Wisconsin Department of Natural Resources prepared a risk assessment on the disposal of potential CWD infected deer from Wisconsin in municipal solid waste landfills (Wisconsin DNRC, 2002). In that analysis, they determined that the primary pathway of potential risk identified for the CWD prion following landfill disposal of infected deer can be described as carcass >landfill>leachate >wastewater treatment plant>sludge>farm field>ingestion by humans or deer/elk. While they concluded that a quantitative or semi-quantitative assessment of the risk was not possible due to unknowns such as the quantity of infectious agent in a deer carcass and the dose required for infection, they did conclude that it was "reasonable that while absolute numbers relating to human health risk cannot be generated, the available knowledge about CWD and other TSEs suggests that landfilling of CWD-infected deer does not pose a significant risk to human health." The Wildlife Diagnostic

Laboratory disposes of cervid tissue remnants from the surveillance program by landfill. These carcasses do not present a risk at this time. If CWD becomes established in areas of Montana, disposal methods for those materials will be re-evaluated.

Rendering as a means of disposal of animal carcasses involves cooking of animal tissues at specific temperatures for set time periods, to produce water, tallow (fats) and meat and bone meal (the protein portion). Rendering involves some level of inactivation of the prion and may reasonably be expected to reduce infectivity by 10-100 fold. Studies using BSE and scrapie agents, however, indicate that TSE agents can survive rendering to some degree. Controlled disposal would be required since the tallow, meat and bone meal could contain infectious agent and could not be marketed for fertilizer or animal feed. There are potential concerns regarding water contamination and quality. If water from the process contained solids the prion agent could "stick" to this. Filtering solids from the wastewater before discharge could reduce potential infectivity in wastewater. The use of the rendering option for disposal is not possible in Montana at this time due to the lack of an approved rendering plant within its borders.

Incineration is another method for disposal of animal carcasses. Incineration is a highly effective method for complete inactivation of the prion protein responsible for TSE diseases if temperatures are sufficiently high. Air curtain incinerators will reach temperatures of 1800 ^{o}C to 2800 ^{o}C when operated properly and will provide efficient incineration and inactivation of the prion. Air curtain incinerators utilize an open topped pit or combustion box, are commonly fueled with wood, and have a fan along the length of the pit or box to both provide the oxygen necessary for high temperature combustion and an air curtain preventing the escape of smoke or unburned particulate from the pit or box. Air curtain incinerators have the capacity to incinerate as many as 100 elk carcasses in a day. There are no air curtain facilities maintained in Montana at this time.

Finally, alkaline hydrolysis may be used for disposal of CWD infected carcasses or carcasses at high risk of contamination with the CWD agent. The tissue digestion equipment is expensive and has a low volume capacity. The process does, however, provide for inactivation of TSE agents and results in a sterile aqueous solution of small peptides, amino acids, sugars, and soaps. By-products consist of the mineral constituents (ash) and softened bones and teeth remnants that can be recovered as sterile bone meal. The process uses alkaline hydrolysis at an elevated temperature to convert the proteins, nucleic acids, and lipids of all cells and tissues, as well as infectious microorganisms and TSE agents.

Carcass disposal became an issue in Montana after finding CWD on an alternative livestock ranch in southwestern Montana. Eighty-seven animals either died or were sacrificed and samples taken for diagnosis and research. Initially, the carcasses were slated for disposal at a municipal landfill. Those plans, however, were abandoned when county authorities at the landfill location balked at disposing of the potentially contaminated carcasses in that county. Eventually, carcasses were disposed of by incineration using a trench incineration technique that incorporated an air curtain to completely incinerate the elk carcasses.

Statutes and Rules Regarding Animal Carcass Disposal in Montana:

Department of Environmental Quality Statutes:

75-10-212. Disposal in unauthorized area prohibited -- exception. (1) A person may not dispose of solid waste except as permitted under this part.
(2) It is unlawful to dump or leave any garbage, dead animal, or other debris or refuse:
(a) in or upon any highway, road, street, or alley of this state;
(b) in or upon any public property, highway, street, or alley under the control of the state of Montana or any political subdivision of the state or any officer or agent or department of the state or political subdivision of the state;
(c) within 200 yards of a public highway, road, street, or alley or public property;
(d) on privately owned property where hunting, fishing, or other recreation is permitted; however, this subsection does not apply to the owner, the owner's agents, or those disposing of debris or refuse with the owner's consent.
(3) A person in violation of this section is absolutely liable, as provided in 45-2-104, and is subject to the civil penalties provided in 75-10-233.

75-10-213. Unlawful disposition of dead animals -- exception. It is unlawful to:
(1) place all or any part of a dead animal in any lake, river, creek, pond, reservoir, road, street, alley, lot, or field;
(2) place all or any part of a dead animal within 1 mile of the residence of any person unless the dead animal or part of a dead animal is:
(a) burned or buried at least 2 feet underground; or
(b) placed in an animal composting facility that is licensed under Title 75, chapter 10, part 2; or
(3) being the owner, permit all or any part of a dead animal to remain in the places specified in subsections (1) and (2) except as provided in subsection (2).

75-10-214. Exclusions -- exceptions to exclusions. (1) (a) This part may not be construed to prohibit a person from disposing of the person's own solid waste that is generated in reasonable association with the person's household or agricultural operations upon land owned or leased by that person or covered by easement or permit as long as the disposal does not create a nuisance or public health hazard or violate the laws governing the disposal of hazardous or deleterious substances.
(b) This part does not apply to the operation of an electric generating facility, to the drilling, production, or refining of natural gas or petroleum, or to the operation of a mine, mill, smelter, or electrolytic reduction facility.
(2) The exclusions contained in subsection (1) do not apply to a division of land of 5 acres or less made after July 1, 1977, that falls within the definition of subdivision in Title 76, chapter 4, part 1, or the Montana Subdivision and Platting Act in Title 76, chapter 3.

Montana Department of Livestock Statutes:

81-2-108. Diseased animals not to run at large -- burial of carcasses. It shall be unlawful for any owner, agent, or person in charge of any domestic animal or animals that are known to be suffering from or exposed to a dangerous, infectious, contagious, or communicable disease to permit such animal or animals to run at large on the public range or public highway. It shall be the duty of the owner or agent or person in charge of animals which died or they have reason to suspect did die from an infectious, contagious, communicable, or dangerous disease to properly bury or burn the same.

Montana Department of Livestock Administrative Rules:

32.3.125 DISPOSAL OF CARCASSES

(1) Carcasses of animals that have died from other causes than anthrax must be disposed of in a satisfactory manner so as not to become a public nuisance or a menace to livestock or poultry. Carcasses of dead animals may not be disposed of along public highways, streams, lakes, or rivers, or allowed to remain on the ground surface so as to become a public nuisance or a menace to livestock or poultry.

32.3.1002 HANDLING OF CARCASSES AND CARCASS PARTS OF ANTHRAX INFECTED ANIMALS

(1) The carcasses of animals which have died of anthrax may not be skinned or opened, except when considered necessary by a deputy state veterinarian in order to make a definite diagnosis.

(2) Hides from carcasses of animals that have died of anthrax shall not be removed. Hides which have been removed prior to diagnosis of anthrax shall be burned or buried.

(3) Carcasses of animals that have died of anthrax must be completely burned, covered with quick lime and buried 6 feet deep from the tip of the carcass, or sterilized in a licensed rendering plant under the immediate supervision of a deputy state veterinarian.

(4) If it is necessary to move the carcass of an animal that has died of anthrax, the natural openings must be plugged with cotton or other suitable material.

(a) The carcass must be rolled onto a stone boat or skid and hauled to the nearest spot suitable for burning or burial.

(b) The stone boat or skid must be burned or thoroughly disinfected.

(c) Carcasses may be moved in an approved licensed rendering plant truck by written

permission from and under the supervision of a deputy state veterinarian.

Environmental Contamination

The role that environmental contamination plays in the transmission and epidemiology of CWD remains unclear. There is concern, however, that the potential exists for indirect natural transmission of CWD through contamination of the environment by excretions, secretions, or the decomposition of infected animal carcasses. (USDA/APHIS, 2002) Studies in Colorado (Miller, et al. 2004) provided preliminary information concerning environmental contamination. In one study, CWD negative animals placed in a pen that had contained CWD infected animals 2.2 years earlier eventually developed CWD as a result of the environmental exposure. In a second study, deer developed CWD following exposure to carcasses of CWD infected deer that had been placed in pens 1.8 years earlier and allowed to decompose. These findings indicate that "environmental sources of CWD infection represent potential obstacles to control in natural and captive settings." Recognizing the risk of environmental contamination, at least 36 states and 5 Canadian provinces have imposed carcass import restrictions concerning importation of heads and spinal cords of deer and elk harvested from other states

Prions, the theoretical causative agent of CWD and other TSEs, are highly resistant to standard decontamination procedures and agents typically used to inactivate other pathogens. Those decontamination procedures include ultraviolet light, temperature extremes, and oxidizing agents. At the present time there does not appear to be a practical way of disinfecting large areas of contaminated ground in order to deactivate the CWD agent. To date de-stocking and disinfecting CWD-infected premises, followed by restocking after an interval of time, has not been successful in eliminating the disease on the premises. The reasons for such failures are not known. Further research is required to determine how effective disinfection of large areas (e.g. deer or elk farms) can be carried out.

3.3: Other Regulatory Agencies

USDA/APHIS

The U.S, Department of Agriculture, Animal and Plant Health Inspection Service (USDA, APHIS)is a federal agency charged with protecting and promoting U.S. agricultural health, regulating genetically engineered organisms, administering the Animal Welfare Act and carrying out wildlife damage management activities. Their Veterinary Services branch is responsible for the animal health portion of this charge and regulates the interstate transportation of animals. The interim final rules for Voluntary National CWD Herd Certification Program and minimum requirements for interstate movement of deer, elk and moose were published in June of 2012. That program is intended as a national program to help prevent the spread of CWD within the captive cervid industry in the U.S. The program is voluntary at the national level but most states require some level of mandatory CWD testing for importation of cervids into their state. The voluntary national program requires CWD testing for all animals that die on the premises over

16 months of age, individual identification of every animal in the herd, and maintenance of complete records concerning date of acquisition, source, date of disposal and destination of any animal removed from the herd.

USFWS

In anticipation of finding CWD on United States Fish and Wildlife Service (USFWS) lands, planning guidelines were prepared by USFWS in February of 2004. The guidelines were intended to assist Regions in working with their field stations (primarily refuges and hatcheries) to develop site-specific plans for CWD surveillance and for management of CWD should it occur on USFWS lands. The guidelines placed a high priority on coordination of actions and shared use of resources with state wildlife agencies, other state and federal agencies and other partners. An environmental assessment for addressing CWD on the Charles M.Russell National Wildlife Refuge was developed in February 2007. Information was provided to field station personnel by MFWP to assist in their plan preparation.

DoL

The Montana DoL instituted a program for surveillance of CWD in captive cervids in April of 1999. Elements of that program include annual inventory inspections, reporting of deaths of all animals that have been individually identified (individual identification required by January 1 of the year following their birth) and CWD testing of all animals that die and are 16 months of age or older. Herds of origin wishing to import animals into Montana were initially required to have a 12-month surveillance period in compliance with the Montana requirements. That 12-month requirement was modified to 24 months in November of 1999 and modified once again in February of 2000 to 60 months.

Other States' Plans

It is generally accepted that the introduction of CWD into a current CWD-free state will occur through the movement of cervids or cervid parts. To that end, 36 states and five provinces have bans or restrictions on the importation of hunter-harvested cervid parts. Thirty-three states and four provinces prohibit the importation of live cervids from CWD-infected areas (Appendix 1). CWD-free states generally test under one or more of the following: symptomatic animals, road-killed animals and/or hunter-harvested cervids (deer, elk, moose). The level of testing in many states including Montana has fallen considerably since the cessation of federal funding for testing.

All 50 states and 10 Canadian provinces do some level of CWD testing in wildlife. Forty-four states and 10 provinces test captive cervids. The knowledge base and attitudes regarding Chronic Wasting Disease has changed considerably over the past decade. Yet, there is no clear biologically sound, socially acceptable, and financially viable solution. Many original state CWD plans were designed to eradicate the disease in the wild via drastic reductions in cervid populations and extensive testing wherever the disease is/was first discovered in the wild.

Several states contacted recognize the improbability of success in a disease eradication approach and advised that their state plans were under review for modification that would focus on containment in the event of an outbreak. Appendix 1 is a summary table for all 50 states and 10 Canadian provinces.

Chapter 4 Environmental Consequences

4.1 Introduction

A number of studies have demonstrated that prions entering the environment (i.e., from the saliva, feces, urine of infected deer), bind strongly to soil and are not easily degraded, persisting in the environment for years to decades. Soil-bound prions are more infectious than unbound prions. These data suggest that reducing the exposure of cervids to prions in the environment is not possible given today's knowledge base.

If CWD is detected in any of Montana's cervids, the possibility of eliminating the prion from the state is almost nonexistent. The only plausible scenario where eradication of the disease could be considered is if it was detected in a small, isolated population with almost no immigration or emigration; however, the prions would probably remain in the environment for a lengthy but unknown amount of time. It is not known if such a population exists and therefore, it is assumed that once the disease is present, it will persist in the Montana environment indefinitely.

Each of the alternatives presented discuss methods for the prevention of CWD in Montana, for CWD surveillance programs, for management of CWD once it is found in Montana, and for the dissemination of information to the public. The public information plan is consistent throughout all of the alternatives and has been provided in Appendix 2. Providing public information is a responsibility taken very seriously by the department and only the timeliest and most efficient program was considered for equal incorporation in each of the alternatives. Research on CWD is only briefly discussed in each of the alternatives. Appropriate research projects will be closely tied to the species, population density, and habitat parameters present where the disease develops and can only be discussed in general terms because specific information on those parameters is not currently known. In all cases, the research will be focused on evaluating the success of any management action implemented and improving programs to meet objectives, so research in this context can be thought of as a fundamental part of conducting CWD management actions. A CWD Response Team, made up of wildlife biologists and wildlife disease experts, will evaluate management success and any new scientific information concerning CWD. That team will make annual recommendations for any changes or modifications to the existing plan based on the science available and their expert judgments.

4.2 Cumulative Impacts

Cumulative impacts are impacts on the environment that result from incremental impacts of the action when added to other past, present, and future reasonably foreseeable actions. Data

are inconclusive on the cumulative impacts of CWD on cervid populations. It is suspected that population level impacts will occur but they will not be measureable until the infection rate is relatively high. These impacts may require as long as 20 years post-infection before impacting populations.

Another unknown in assessing cumulative impacts is the lack of data on treatments to reduce CWD prevalence relative to control areas where treatments have not been implemented. Most likely, annual fluctuations in populations will mask any population-level impacts.

Management action taken in alternatives 5 through 8 would have some cumulative impacts on the local area in which CWD is initially identified. They would be considered cumulative as the management actions would be commitments to annual actions taken until management goals are reached for each alternative. In most cases, this impact would occur as a decrease in the overall deer and/or elk population in the area and accompanying economic loss to the local economy from the decrease in big game and big game hunters in the area. These localized short term economic losses must be compared to potential long term losses that could occur if no management action were taken and CWD became established in the deer and elk populations not only locally, but also state-wide.

Preventative actions could have cumulative financial impacts on taxidermists and meat cutters in Montana over the years that the measures are in place. The preventative actions provide laws to prohibit the import of carcass parts, including deer and elk heads, from other CWD-positive states. Although that prohibition could negatively impact taxidermists who regularly process trophies from out of state animals, the impact may be reduced because other states have similar prohibitions. Therefore, many non-resident hunters harvesting an animal in Montana would have their trophy mounted in Montana prior to return to their home state. In the same regard, some meat cutters may lose business from resident hunters who have harvested an animal from out of state and must have the animal either boned or processed before bringing it back to Montana. Again, non-resident hunters who harvest an animal in Montana may provide additional business to the local meat cutters if they live in a state with similar prohibitions.

4.3 Irreversible and Irretrievable Commitments

An irretrievable commitment of a resource is one in which the resource or its use is lost for a period of time whereas an irreversible commitment of a resource is one that cannot be reversed. As stated earlier, once established, it is probably impossible to eradicate the disease from the state and it will become a disease management issue. The no action alternative would present the most risk in allowing the disease to be undetected for a number of years.

4.4 Environmental Consequences of CWD on Identified Issues

For the purposes of this environmental assessment, all alternatives were determined to have similar environmental consequences varying on a matter of undeterminable scale. There are known impacts to the environment and individual infected animals but current data are lacking as to the long-term impacts to the environment and population level effects making individual alternative assessments very speculative. Following is an analysis of known impacts of CWD and cervid populations.

4.4.1: Effect on Montana's Wild Deer and Elk

CWD is unlike other diseases that affect wildlife populations. Most disease agents, once they have established an infection in a susceptible host population, have the ability to move through that population rapidly. In those cases, outbreaks of the disease called epizootics may result in a high percentage of the population being affected (high morbidity) and, depending on the disease agent, a high percentage of death in the affected population (high mortality). In those cases, predicted effects on overall populations may be easily determined for diseases that are well understood.

CWD has an absolute mortality rate (100%) but does not produce a high rate of infection (morbidity) over short periods of time due, presumably, to relatively inefficient transmission and long incubation periods. Dulberger et al.(2010) estimated that although infected mule deer does weaned fewer fawns per doe, the effect was sufficiently small that it could be omitted in estimating the influences of CWD on population growth rates. Although a CWD-infected cervid population may have significant social implications, there is little data to predict long-term population level impacts.

The location of the initial CWD diagnosis in Montana and the affected cervid species will have a great influence the overall impact of CWD. Montana's deer herds have been divided into management units. Those management units include the Northwest Montane, the Mountain Foothills, the Prairie/Mountain Foothills, the Southern Mountains, and the Prairie Breaks. Depending on where CWD is found, the population density of the local herds and their migratory patterns within and out of those management units will influence the speed at which CWD is able to move across the landscape. Differences in environmental characteristics and population dynamics contributed to the definition of management units.
Powell et al.(???) found that there is a high level of genetic connectivity in Montana's mule deer therefore, from the perspective of disease ecology, Montana's deer herds should be considered as one continuous population. Geological or geographic barriers may slow the spread of the disease, but without adequate prevention and management, CWD may ultimately affect deer and/or elk throughout the state. Whether computer models have correctly forecast potential impacts on overall populations is yet to be determined.

4.4.2 Effect on Wildlife Management Tools

In 2012, almost hunters took to the field during the Montana deer season resulting in a harvest of about 108,000 mule deer and white-tailed deer combined. Similarly, elk hunters have participated in the management of the elk population in recent years with annual harvests averaging about 24,000 animals. In addition to providing a substantial economic impact to Montana's local economies and funding MFWP efforts to manage big game populations, those hunters have provided a vital tool for the management efforts needed to maintain healthy big game populations within the boundaries of habitat availability and social pressures. A reduction in numbers of hunters could have significant impacts on the ability of FWP to manage big game populations in Montana.

In 2002, license sales for the Wisconsin gun deer-hunting season declined approximately 11% following the discovery of CWD in the state (Vaske, J.J. et al. 2004)and never fully recovered. Hunter surveys conducted in South Dakota (Gigliotti, L.M. 2004) indicated that the prevalence of CWD in a particular hunting unit had a direct influence on hunter participation in that unit. Survey results in 2003 indicated that 59% of South Dakota hunters would change their hunting habits if only one CWD positive deer was discovered in their deer-hunting unit. If the prevalence of CWD in that hunting unit were 5%, however, 89% of the hunters indicated that they would change their hunting habits. Whereas only 2% to 4% of hunters indicated they would stop hunting deer in their unit if only one CWD positive deer were found, 9% to 15% indicated they would stop hunting deer in their unit if the prevalence of CWD were at 5%.

In a 2013 survey of hunter and landowner attitudes on CWD, Lewis (pers comm), only 11% of the hunters responded that they would likely or very likely move from their preferred hunting district in the event of a CWD infection.

Earlier research indicated that the effect of CWD on resident hunter participation may be localized to areas or regions of a state where CWD has been diagnosed, non-resident hunters indicated that they would be more likely to hunt in other states not affected by CWD. All of these reactions to CWD by hunters are tied both to CWD prevalence and to the perceived threat of CWD to human health. If prevalence levels increase to 50% in a particular state, surveys have shown that almost 50% of hunters will stop hunting in that state. Based on the findings from South Dakota and Wisconsin, 60% to 68% of hunters will stop hunting deer/elk in their state if prevalence level increases to 50% and CWD is shown to be transmissible to humans or cause human death (Needham, M.D. et al. 2004).

In addition to the potential loss of hunters as a general wildlife management tool, loss of hunter participation in regions of the state where CWD has been found may affect the success of potential management actions. Many of the alternatives described below enlist hunters to harvest animals from affected areas providing CWD prevalence data. Hunter's involvement will also be important in the reduction of population densities in CWD affected areas. If there is a reduction in hunter participation, responsibility to carry out management actions may fall more with trained agency staff. Surveys have shown that the public acceptability of using trained agency staff to take management actions as opposed to using hunters is directly related to the prevalence of CWD in the management area and the status of any CWD human health issues.

4.4.3 Effect on Montana's Economy

On average, about 150,000 elk license are sold to Montana residents and another 18,000 licenses are sold to non-resident elk license sales generating significant income to MFWP. In addition, deer and elk hunters accounted for a large share of the nearly $9 million in Federal Pittman-Robertson funds distributed to MFWP as a result of federal excise taxes collected on the manufacture of rifles, handguns, ammunition, and archery equipment. Thus, elk and deer hunting are of major importance in direct funding to MFWP for conservation and management programs affecting elk, deer and other wildlife species native to Montana.

Funding management programs for the prevention and control of CWD in Montana would provide additional economic strain on MFWP. Wisconsin reported an expenditure of $14.7 million in 2002-03 fiscal year for combating CWD. Of that $14.7 million, $12.6 million was spent by the Wisconsin Department of Natural Resources, Wisconsin's equivalent of MFWP (Bishop, 2004). Montana's CWD surveillance program is being funded through entirely license fees. It is anticipated that the funding of CWD management through appropriated license dollars would adversely impact other programs at MFWP designed to manage and protect our wildlife resources.

In addition to providing funding to MFWP through the sale of hunting licenses, the hunting and wildlife viewing industry in Montana are substantial contributors to the state's overall economic output. In 2011, hunters spent an estimated $627 million in Montana (USDI, Fish and Wildlife Services and U.S. Department of Commerce, U.S. Census Bureau 2013). Big game hunting accounted for about 80% of this total. Wildlife viewing provided an additional estimated expenditure of $400 million. Thus, hunting and wildlife viewing accounted for an estimated $1.027 billion in expenditures in Montana. The amount spent on hunting and wildlife viewing represents 23% of the economic output provided by farming, ranching, and agricultural services combined in Montana in the same time period. Similar comparisons are 62% of the combined economic output of all mining, 38% of the output of the petroleum industry, and 32% of the combined output of forestry products, wood products, and pulp and paper. All of these dollars provide a "multiplier effect" as the dollars spent for lodging, fuel, sporting goods, equipment, etc. are then used to provide jobs and income to local communities where the dollars generated are again turned over to purchase more local goods and services.

Information generated in Wisconsin during the 2002 and 2003 hunting seasons indicated a 9.9% reduction in hunters in 2002 (the year of the initial CWD diagnosis in Wisconsin) and a 5.9% reduction in 2003. The slight increase in hunters between 2002 and 2003 was most likely the result of surveillance efforts conducted in 2002 and assurance to hunters that CWD was limited to a few southern counties (Bishop, Richard C., 2004). Although only 6% of Wisconsin hunters were non-residents, there was a 19% decrease in the number of non-resident hunters in 2002. In evaluating Wisconsin's economic losses due to CWD concerns, Bishop pointed out that, although he estimated a $55 million loss to Wisconsin due to CWD, most of that loss was not removed from the Wisconsin economy since Wisconsin's predominantly resident hunters probably spent their hunting dollars on other commodities in Wisconsin. Approximately 16% of

Montana big game hunters are non-residents. If, Montana lost 19% of those non-resident hunters as Wisconsin did, the economic impact would be significant. The economic contributions to Montana retail sales from non-resident deer and elk hunters were estimated at $74 million in 2012 (Brooks pers. comm). A loss of 19% of those non-resident hunters would amount to an impact of about $14 million.

Resident hunters in Montana make up approximately 70% of the total hunter numbers. Of the $627 million dollars spent in 2011 on hunting related activities in Montana, a portion of that was money spent by resident hunters in local economies. Although those dollars may be redistributed to other expenditures and not lost to the total Montana economic output if CWD were diagnosed in Montana, that redistribution could have significant impacts on local economies. Many businesses in those local economies depend heavily on the big game hunting season to supply a substantial portion of their annual incomes.

4.4.4 Effect on the Alternative Livestock Industry

MFWP currently licenses 39 alternative livestock ranches (game farms) in Montana. Those licensed facilities reported an inventory of 1086 animals in their December, 2012 inventory reports to the department. Elk are farmed for breeding stock, velvet antler production, meat production, and sale to out of state “game parks” for the harvest of trophy bulls.

Nationwide, the North American Elk Breeders Association has estimated that there are 150-160,000 elk on U.S. alternative livestock ranches. Based on an estimated average value of $2500 per elk, the value of 150,000 elk on U.S. farms is $375 million. In 1999, gross receipts for the elk farming and velvet antler industry in North America totaled an estimated $150 million (USDA/APHIS, 2003). CWD has, however, had a significant impact on the economy of the alternative livestock industry since 1999. CWD was first found in an alternative livestock herd in South Dakota in 1997. Since that time, CWD has been found in additional farmed cervid herds in South Dakota, Colorado, Nebraska, Montana, Wisconsin, Kansas, Oklahoma, Minnesota, and New York. The finding of CWD either in captive or free ranging cervids has prompted at least 23 states to ban the import of cervids. In addition, the Republic of Korea has suspended all imports of deer and elk, and their products, including velvet antler, from the United States. While it is difficult to determine the economic loss in the U.S. from the sale of velvet antler to Korea, Canada did show an 80% drop in their CA$13 million sale of velvet antler to Korea the year after CWD was introduced into Korea from Saskatchewan (Saskatchewan Agriculture and Food, 2000). Likewise, the ban on the import of animals has reduced the market size and corresponding market value for breeding stock sales economically affecting the alternative livestock industry.

Economic impacts of CWD to the alternative livestock industry result not only from the loss of market value of the animals and their products, but also from the expenses incurred by alternative livestock ranchers to participate in state and federal programs required for the control of CWD. Currently, any alternative livestock animal in Montana that dies and is 16

months of age or older must be tested for CWD. In addition, the CWD testing program requires that an annual inventory be conducted on each alternative livestock herd by a D.V.M. certified by the state of Montana as a "designated agent" of the Department of Livestock (DoL). Ear tags on all alternative livestock must be read and the final inventory verified against department records. As of June, 2013 there were 39 licensed alternative livestock facilities in Montana that reported a total of 1086 alternative livestock animals behind their exterior fences. These facilities generate income from the sale of breeding stock, meat or animal products, and antler velvet. Prior to November, 2000, an additional source of income had involved the charging of a fee to an individual for the opportunity to shoot alternative livestock.

The diagnosis of CWD either in an alternative livestock herd or in a wildlife population in close proximity to a captive herd may result in the quarantine of that facility by the DoL. DoL would develop a "herd plan," in cooperation with the alternative livestock licensee. One outcome of that herd plan could be depopulation of the animals to allow for CWD testing. The developed herd plan may also restrict the rancher as to what animals may be kept on what had been captive cervid pastures for a long period of time resulting in further economic loss to the licensee. In the one instance where a Montana alternative livestock licensee was faced with the diagnosis of CWD in his herd, a total of 87 animals were "depopulated." Although the herd plan included a requirement that cervids not be allowed on that land for a minimum of 2 years, the former licensee has since opted to relinquish his alternative livestock license and not to restock the facility with captive cervids.

If an operator did not opt for depopulation of CWD exposed animals, the other option would be a state-imposed quarantine lasting for several years. Quarantine of the animals would require that the facility have a double fence to restrict any direct contact with domestic livestock or with free-ranging wildlife. Under quarantine conditions, the licensee would not be able to sell or move live animals from the facility severely limiting any economic opportunities.

4.4.5 Effect on Human Health

The prion thought to cause CWD has not been shown to affect humans. The perception of risk from CWD due to the association that has been tentatively established between mad cow disease, a domestic animal TSE, and variant Creutzfeldt-Jakob Disease (vCJD), a human TSE, has caused public concern and heightened public awareness of TSE diseases. There have been numerous reports by the media of big game hunters who have developed CJD. These reports, for the most part, have not identified the disease diagnosed in the humans as sporadic CJD or variant CJD. As a result of the media reports, studies have been conducted by the Center for Disease Control (CDC) to evaluate the risk of CWD to hunters or to those consuming venison. In all cases, a causal relationship, such as a food-born link between CWD and a human illness, could not be identified. Additionally, even though CWD has been endemic in Colorado and Wyoming for decades, the incidence of sporadic CJD and the age distribution of sporadic CJD

case-patients in those two states are similar to that seen in other parts of the United States (Belay, et. al., 2004). There have only been three cases of vCJD reported in the United States. Each case involved patients who had been exposed to the BSE agent in overseas prior to moving to the United States. Studies done by CDC to this point have not identified a link between CWD and any form of prion disease in humans.

Although there is no scientific evidence to implicate CWD in any form of human illness, it is anticipated that the finding of CWD in wildlife populations will raise new concerns among the public. Based on the results of surveillance studies carried out in deer and elk in Montana since 1998, there is no known human exposure to the CWD prion agent in Montana due to handling or consumption of free-ranging deer or elk or tissues at this time. In a 2013 survey of hunters and landowners, Lewis (pers comm) found that that hunters and landowners are split on their concern level about the human health risk from CWD with landowners being slightly more concerned than hunters.

4.4.6 Effect on Environmental Contamination

The role that environmental contamination plays in the transmission and epidemiology of CWD remains unclear. There is concern, however, that indirect natural transmission of CWD could occur through contamination of the environment by excretions, secretions, or the decomposition of infected animal carcasses. (USDA/APHIS, 2002) Studies recently completed in Colorado have provided new information concerning environmental contamination. In one study, CWD negative animals placed in a pen that had contained CWD infected animals 2.2 years earlier eventually developed CWD as a result of the environmental exposure. In a second study, CWD uninfected deer developed CWD following exposure to carcasses of CWD infected deer that had been placed in pens 1.8 years earlier and allowed to decompose. These findings indicate that, “environmental sources of CWD infection represent potential obstacles to control in natural and captive settings” (Miller et al. 2004).

Even before the Colorado study, many states had imposed carcass import restrictions limiting importation of heads and spinal cords from deer and elk harvested in other states. Dr. Mike Miller, the author of the study, has indicated that the implications of the Colorado environmental studies must, however, be taken in context concerning the spread of CWD via parts from harvested animals. First, the infective material used as the “contaminant” in these studies originated from animals that were either in the end stages of CWD or had died of CWD. In the wild, the majority of CWD infected animals harvested would not be showing clinical symptoms and would conceivably not have the concentration of abnormal prion in the nervous tissue and lymph tissue that the study sources did. Viscera and other wastes left in the field by hunters harvesting normal appearing animals, even if they had been infected with CWD, would provide much less of an “infective dose” than that provided by the study animals as would the brains and spinal cords of harvested animals brought home or to the meat processor. Second, the experimental animals in the Colorado study were confined in relatively small pens where

repeated exposure to the contaminated material was more likely to occur than would be expected on the open ranges.

Nevertheless, animals dying in the wild from CWD would have the capacity to transmit CWD to non-infected herd mates. If environmental CWD exposure does turn out to be an important aspect of natural CWD transmission in the wild, the disease may be expected to sustain itself in the face of eradication attempts that do not involve attempts to remove animal carcasses from the landscape. In addition, carcass remnants from harvested animals could provide an additional source of contamination if proper disposal methods are not utilized. The finding of CWD in Montana's wildlife populations may, therefore, precipitate some changes in carcass disposal requirements in Montana. Those requirements would be expected to decrease the possibility for the spread of CWD. Without a definite management plan, the form those requirements may take is difficult to predict.

4.5 Predicted Differences of Environmental Impacts among Alternatives

4.5.1 Biological Environment

There is little evidence of differences in impacts on the biological environment among all alternatives. Differences among surveillance techniques have no impact on the progression of the disease in the state. A laissez faire approach to cervid management after its discovery would allow the disease to progress "naturally" while there is no evidence that an aggressive approach to management would alter the progression of the disease. Once established there is currently no known method of elimination of the prion from the environment.

Impacts on Other Wildlife Populations

Local effects on other species are unknown. Any large predators in a management zone would be expected to be affected by decreases in the cervid population. Those predators may substitute other prey sources or leave the area. Scavenger populations may show a temporary increase due to the increase in viscera left behind from increased harvests. There is no indication at this time that scavenger or predator species can be "infected" by CWD. Any effect on endangered species would be evaluated depending on the population of endangered species, if any, in the area.

4.5.2: Physical Environment

Soil, Water and Air

Only alternatives (Alternatives 5-8) that strengthen carcass importation regulations could reduce the potential for CWD contaminated carcasses or the potential for improper disposal of carcasses from animals harvested within or outside of Montana. Contamination of soil with

prions could be an issue, although the importance of that issue in the natural transmission of CWD is not fully understood at this time. A prohibition on the removal of contaminated carcasses or of heads and spinal cords from the management area would reduce the potential for contamination of soils outside of the management zone with CWD.

Management actions in a defined area would require that no heads or spinal cords from animals harvested in that area be allowed to leave. Incineration of those carcass parts would be required using a state-owned portable incinerator. There would be minimal effect on the air due to the incineration of those carcass parts and that effect would be localized and short lived.

4.5.3: Socioeconomic Environment

Alternative Livestock Industry

No direct effects are anticipated through the enactment of management actions included in Alternative II. If there is an alternative livestock facility within the home ranges of free ranging cervids in the affected area, it would be expected that DoL would take appropriate actions to assure the safety of the rest of Montana's alternative livestock industry. Those actions may include facility quarantine and accompanying herd plan.

Economy

The effect of CWD on Montana's economy has been discussed previously in section 4.4.3. Alternatives with increased harvests may be expected to have a short-term positive effect on the local economy as increased harvest took place over the years. That positive effect may be reduced if the management plan is successful in reducing local big game populations thus reducing income generated by hunting.

Human Health

No human health implications would be expected with the implementation of any alternative. The human health "impacts" are public perception of CWD rather than the actual impacts themselves. AS stated earlier, a survey of hunters and landowners by Lewis (2013, pers comm.) indicated there is a relatively high level of concern about the potential human health impacts although there are no data to support such concern. FWP needs to be cognizant of the perceived impacts and address them accordingly in any public education efforts. The public would be kept informed of the CWD status in Montana via various methods.

List of Persons and Agencies Consulted

Montana Department of Fish, Wildlife and Parks staff

Montana Department of Livestock

Montana Department of Health and Human Services

Random sample of 1500 hunters and 1500 landowners

US Department of Agriculture: Animal and Plant Health Inspection Services (APHIS)

US Department of Interior, Fish and Wildlife Service

Numerous State Fish and Wildlife Agencies

Public Comment

The draft EA was published on 11/29/13 for public comment and comments were accepted for 30 days. In addition to web publication, notices were sent to interested individuals and all Montana counties. A total of 7 online comments and 1 mailed comment were received. Comments were from one state agency, one non-profit and 6 individuals.

One commenter corrected information on USDA/APHIS indemnification program which is no longer available and corrected one paragraph on alternative livestock farms. They preferred Alternatives 3 or 4 for prevention (moderate or aggressive) and Alternatives 6 or 7 for protection of Montana's alternative livestock industry.

Five individuals commented. One person suggested we stop wolf trapping to allow wolves to "clean up diseases in ungulates." One comment urged FWP to remain vigilant in our efforts to detect CWD. One comments recommended we let CWD run its course and stop wasting license dollars. One comment urged FWP to stop out-of-state hunters. One comment supported Alternative 3. One comment referenced a recent study that indicated Illinois' sharpshooting program maintained infection rates at a lower level than Wisconsin's which discontinued agency sharpshooting and the role of artificial feeding in disease transmission. Another comment was received challenging the fact that CWD transmission to humans has not been proven and urging stricter regulations.

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APPENDIX

1- An up-to-date listing of CWD regulations table for all states and provinces can be found from CWD-info.org at http://www.cwd-info.org/pdf/CWDRegstableState-Province.pdf