# BLACK RIVER ELK HERD

## MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

*December 2001*

**Department of Natural Resources**
**Box 7921**
**Madison, WI 53707**

***PUB-WM-353 2001***

## EXECUTIVE SUMMARY

The Central Forest Region of Wisconsin was once home to a native population of elk. A local group of Jackson County enthusiasts has sparked community interest in restoring an elk population following a request from the Jackson County Board of Supervisors. The Department conducted 3 public forums to see if support exists within the region for a reintroduction effort to take place. From these forums, the predominant public feelings were positive. The significant concerns that were brought up, involved crop damage, animal health and potential recreation use restrictions. If elk are reintroduced into the Central Forest the Department recommends an elk population management alternative of releasing 35 animals initially and allowing the herd to increase naturally to a herd of 390 animals, without additional stocking. Population goals in a 70 square mile core range, completely located within the Black River State and Jackson County Forest land in Jackson County, would be set at about 2 elk/square mile in the core range. Surrounding the core range, a lower population goal (1 elk/square mile) would be set in the 250 square mile buffer range on a mix of state and county forest and Ho-Chunk Nation Tribal lands. The buffer range would be set lower to help prevent the dispersal of elk to neighboring public and private lands.

Once population goals are reached, public hunting will be used to maintain the population at those levels. The population goals could be adjusted after the population has grown and dispersed to a level at which their interaction with Wisconsin's people, flora, and other fauna can be more thoroughly understood and predicted. Undesirable effects which will be indicators that elk densities are too high would include substantial impacts on winter browse or rare plants, elk occupation of deer yarding areas, declining elk productivity or survival rates, and increasing dispersal or habituation rates. In the area outside of the core and buffer ranges (referred to as the X-zone), elk causing damage or nuisance behavior will be hazed, captured or removed by lethal means.

Limited public hunting for bulls will begin when the population reaches about 150 elk. Harvest of both cows and bulls will begin when population reaches management goals. Elk hunts will be held every other year to reduce the administrative costs of conducting harvests of small numbers of animals.

The authority for elk habitat management lies with the Wisconsin Department of Natural Resources, private landowners, Jackson county, and the U.S. Department of Defense (Ft. McCoy). The Department recommends no changes to the existing county, state or federal forest (and timber harvest) management plans.

All released adult elk will be radio-collared to facilitate elk population monitoring. Population monitoring will focus on estimating population size and distribution, productivity, and survival. Aerial surveys incorporating mark-resight or sightability estimates will be used to estimate population size and distribution. Productivity will be assessed by determining calf:cow ratios during late winter. Survival rates will be measured by routine ground-monitoring of radio-collared elk and aging of carcasses, including hunter-killed animals. Whenever possible, elk carcasses will be necropsied using procedures developed by the Department's Wildlife Health Program to monitor for disease. Along with this disease monitoring and intense disease testing in conjunction with the 90 day quarantine of any elk intended for release in Jackson County, all elk handled for marking or monitoring purposes in the field after release will have blood samples drawn for disease testing purposes.

The impacts of elk herbivory on native vegetation are difficult to predict, and a habitat monitoring program will be important for determining these effects. Surveys will be conducted to monitor winter browse utilization by elk, and competition between elk and deer for winter habitat. Several species of rare plants may also be impacted, and patches of these plants will be monitored for evidence of elk herbivory.

In the designated elk range, habituated animals displaying nuisance behavior near residential areas, roads, or trails will be relocated. Hazing will be attempted. Those animals that cannot be captured or which continue to display nuisance behavior after one relocation attempt will be killed. Elk densities will be reduced through public hunting in areas surrounding those where problems with habituated elk have developed.

The potential for crop damage by a Black River elk herd exists, but the scope is yet to be determined. Elk causing crop damage inside the designated range before public hunting is initiated will first be hazed and/or relocated. If hazing/relocation is unsuccessful the animal will be killed. Once public hunting is initiated, additional permits will be issued for areas surrounding those where crop damage problems have occurred. The Department is seeking legislation to add elk to the list of species in the Wildlife Damage Abatement and Claims Program once public hunting is initiated, with $1.00/elk permit application received earmarked for that fund.

Because of the risk of disease transmission from captive elk to wild elk populations and the potential for escaped captive animals to mix with wild elk populations under current regulations, the Department recommends that no new licenses to keep farm-raised elk or red deer be issued within the designated Central Forest elk range.

Black bears and gray wolves are potential predators of elk in central Wisconsin. Although, there has been documented kills of elk in the Clam Lake herd by bears and wolves, and the Black River herd will undoubtedly experience the same, predation is not expected to be a major regulating factor for the herd. Predator management goals in the designated elk range will continue to be implemented without consideration for elk.

Compatibility of human activities with elk in the Black River area will have to be monitored. Because the proposed designated elk range lies primarily within the Black River State Forest and Jackson County Forest, the Department of Natural Resources and the Jackson County Forest and Parks department are the agencies that will regulate any activities. With one exception, the Department does not currently recommend restrictions on human activities to benefit elk. The Department is pursuing legislation to regulate artificial feeding and baiting of elk to limit habituation problems.

The Department has determined that establishing an elk herd in the Black River area is feasible if adequate resources are available to deal with the management needs for this herd. The Department recommends annual review of the herd with the option of removal if unforeseen complications develop which can not be resolved through management.

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**ACKNOWLEDGEMENTS**

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## INTRODUCTION

In 1989 the Wisconsin Department of Natural Resources (WDNR) was directed by the State Legislature to explore the likelihood of successfully reintroducing elk, moose, and caribou (Anderson 1999). The resulting publication "Feasibility Assessment for the Reintroduction of North American Elk, Moose, and Caribou into Wisconsin" (Parker 1990) determined that an elk reintroduction effort could succeed, while reintroductions of moose or caribou likely would not. Considerable public interest and adequate habitat within Jackson County has driven the Department to consider release of an elk herd. The objectives were to:

1. Re-establish an animal once native to the area.
2. Increase tourism by providing opportunities to view elk.
3. Provide educational opportunities to visitors about elk and their relationships with their habitat.
4. Provide opportunities for limited hunting of elk by state residents.
5. Provide opportunities for cooperation and partnerships between the public and private sector.

Wisconsin's first elk reintroduction effort was in 1931 when 17 elk were released near Trout Lake, but were eradicated by poachers. The modern day elk reintroduction occurred in 1995 near Clam Lake. Through this effort, interest was developed and a dedicated group of sportsmen known as the Jackson County Wildlife Fund (JCWF) proposed the concept of reintroduction of elk to eastern Jackson County. The Jackson County board adopted a resolution in support of the reintroduction of elk to public lands in eastern Jackson County. The JCWF forwarded their proposal to the Wisconsin DNR. The Wisconsin DNR, after determining that historical and adequate elk habitat existed in the Black River area, conducted public meetings in March of 1999 and September of 2000 to determine if public support existed on a community level. The three meetings held in September of 2000 showed support among the public, however, there were concerns in regards to crop damage, animal health and recreational restrictions which will be addressed later in this management plan.

The Department of Natural Resources is looking into reintroducing an elk herd in the Black River area. This document describes alternatives if an introduction were to occur as well as the ecological, social, and economic impacts of each alternative. Findings are based on studies and experiences from established elk herds and habits at Clam lake and other areas in the U.S. This document also serves as a management plan outlining management objectives and policies for an elk herd in the Central Forest.

## REINTRODUCTION AREA DESCRIPTION

The Black River area is approximately 300 sq. miles and is located in west central Wisconsin. This area is also part of the Central Sand Plains Ecological Landscape. Interstate Highway 94 and County Highway 54 make up the West and North boundaries of the core area of the Central Forest. The topography of the Central Forest is composed of hills, coulees and sandstone bluffs and lies within the Central Plains region. Soils of the Central Forest were formed from siliceous sandy alluvium or siliceous residuum from sandstone. They are characterized by shallow topsoil with little organic matter and noticeable leaching of

iron compounds into the lower layers of the subsoil. The climate is cool and moist, with an average annual air temperature of 46°F (NOAA). Average precipitation ranges from 30 to 34 in. per year. Average snowfall is usually 43 inches, with the greatest amount of snow coming in December, January and March. Jackson County public land is under DNR and Jackson County Forest and Parks ownership.

The designated elk range will consist of separate core and buffer ranges (Fig. 1). The buffer range will surround the core range, functioning as a buffer between the core range and private lands. It will also provide additional space for herd expansion and dispersal.

Core elk range – The 70 $mi^2$ core range (Fig. 1) is centered within the Black River State Forest (BRSF) and Jackson County forest with a few parcels of non-agriculture private land.

Buffer elk range - The 250 $mi^2$ buffer range (Fig. 1) surrounds the core range. Land ownership in the buffer range is a mix of state and county forest, and Ho-Chunk Tribal land. Private land to the North and East of the designated elk range consists primarily of agriculture, with the main crops being soy, corn, cranberries, and Christmas trees (fig. 2). These areas were excluded from the elk range to minimize the potential for habituation problems with elk.

## POPULATION MANAGEMENT ALTERNATIVES

Four general population management alternatives, and the no action alternative, are described below. Public hunting would be used to maintain the population at target levels for any of the four action alternatives. If any action alternative is selected, management of the Black River herd will differ from management of other reintroduced species in Wisconsin. The goal of other reintroductions has been to restore the species to the core of its former range and allow expansion to fill all suitable habitats. To avoid crop damage problems and other conflicts with private landowners that would likely develop if animals were allowed to wander freely throughout Wisconsin (Parker 1991), elk will be restricted to core and buffer ranges with high public land ownership. If other identifiable elk habitat with public support is determined, boundaries can shift. The core range will contain the highest densities of elk. Elk in the buffer range will be managed at lower densities than in the core range. However, animals outside of the designated elk range (referred to as the X-zone throughout the rest of this document) showing nuisance behavior or causing damage will be captured or killed. Liberal quotas in the X-zone will be developed to limit the number of elk in this area. Elk hunting permits issued for the core or buffer ranges will also be valid for use in the X-zone.

The 4 population management alternatives are:

1. Natural increase – After initially stocking 35 animals, this alternative would allow the Black River herd to increase to a target level, about 390 elk, without stocking additional animals. The target population would be below levels at which elk are negatively affecting other resources, at a density of around two elk per square mile in the core range, and lower in the buffer zone. This population goal may change in the future if continued monitoring of the elk herd's growth shows that significant conflicts are likely to occur between elk and people, flora or other fauna.

We expect that a herd of this size should provide significant recreational opportunities (viewing and hunting) to the public, while still being manageable within the boundaries of the elk range.

2. Supplemented increase – This alternative would be similar to #1, except that an additional release of 25-50 elk would be undertaken to reach the population goal of around two elk per square mile in the core range quicker. Hunting would therefore be initiated sooner. The number of animals in the second release would be based on availability from the source herd.

3. Minimal Population – Under this option, the herd would be significantly limited, probably to <50 animals. Management priority would be to limit the size and distribution of the elk population and it's associated negative effects. Elk would be tolerated only in the core range. Lethal removal through hunting and/or shooting by agency personnel would be used to maintain the population at very low levels.

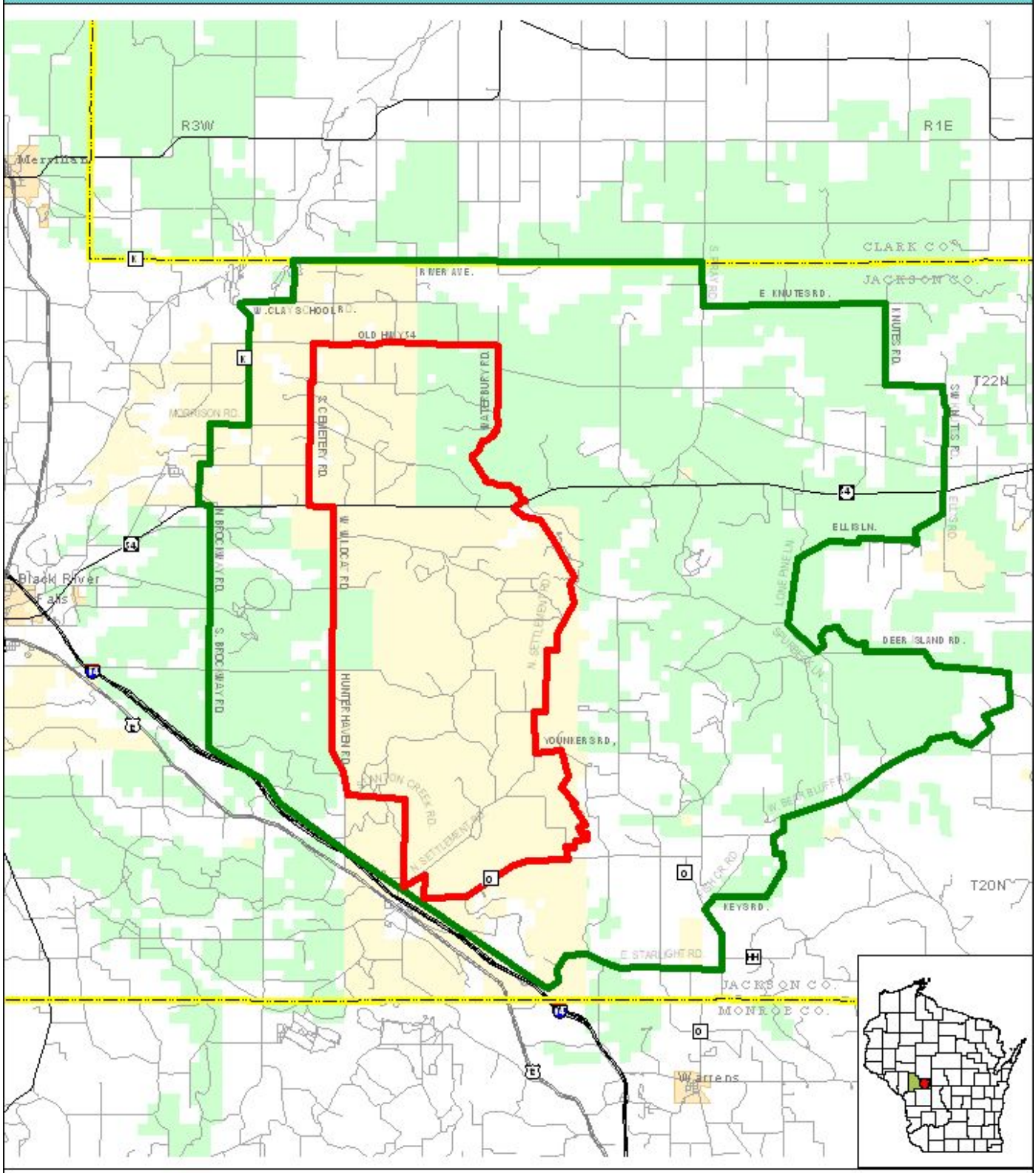
4. Unrestricted Increase- After initially stocking 35 animals, this alternative would allow the Black River herd to increase without stocking additional animals. The population would be allowed to expand as permitted by the natural carrying capacity. No effort by the DNR to restrict this growth would occur.

5. No Action- Under this option, no elk would be released.

Alternative #1 is the option preferred by the Department. Information, which we review later in this document, indicates that expansion of the Black River herd is feasible. Expansion would occur more gradually with alternative #1 than with alternative #2. The effects of a reintroduced elk herd can to some degree be predicted, but not with absolute certainty. If unacceptable impacts on other resources or public and private uses occur, they would happen more gradually with Alternative #1 than with Alternative #2. More time would be available to develop and implement management actions to alleviate unanticipated problems. The considerable costs of stocking additional elk may come at the expense of monitoring or other management efforts for the Black River herd. Finally, stocking additional animals would add the risk of introducing disease to elk already present, a scenario which should be avoided at all costs. Ultimately, the management of elk would be a dynamic process allowing for evaluation and adjustment. In the following sections, elk biology, ecological impacts, and socio-economic concerns relating to management of the Black River herd will be discussed.

# Black River Elk Range

## Jackson County, Wisconsin




Buffer Zone
Core Range
County Boundary
Interstate Highway
US Highway
State Highway
Local Road

0.9 0 0.9 1.8 2.7 Miles

1:250,000

Wisconsin Transverse Mercator NAD83(91)

March 1, 2001

Cartography by William Geelen

DNR Lands

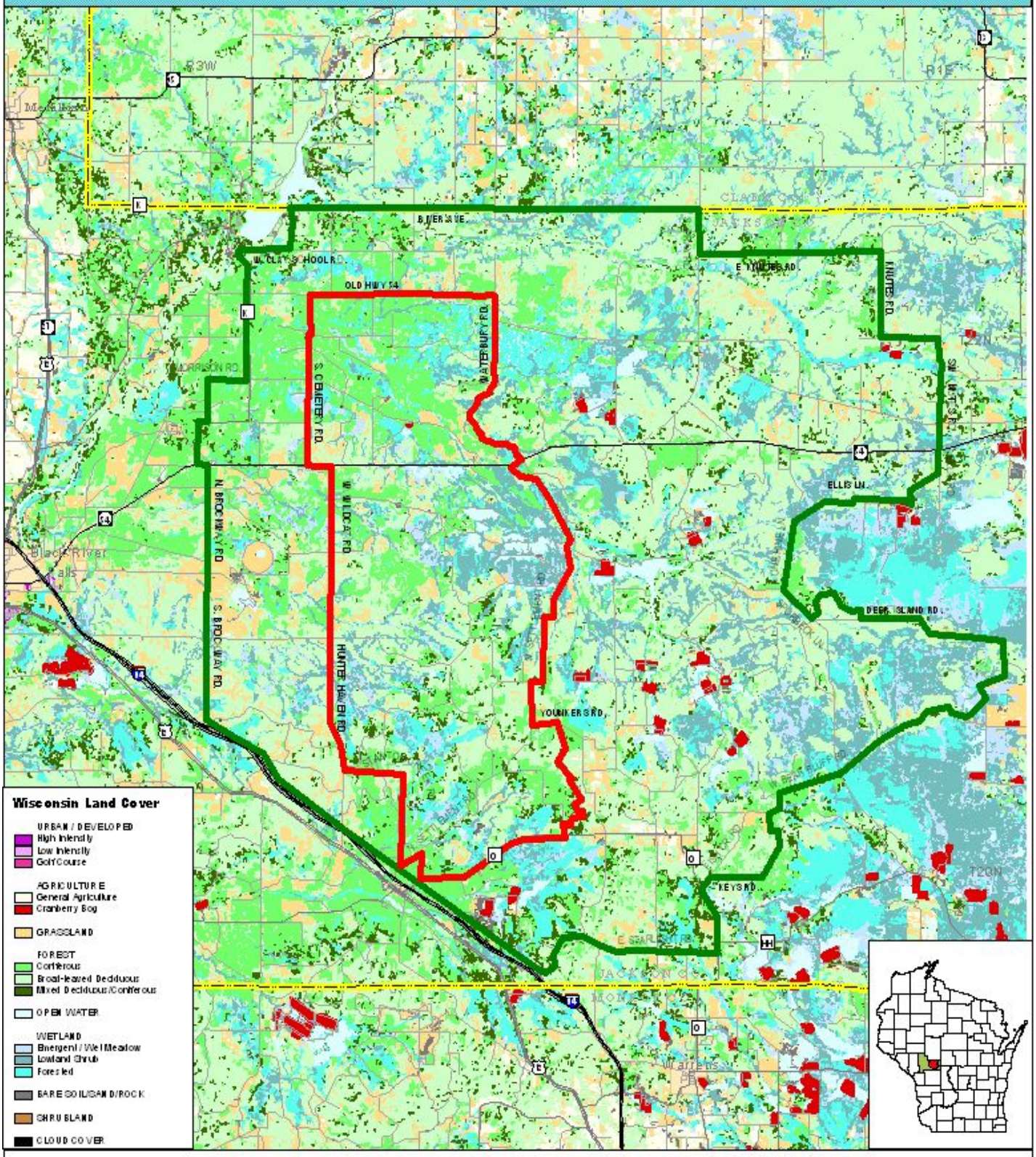
Jackson County Forest

The DNR Managed Lands dataare a spatial representation of a March, 1996 "snapshot" of the Bureau of Facilities and Lands (LF) Oracle land Records System and may include omissions and should not be interpreted as a legal representation of legal ownership boundaries.

All request from outside the agency should be referred to: David Wilson (wilsod@dnr.state.wi.us).

# Black River Elk Range

## Jackson County, Wisconsin




The Wisconsin Land Cover dataset is a raster representation of vegetation and land cover for the state. Source data were acquired from the Landsat Satellite Thematic Mapper (TM) sensor, primarily in the spring and fall of 1992. Image processing techniques followed work published in the Upper Midwest GAP Image Processing Protocol (1995). The pixel size of the source TM data is 30 meters; however, the classified Land Cover data (excluding URBAN) are generalized or "smoothed" to an area no smaller than four contiguous pixels (equivalent to approximately one acre). Design guidelines recommend that any feature five acres or larger may be resolved in the data (i.e., a Minimum Mapping Unit (MMU) of five acres). The Land Cover data are considered reliable at nominal scales from 1:40,000 to 1:500,000 for a wide variety of natural resource management and planning applications.


Lillesand, T., J. Chipman, D. Nagel, H. Reese, M. Bobo, and R. Goldman. 1998. Upper Midwest GAP Image Processing Protocol. US. Geological Survey, Environmental Management Technical Center Document #98-0001, 25 pages.


N

0.9 0 0.9 1.8 2.7 Miles

1:250,000

Wisconsin Transverse Mercator NAD83(91)

March 1, 2001

Buffer Zone
Core Range
County Boundary
Interstate Highway
US Highway
State Highway
Local Road

## ELK BIOLOGY AND ECOLOGY

North American elk, genus *Cervus,* are also commonly referred to as wapiti. With the exception of moose, elk are the largest members of the deer family (*Cervidae)* in North America. The subspecies that once occurred throughout Wisconsin, Eastern elk (*Cervus elaphus canadensis*) is now believed to be extinct. Thus, reintroduction efforts would involve another subspecies, the Rocky Mountain elk, *Cervus elaphus nelsoni*. Elk in Wisconsin were most abundant in the southern and west-central portions of the state where they were associated with grassland/forest edges, open woodlands, and oak openings (Schorger 1954). Records indicate that elk were present in 50 of Wisconsin's 72 counties (Figure 2). Over-hunting led to the extirpation of elk in Wisconsin in the mid to late 1800's (Schorger 1954, Jackson 1961). A reintroduction attempt was made in Vilas County, Wisconsin in 1932 with Rocky Mountain elk acquired from Wyoming. By the early 1950's only two elk were thought to remain. Poaching is believed to be the primary reason for the failure of this reintroduced herd to sustain itself (Schorger 1954).

In the north central Lower Peninsula of Michigan, the release of seven elk in 1918, also from Wyoming, has resulted in an elk herd which today contains an estimated 800-900 animals. This herd is the model upon which much of the criteria for evaluating the feasibility of reintroducing elk in Wisconsin was based.

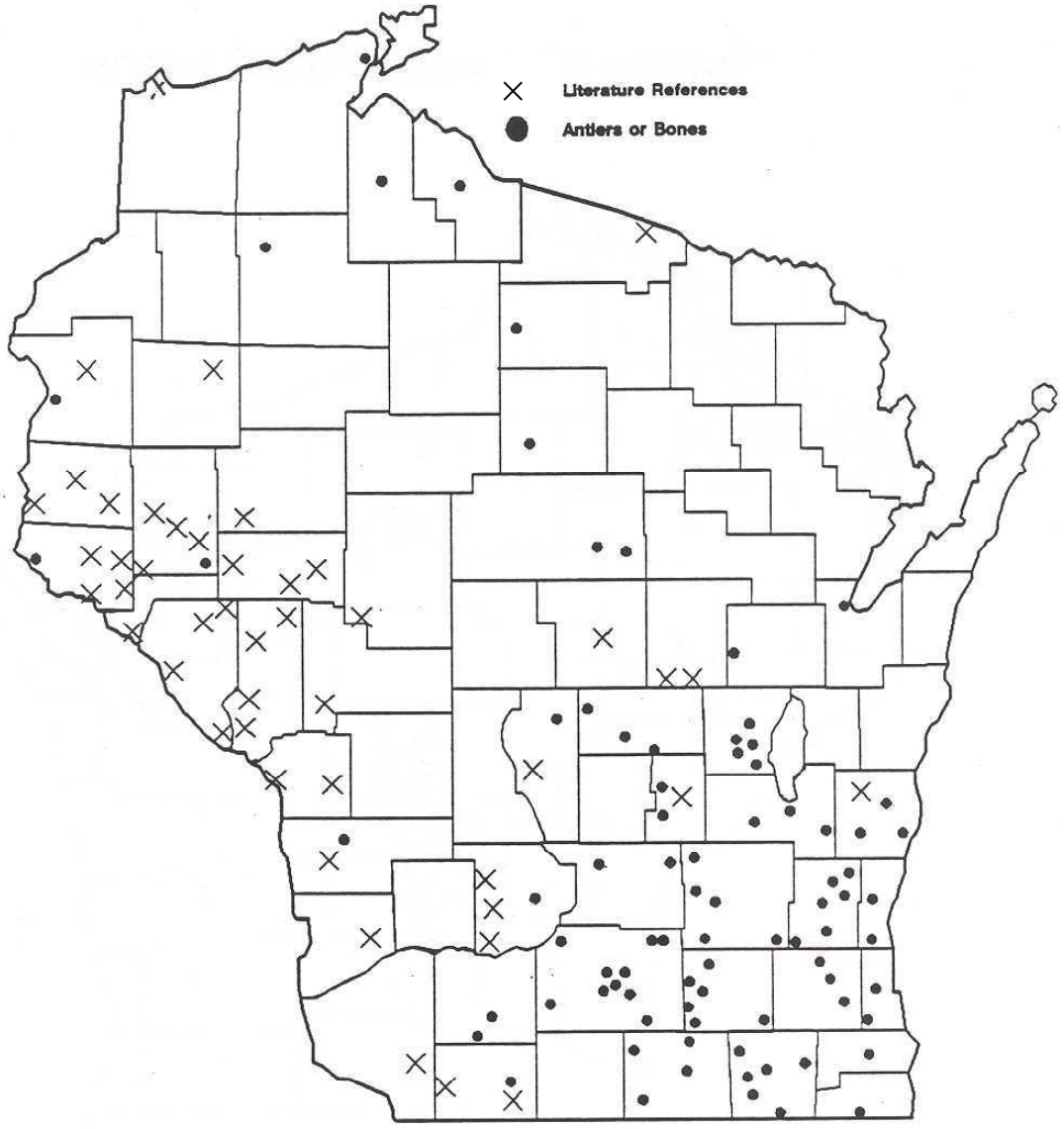
### Elk Habitat Suitability

Elk are highly adaptable animals found in a large variety of habitats and are known to exhibit a wide variety of forage preferences. Most studies indicate that elk prefer eating grasses and sedges over woody vegetation. Elk tend to utilize open grassy habitats in spring and fall. Forbs, woody twig growth, leaves, and warm season grasses (if available) are the main sources of summer forage (Winkler, 1989). In winter, elk subsist on all available forage types. However, woody browse is sometimes the major source of winter forage available to elk.

Research done on the Clam Lake herd identified winter cover, winter forage, and spring forage as potential limiting factors for eastern elk populations. The Central Sand Plains Ecological Landscape is similar in some respects (climate, vegetation, soil fertility, etc.) to the Northern Wisconsin elk range. The potential limiting factors identified in Clam Lake probably will apply to the Black River elk range as well (Table 1).

#### Winter Cover

Lowland conifers such as cedar, fir and spruce provide one type of optimal winter cover. Upland conifers such as red and white pine will also provide thermal protection for elk. Additional thermal cover can be provided by dense stands with a well-developed conifer understory such as mature, deciduous aspen stands. The above factors are abundant enough in the Black River area to satisfy winter cover needs. Because of their large body size and thick coat, elk are well adapted for survival in cold climates. The cover in the Central Sand Plains should provide sufficient thermal protection, and should not be a limiting factor for elk.




Note: Schorger does not include a reference of elk near Chequamegon Bay on the Bayfield peninsula made by Radisson and Crosseilliers in the 1600's (Thwaites, 1888).

Fig. 2. Historic records of elk in Wisconsin from Schorger (1954). Note that this is not a complete record of historic elk locations.

Table 1. Cover types in the Black River area considered valuable for winter cover and winter or spring forage. Cover type percentages are for public forestland only, encompassing core and buffer areas. Similar information is not available for private forestland, however, examination of air photos indicates that percentages given for public land are similar to those for non-agricultural private land.

| Vegetation Zone | Cover Type | % Cover |
|---|---|---|
| Forested Upland | Aspen | 17.0 |
| | Hardwoods (Oak, bottomland and swamp hardwoods) | 22.2 |
| | Red Maple | <1.0 |
| | Red pine | 7.1 |
| | Birch | < 1.0 |
| Non-forested Upland | Grass | 6.9 |
| | Shrub | 0.7 |
| | Water | 1.0 |
| Forested Lowland | Tamarack | 2.1 |
| | White Pine | 9.0 |
| Non-forested Lowland | Marsh | 10.3 |
| | Lowland brush | 2.5 |

Winter Food

Elk were once known to exist in this area. Land use and cover types have not dramatically changed, therefore it is likely that adequate winter forage for elk is present. A study on elk winter use will be conducted in the future in the Black River area if elk are to be reintroduced.

General winter foraging patterns of the Clam Lake herd correlate well with studies conducted on other eastern elk herds. It is assumed that the Black River herd would also follow a similar pattern. Elk were much less selective than deer in their feeding habits. Bark stripping was found to be a common winter feeding habit (Moran 1973). This activity, along with other types of browsing, can actually hold back succession, providing additional browse material. In Pennsylvania, annual woody growth was important winter forage for elk. Ten species of trees and shrubs were heavily browsed, with red maple and aspen as major components of the winter diet (Hunter et al., 1979). Data will be collected by the DNR to see if the Black River herd is using a variety of browse species.

Spring Food

Spring foods are those available to elk immediately after snow cover melts. Elk seek highly nutritious forage in early spring to restore their energy reserves, which are depleted during the winter. Green grasses, forbs, and sedges are preferred by elk over woody browse at this time. Wildlife openings (fertilized grasses or crop) and cultivated fields (winter wheat, etc.) contain the best forage. Young aspen stands and natural openings (those that contain native vegetation or are unfertilized) also provide quality spring forage for elk. Upland conifers, swamp conifers and maple stands are less preferred by elk in spring (Beyer 1987). The Black River area is primarily forested, with some open grassland and barrens scattered throughout. Significant open areas, primarily lowland sedge and upland grass/forb meadow, are maintained at the Dike 17 Wildlife Area on the Black River State Forest and Wazee Recreational Area on the Jackson County forest. Additional spring forage may be provided by regenerating aspen stands.

In Michigan, foraging provided by the new herbaceous growth in the openings were used by a large number of elk in early spring through June. Openings on the Pennsylvania elk range consist of agricultural lands, clearcuts, and reclaimed strip mines. Grasses were found to be of primary importance to elk (Witmer and Cogan 1989), especially in late spring and mid-fall (Devlin and Tzilkowski 1986). Anderson (1999) found that radio collared elk in the Clam Lake area during spring and summer of the first year after release selected upland openings, hardwoods, and conifers, while aspen stands were used in proportion to their availability on the landscape. Elk are expected to behave similarly in the Black River area, however, a similar study will be conducted once elk are released. The information collected will allow biologists to better predict how well the Black River area will fulfill the spring habitat requirements of an expanding elk population. It is possible that spring forage may become the most important factor limiting population growth if the herd is allowed to expand.

Summer and fall habitat use and forage selection

Research in Michigan concludes that summer and fall habitat are not limiting factors for elk in Michigan. It is assumed that an area providing suitable winter and spring habitat would also be adequate in summer and fall, as well. Forage is generally abundant during these seasons, and thermal demands are low. Moran (1973) found openings to be a key feature on elk range in the fall. Rutting and harem activities occurred largely on these openings (providing viewing opportunities for the public). After the first frost, a pronounced dietary shift towards browsing of woody growth occurred. With the first snow cover, post-rut harem groups broke up and dispersed from openings. During the first year after release, radio-collared Clam Lake elk selected for openings within the habitat. Along with openings, aspen, upland and lowland conifer, and aspen-balsam fir-white spruce stands were used in proportion to their availability on the landscape (Anderson 1999). Elk are expected to behave similarly in the Black River area but research will be conducted to determine radio-collared elk use of summer and fall habitat.

## Summary

Review of pertinent literature indicates that the Central Sand Plains provides quality elk habitat, and the population is expected to respond well. The three critical factors of winter thermal cover, winter forage, and spring forage do not appear limiting. Further studies on spring forage will be conducted to determine if

they would become a limiting factor if the herd is allowed to expand. Population growth in the Clam Lake herd is currently high, due to good calf production and high survival rates. It is expected that the Black River herd will respond in a similar manner. Therefore, all of the population management alternatives listed earlier in this document could be biologically valid options.

## Elk Demographics

Although elk are frequently thought of as productive animals capable of rapid population growth, they have a much lower productivity potential than Wisconsin's more numerous large herbivore, the white-tailed deer. Pregnancy rates for yearling cows are highly variable depending on factors such as nutrition, but they are generally much lower than those for older cows. Yearling bulls rarely breed because larger 7-12 year old bulls out-compete them. Twinning is rare for elk. They are potentially long-lived animals, especially in lightly hunted populations. Cow elk on Yellowstone National Park's northern range may live >20 years (Houston 1982). Therefore, population management considerations for elk must differ from those for deer. The following section will focus on demographic characteristics of elk populations relating to management concerns for the Black River herd.

### Productivity

Pregnancy rates of Michigan elk were 89% for adults and 33% for yearlings (Beyer 1987) in 1984 and 1985. During 1985, adult cows had a natality rate (the percentage of cows that produced calves) of 89%, while yearling cows produced calves 50% of the time.

Pregnancy rates for the Black River herd should be similar as that of the Michigan and Clam Lake herd. Natality rates, otherwise known as birthrates, for the Clam Lake herd, have improved each year since the release. The natality rate was 13% in 1996, which was lower than expected (Lizotte 1998). This was attributed to a high percentage of yearlings in the population during the previous year's rut, severe winters during 1995-96 and 1996-97, and unfamiliarity of the elk with their new environment. Natality rates improved to 69% in 1997 and 93% in 1998, which compare favorably with published rates for Michigan and other areas. This was probably due to breeder maturation and growing familiarity of the herd with its range.

### Survival and Mortality

Annual mortality rates for the Michigan herd in 1963-65 were estimated at 30-46% for the 0–1.5 year olds (Moran 1973). Highest losses occurred during a winter in which 24 inch snow depths continued into April. Adult annual mortality rates were 28% for cows and 33% for bulls in 1964 (Moran 1973). The annual mortality rate for yearling bulls nearly doubled from 26% in 1964 to 49% in 1965, following the first year of hunting. Major sources of mortality prior to the advent of elk hunting in Michigan included illegal shooting, disease, car or train collisions, and malnutrition (of small calves) (Moran 1973). During 1959-1970, annual losses due to illegal shooting in Michigan ranged from 4 (1966) to 28 (1964) animals from a herd of approximately 150 elk. The parasitic brainworm *Parelaphostrongylus tenuis*, commonly carried by deer in the Great Lakes region, has also been a significant source of mortality in eastern elk herds. In Pennsylvania, 12% (1% of the herd) of all known annual elk mortality was attributed to brainworm

(Witmer and Cogan 1989). Brainworm infection also kills 1% of the Michigan elk herd each year.

Survival of the Clam Lake herd has been better than rates observed in Michigan and elsewhere. Mild winters in recent years may have been a factor. Overall annual mortality for the Clam Lake herd within a year of their release was 16%. These losses were primarily the result of capture stress, although 1 elk was shot during the gun deer season (Lizotte 1998, Anderson 1999). Survival rates improved markedly after the first year. Calf survival has been excellent. For 1997-99, the annual mortality rates for calves known to have been born were 4%, 2%, and 6%. Confirmed causes of calf mortality have included predation by black bears (n=2) and wolves (n=2), and road kill (n=1). Adult survival has also been high. For 1997-98, there were no known mortalities of adults. In early 1999, 2 yearling bulls died (caused by drowning and car collision) for an annual mortality rate of 4%.

The high survival rates experienced by the Clam Lake herd are typical for a reintroduced population in quality habitat and the Black River herd is expected to be similar. If the herd is allowed to grow to higher densities, mortality rates will probably begin to increase towards levels reported for other areas as intraspecific competition for resources begins to occur. Several mortality sources, which are reported in the Clam Lake herd and also found in the Central Sand Plains region, could have impacts on population dynamics and management. Two illegal shootings of Clam Lake elk has occurred, and poaching has been a problem for other states. Hunter education and law enforcement programs will be important for controlling illegal shooting. Although no cases of brainworm infection have been reported for Clam Lake elk, it probably will eventually affect some animals in both the Clam Lake herd and the Black River herd (as it has in Michigan and Pennsylvania). High black bear densities and an expanding wolf population in the Central Sand Plains may affect growth rates of the elk population. Year to year survival rates could also vary widely due to winter severity.

Sex-age ratios

Calf:cow or bull:cow ratios are commonly used as indices of productivity and survival (Eberhardt 1996), and are reported as the number of calves or bulls:100 cows. Ratios may vary substantially among years with differences in harvest rates, winter severity, etc. Calf:cow ratios of 45-55:100 were reported in Michigan (Beyer 1987), while a lower ratio of 33:100 was observed in Pennsylvania (Witmer and Cogan 1989). These ratios are typical of productive elk populations throughout their range. Calf:cow ratios for the Black River herd will not be meaningful for comparisons at the early stages of the reintroduction, due to the small population size. If the population is allowed to expand, calf:cow ratios should be calculated by counting and classifying as much of the population as possible.

In most elk populations, bull:cow ratios depend heavily on bull harvest rates. Heavy hunting pressure in many western states limits bull survival, leading to low bull:cow ratios. Bull:cow ratios tend to be higher in areas where bull harvest rates are restricted, as is common with eastern elk herds. Post-rutting bull:cow ratios of Michigan elk ranged from 52-74:100 (Beyer 1987). If the Black River herd is allowed, it is likely that an elk-hunting season will follow. Bull:cow ratios would likely be affected by harvest strategies, as determined by management goals. Calculation of bull:cow ratios would help biologists assess the effects of hunting, and would be part of a future monitoring protocol if the Black River herd is established.

Home range size and population density

Home range sizes of elk vary among habitats and seasons. In Michigan, the average winter home range was 7,463 acres (11.6 $mi^2$); mean home range sizes of bulls (rut: 13,284 acres (20.8 $mi^2$), non-rut: 23,136 acres (36.2 $mi^2$)) were greater than those of cows (rut: 6,699 acres (10.5 $mi^2$), non-rut: 15,923 acres (24.9 $mi^2$)) (Beyer, 1987). Yearly home range sizes of the Clam Lake herd were smaller than those reported for Michigan elk. Females averaged 6,800 acres (10.6 $mi^2$), while males averaged 10,700 acres (16.8 $mi^2$) (J. Schmidt, personal communication).

In Riding Mountain National Park, Manitoba, densities of 2-4 elk/$mi^2$ have been maintained since 1950 following an eruptive phase in which a high of 10/$mi^2$ was reached. (Blood 1966). Carrying capacity is believed to be about 5/$mi^2$. Michigan elk density in the late 1930's, approximately 20 years after reintroduction, was estimated at 2.9/$mi^2$. At that time, 300–400 elk occupied 125–140 $mile^2$ (Shapton 1940). By 1958 the herd had grown to 900–1,000 elk occupying a 400 $mi^2$area, for a density of 2.25-2.5/$mi^2$ (Moran 1973). The 1990 winter population estimate was 918 elk on 300 $mi^2$ of primary range (3/$mi^2$) and 600 $mi^2$ of total range (1.5/$mi^2$) (G. Boushelle, personal communication). Current Clam Lake elk densities are 1.2/$mi^2$ for the area occupied by most of the elk (J. Schmidt, personal communication), which is lower than densities maintained in other eastern elk herds. If elk are allowed to increase throughout the designated elk range and there are better habitat conditions, then elk densities could be higher in the Central Sands Plains.

## Disease in Elk

Elk are susceptible to numerous diseases and parasites. Some of these are of concern to farmers and elk ranchers, because of the potential for disease transmission to livestock or captive elk. A few of them could have serious consequences for wild elk or deer populations. Brief descriptions of some major diseases and parasites affecting elk and livestock are given below.

1. brainworm – *Parelaphostrongylus tenuis* (brainworm) is a parasitic nematode, which can impact elk where they coexist with white-tailed deer. White-tailed deer have evolved with this parasite, and do not develop clinical disease from it. Elk are more likely to develop clinical disease from the parasite than white-tailed deer, but are much more tolerant of it than moose or caribou. Larval worms exit their hosts, normally white-tailed deer, in feces (Kistner et al. 1982). They next enter terrestrial snails that serve as the intermediate host, where they develop into the infective stage. The infective larvae are then transmitted to the host, which could be deer or elk, when the host eats vegetation containing snails. Higher deer densities result in increased transmission rates of brainworm to elk.

2. brucellosis – This bacterial disease, also known as undulant fever in humans, is caused by the bacteria *Brucella abortus*. It is a health concern for both livestock producers and the general public (United States Department of the Interior 1998). There is no effective treatment or cure for animals infected with it, although treatments now exist for humans. In domestic cattle, acute infection results in abortion. Costly prevention and eradication programs have been implemented by state and federal agencies to reduce the threat of this disease to the livestock industry. The disease would likely have little effect on elk populations. Free-ranging elk populations wintering on feed grounds in Wyoming have a high rate of exposure to

*Brucella.* Close contact among animals congregated around artificial feed facilitates transmission of the disease. However, elk herds that are not artificially fed are essentially free of this disease (Haigh and Hudson 1993).

3. bovine tuberculosis – Among ungulates such as elk and cattle, this bacterial disease is transmitted through the air or in contaminated feed and water. Close contact among animals facilitates transmission of bovine tuberculosis. Infected animals develop extensive pulmonary lesions and usually die. Although tuberculosis in wild ungulates is rare, Michigan has recently experienced an outbreak in its deer herd. Elk are present in the affected area. Although they have been intensively monitored, no Michigan elk have tested positive for the disease. High deer densities and artificial feeding are 2 factors cited as contributing to the maintenance of the disease in the deer population (Davidson and Nettles 1997).

4. chronic wasting disease (CWD) – CWD is a fatal transmissible spongiform encephalopathy disease related to the mad cow disease reported in Europe. This infectious disease appears to develop when an abnormal protein called a prion accumulates in nervous tissue causing swiss-cheese-like holes. Primary symptoms include emaciation, incoordination, and excessive salivation of affected individuals (Davidson and Nettles 1997). There is currently no definitive test for this disease in living animals. Instead, brain tissue must be examined after the animal has been killed. The only areas where wild deer and elk are known to be infected with CWD are northeastern Colorado and adjacent areas of Wyoming. However, CWD infected captive elk herds have been identified in Saskatchewan, South Dakota, Colorado, Montana, Nebraska, and Oklahoma. Currently, there is no evidence to indicate that CWD can be transmitted to humans or animals other than deer or elk.

5. leptospirosis – Though serologic evidence indicates exposure of free-ranging elk and deer to the bacteria causing this disease, it appears to have little impact on North American populations (Kistner et al. 1982, Haigh and Hudson 1993, Davidson and Nettles 1997). Elk may serve as a major reservoir for *Leptospira,* which can be pathogenic to humans and livestock, causing kidney disease, abortion, infertility, and occasional mortality.

6. anaplasmosis – This is a rickettsial disease that would likely have little effect on elk health (Kistner et al. 1982) but causes considerable loss to the cattle industry in the southern United States (Davidson and Nettles 1997). The disease is transmitted by biting flies, ticks, or other vectors that transfer blood. Though Anaplasma organisms have been detected in a variety of North American deer (including elk) and mule deer (which live only in the western states), are the species that have been diagnosed with clinical anaplasmosis. Elk are probably unimportant anaplasmosis reservoirs.

7. bluetongue (BT) and epizootic hemorrhagic disease (EHD) - These closely related viral diseases are unlikely to cause clinical disease in elk (Haigh and Hudson 1993). Though elk are probably not major reservoirs for either disease elk can be infected and transmit the viruses. Screening and prohibitions on movement of elk testing positive for BT or EHD are used to prevent transmission to more susceptible species like sheep and white-tailed deer. Mortality rates for deer during outbreaks in areas where deer have not previously been exposed to these viruses can be >50% (Davidson and Nettles 1997). Although no outbreaks have been reported in Wisconsin's deer herd, both Illinois and Iowa have recently reported deer mortality possibly due to BT or EHD. Bluetongue and EHD are transmitted by biting midges. Although

susceptible, cattle do not usually produce clinical signs of disease.

8. liver flukes – The large liver fluke (*Fascioloides magna*) is found in cervid populations throughout North America (Kistner et al. 1982). Though infection can result in clinical disease, this parasite probably does not have major impacts on free-ranging elk populations. Native ungulates may serve as reservoirs of this trematode parasite for livestock. Large liver fluke infections can decrease the value of cattle sent to slaughter, and are frequently lethal to sheep and goats.

DNR wildlife and veterinary staff will work closely with other states and the Wisconsin Department of Agriculture Trade and Consumer Protection (DATCP) Division of Animal Health to help select a clean source herd and follow quarantine regulations before introducing animals into the Black River area. Elk would be required to be quarantined in the state they are originating from for 90 days, during which time two rounds of disease testing would occur (see quarantine section, pg. 45).

### Summary

There is potential for disease problems in the future, developing in the introduced population or resulting from contact between wild elk and livestock, including farmed elk. In Manitowoc County, 4 captive elk herds have been diagnosed with bovine tuberculosis since 1997, and all 4 of these herds have subsequently been depopulated (Ehlenfeldt, personal communication). Additionally, animals from a captive red deer herd in Barron County tested positive for bovine tuberculosis in 1990, and the herd was depopulated. Chronic wasting disease has been diagnosed in captive elk in other states, and elk have been imported to Wisconsin farms from one of these CWD infected herds (Ehlenfeldt, personal communication). Currently there is no way to test animals being imported into the state for CWD. However, the WI DATCP Division of Animal Health is working with the elk farm industry to develop a CWD monitoring and prevention program. Still, CWD could be transmitted to wild elk and/or deer populations if contact between free-ranging and captive animals occurred. Therefore, disease monitoring and prevention programs will be important in management of the Black River herd.

## SOCIO-ECONOMIC IMPACTS

In this section, potential social and economic costs and benefits associated with elk management are considered. When available, data from the Clam Lake herd were incorporated, supplemented by literature from other areas. Three meetings to inform the public and gauge support for elk restoration and management were held in Neillsville, Tomah, and Black River Falls during September 2000.

### Elk Depredation

Elk depredation occurs most often to forest and agricultural crops (de Calesta 1983). Forest damage is normally to regenerating trees, which are attractive to elk because they provide easy access to annual growth. Agricultural damage includes competition with livestock for pasture (primarily in western states), losses of cereal and hay crops, and damage to fences, orchards, and ornamental plants.

Forest crop damage

Elk can adversely affect some timber resources. Over-browsing is the primary cause of damage to timber by elk; bark stripping and antler thrashing are secondary factors. In Michigan, there has been concern that browsing may restrict aspen regeneration (Campa 1989). In the early 1960's there was growing recognition that the Michigan elk herd, numbering 1,500-2,000 animals, was damaging forest reproduction. Landowner surveys indicated that 28% of those responding had experienced damage to trees and shrubs. Depredations by elk were ascribed to over-population (Moran 1973). A recent study undertaken by Michigan State University to determine the extent and severity of elk damage to forest crops found that heavy browsing appears to decrease stem densities and cover, and to increase the frequency of some herbaceous species. Browsing of >50% of annual woody production affected tree height and shoot production of big tooth aspen (Campa et al. 1992). Decreases in tree height and twig production of quaking aspen were observed only when 100% of annual woody growth was browsed. Browsing by elk has not been shown to reduce stem density below that of natural thinning, therefore, final stocking densities of stands at harvest are not impacted (Campa 1989). Campa (1989) concluded that "no effects on timber production can be identified to date." Small stands, especially those adjacent to cover, appear to be most susceptible to over-browsing, however, there is no evidence to support this observation (Campa, personal communication).

Additional concern exists that heavy browsing may facilitate conversion of aspen to pine. N. Caveney (personal communication), Forester of the Pigeon River Country State Forest (PRCSF), indicated that the best aspen regeneration stands on the PRCSF are most heavily impacted, often resulting in conversion to pine. There is some question of how extensive this problem is; some feel that it is restricted to only one site. Despite aggressive timber management practices, Michigan is predicting a continued decline in the percentage of aspen on state land as a result of natural forest succession. A recent plan to reduce the elk herd to a winter goal of 850 animals was accepted in hopes of preventing damage to the remaining aspen stands. It is likely that as the proportion of aspen declines, the elk population goal may again be lowered (Caveney, personal communication).

A study of the effects of elk and deer browsing in Pennsylvania discovered that most woody plant species remained viable and potentially productive (Hunter et al. 1979). Aspen regeneration, in most sites, provided important winter forage for elk and deer. However, once the aspen grew out of the browsing range of elk, the stand developed into dense commercial timber. The degree to which heavy browsing affected a site depended on the site characteristics, such as soil moisture and fertility (which determine growth rates of woody plants).

Browse utilization rates reported for the Clam Lake herd (Lizotte 1998) indicate that elk are not seriously impacting any species. However, the literature from Michigan shows that damage to forest crops is a possibility. Big-tooth aspen may be especially susceptible to damage (Campa et al. 1992). Two complaints of damage to forest crops by Clam Lake elk have been received. Anderson (1999) described a report from a tree farmer who claimed that an elk had destroyed 700 scotch pine seedlings on his property. The damage was attributed to cattle fenced within the plantation after inspection of the site by University of Wisconsin Stevens Point researchers and USDA Animal and Health Plant Inspections Services personnel. Complaints of forest crop damage by both deer and elk have also been received by the Department from another area

landowner, but these reports also have not been verified.

Continual inspection of elk range in the Black River core area will be done to determine if impacts on timber products are occurring. If negative impacts do occur, a herd size reduction will be recommended to a level at which timber will not be adversely affected.

Agricultural crop damage

Michigan DNR biologists discovered that reports of damage to agricultural crops increased as the elk population expanded in the late 1950's-early 1960's and again in the early 1980's. Eleven percent of landowners surveyed indicated that they had experienced crop damage. Farmers comprised 12% of the landowners on the elk range at that time. Farmers contacted by Moran (1973) most often complained of damage to fences, oats, and sometimes haystacks. There were only a few instances in which serious crop damage was reported, usually on sites bordered by heavily used summer elk range. Currently, Michigan farmers cite damage to alfalfa, beans, and increasing corn. Records of estimated crop damage values are not kept in Michigan. Crop damage was one of the issues leading to the development of an elk management plan by the Michigan DNR in 1984. Reducing population goals and heavily harvesting elk in agricultural areas are the main strategies used to limit crop damage.

In the 1980's, elk depredation became highly publicized in Minnesota. Although farmers were concerned with many issues, it was damage caused by elk that drew the most attention. Thousands of dollars of damage to alfalfa bales, sunflower seeds, and corn were reported to the Minnesota State Legislature ($39,000 by one farmer). However, later investigations by USDA found that most reports were overestimated. On one property reported to have suffered an 80% loss, only ¼ acre was actually damaged. Despite this, the Minnesota Legislature approved removal of the elk by trapping. After several animals died during the relocation, a court injunction filed by the Sierra Club stopped the removal.

In Pennsylvania, elk have found better foraging on private than on public land (Witmer and Cogan 1989). Open areas account for only 2% of public land, whereas 15-20% of private land is open. Most damage complaints involve corn, hay and oats. A survey of crop damage, started in 1982, revealed that 1-10% of crops planted received damage on 9 farms in 1983 and 5 in 1984, respectively. Fence damage is also occasionally reported in Pennsylvania.

In areas of the West where crops are cultivated, elk commonly damage haystacks and fences (C. Wheaten, personal communication). Orchards are also susceptible to elk depredation, as elk can easily knock down small fruit trees. During the public comment period for the proposed Bayfield Peninsula elk reintroduction, orchard owners were an important interest group opposed to the effort (Parker 1991).

Concerns voiced thus far for elk in the Black River area, is how will agriculture be compensated for elk damage. Elk are not currently included in the Wildlife Damage Abatement and Claims Program (WDACP). The Department believes no elk should be released into Jackson County until elk are added to the Damage and Claims Program. If the released elk begin to cause problems, an attempt of non-lethal abatement will be made first. For any elk causing a damage or nuisance problem outside the core and buffer ranges the Department will attempt to capture and relocate the problem elk to the core area. Elk that are not

successfully captured, the Department will harass these elk using scare devices to move them from the problem area. This method will only be used if it is deemed that it will not cause more damage to crops due to the movement of people, animals and/or vehicles through crops. If these methods are not successful and these elk continue to be a problem, then they will be removed using lethal means.

In the Wildlife Damage Abatement and Claims Program (WDACP), farmers will be eligible to receive both abatement assistance and claims reimbursement for elk damage to agricultural crops. The primary focus of the WDACP is to help farmers reduce agricultural damage occurring on their property. An important abatement tool, and a requirement of participating in the WDACP, is to provide hunting access to the public during the open season(s) for the species causing damage. In the case of elk, farmers that enroll in the WDACP for elk damage in a given year would only be required to allow elk hunters access to their property during the open season(s) for elk.

When the elk population reaches about 150 animals, an elk hunting season will be implemented. Farmers enrolled in the WDACP for elk damage, after the elk hunting season is established, would have two options for providing access to elk hunters during the open seasons. The first option is 'open access', in which any number of hunters may hunt on the farmer's land during the open season. Under this option, all hunters must notify the farmer of their intent to hunt on the farmer's land, and the farmer is not required to keep records of hunter entry and exit to the property. The second option is 'managed access', under which the farmer can limit access to 2 hunters per 40 acres of land suitable for hunting. Under this option, all hunters must ask permission of the farmer prior to hunting and must sign in on the farmer's logbook. This is the most common option chosen by farmers.

The program also provides various other abatement tools to farmers, including scare devices, repellents, and temporary fencing. Abatement materials are cost shared on a 50/50 basis with the farmer—the program provides all materials (considered to be 50% of the total cost), and the landowner is responsible for installation or application, as appropriate (considered to be 50% of the total cost).

An additional abatement option for severe, long-term damage to high value agricultural crops (e.g. orchards, cranberries) is installation of a permanent, high-tensile woven wire fence surrounding the crop area. These fences are cost shared with the farmer on a 75/25 basis—the program provides 75% of the cost for materials and installation, and the farmer provides the remaining 25%. On average fencing cost for Jackson County run about $3.50 per foot, based on previous damage claims for deer . Woven wire fences are prescribed based on cost-effectiveness over the 15-year lifespan of the woven wire fence contract. Fences are designed in close consultation with the farmer to protect the crops from damage, simplify fence construction and maintenance, and minimize operational impacts to the farmer. Farmers are required to enroll in the WDACP and provide hunting access to the public only in the year that the fence is constructed. Farmers also must agree to maintain the fence over the 15-year duration of the contract, which includes maintaining the fence clear of brush and other vegetation. Costs for regular maintenance are minimal (e.g. mowing or spraying the fence perimeter as needed). If the fence is damaged by factors not under the control of the farmer (e.g. material failure), the program provides replacement materials to the farmer at no cost.

Claims reimbursement for crops damaged by elk are also available to farmers enrolled in the WDACP. The claim amounts are determined by crop appraisals conducted by WDACP field technicians, and are based on

tested appraisal methods documented in the WDACP Technical Manual. Farmers are eligible for 100% of losses up to $5000, and 80% of losses up to a maximum of $15,000, with a $250 deductible. Appraisal methods in the WDACP Technical Manual will be updated, where needed, to reflect damage specific to elk which may be of a multi-year nature (e.g. severe elk damage to cranberry beds necessitating replanting).

## Elk-Vehicle Collisions

Because elk are grazing animals, they are often attracted to grassy areas along highways and railroads. Vehicle collisions may occur in areas where elk are present. In Banff National Park, Alberta, motor vehicles were once the primary cause of adult elk mortality (Leighton 1988). However, Michigan averages only 1-3 elk-vehicle collisions/year (G. Boushelle and E. Langenau, personal communication). This is surprising given that the elk range is bordered to the west by an interstate highway and by county highways to the north, east, and south. There may be an avoidance response of elk evoked by vehicle traffic (Lyons 1983). In Minnesota, vehicle collisions with elk are rare although they regularly cross highways. There is also the potential for collisions between elk and snowmobile or all-terrain vehicle (ATV) users. In Yellowstone National Park, there are collisions between snowmobiles and large mammals including elk each year on groomed trails (United States Department of the Interior 1999). There have been no known collisions between elk and snowmobiles or ATV's in the Clam Lake area. During February 1999, a yearling bull elk from the Clam Lake herd became habituated to human activity around snowmobile trails, and was relocated to prevent someone from colliding with him. Three known elk-vehicle collisions have occurred since release of the Clam Lake herd. All three elk died from injuries received in the collisions.

While statistics on the average amount of damage from an elk-vehicle collision are not available from Michigan, there is general agreement among Michigan DNR personnel that vehicle collisions with elk tend to be much more serious than those with deer (N. Johnson, personal communication). Because elk are much larger than deer, vehicle collisions with elk involve greater risk of human injury and property damage. The State of Wisconsin does not assume legal liability for deer/vehicle collisions nor would the State likely be held liable for collisions with elk (J. Christenson, personal communication). Signs warning motorists of elk crossing areas on highways have already been erected in the Clam Lake area and would be erected in the Black River area. When elk become habituated to human activity around roads or trails, thereby creating a traffic hazard, the management protocol for habituated elk described later in this document would be used to decrease the risk of collisions. However, if the Black River herd is allowed, no management strategy would be able to eliminate the risk of elk-vehicle collisions.

## Impacts of Human Activities on Elk

Human activities can negatively impact elk. Changes in land use, including increased recreational activity, on the Michigan elk range were thought to have made portions of "prime elk range ... virtually uninhabitable" (Moran 1973). The presence of human activities has implications for visibility and approachability of elk, which may relate to visitor use and satisfaction. A variety of human activities occur in all seasons in Jackson County. The potential exists for impacts on elk from both recreational and non-recreational users. As a result, many people are concerned that a variety of activities in Jackson County could be restricted to limit impacts on elk.

Motor vehicles

Studies have documented that vehicle traffic may cause declines in habitat use adjacent to roads (Lyons 1983). In Idaho, elk preferred to be over 400 yards from traveled roads at all times (Irwin and Peek 1976). Christensen et al. (1993) declared the amount of roads and motor vehicle use to be the primary factor controlling elk habitat effectiveness in the western National Forests. In Michigan, those areas within the elk range that offered the most protection from human encroachment including roads experienced the highest herd increases (Michigan Department of Natural Resources 1984). Although little research has been conducted to directly assess the impacts of roads and motor vehicle use on elk in Michigan, they appear to be more tolerant of roads than western elk (D. Smith, personal communication).

Given the potential for impacts on elk from roads and motor vehicle users, elk habitat management strategies must address these issues. At the present time, the Department does not recommend additional restrictions on motor vehicle or other recreational uses in Jackson County for elk management purposes, because there is currently no biological justification for them. If serious negative impacts on elk from motor vehicles or other recreational users in the core elk range become apparent in the future, the Department may recommend additional restrictions. These recommendations could include seasonally closing areas to motor vehicle use, re-routing snowmobile, ATV, and/or ski trails, or routing any new snowmobile, ATV, and/or ski trails to protect important elk habitat within the core elk range. Several highways regulated by the state and counties pass through the Central Forest.

Disturbance to wintering elk by snowmobiles has the potential to be especially harmful, because winter is the most energetically taxing season for them (Mautz 1978). Activities resulting in elk abandoning areas of high-quality habitat or repeatedly fleeing from disturbance may result in lower survival and productivity rates (Clark 1999). In Oregon, elk counts decreased by half after a winter range began to be used by recreational snowmobilers (Anderson and Scherzinger 1975). In Yellowstone National Park, some elk were displaced from areas near groomed snowmobile trails, while others became habituated to human activity (Aune 1981). Animals habituated to snowmobiling are more at risk of being hit by snowmobiles (Reinhart 1999), creating a safety hazard for both people and elk.

ATV's may also have the potential to negatively affect elk. In Michigan, biologists have observed that elk seemed to be temporarily displaced from areas experiencing frequent summer ATV use (D. Smith, personal communication). Some farmers feel that this has caused elk to move from public land onto private farmlands, where they have caused crop damage problems. However, there is currently a lack of published scientific information available documenting the impacts of ATV's on elk.

Both snowmobiling and ATV use occur in Jackson County. There are now numerous designated snowmobile and ATV trails totaling approximately 137 miles in Jackson County alone. Snowmobile trails occur both inside and outside of the core elk range and cross both public and private land. Michigan and Pennsylvania prohibit the use of ATV's and snowmobiles except on designated trails. Both states have few trails within the elk range, therefore, having minimal impact on the elk herd. Temporary displacement of elk to more secluded areas generally occurs with increased activity. There is currently no indication that snowmobiles, ATV's, or other motor vehicles have displaced elk from important habitat. The only impacts on the Clam Lake herd associated with motor vehicles so far have involved collisions with cars.

Pennsylvania and Michigan both indicated that no reported elk related accidents involving recreationalists have occurred (personal communication R. Cogan & G. Matthews). However, more conflicts between elk management and motor vehicle users may occur in the future if the Black River herd is allowed to increase.

Recreational users

It is likely that elk visibility is reduced as deer hunting pressure and season length increase. Deer hunting had little effect on elk in the Clam Lake area (Anderson 1999). During the Michigan deer season, deer hunter densities ranged from 14 to 25 hunter/$mi^2$ in elk territory (personal communication Glen Matthews, Michigan DNR). Before the decline to the Michigan deer herd due to TB, hunter densities in the Michigan elk range were comparable to the Black River area. Short-term displacement of elk was observed during deer hunting seasons in Michigan (personal communication Dave Smith, Michigan DNR). According to Pennsylvania's elk biologists, deer hunting doesn't have a negative impact on elk, except that an occasional elk is mistaken for a deer. Deer hunters do not pressure elk to the point of moving them into undesirable areas. Elk have adapted well to this pressure (personal communication Rawley Cogan, Pennsylvania Game Commission). The responses of elk to bear hounding activities were also monitored, and no animals moved out of their previous or established home ranges. Deer hunter density is considerably higher in the Black River area versus the Clam Lake area, approximately 30 hunters/$mi^2$ to the approximately 7 hunters/$mi^2$.

In Alberta, winter elk distribution was largely unaffected by skiing, although elk tended to move away from heavily used trails during the ski season (Ferguson and Keith 1982). In Jackson County, cross-country skiing is a popular activity occurring primarily on 35 miles of designated ski trails, (D. Brown, personal communication). Other recreational uses such as snowshoeing, hiking, camping, mountain biking, and small game hunting are also popular within the state and county forests. Pennsylvania's elk herd has had little to no impacts by these activities (personal communication Rawley Cogan, Pennsylvania Game Commission). Impacts from recreational uses will be monitored. Initially there are no recommendations to close any trails to enhance elk habitat.

Elk viewing

Elk movements in Rocky Mountain National Park, where elk hunting ceased in 1962, did not appear to be affected by people watching elk from parking areas (Schultz and Bailey 1978). Elk generally fled a short distance when approached by people, but were often reluctant to leave the area completely. Michigan offers successful viewing opportunities to visitors of the elk range in designated viewing areas. These areas are especially popular with both elk and humans in the fall. Elk visibility is carefully monitored on the Michigan elk range. Beyer (1987) recommended modification of elk viewing areas to keep observers far enough away so that disturbance to animals is lessened and they do not become habituated to humans. Elk easily become habituated to predictable, harmless human activity (Thompson and Henderson 1998). This is a very undesirable condition that can lead to safety concerns for both people and elk. Habituated animals can create tension among those wishing to eliminate problem animals by any means necessary and those who enjoy their presence (Thompson and Henderson 1998). Additionally, the goal of the reintroduction was to restore a wild population of elk to Wisconsin, and habituation would decrease their “wildness”. Survey respondents at meetings for the Clam Lake herd thought that tourism and elk viewing should not be

promoted, to decrease the chances of animals becoming habituated and losing "wildness". The Clam Lake elk have not been very visible thus far, due to the low number of elk present and the thick cover characterizing the range. Until populations increase in the Black River area, a similar situation will probably exist. A few problems associated with people viewing elk have been noted in the Clam Lake area. Two yearling bulls became habituated to humans. Both of these animals subsequently died, one from injuries sustained in a collision with a car and the other from drowning. The Jackson County Forestry and Parks Department have proposed installing a wildlife viewing area. The potential for habituation would be high at these areas.

Artificial feeding/baiting

Artificial feeding of deer is a popular, legal activity throughout Wisconsin. Many people derive great enjoyment out of watching deer feed in their yards, and feel as though they are contributing to the maintenance of healthy deer populations. Problems with artificial feeding of elk are almost certain to develop if this is allowed. Elk accustomed to artificial feeding rapidly become habituated, and nuisance problems soon develop, including destruction of trees and shrubs in areas adjacent to where elk were being fed and safety concerns with motorists and/or people. Artificial feeding could also facilitate disease transmission among elk because animals are in closer contact with one another than they would be under normal circumstances (Davidson and Nettles 1997). Elk viewing and artificial feeding have had negative impacts in the Pennsylvania elk herd because elk are becoming habituated. An eight mile$^2$ section of elk range has been closed to hunting due to habituated elk. Regulations to prevent artificial feeding of elk in Pennsylvania have been implemented.

If a Black River herd is established the Department would discourage artificial feeding and baiting in elk range via public education efforts.

Logging

Edge and Marcum (1985) found that elk in Montana tended to stay 500-1,000 yards away from logging activity, but moved into logging areas during nonactive periods. There is also evidence that elk may become habituated to logging activities occurring over a long period of time (Beall 1976). Anderson (1999) reported that logging activities around the Clam Lake herd did not adversely affect elk movements near logging units. Disturbance of elk due to logging would not be a major management concern.

## Social Implications

Prior to establishment of the Clam Lake herd, elk had essentially been absent from the state for >100 years. There is no doubt that elk are a magnificent animal with high intrinsic value and appeal. If allowed to remain, many citizens of Wisconsin would receive an "existence value" from the presence of a wild population of elk. They would take pleasure or pride in knowing that elk occur here, even if they do not visit the herd or gain from it economically. Species reintroduction efforts often result in a sense of pride and stewardship among the residents of the reintroduction area. Community pride and local support for elk reintroduction is readily apparent in the Clam Lake area, where businesses display elk pictures and herd updates from the UW-SP research team. A wild elk herd would provide residents of Wisconsin and other

states with an opportunity to view the animal outside of captivity. This experience would be highly valued by many. Elk in the Black River area may increase visitation to Black River Falls, Neillsville and Tomah, regions where the economy relies heavily on tourism. The economic benefits of an increase in tourism would be welcomed by many residents. There are probably also those who do not want to see more visitors to the area because of the potential problems like increased traffic causing greater congestion and road maintenance costs, or decreased aesthetic values and environmental quality resulting from more development. During public meetings for the Clam Lake herd, statewide restoration was favored by 97% of survey respondents, while 3% neither favored nor opposed. These results may be biased, as 40 of the 103 meeting attendees were Rocky Mountain Elk Foundation (RMEF) members, a non-profit organization dedicated to preservation of elk and their habitat. Nonetheless, little opposition to elk restoration was encountered.

Hunting is an important heritage throughout Wisconsin. If a Black River herd is established, limited opportunities to hunt elk would probably eventually be available to citizens of this state. Many residents of Wisconsin travel to western states each year to go elk hunting. However, such long distance elk hunts are no doubt cost-prohibitive and/or logistically impossible for many people. The opportunity to hunt elk in Wisconsin would be very attractive for many individuals.

Successful elk management would require the joint cooperation of many public and private groups. The formation of partnerships among these groups is considered by many to be an exciting prospect. There is tremendous potential for continued partnerships with the RMEF. Currently there are 19 RMEF chapters in Wisconsin with a membership of approximately 4,600. A successful reintroduction and management program in the Black River area may also improve public confidence in the natural resource management agencies involved: Wisconsin Department of Natural Resources, U.S. Forest Service, and County Forestry Departments. However, if problems were to develop such as failure to control damage or keep the herd in the desired area, public confidence in the involved agencies could decline.

## Economic Implications

A variety of economic gains and costs can be expected if the decision is made to introduce elk to the Central Forest. Economics must be considered in elk management decisions. The economic potential of tourism and hunting, along with anticipated management costs, are discussed in the following section.

### Benefits to local economies

There is ample evidence that the Michigan elk herd is a significant attraction. Parker (1991) estimated that 53,000 people per year would visit to view elk, and would remain in Bayfield County accommodations for an average of 1.7 nights. An average of $35.00/day/person would be spent, for a total economic contribution of $3,153,500 to local economies. However, these figures may not apply well to the Central Forest area, as it is difficult to predict how many people would actually come to view elk. Because Jackson County is heavily forested, opportunities to view elk may be more limited. If elk do not become visible, people traveling to the Black River area to see them may become discouraged and not return. Local and state interest in elk is high, as evidenced by continually large numbers of requests for information about the elk study, and statewide support of RMEF functions and fund raisers. There would likely be an economic

contribution to local economies from elk tourism if the Black River herd were allowed, although amounts are difficult to estimate.

Hunting will become part of elk management in Wisconsin if a harvestable surplus were to develop. Local economies would receive some economic gains from elk hunting. Hunters would be expected to spend money on food, lodging, fuel, and hunting equipment. However, the number of elk licenses available would be limited (probably <100/year).

Costs of elk management

If the Black River herd is allowed, there will be substantial management costs (Table 2, Appendix). Some people may feel that an elk management program would divert money, time, and public interest away from other wildlife management projects, which already lack funding and staff. One of the largest current funding sources for the elk program is revenue from Indian gaming. The 1999-2001 state budget earmarked $200,000 in gaming revenue for this purpose in fiscal year 2001. Some costs could also be shared by the Jackson County Forestry and Parks Department and the Ho-Chunk Nation. Private organizations such as the Rocky Mountain Elk Foundation can match dollars contributed by state and federal agencies. RMEF has indicated a desire to continue to provide funding for the management of elk in Wisconsin. The sale of elk hunting permits and application fees would generate additional revenue. In 1988-89, Michigan generated $223,500 from the sale of 235 permits, at $4.00/application and $100.35/license (Table 3, Appendix).

In addition to adequate funding, additional personnel would be necessary to successfully manage the Black River herd. The existing personnel available would not be sufficient to manage an elk herd. One full time biologist stationed at Black River Falls would be essential, along with annual support by limited term employees when needed. Elk management responsibilities would include population and habitat monitoring, public contact, and handling problem situations.

## Summary

Economic and social impacts would be associated with elk management decisions. There is support from the general public and crop producers for a statewide elk restoration. A decision to introduce elk in the Black River area and allow them to increase would probably bring money into local economies from tourism and elk hunting. Many people would enjoy having the opportunity to view wild elk, or just know that the animals are present. Local residents might take pride in the elk program. Elk would probably be compatible with other uses of Jackson County. However, an elk population could also cause economic loss and frustration with elk management for private landowners suffering crop damage. Although other eastern states have had few elk-vehicle collisions, that risk might increase if the population grew. Conflicts could develop between elk management interests, motor vehicle and other recreational users if these activities began to have negative impacts on elk. An elk management program would also incur additional costs on the Department and supporting partners, although options for funding the program exist.

Different socio-economic impacts could be expected under each of the four population management alternatives. There will be greater potential for forest/agricultural crop damage, elk-vehicle collisions, and conflicts with recreational and non-recreational users of the Central Forest for Alternatives #1, #2 and #4 than with #3, because population goals are higher for those alternatives. However, local and state pride, economic benefits to local economies, and recreational opportunities to view and hunt elk would also be greater for Alternatives #1, #2 and #4. Costs of long-term management will be greater for Alternatives #1 and #2 than for #3 or #4. Alternative #2 is distinct from #1 in that associated socio-economic impacts would be expected to occur more quickly, because the elk population will grow faster.

## ECOLOGICAL IMPACTS

An elk population in the Central Forest will have impacts on other biological resources. Some impacts might be acceptable, while others would not. The following section discusses potential impacts of a Black River herd on natural flora and fauna.

### Wildlife

Deer and deer hunting are culturally and economically important in Wisconsin. Public concern has been expressed that elk would compete with deer, resulting in fewer deer. While elk and deer are closely related sympatric cervids, there is usually not a high degree of interspecific competition between the two (Nelson 1982). In Michigan, the white-tailed deer herd is compatible with elk (Moran, personal communication). Over-winter deer densites are 30-40/mi$^2$. In Minnesota, overwinter deer densities of 25/mi$^2$ are maintained on the elk range. Resource partitioning by elk and deer is partly a result of the ability of elk to utilize a wider range of food and cover types (Moran 1973). Deer normally begin yarding in conifer swamps and lowlands when snow depths reach 12 inches. At depths of 24 inches or more, elk will move into conifer stands (Leege and Hickey 1977). However, elk movements do not appear to be seriously curtailed until snow depths reach 30 inches or more (Adams 1982). In Michigan, elk movements were restricted when snow depths exceeded 18 inches. However, they moved freely between cuttings and heavy cover and were never restricted to conifer yards for an extended period of time (Moran 1973). Competition is expected to occur primarily during severe winters when both elk and deer occupy conifer yards. Competition between elk and deer in the Clam Lake area has been negligible so far (Lizotte 1998) and a similar situation would probably exist in the Black River area. If elk densities increase, they could begin impacting browse availability and crowding deer out of yards. This potential would be greatest with Alternatives #1, #2 and #4. Population goals for elk would be set at levels below which competition with deer would be expected. Competition between elk and deer would not be expected to occur with Alternative #3.

### Endangered, Threatened and Special Concern Animals

Elk impact on endangered and threatened species would need to be carefully monitored to avoid any detrimental affects.

Gray wolves are a state threatened and federally endangered species in Wisconsin. The Central Sand Plains is high quality wolf habitat (Mladenoff et al. 1995), and contains several packs (Wydeven and Wiedenhoeft 1999). Although elk are preyed upon by wolves in the West (Bangs et al. 1998, Kunkel et al. 1999), in this

region wolves prey primarily on deer. We expect that wolves will occasionally kill elk. Two depredated elk in the Clam Lake herd already have been reported (J. Schmidt, personal communication). It is unlikely that elk will ever be abundant enough to become a significant addition to the prey base for wolves in the Black River area. None of the elk management alternatives would be expected to have an appreciable impact on wolves in the Central Forest.

Several other federal or state threatened or endangered animal species are present in Jackson County as well, including, bald eagles, ospreys, red-shouldered hawks, trumpeter swans, Kirkland's warbler, Blanding's turtle, massasauga, and wood turtles. These species would not likely be directly impacted by elk. However, active habitat management such as converting conifer stands to early succession forest cover types beneficial to elk would be detrimental to these species (Gieck 1986). The Department is not recommending such habitat manipulations for elk management.

Elk are known to feed on species of lupine (*Lupinus spp*) in western states, (Kufeld 1973), and one study found a species of lupine (*Lupinus leucophyllus)* as the most important forb in the summer diet of elk (Martinka 1969). Karner blue butterflies, a federally endangered species, are dependent on wild lupine (*Lupinus perennis)* to complete their life cycle (Wisconsin DNR 1999). The US Fish and Wildlife Service deemed it necessary for the Department of Natural Resources to conduct a Biological Assessment on the Karner Blue Butterfly, to get a better understanding of the affects elk will have on the butterfly habitat. (Refer to APPENDIX B for the Biological Assessment of Potential Impact by Elk on Lupine, Karner Blue Butterflies, and Other Rare Plants and Animals in Central Wisconsin.)

Based on the Department's assessment and the US Fish and Wildlife Services' biological opinion, the introduction of elk into Jackson County will not likely jeopardize the continued existence of the Karner blue butterfly as proposed in the management plan. It is understood that some incidental consumption of Karner butterfly eggs and larvae, which is found on lupine plants, will occur. The anticipated take by elk is not likely to result in substantial modification or destruction of critical butterfly habitat (USFWS 2001).

Because the ultimate impact of the introduction of elk on the Karner blue butterfly is largely speculative, it will be necessary to closely monitor this reintroduction to detect any deleterious effects of the action. Therefore, the following terms and conditions are designed to provide for early recognition of any potential problems, which would allow for implementation of corrective actions. Experimental design and study methods for each of these monitoring efforts was agreed upon by mutual consent of the Service's Green Bay, Wisconsin, Ecological Services Field Office and the Wisconsin DNR (USFWS 2001).

1. Design and conduct studies to determine the plant species and their relative composition in the diet of elk released in the Central Wisconsin reintroduction area. These studies should be designed using the most current techniques for determining food habits of ungulates. Studies should be initiated immediately following the release of elk, and must be conducted for a minimum of l year, to clearly determine which plant species are preferred by elk in the habitat throughout the year. An essential component of this research is to clearly determine the impact of elk herbivory on individual lupine plants, including whether elk consume entire plants or just the reproductive portions. A report on the results of this research should be furnished to the Service's Green Bay, Wisconsin, Ecological Services Field Office within 2 years of the initial release of elk.

2. Design and conduct studies to determine the types of habitat utilized by elk, and relative amounts of time spent in each habitat, especially areas of lupine. This research also should be initiated immediately following release of elk, and be conducted for a period of time sufficient to determine seasonal use patterns, at least 1 year. A report on the results of this research should be furnished to the Service's Green Bay, Wisconsin, Ecological Services Field Office within 2 years of the initial release of elk.

3. In conjunction with the two studies described above, local populations of Karner blue butterfly and wild lupine should be monitored to ensure that anticipated levels of take are not exceeded. It will be especially important to monitor at those lupine patches, which are documented through telemetry as being used by elk. Sampling protocols should be designed with the intent of detecting any population changes that could be attributed to the presence of elk. An interim report on the results of this monitoring should be furnished to the Service's Green Bay, Wisconsin Ecological Services Field Office by December 1 of each year, beginning in the year in which elk are first released. Annual reports should be submitted for a minimum of 5 years. A decision whether to require further monitoring or reporting will be made at the end of this 5-year period.

4. Experiments to determine the levels of utilization of lupine by elk should include the construction of enclosures, which would allow for direct measurements and comparison between areas subject to elk grazing, and areas protected from grazing pressure. This action should be conducted using an experimental design sufficient to detect the effects of elk utilization on individual lupine patches. Results of this portion of the monitoring program should be reported in the annual reports described above under terms and conditions 1, 2, and 3.

5. Should any studies document a significant decline in lupine populations, the Green Bay, Wisconsin, Ecological Services Field Office must be contacted. The Federal Aid Office will ensure that a plan is formulated and implemented, in coordination with the Green Bay, Wisconsin, Ecological Services Field Office for mitigation of losses, through habitat creation, restoration or other appropriate means. Such mitigation may include the planting of lupine or nectar plants, or physical protection of key Karner blue butterfly populations from adverse effects due to elk. The Service's Green Bay, Wisconsin, Field Office will also evaluate the need to pursue mitigation measures in reviewing the annual monitoring reports identified in term and condition 3.

These reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. With implementation of these measures, we believe that eggs, larvae or adult butterflies may be incidentally taken annually within the project area as a result of the proposed action. However, any take will be difficult to detect for the following reasons: some losses are expected to occur during a season when adult butterflies are not present; losses may be masked by seasonal fluctuations in numbers; and finding a dead or impaired specimen is unlikely. Take may also occur as a result of damage to lupine plants caused by grazing or trampling by elk. The amount of this type of take is also difficult to quantify, but can be estimated at an annual loss or damage to up to 5 acres of lupine-occupied habitat, because the Karner blue butterfly is dependent upon wild lupine for its existence.

If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring review of reasonable and prudent measures provided. The Federal Aid Office must immediately provide an explanation of the causes of the taking and review with the Green Bay, Wisconsin, Ecological Services Field Office the need for possible modification of the reasonable and prudent measures.

This biological opinion is based on information in Fish and Wildlife Service files, pertinent literature, telephone conversations, discussions with species experts including the Wisconsin DNR, the Management Plan and Environmental Assessment (EA) prepared for this project (WDNR 2001), the Biological Assessment (BA) prepared to analyze effects on lupine, Karner blue butterflies and other species (Wydeven, et al.2001), and other sources of information. A complete administrative record of this consultation is on file in the Service's Green Bay, Wisconsin, Ecological Services Field Office.

## Native Vegetation

Elk are large herbivores with broad dietary preferences including many herbaceous species (Kufeld 1973). Concern exists among both resource managers and the public that elk may adversely affect some species of native vegetation, including rare herbaceous plants. The potential effects of elk herbivory on rare herbaceous plants are difficult to predict because of the complex nature of the issue and the fact that much of the information required to evaluate it better is now lacking. For example, the elk range has not been thoroughly surveyed for rare plants, so there is a great deal of uncertainty regarding what plants may or may not be present. It is also difficult to predict which plant species are likely to be impacted by elk herbivory. Although numerous studies examining the diets of elk have been published, almost all of them were conducted in the western part of the continent where plant communities are very different from those occurring in northern Wisconsin. It is therefore uncertain how heavily elk may utilize different species. Perhaps most importantly, it is difficult to predict how rare plant populations may be affected by the addition of elk herbivory to deer herbivory. Several researchers have indicated that high-density deer populations are having deleterious effects on some species of rare plants throughout northern Wisconsin (Martin 1995, Alverson et al. 1988). For species that are already impacted by deer herbivory, any herbivory by elk would exacerbate those problems. Unfortunately, basic information regarding direct impacts of herbivory by deer at known population levels on specific species of rare plants in Wisconsin is lacking (Martin 1995), which further complicates efforts to predict how elk herbivory will affect rare plant populations.

Some inferences regarding the potential impacts of elk on specific species of rare plants can be made based upon the limited information available. There are currently 28 plant species listed as state endangered, threatened, or species of concern that are known to occur in the core and buffer ranges, several of which are also designated as region or forest sensitive by the USFS (Table 5). There are no federally threatened or endangered plants known to occur in the core or buffer elk ranges. There are also 40 species of rare plants that may be present in the elk range because the proper habitat exists for them, but because the area has not been thoroughly surveyed it is unknown whether or not they occur. Species that could be affected by the cumulative impacts of elk and deer herbivory include Showy Lady's Slipper (Alverson et al 1988, Martin 1995), Small Yellow Lady's Slipper (Alverson et al 1988, Martin 1995), American Ginseng (Martin 1995),

Calypso Orchid (M. Sheehan, personal communication), Downy Willow-Herb (M. Sheehan, personal communication), Maidenhair Spleenwort (M. Sheehan, personal communication), and Fairy Slipper (M. Sheehan, personal communication). Additionally, Crinkled Hairgrass (Jost et al 1998) and Marsh Valerian (Kufeld 1973) were both strongly selected by foraging elk in other areas of the country. These plants may be at risk from elk herbivory alone. Future research and monitoring efforts could reveal more species at risk from elk herbivory, as well.

The largest impacts on native vegetation could be expected with Alternatives #1,#2 and #4 because they have the highest elk population goals. An appropriate vegetation monitoring program, described later in this document, would be important to help determine impacts of elk herbivory on native vegetation with either of these alternatives. Insignificant impacts would be expected with Alternative #3, because elk would be at very low densities. Vegetation monitoring would therefore not be necessary.

## Summary

Some impacts of elk on other resources of the Black River area may occur. There may be competition between elk and deer, and definite potential for damage to native vegetation including some species of rare herbaceous plants. These impacts will be minimized by maintaining elk densities through hunting at levels below which substantial negative effects would be expected. The potential for these impacts would be greatest under Alternatives #1, #2 and #4, because they have the highest elk population goals. Impacts could occur quicker with Alternative #2, because elk population growth rates would likely be greater. Minimal impacts would be expected under Alternative #3. State or federally listed terrestrial vertebrates, ruffed grouse, or other wildlife species are not anticipated to be affected under the first three alternatives.

Table 5. Rare plants in the core and buffer elk ranges of the Black River area. Species of special concern (SC) are those which may qualify for listing as state or federally threatened (THR) or endangered (END) species, but insufficient data is available to assess their status. Regionally (r) or forest (f) sensitive species are those that are not listed as federally threatened or endangered, but are given special management consideration by the United States Forest Service because they are rare in that Forest Service Region or in the Black River area. Deliberative species are those that are under consideration for listing as regionally sensitive.

| SCIENTIFIC NAME | COMMON NAME | STATE STATUS | FEDERAL STATUS |
|---|---|---|---|
| HEMIDACTYLIUM SCUTATUM | FOUR-TOED SALAMANDER | SC/H | |
| GAVIA IMMER | COMMON LOON | SC/M | |
| BOTAURUS LENTIGINOSUS | AMERICAN BITTERN | SC/M | |
| IXOBRYCHUS EXILIS | LEAST BITTERN | SC/M | |
| CYGNUS BUCCINATOR | TRUMPETER SWAN | END | |
| PANDION HALIAETUS | OSPREY | THR | |
| HALIAEETUS LEUCOCEPHALUS | BALD EAGLE | SC/FL | (PS) |
| CIRCUS CYANEUS | NORTHERN HARRIER | SC/M | |
| ACCIPITER GENTILIS | NORTHERN GOSHAWK | SC/M | |
| BUTEO LINEATUS | RED-SHOULDERED HAWK | THR | |
| TYMPANUCHUS PHASIANELLUS | SHARP-TAILED GROUSE | SC/M | |
| CHLIDONIAS NIGER | BLACK TERN | SC/M | |
| EMPIDONAX VIRESCENS | ACADIAN FLYCATCHER | THR | |
| DENDROICA KIRTLANDII | KIRTLAND'S WARBLER | SC/M | LE |
| DENDROICA CERULEA | CERULEAN WARBLER | THR | |
| PROTONOTARIA CITREA | PROTHONOTARY WARBLER | SC/M | |
| OPORORNIS FORMOSUS | KENTUCKY WARBLER | THR | |
| OPORORNIS AGILIS | CONNECTICUT WARBLER | SC/M | |
| AMMODRAMUS HENSLOWII | HENSLOW'S SPARROW | THR | |
| AMMODRAMUS LECONTEII | LE CONTE'S SPARROW | SC/M | |
| ANGUILLA ROSTRATA | AMERICAN EEL | SC/N | |
| PERCINA EVIDES | GILT DARTER | THR | |
| SOREX ARCTICUS | ARCTIC SHREW | SC/N | |
| SOREX HOYI | PIGMY SHREW | SC/N | |
| CLEMMYS INSCULPTA | WOOD TURTLE | THR | |
| EMYDOIDEA BLANDINGII | BLANDING'S TURTLE | THR | |
| OPHISAURUS ATTENUATUS | WESTERN SLENDER GLASS LIZARD | END | |
| DIADOPHIS PUNCTATUS EDWARDSII | NORTHERN RINGNECK SNAKE | SC/H | |
| PITUOPHIS CATENIFER | BULLSNAKE | SC/P | C |
| SISTRURUS CATENATUS | EASTERN MASSASAUGA RATTLESNAKE | END | |
| CICINDELA PATRUELA HUBERI | A TIGER BEETLE | SC/N | |
| CICINDELA LEPIDA | LITTLE WHITE TIGER BEETLE | SC/N | |
| NEPA APICULATA | A WATER SCORPION | SC/N | |
| POLYAMIA DILATA | NET-VEINED LEAFHOPPER | THR | |
| ERYNNIS MARTIALIS | MOTTLED DUSKY WING | SC/N | |
| ERYNNIS PERSIUS | PERSIUS DUSKY WING | SC/N | |
| HESPERIA METEA | COBWEB SKIPPER | SC/N | |
| POANES MASSASOIT | MULBERRY WING | SC/N | |

| | | | |
|---|---|---|---|
| EUPHYES BIMACULA | TWO-SPOTTED SKIPPER | SC/N | |
| ATRYTONOPSIS HIANNA | DUSTED SKIPPER | SC/N | |
| LYCAENA EPIXANTHE | BOG COPPER | SC/N | |
| CALLOPHRYS IRUS | FROSTED ELFIN | THR | |
| CALLOPHRYS HENRICI | HENRY'S ELFIN | SC/N | |
| LYCAEIDES MELISSA SAMUELIS | KARNER BLUE BUTTERFLY | SC/N | LE |
| CHLOSYNE GORGONE | GORGONE CHECKER SPOT | SC/N | |
| OENEIS JUTTA | JUTTA ARCTIC | SC/N | |
| HEMILEUCA SP 3 | MIDWESTERN FEN BUCKMOTH | SC/N | |
| GRAMMIA PHYLLIRA | PHYLLIRA TIGER MOTH | SC/N | |
| PHYTOMETRA ERESTINANA | ERNESTINE'S MOTH | SC/N | |
| MEROPLEON AMBIFUSCA | NEWMAN'S BROCADE | SC/N | |
| SCHINIA INDIANA | PHLOX MOTH | END | |
| GOMPHURUS LINEATIFRONS | SPLENDID CLUBTAIL | SC/N | |
| GOMPHURUS VENTRICOSUS | SKILLET CLUBTAIL | SC/N | |
| GOMPHUS VIRIDIFRONS | GREEN-FACED CLUBTAIL | SC/N | |
| OPHIOGOMPHUS SP 1 NR ASPERSUS | BARRENS SNAKETAIL | SC/N | |
| AESHNA TUBERCULIFERA | BLACK-TIPPED DARNER | SC/N | |
| AESHNA VERTICALIS | GREEN-STRIPED DARNER | SC/N | |
| NEUROCORDULIA YAMASKANENSIS | STYGIAN SHADOWFLY | SC/N | |
| SOMATOCHLORA ELONGATA | SKI-TAILED EMERALD | SC/N | |
| SOMATOCHLORA FRANKLINI | DELICATE EMERALD | SC/N | |
| SOMATOCHLORA INCURVATA | WARPAINT EMERALD | END | |
| SOMATOCHLORA KENNEDYI | KENNEDY'S EMERALD | SC/N | |
| SOMATOCHLORA TENEBROSA | CLAMP-TIPPED EMERALD | SC/N | |
| WILLIAMSONIA FLETCHERI | EBONY BOG HAUNTER | SC/N | |
| WILLIAMSONIA LINTNERI | RINGED BOGHAUNTER | SC/N | |
| SYMPETRUM DANAE | BLACK MEADOWHAWK | SC/N | |
| CHROMAGRION CONDITUM | AURORA DAMSELFLY | SC/N | |
| STYLURUS NOTATUS | ELUSIVE CLUBTAIL | SC/N | |
| STYLURUS SCUDDERI | ZEBRA CLUBTAIL | SC/N | |
| SPHARAGEMON MARMORATA | NORTHERN MARBLED LOCUST | SC/N | |
| PSINIDIA FENESTRALIS | SAND LOCUST | SC/N | |
| TRACHYRHACHYS KIOWA | ASH-BROWN GRASSHOPPER | SC/N | |
| SOYEDINA VALLICULARIA | A STONEFLY | SC/N | |
| ALASMIDONTA MARGINATA | ELKTOE | SC/H | |
| CYCLONAIAS TUBERCULATA | PURPLE WARTYBACK | END | |
| ASCLEPIAS OVALIFOLIA | DWARF MILKWEED | THR | |
| SOLIDAGO SCIAPHILA | SHADOWY GOLDENROD | SC | |
| CALLITRICHE HETEROPHYLLA | LARGE WATER-STARWORT | THR | |
| BARTONIA VIRGINICA | YELLOW SCREWSTEM | SC | |
| MYRIOPHYLLUM FARWELLII | FARWELL'S WATER-MILFOIL | SC | |

| | | |
|---|---|---|
| UTRICULARIA GEMINISCAPA | HIDDEN-FRUITED BLADDERWORT | SC |
| RHEXIA VIRGINICA | VIRGINIA MEADOW-BEAUTY | SC |
| EPILOBIUM PALUSTRE | MARSH WILLOW-HERB | SC |
| POLYGALA CRUCIATA | CROSSLEAF MILKWORT | SC |
| TALINUM RUGOSPERMUM | PRAIRIE FAME-FLOWER | SC |
| SALIX SERICEA | SILKY WILLOW | SC |
| VIOLA FIMBRIATULA | SAND VIOLET | END |
| CAREX ASSINIBOINENSIS | ASSINIBOINE SEDGE | SC |
| CAREX CUMULATA | CLUSTERED SEDGE | SC |
| CAREX FOLLICULATA | LONG SEDGE | SC |
| CAREX LIVIDA VAR RADICAULIS | LIVID SEDGE | SC |
| CAREX STRAMINEA | STRAW SEDGE | SC |
| SCIRPUS GEORGIANUS | GEORGIA BULRUSH | SC |
| SCLERIA RETICULARIS | RETICULATED NUTRUSH | END |
| SCLERIA TRIGLOMERATA | WHIP NUTRUSH | SC |
| JUNCUS MARGINATUS | GRASSLEAF RUSH | SC |
| ARETHUSA BULBOSA | SWAMP-PINK | SC |
| PLATANTHERA HOOKERI | HOOKER ORCHIS | SC |
| ORYZOPSIS CANADENSIS | CANADA MOUNTAIN-RICEGRASS | SC |
| POA PALUDIGENA | BOG BLUEGRASS | THR |
| POTAMOGETON DIVERSIFOLIUS | WATER-THREAD PONDWEED | SC |
| LYCOPODIUM POROPHILUM | ROCK CLUBMOSS | SC |
| THELYPTERIS SIMULATA | BOG FERN | SC |

## MONITORING AND MANAGEMENT POLICIES

The following section discusses monitoring and management needs relating to the Black River herd if it is allowed. Unless otherwise noted, discussion focuses on monitoring and management protocols to be implemented for Alternative #1 (the preferred alternative).

### Monitoring

While experience at Clam Lake and other US locations are good indicators, it is impossible to predict with certainty how other resources will be affected. Therefore, it will be crucial to continue intensive monitoring of the elk population and its relationship to the environment. Many management decisions would need to be based on information derived from monitoring. An effective monitoring program would be the only way to identify when elk populations are reaching maximum tolerable levels. Indicators that the population is reaching that level would include substantial impacts on winter browse or rare plants, elk occupation of deer yarding areas, declining productivity or survival rates, and increasing dispersal or habituation rates. If some of these indicators are detected by monitoring, elk numbers would then be reduced through hunting. Documenting the outcome of the reintroduction for the benefit of other states and other areas of Wisconsin considering a similar attempt would also be useful (Gogan 1990).

Elk population

Knowledge of basic population parameters is essential for making appropriate elk management decisions. The most important parameters would be population size and distribution, so biologists know how elk numbers compare to goals for core and buffer ranges. Numerous techniques exist for estimating populations. Michigan DNR uses short, intensive air and ground surveys. During a 3-day period in January 1984, 65 people used 2 airplanes and numerous trucks, snowmobiles, and snowshoes to survey approximately 600 $mi^2$. An estimated 80% of the total population is counted each year using this technique (Michigan Department of Natural Resources 1984). In February 1999, the Department conducted an aerial survey in which straight-line transects were flown over the Clam Lake reintroduction area from a fixed-wing aircraft in an attempt to get a total herd count. Prior to the flight, the pilot was given recent locations of instrumented elk and their transmitter frequencies. Twenty-four of 28 elk known to be present, all in 3 groups with at least one instrumented elk per group, were counted from the air. This technique may be sufficient when the elk population is low and a high percentage of the population is instrumented. However, it will become much more difficult to obtain a total herd count from aerial surveys as the population grows and begins occupying a larger area. Mark-resight (Eberhardt et al. 1998) or sightability-adjustment (Cogan and Diefenbach 1998) techniques would therefore be used with aerial and ground surveys to obtain population estimates. Some elk would need to be marked with radio collars visible to survey aircraft. Good spatial distribution of marked animals throughout the population would be important for the technique to work well.

Productivity and survival rates would also be monitored. Capture and collaring of newborn calves may be necessary for the first few years of the reintroduction study to determine mortality factors, however, long-term trapping may not need to be done with calves. Biologists would attempt to count and classify groups of elk from the air and/or the ground to obtain calf:cow:bull ratios, providing a valuable index of productivity and survival (Taber 1982) that would be used to assess elk population dynamics. Survival rates of adults would be measured by routine ground monitoring of radio-collared animals. Aging of hunter-killed elk would also be conducted once public hunting is initiated.

Routine ground-monitoring of radio-collared animals would be used to detect dispersing elk. However, chances are that dispersing elk would often not be instrumented. Aerial surveys might sometimes reveal the presence of these animals. The Department would usually have to rely on reports from the public to detect these animals.

Monitoring for disease in the Black River herd would be conducted. Field and laboratory necropsy of elk carcasses using standard procedures devised by the DNR Wildlife Health Team would be used for disease monitoring. Additionally, whenever elk are handled to replace radio-collars, samples would be collected for disease screening. This type of monitoring will be critical for determining mortality factors for the new population and detecting and preventing diseases that could put deer or livestock at risk.

Radio collars facilitate the collection of much useful information. All elk initially released in the Black River area would be radio-collared. The batteries on collars used these days have a life of about 6 years, which would require additional elk to be captured and instrumented in the future. There is an inherent risk of injuring or killing animals when capturing and handling them, but this risk would be minimized by

developing safe capture procedures that would be reviewed by experienced professionals and the DNR Animal Care and Use Committee before they are implemented. The number of collared animals required for good population estimates will depend on what survey technique is used. Capturing adequate numbers of elk for collaring with reasonable spatial distribution will prove challenging. Chemical immobilization with dart guns is unlikely to work in most cases, due to the thick cover dominating the Black River area and the skittish nature of the elk. However, there may be cases where elk offer the opportunity for darting. Corral traps have been successfully used in the past and are likely going to be the best option available for collaring significant numbers of elk, although adequate spatial distribution of collared animals may be difficult to obtain. The Department would use both of these techniques when applicable to collar elk with good spatial distribution. In addition, each time an unmarked elk is captured for management purposes it would be marked, preferably with a radio collar.

Larger populations spread over broader areas are more difficult to estimate than smaller populations in restricted areas. Alternative #3 would probably require only a minimal population monitoring effort to determine population size and distribution. Population monitoring would therefore require more time, personnel, and expense for Alternatives #1, #2 and #4, than with #3.

Habitat

The Department would continue to monitor habitat utilization by elk and their impacts on native vegetation. Winter browse utilization surveys would be conducted periodically and will be an important part of future monitoring efforts. Data would be collected on what species elk are browsing and how heavily they are being utilized. Deer surveys would be conducted near wintering groups of elk to determine if they are competing with deer for winter habitat.

Rare herbaceous plants would also be a part of the monitoring program, given that elk herbivory has the potential to impact several species. Much needed base-line data on rare plant occurrences should continue to be collected, although such efforts are often limited by funding. Patches of rare plants likely to be affected by elk herbivory would be monitored. Target species would include Lupine, Showy Lady's Slipper, Small Yellow Lady's Slipper, American Ginseng, Calypso Orchid, Downy Willow-Herb, Maidenhair Spleenwort, Fairy Slipper, Crinkled Hairgrass, Marsh Valerian, and any others that data suggest should be monitored.

Although the literature on U.S. herds indicates no adverse impacts on elk caused by motor vehicles or other recreational uses, there is a considerable amount of published scientific information available suggesting this could become an elk management concern in the future if the herd is allowed to increase. Investigations should be conducted if the herd is allowed to expand to determine if impacts on elk continue to be negligible or if they are being excluded from important habitat in the core range by various human activities.

Artificial feeding and baiting could lead to habituation problems for elk, even if they are not the target species. Surveys would be conducted to determine where these activities occur within the designated elk range, especially in relation to groups of elk, to allow predictions of where habituation problems might develop. Public contacts would be made to supplement the surveys.

Habitat monitoring would be more involved and expensive with Alternatives #1, #2 and #4 than with Alternatives #3. Larger elk populations would lead to increasing impacts on habitat, and the monitoring programs described above would be important. Low elk populations such as those that would be associated with Alternative #3 would be expected to have inconsequential impacts on habitat, and therefore would not require intensive monitoring.

## Elk Hunting Regulation

Hunting will be the primary method of maintaining elk population goals. In polygamous animals like elk, small numbers of bulls can breed most of the cows (Geist 1982). Harvesting a small number of bulls has no effect on population growth rates. This type of limited harvest for bulls would begin when the population reaches 150. Harvest rates would be increased when population goals are reached, with a goal of removing the annual increment to the herd. Antlerless elk as well as bulls would then be harvested. Bull harvest rates would be controlled so that good bull:cow ratios are maintained to allow adequate numbers of older age class bulls for breeding. Most tourists and hunters would be interested in the opportunity to view or kill mature, large antlered bulls. Bull:cow ratios of approximately 40-50:100 are comparable to those for the Michigan herd, and would allow for adequate viewing and hunting opportunity. Assuming a population growth rate of 13% (as in Michigan), a range of harvest goals would be 26 elk if the population were 200 or 58 from a population of 450.

Legislation is needed to establish the legal structure of an elk season in Wisconsin. Aspiring elk hunters would need a permit to kill an elk. Permits would be distributed by lottery, with no preference system. The Department may restrict the number of permits an applicant can receive in their lifetime, or set a waiting period that successful applicants must observe before they could begin applying for elk permits again. Permit and permit application fees would be set. Michigan charges $4.00/application and $100.00/permit. This system would be affordable to a broad section of the public, and the Department may charge similar fees. The Department suggests that revenue generated from elk license sales be used to fund the elk program, except for $1.00/application of which would go to the Wildlife Damage Abatement and Claims Program.

Elk hunting seasons would have to be established in order to properly manage the herd. Hunting seasons would likely be held every other year to reduce the administrative costs of a hunt involving a small number of permits. Both Michigan and Arkansas have multiple seasons, with permits only valid for one season. These seasons are generally in mid-late September and early December, with 5-7 days/season. The Department would consider both of these options when structuring seasons. Success rates for bulls might be best in September, as they are generally more active during the rut. Antlerless elk are typically more vulnerable after the rut in early winter (Mohler and Toweill 1982), when there is usually snow cover to concentrate animals in wintering areas, facilitate tracking, and increase elk visibility. Elk hunters would be able to use any weapon that is legal for deer hunting including rifle, shotgun, handgun, muzzleloader, or bow.

Elk hunting zones would be established to direct the harvest of elk numbers in different areas according to population goals. The buffer range would have lower goals, and therefore higher harvest rates, than the core range. Buffer and core ranges could roughly be used as hunting zones, which could be split into additional zones if finer spatial resolution was necessary to reduce or protect elk in specific areas. Finer-

scale hunting zones cannot be established until we know more about how the herd would distribute itself on the landscape as it increases.

Harvest goals would be largest with Alternative #4 since the population would expand to the greatest number under this alternative. Additionally harvest goals would be larger with Alternatives #1 and #2 than for #3, providing more hunting opportunities. Accordingly, hunting season frameworks would be more complex, requiring more supporting legislation. Administrative costs for hunting seasons would be higher as well, although they may be offset by greater revenue.

## Habitat Management

Much of the designated elk range is owned by the WI DNR and Jackson County (managed by Forestry and Parks Department), including virtually the entire core range. These agencies would have ultimate authority over habitat management projects. Much of the elk range is currently designated for pulp production. Literature review indicates that this is an important habitat component for elk. The WI DNR Black River Forest is getting ready to revise their 10-15 year forest management plan. Current management of the Jackson County forests is apparently highly compatible with elk. Reduced aspen management would mean an eventual decrease in aspen cover types. It is therefore possible that the long-term suitability of the Jackson County forests for elk could decline if reduced aspen cutting alternatives are selected for future management plans for the Black River State Forest. Elk would not unilaterally drive the forest management decision, rather forest management plans would still be based on ecosystem management principles. Being a generalist, elk can be expected to thrive under a variety of management strategies. No special habitat management considerations for elk outside of the core range are recommended, however further research would be conducted when elk are in place to see if accepted and tested habitat management activities can minimize elk displacement and damage.

## Crop Damage Response Protocol

In the event that elk are creating damage to private property, the following guidelines will be used to prevent further problems. Each elk nuisance report will be handled individually, therefore the following protocol will not be implemented step-by-step in every case. Situations may present themselves where only one or two procedures may be suitable based on the surrounding environment and conditions.

- People experiencing elk problems or damage should first contact their local DNR Wildlife Biologist or Game Warden.
- DNR Wildlife Biologist will then contact USDA Wildlife Services to validate and assess the damage. - Landowners will determine how much elk activity is tolerable.
- Wildlife Services first step will be to lend the landowner scare devices, such as noise cannons and pyrotechnics, to assist in removing elk from the property.
- If the first method doesn't succeed, DNR or Wildlife Services' staff will attempt to haze elk off the premises
- Next, if hazing doesn't deter the elk, DNR Biologist will attempt to live trap and relocate the elk. Methods for live trapping consist of using Clover traps in the winter and aerial net gunning from helicopters when conditions are favorable.

- Chemically immobilizing problem elk will be the next option for DNR staff. After an elk is immobilized, it will be transported back to the original release pen where the elk will under-go a soft release.
- Failed attempts to scare, haze, trap, and immobilize the elk will result in having to use lethal means.
  A. Prior to an established hunting season in Wisconsin, problem elk will be euthanized by DNR staff and donated to a local food pantry.
  B. Once elk hunting in Wisconsin is initiated, shooting permits may be available for landowners or hunter-generated lists will be used to remove problem animals as done with the bear program.

Because of the importance of crop and damage concerns, areas identified with significant agricultural land use were excluded as consideration as core buffer elk ranges. In the area outside the core and buffer ranges, elk would be tolerated if they are not causing damage or exhibiting nuisance behavior. As described earlier in this document, elk outside of the core and buffer ranges would be subject to liberal harvest regulations. In the designated elk range before the population becomes large enough to initiate public hunting, hazing and/or relocation would first be attempted. A variety of exclusion techniques could also be used. Initially electric fences were successfully used by Michigan and Pennsylvania (Parker 1991), however, recently Pennsylvania has moved to high profile woven wire fencing to prevent elk damage because of electric fence failures (Rawley Coogan, pers. Comm). In the Wildlife Damage Abatement and Claims Program (WDACP), high profile woven wire fencing would be prescribed and used where cost effective and within core and buffer ranges, or in their vicinity. Well outside the core and buffer ranges, if hazing and relocation efforts fail, the offending animals may be killed. Once the population becomes large enough that public hunting is initiated, additional elk hunting permits would be issued for areas where elk are causing crop damage. Shooting permits may also be issued to landowners experiencing crop damage if their complaints have been investigated and approved by Department personnel.

The Department prefers to implement a crop damage-abatement and claims program, which emphasizes damage prevention, for elk similar to the one that exists for deer. However, elk would have to be added to the Wildlife Damage Abatement and Claims Program (WDACP) by the state legislature before the introduction could take place. The Department will pursue legislation adding elk to the WDACP and earmarking $1.00/elk permit application for the fund. This is part of the reason for initiating an elk-hunting season as soon as it becomes biologically feasible.

Crop damage program would differ among the 4 alternatives. Alternative #3 would require a minimal crop damage program. Elk would be restricted to the core range at low levels. The chances of crop damage problems developing would be slight. If they did develop, aggressive lethal management techniques would be implemented. Alternatives #1, #2, and #4 would involve the more expensive and complicated programs described above including hazing, relocation, damage permit allocation, and crop damage payments.

## Habituation Response Protocol

Habituation refers to elk adapting to human presence. It often results in elk becoming a nuisance or causing damage, and can increase risk to human health and safety, plus, often results in elk mortality. Habituation of elk could be an issue in the Black River area. Preventative action would be taken to decrease the chances of habituated nuisance elk problems from developing. Informational materials would be prepared

to inform the public of the possible negative effects of habituation, and how to avoid them. These materials would be posted at wildlife viewing areas and elsewhere throughout the Jackson County Forest, natural resource agency offices, and local businesses. The Department recommends against artificial feeding and baiting in the core and buffer zones, and would develop public education tools accordingly.

More habituated elk problems could be expected with Alternatives #1, #2 and #4 than for #3, because elk would be more numerous. Prompt action for managing habituated nuisance elk would be important with any of the Alternatives. Department personnel would monitor elk that are exhibiting habituated nuisance behavior, and take management action if needed. Examples of nuisance behavior requiring management action would include habituated elk lingering near residential areas where they are damaging trees and posing a safety concern for people or their pets, or those near roads or trails where they present a hazard to motor vehicle users. Management techniques would be more aggressive with Alternative #3 than for Alternatives #1, #2 and #4. Lethal control would primarily be used under Alternative #3 to minimize costs and effort for management. More consideration for non-lethal techniques would be given to habituated elk in the designated elk range under Alternatives #1 and #2, because maintaining the population at or near goals would be high priority. Hazing by agency personnel may be used to disperse habituated elk from areas where they are in conflict with people in some cases. Habituated elk displaying nuisance behavior near areas with high human usage or major roadways would first be relocated to the core range if Department personnel are able to capture the animal(s). Nuisance elk not captured after reasonable effort has been made or those that have been relocated once and continue to exhibit habituated nuisance behavior would be killed. These carcasses may be donated to food pantries. Reducing elk densities may also help reduce habituation problems by decreasing intraspecific competition (Thompson and Henderson 1998). The Department would reduce elk densities in areas surrounding those where problems have developed through allocation of hunting permits.

## Disease Issues

There is concern about the possibility of disease transmission between elk and livestock. The risks of disease transmission from wild elk to livestock, or vice versa, are different among the four alternatives. There is always a risk of disease transmission with any animal being brought into the state, whether it is wild animals, game farm animals, or livestock. However, following strict DATCP regulations, the risk will be minimized to the lowest level available to us with current testing procedures. The greatest risk of disease transmission would be expected with Alternative #2, where you have multiple releases. Alternatives #1 and #4 would have a low risk of disease transmission, because no additional animals after the first release would be brought in. However, elk would be at higher densities than with Alternative #3, thereby increasing both the potential for contact with livestock allowing disease transmission and possible spread of disease through the elk population if a disease were introduced. As previously described, this risk could be minimized using appropriate management strategies to prevent elk occupation of agricultural areas where they may contact livestock. Alternative #3 would have the lowest risk of disease transmission, because elk would be at low densities in a very restricted area.

The Department is sensitive to the publics' concerns regarding elk herd health and possible disease transmission to or from wild elk. Risk of disease transmission between elk and livestock can be minimized. First, elk brought into the state for release would be tested using a protocol developed by DNR

veterinarians, incorporating Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP) requirements to ensure they are free of brucellosis, bovine tuberculosis, anaplasmosis, BT, bovine virus diarrhea, and leptospirosis. Second, whenever elk in the population are handled for management purposes, they shall be examined for signs of ill health and blood samples taken for testing of a variety of diseases, including bovine tuberculosis. Appropriate health management described below shall be implemented and if emergencies arise, the Department will be working with WDATCP to quickly implement disease management procedures. The third management strategies would be developed to maintain spatial separation of free-ranging elk and livestock. The boundaries of the elk range were designed to exclude agricultural operations, so there are very few livestock within the designated elk range. Elk may wander outside of the designated range where they could contact livestock. However, elk will not be tolerated in these areas, and they will be removed when in close association with livestock.

Brainworm can affect elk populations. White-tailed deer and terrestrial snails occupy the Central Sand Plains, therefore it would be likely that some elk will succumb to it. However, based on data from populations in Michigan and Pennsylvania, it will probably not be a major limiting factor for the Black River herd. The only management action that could decrease the impact of brainworm would be to reduce deer densities, thereby inhibiting transmission of the parasite to elk. Due to the cultural and economic importance of deer in Wisconsin, the department would not attempt to reduce deer densities to accommodate elk.

## Elk Ranching Issues

Ranching of elk and red deer (the European counterpart to the North American elk, classified as the same species) is a growing industry in Wisconsin. They are raised for sale of meat, antlers, breeding stock, and for trophy hunting. There are currently 191 elk/red deer ranches in the state. Elk ranchers have expressed concern about the potential effects of reintroducing wild elk populations to Wisconsin on the elk ranching industry. Elk ranchers fear that the state may place additional regulations on their operations to protect wild elk, or that wild elk transported into the state could transmit disease to their captive herds. Bovine tuberculosis has been diagnosed in captive elk in Wisconsin, so the possibility of disease transmission from captive elk to wild elk populations is also a definite concern. Captive elk are subject to disease testing requirements to minimize the risk of disease transmission. A health certificate showing that all animals have tested negative for bovine tuberculosis and brucellosis is required for interstate transfer of farm-raised deer, including captive elk (Wisconsin Statute 95.49). In Wisconsin, all keepers of captive elk or other cervids must have a license from the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP) who has the authority to, at any time, test farm-raised deer for bovine tuberculosis (Wisconsin Statute 95.25) or brucellosis (Wisconsin Statute 95.26). Five captive elk or red deer herds in Wisconsin have been depopulated due to infection with tuberculosis (O'Connor, personal communication). Elk unknowingly affected by a disease, such as CWD for which there is no live-animal test, could be transported into the state. Three Wisconsin elk farms currently have elk quarantined because they were imported from a CWD infected Colorado herd. Currently, DATCP is working with the elk ranching industry to implement a CWD monitoring and prevention program. If diseased farmed elk escaped from captivity or otherwise mixed with wild elk populations, disease could be transmitted to those wild populations.

Captive animals sometimes escape from fenced areas. Under Wisconsin Statute 29.875, the state has the authority to seize or dispose of any escaped farm-raised deer if it has traveled >3 miles or if it has not been returned to captivity within 72 hours. However, state law does not require the licensee to report escaped farm-raised deer. Both captive elk and red deer have escaped in Wisconsin, although comprehensive records do not exist and the magnitude of the problem is unknown (O'Connor, personal communication). Escaped animals frequently cannot be recaptured. Escaped animals could mix with wild elk, potentially transmitting disease or introducing unwanted genomes (especially red deer) into the wild populations

## Protection

Because poaching and accidental shootings have been a problem with virtually all eastern elk reintroductions, it is clear that an effective protection program integrating law enforcement, education, and stiff penalties must be developed. This approach has been used successfully by Michigan since the mid-1970's to reduce illegal killings (Parker 1990). Wisconsin statutes have already been amended to increase penalties for illegal killing of elk. Elk are now legally classified as game animals with a closed season. Penalties for illegal killing of elk include fines of $1,000-$2,000 and mandatory revocation of hunting privileges for 3-5 years (Wisconsin Statute 29.971.3m). If the herd is allowed, additional law enforcement presence on the elk range will become necessary. The Department estimates that within the next several years, elk-related law enforcement duties for area wardens will require funding equivalent to a 0.5 FTE position. This money would have to come from law enforcement budgets separate from existing elk project accounts.

In the fall of 1995, public education and awareness efforts to prevent accidental shooting of elk by deer hunters were begun in the Clam Lake area (Anderson 1999). Brochures describing differences between elk and deer were distributed. This information was also released for publication to the media, including local and state newspapers and outdoor publications. Deer hunting camps located near areas occupied by elk were contacted by USFS and research personnel to warn hunters that elk were present. There has been only 2 known accidental shootings of elk since the Clam Lake herd was released, indicating that this program has been successful. Public education would be an important part of the elk protection program to minimize accidental shooting in the Black River area.

Alternatives #1, #2 and #4 would require greater effort and expense for elk protection. A larger elk population would mean increased potential for illegal killing of elk and more extensive elk hunting seasons requiring greater law enforcement presence. Public education and awareness needs would also be greater. Under Alternative #3, elk protection programs would be low priority, with minimal effort and expense applied.

## Predator Management

The Black River area contains high densities of potential elk predators, with black bears being the most numerous. Bears are able to prey only on calves within the first few weeks of life. Wolves are also present in the Black River area, and are more effective predators potentially able to kill both calves and adults. Where elk and deer are both present, wolves usually select deer (Mech 1970, Kunkel et al. 1999) because

they are smaller and more vulnerable. On rare occasions, coyotes have been known to kill elk (usually calves) (Taber et al. 1982), although they are not considered a major predator of elk. Predation has been of low significance to the Clam Lake herd, and is not expected to seriously limit future elk abundance anywhere in the state. Nonetheless it can be expected that predators would take a small percentage of the annual increment to the herd.

A predator reduction policy to boost elk population growth is not biologically necessary and would be unacceptable to many people. The Department would not implement predator control to support elk populations. There would be no differences in predator management among the Alternatives.

## Herd Expansion Protocol

Management alternative #2, which is not the Department's preferred alternative, includes stocking the Black River herd with additional elk after their initial release. Several reasons exist for opposing stocking additional elk. It would increase the risk of introducing disease to the Black River herd. The cost of a stocking operation would divert resources needed for monitoring of the Black River herd. Stocking would also complicate efforts to monitor impacts on other resources in the Black River area. However, if the decision is made to augment the Black River herd with additional elk, the Department must have a protocol for capturing, transporting, and releasing wild elk into the state. The following section describes capture and release procedures that would be used with the initial release and any subsequent releases.

### Source herd selection

If the decision were made to import more elk into the state for release in the Black River area, a source herd would have to be selected. Selection of a source herd would be based on availability of elk, comparison of geographic habitat, availability of 90-day quarantine facilities, health history status relative to several important diseases, and prophylactic treatment (Corn et al. 2001). Michigan elk were selected as the source herd for the Clam Lake release in 1995 because of similarity in climate, habitat, recreational uses, and timber management between Michigan's elk range and Clam Lake, low cost (all animals were donated), ease of logistics, presence of quarantine facilities, and target disease-free status of the population (Anderson 1999). Michigan DNR has indicated that additional elk might be available for capture and relocation to Wisconsin in the future. However, Michigan has found one elk positive with bovine tuberculosis in 2000. Michigan is still the most heavily tested and monitored herd of any possible donor states. The positive cow elk was found on the eastern edge of the elk range, where bovine TB is more common, than on the western end of the range, where bovine TB is less common. With the spread of chronic wasting disease, which can not be tested on live animals, in captive and wild elk populations in many western states, potential sources such as South Dakota's Wind Cave National Park would be risky. The Department feels that the risk of releasing animals potentially exposed to testable diseases like tuberculosis is much less than the risk associated with releasing animals potentially infected with untestable diseases like CWD.

### Capture

Before trapping of elk could begin, a Memorandum of Understanding between the source and WDNR would be signed which specified the agencies' responsibilities for the project. Responsibilities of the

WDNR under such an agreement would include securing adequate funding, arranging quarantine facilities and disease testing, obtaining a certificate of veterinary inspection and premovement permit number from WDATCP for shipment of elk, and notifying WDATCP Division of Animal Health of intent to import elk ≤5 days before transport. Collecting permits would also be obtained from the donating source. The permit granted by Michigan DNR to UW-SP to capture, handle, tranquilize, and transport elk to Clam Lake restricted trapping to private land unavailable to the public for hunting, during January (after the elk season) to minimize impacts of a capture operation on elk hunters. Elk known to have caused damage or nuisance could not be trapped for transport to Wisconsin (Anderson 1999). Such conditions would probably apply for future capture operations, as well. After permits were obtained, WDNR would be given a list of private landowners for potential trapping sites. Permission would be obtained from landowners for WDNR to trap at one or more of these sites. Portable single-entry traps with guillotine doors would be used to trap elk. Trapped elk would be sorted until the desired sex-age composition was obtained. A sex ratio skewed towards cows would be chosen because they may be less likely to stray from the release area, and to increase population growth rates (Parker 1991). A balanced age structure would also be sought to avoid potential problems associated with a clumped distribution.

Quarantine

After capture, elk would be transported to a quarantine facility and held for 90 days. Facilities at a nearby elk ranch were used for the original Clam Lake release (Anderson 1999). Elk would be isolated from all other bovids and cervids for 90 days, during which time two rounds of disease testing would occur. Tests for bovine tuberculosis, brucellosis, paratuberculosis, leptospirosis, salmonella, bovine virus diarrhea, EHD, BT, anaplasmosis, and IBR would be conducted at the beginning and end of the quarantine period. Positive tests from any animal for exposure to tuberculosis, brucellosis, anaplasmosis, or BT would prevent the entire herd from being transported to Wisconsin. Elk would also be treated for internal and external parasites. During the second round of testing, elk would be fitted with radio-collars and ear tags denoting that they had been disease tested. Blood samples would also be collected for DNA analysis and pregnancy tests. If disease tests were negative, a stocking permit would be issued by WDNR and a health certificate would be issued by WDATCP to allow transport and release of the elk in the Black River range.

Transport

Elk would be transported from the quarantine area at the source site to an acclimation pen in the Black River area using livestock trailers. Antlers would be sawed off of adult bulls, and compartments to prevent them from injuring each other would separate them. Cows and yearling bulls would be transported separately from calves.

Acclimation

Hamr et al. (2001) found that 78 percent of elk held in acclimation pens for 6 weeks, dispersed up to 5 km compared to 5.4 percent of 'hard released' elk. Hard released elk traveled the longest dispersal distances of 120 and 140 km. They also found that hard release elk experienced up to 45 percent more mortality than 6 week acclimated elk. We proposed that after transport, the elk would be unloaded into an acclimation pen, where they would spend 6 weeks. The purpose of a “soft release” would be to give the animals time to

recover in a controlled environment from the stress of capture, testing, and transport. Soft releases also help animals acclimate to their new environment, thereby decreasing the chances of them immediately straying far from the release area (Parsons 1998). Baled hay would be fed to elk in the pen each day. After 6 weeks, the pen doors would be opened to allow elk to exit. Release would occur around mid-May to coincide with spring green-up, so that animals would find optimal forage conditions in close proximity to the pen.

When elk were released at Clam Lake in 1995, two of the mature bulls dispersed 20 to 30 km away, in different directions, from the release site, taking a few cows and calves with them. These bulls had been captured and held during the winter of 1994/1995 while testosterone levels were waning but still above sexual dormant periods. This could have created a repellent stimulus that was expressed by significant dispersal upon release after the brief 2-week acclimation period. This resulted in low initial reproduction do to separation of the experienced and mature reproducing bulls from the main herd of cows. The result was reduced reproductive potential for three years until younger bulls matured enough to provide adequate service for the mature cows in the main herd remaining close to the release site. In an effort to reduce movements of mature bulls at the time of release, in addition to a longer period of 6 weeks of acclimation, project managers should consider segregating the original groups into separate acclimation pens comprised of mature bull and calves two to three miles apart, similar to fall bull/cow harems. This would give the mature bulls some 'elbow room', reducing separation stimuli of other mature bulls, thereby reducing mature bull dispersal.

## EVALUATION OF PROJECT SIGNIFICANCE

Social and economic benefits are expected to result from the establishment of an elk population in Black River. These benefits would be greatest under Alternatives #1, #2 and #4. However, these alternatives would also involve the greatest effort and cost for management and monitoring, in addition to greater chances of problems with elk developing. All of the alternatives will require long-term commitment of resources for elk management.

There is currently a high level of interest in establishing elk herds in other areas of Wisconsin. Many of the same methods used to establish and manage the Clam Lake herd would be directly applicable in Black River and elsewhere in the state as well. For example, elk herds established in other areas would also be restricted to designated ranges, and would not be tolerated outside of those areas. However, it is unlikely that the precedence set by the Clam Lake reintroduction would affect reintroductions of other species in the state.

The potential for cumulative economic and ecological effects resulting from the long-term establishment of an elk population in the Black River area are minimal. There could be some cumulative effects on native vegetation with Alternatives #1, #2 and #4 resulting from elk and deer herbivory. Habitat monitoring and elk population management strategies described in this document will be implemented to minimize such impacts. No cumulative effects would be expected with Alternative #3.

If a new population is established and presents unforeseen problems that have significant adverse impacts

to biological, social or economic values the herd could be depopulated and existing conditions restored. Based on this analysis and experience with existing herds at Clam Lake and other US locations, no such negative impacts are anticipated. The reintroduction project will be revisited in the year 2007 to determine if depopulation needs to occur due to unresolved conflicts.

## Public Input, Issue Identification and Plan Review/Approval Process

Three public meetings were held to describe this project and gather public input. A complete description of the meetings, attendance and public feedback is contained in Appendix C. Most of the input received supported the project. Responses are provided to all public input received. Appendix D contains resolutions and letters of support from other parties.

All comments received will be considered before the plan/EA is finalized. The final plan/EA will then be submitted, with a Department recommendation, as to which if any alternatives should be pursued, to the Natural Resources Board (NRB). The NRB will ultimately decide if the project moves forward.

## LITERATURE CITED


Adams, A. W. 1982. Migration. Pages 301-321 *in* J. W. Thomas and D. E. Toweill, editors. Elk of North America: ecology and management. Stackpole Books, Harrisburg, PA.

Alverson, W. S., D. M. Waller, and S. L. Solheim. 1988. Forests too deer: edge effects in Northern Wisconsin. Conservation Biology 2:348-358.

Anderson, E. W., and R. J. Scherzinger. 1975. Improving quality of winter forage for elk by cattle grazing. Journal of Range Management 28:120-125.

Anderson, S. C. 1999. Experimental elk reintroduction in northern Wisconsin: planning and initial results. M.S. Thesis, University of Wisconsin - Stevens Point, Stevens Point, WI. 103 pp.

Aune, K. 1981. Impacts of winter recreationists on wildlife in a portion of Yellowstone National Park, WY. Thesis, Montana State University, Bozeman, Montana.

Bangs, E. E., S Fritts, J. Fontaine, D. Smith, K. Murphy, C. Mack, and C. Niemeyer. Status of gray wolf restoration in Montana, Idaho, Wyoming. Wildlife Society Bulletin 26:785-798.

Beall, R. C. 1976. Elk habitat selection in relation to thermal radiation. Pages 97-100 *in* E. R. Hieb editor. Proc. Elk-logging Roads Symp., Univ. Idaho, Moscow, ID.

Beyer, Dean E., Jr. 1987. Population and Habitat Management of Elk in Michigan. Dissertation, Michigan State University, Department of Fisheries and Wildlife. 148 pp.

Blood, D. A. 1966. Range relationships of elk and cattle in Riding Mountain National Park, Manitoba. Wildlife Manage. Bull. 1(19). Canada Wildlife Service Ottawa, Quebec, Canada. 62 pp.

Blouch, R. I. 1984. Whitetail population and habitats in the northern Great Lakes and Ontario forests. Pages 391-410 *in* L. K. Halls, editor. White-tailed deer: ecology and management. Stackpole Books, Harrisburg, PA.

Campa, H. 1989. Effects of deer and elk browsing on aspen regeneration and nutritional qualities in Michigan. PhD Dissertation, Michigan State Univ., Dept. of Fisheries and Wildlife. 122 pp.

Campa, Henry III, Jonathan B. Haufler, and Dean E. Beyer, Jr. 1992. Effects of simulated ungulate browsing on aspen characteristics and nutritional qualities. Journal of Wildlife Management 56:158-164.

Cassirer, F. E., D. J. Freddy, and E. A. Ables. 1992. Elk responses to disturbance by cross-country skiers in Yellowstone National Park. Wildlife Society Bulletin 20:375-381.

Christensen, A. G., L. J. Lyon, and J. W. Unsworth. 1993. Elk Management in the Northern Region: Considerations in Forest Plan Updates or Revisions. General Technical Report INT-303. Ogden, UT: USDA-FS, Intermountain Research Station. 10 pp.

Clark, W. 1999. Effects of winter recreation on elk. Pages 17-29 *in* T. Oliff, K. Legg, and K. Baeding, editors. Effects of winter recreation on wildlife of the Greater Yellowstone Area: a literature review and assessment. Report to the Greater Yellowstone Coordinating Committee. Yellowstone National Park, WY. 315 pages.

Cogan, R. D., and D. R. Diefenbach. 1998. Effect of undercounting and model selection on a sightability-adjustment estimator for elk. Journal of Wildlife Management. 62:269-279.

Corn, J. L., and V. F. Nettles. 2001. Health protocol for translocation of free-ranging elk. Journal of Wildlife Disease. 37(3): 413-426

Davidson, William R., and Victor F. Nettles. 1997. Field manual of wildlife diseases in the southeastern United States, 2nd edition. Southeastern Cooperative Wildlife Disease Study. University of Georgia. Athens, GA. 417 pp.

Davis, A., Puettman, K., and Perala, D. 1998. Site preparation treatments and browse protection affect establishment and growth of northern white-cedar. Res. Pap. NC-330. St. Paul, MN: USDA, Forest Service North Central Forest Experiment Station. 9 pp.

de Calesta, D. S. 1983. Elk. Pages 35-44 *in* Prevention and control of wildlife damage. Institute of Agriculture & Natural Resources, University of Nebraska, Lincoln.

Devlin, D. and W. M. Tzilkolwski. 1986. Grass use by elk and white-tailed deer in Pennsylvania: habitat management. Proceedings of the Pennsylvania Academy of Science, 60:51-54.

Eberhardt, L. L. 1969. Population analysis. Pages 457-495 *in* Robert H.Giles, Jr., editor. Wildlife Management Techniques, third edition. Edward Bothers, Inc. Ann Arbor, MI.

Eberhardt, L. L., R. A.Garrott, P. J. White, and P. J. Gogan. 1998. Alternative approaches to aerial censusing of elk. Journal of Wildlife Management 62:1046-1055.

Eberhardt, L. E., L. L. Eberhardt, B. L. Tiller, and L. L. Caldwell. 1996. Growth of an isolated elk population. Journal of Wildlife Management 60:369-373.

Edge, Daniel and Les Marcum. 1985.Movements of elk in relation to logging disturbances. Journal of Wildlife Management. 49:926-930.

Ferguson, M. A. and Lloyd B. Keith. 1982. Influence of nordic skiing on distribution of moose and elk in Elk Island National Park, Alberta. Canadian Field Naturalist. Vol. 96:69-78.

Geist, Valerius. 1982. Adaptive behavioral strategies. Pages 219-277 *in* J. W.Thomas and D. E. Toweill, editors. Elk of North America: ecology and management. Stackpole Books, Harrisburg,PA.

Gieck, C. M. 1986. Pine marten recovery plan. Wisconsin Department of Natural Resources. 33 pp.

Gogan, Peter J. 1990. Considerations in the reintroduction of Native Mammalian Species to Restore Natural Ecosystems. Natural Areas Journal 10:210-217.

Haigh, J. C., and R. J. Hudson. 1993. Farming Wapiti and Red Deer. Mosby-Year Book, Inc., St. Louis, MO.

Hamr, J, F. Castiov, I. Filion, and R. Rosatte. 2001 The effect of holding time on post-release dispersion and mortality of elk translocated to Ontario. 6th Annual Eastern States Elk Management Workshop, Abstracts. Harrison, Arkansas. Arkansas Game and Fish Commission and Rocky Mountain Elk Foundation.

Hickenbottom, J. R., B. Summerfield, J. Aardahl, G. Halekas, M. Hilliard, L. Jackson, D. Prevedel, and J. Rupe. 1999. Biological assessment of the effects of National Forest Land and Resource Management Plans and Bureau of Land Management Land Use Plans on Canada lynx. USDA Forest Service 149 pp.

Houston, D. B. 1982. The northern Yellowstone elk herd. MacMillan, New York, New York.

Hunter, N., J. George, and D. Devlin. 1979. Herbivore-woody plant relationships on a Pennsylvania clearcut. Pages 145-151 *in* M.S. Boyce and L.D Hayden-Wing, editors. North American Elk: Ecology Behavior and Management. University of Wyoming, Laramie, Wyoming. 294 p.

Irwin, L. and J. Peek. 1976. Habitat use relative to forest succession in Idaho. J. Wild. Manage. 47:664-672.

Jackson, H. 1961. Mammals of Wisconsin. The University of Wisconsin Press, Madison, WI. 504 pp.

Kistner, T. P., K. R. Greer, D. E. Worley, and O. A. Brunetti.1982. Diseases and Parasites. Pages 181-217 *in* J. W. Thomas and D. E. Toweill, editors. Elk of North America: ecology and management. Stackpole Books, Harrisburg, PA.

Kohn, B. E., and R. G. Eckstein. 1985. Research report: status of pine marten in Wisconsin. Wisconsin Department of Natural Resources. 18 pp.

Kufeld, R. C. 1973. Foods eaten by the Rocky Mountain Elk. Journal of Range Management. 26: 106-113.

Kunkel, K. E., T. K. Ruth, D. H. Pletscher, and M. G. Hornocker. 1999. Winter prey selection by wolves and cougars in Glacier National Park, Montana. Journal of Wildlife Management 63:901-910.

Leege, T. A. and W. O. Hickey. 1977. Elk-snow-habitat relationships in the Pete King drainage, Idaho. Wildl. Bull. No. 6. Boise: Idaho Dep. Fish and Game. 23 pp.

Leighton, D.. 1988. Helping the animals cross the road with fences and underpasses. Canada Geographic. 108:22-28.

Lizotte, T. 1998. Productivity, survivorship, and winter feeding ecology of an experimentally reintroduced elk herd in northern Wisconsin. M.S. Thesis, University of Wisconsin-Stevens Point, Stevens Point, WI 110 pp.

Lyons, J. 1983. Road density models describing habitat effectiveness for elk. J. Forestry 81:592-595.

Martin, M. 1995. Pages 13-22 *in* William Vander Zouwen and Keith Warnke, editors. Deer population goals and harvest management environmental assessment. Wisconsin Department of Natural Resources. 305 pp.

Martinka, C. J. 1969. Population ecology of summer resident elk in Jackson Hole, Wyoming. Journal of Wildlife Management. 33: 465-481.

Mautz, W. W. 1978. Nutrition and carrying capacity. Pages 321-348 *in* J. L. Schmidt and D. L. Gilbert, editors. Big Game of North America: ecology and management. Stackpole Books, Harrisburg, PA.

Mech, L. D. 1970. The wolf: ecology and behavior of an endangered species. Natural History Press, New York. 384 pp.

Michigan Department of Natural Resources. 1984. Elk Management Plan.

Mladenoff, D. L., T. A. Sickley, R. G. Haight, and A. P.Wydeven. 1995. A regional landscape analysis and prediction of favorable gray wolf habitat in the Northern Great Lakes Region. Conservation Biology 9:279-294.

Mohler, L. L. and D. E. Toweill. 1982. Regulated elk populations and hunter harvests. Pages 561- 597 *in* J. W. Thomas and D. E. Toweill, editors. Elk of North America: ecology and management. Stackpole Books, Harrisburg, PA.

Moran, R. J. 1973. The Rocky Mountain elk in Michigan. Res. Dev. Rep. 267, Michigan Department of Natural Resources, Lansing, MI. 93 pp.

Nelson, J. R. 1982. Relationships of elk and other large herbivores. Pages 415-441 *in* J. W. Thomas and D. E. Toweill, editors. Elk of North America: ecology and management. Stackpole Books, Harrisburg, PA.

Overton, W. S., and David E. Davis. 1969. Estimating the numbers of animals in wildlife populations. Pages 403-455 *in* Robert H. Giles, Jr., editor. Wildlife Management Techniques, third edition. Edward Bothers, Inc. Ann Arbor, MI.

Parker, L. R. 1990. Feasibility assessment for the reintroduction of American elk, moose and caribou into Wisconsin. Wisconsin DNR, Madison. 86 pp.

Parker, L. R. 1991. Management plan for the proposed reintroduction of elk into the Bayfield County Peninsula, Northern Wisconsin. Wisconsin DNR, Madison. 91 pp.

Parsons, D. R. 1998. "Green fire" returns to the Southwest: reintroduction of the Mexican wolf. Wildlife Society Bulletin 26:799-807.

Reinhart, D. 1999. Effects of winter recreation on habituated wildlife. Pages 151-154 *in* T. Oliff, K.Legg, and K. Baeding, editors. Effects of winter recreation on wildlife of the Greater Yellowstone Area: a literature review and assessment. Report to the Greater Yellowstone Coordinating Committee. Yellowstone National Park, WY. 315 pages.

Schultz, Richard D. and James Bailey. 1978. Responses of National Park elk to human activity. Journal of Wildlife Management 42:91-100.

Schorger, A. W. 1954. The elk in early Wisconsin. Wisconsin Academy of Sciences, Arts and Letters, 43:5-23.

Shapton, W. 1940. Report of an elk survey in the Pigeon River State Forest during the deer hunting season, 1939. Michigan Department of Conservation. Game Report No. 498. 15 pp.

Speigel, L. E., C. H. Huntly, and G.R. Gerber. 1963. A study of the effects of elk browsing on woody plant succession in northern Michigan. The Jack Pine Warbler 41:68-72.

Taber, R. D., K. Raedeke, and D. A. McCaughran. 1982. Population characteristics. Pages 279-298 *in* J. W. Thomas and D. E. Toweill, editors. Elk of North America: ecology and management. Stackpole Books, Harrisburg, PA.

Thompson. M. J., and R. E. Henderson. 1998. Elk habituation as a credibility challenge for wildlife professionals. Wildlife Society Bulletin 26:477-483.

United States Forest Service. 1994. Elk research study environmental assessment. USDA-FS, Chequamegon National Forest, Glidden Ranger District, Wisconsin.

United States Forest Service. 1986. Final Environmental Impact Statement: Chequamegon National Forest Land and Resource Management Plan. United States Department of Agriculture – Forest Service – Eastern Region.

United States Department of the Interior. 1999. Winter use plans draft environmental impact statement for the Yellowstone and Grand Teton National Parks and John D. Rockefeller Jr. Memorial Parkway. National Park Service, Yellowstone National Park, WY.

United States Department of the Interior. 1998. Draft Environmental Impact Statement for the interagency bison management plan for the state of Montana and Yellowstone National Park. NPS D-655.

US Fish and Wildlife Services. 2001. Biological opinion for the introduction of elk into Wisconsin's Black River State Forest. Green Bay, WI.

Winkler, C. 1989. Rocky Mountain elk food habits and interrelation ships with other large herbivores. Unpublished Report.

Wisconsin Department of Natural Resources. 1999. Wisconsin Statewide Karner Blue Butterfly Habitat Conservation Plan and Environmental Impact Statement. Wisconsin Department of Natural Resources, Madison, Wisconsin.

Witmer, G. W. and R. Cogan. 1989. Elk and crop damage in Pennsylvania. Pages 220-224 *in* S. Craven, ed. 4th Eastern Wildlife Damage Control Conference Proceedings, University of Wisconsin, Madison, Wisconsin.

Wydeven, A. P., and J. E. Wiedenhoeft. 1999. Gray Wolf Population, 1998-1999. Wisconsin Wildlife Surveys 9:133-140.

**APPENDIX A – Estimated costs and revenues for management and monitoring of the Central Forest elk herd, and establishment of elk herds elsewhere in the state.**

Table 2. Estimated annual expenses for management and monitoring of the Central Forest elk herd with Alternative #1 and establishment of elk herds elsewhere in the state during fiscal years 2000-2002.

| | Dollars | | | | | |
|---|---|---|---|---|---|---|
| Expense | 2002 | 2003 | 2004 | 2005 | 2006 | Total |
| Salaries: 1 FTE biologist | 65,000 | 66,200 | 67,436 | 68,709 | 70,020 | 337,365 |
| 1 LTE biologist | 7,000 | 7,000 | 7,000 | 7,000 | 7,000 | 35,000 |
| Meals, Lodging, Personal Miles | 3,405 | 3,405 | 3,405 | 3,405 | 3,405 | 17,025 |
| State Vehicle Mileage | 2,320 | 2,320 | 2,320 | 2,320 | 2,320 | 11,600 |
| Equipment | 25,420 | 0 | 0 | 0 | 0 | 25,420 |
| Capture and Collaring | 10,755 | 1,440 | 2,010 | 4,365 | 4,915 | 23,485 |
| Flight Time | 1,375 | 1,375 | 1,375 | 1,375 | 1,375 | 6,875 |
| Law Enforcement | 5,250 | 5,400 | 5,560 | 5,725 | 5,900 | 27,835 |
| Total | 120,525 | 87,140 | 89,106 | 92,899 | 94,935 | 484,605 |

Table 3. Estimated revenue from recreational elk hunting in the Black River herd, based on an annual harvest of 13% of the herd and a projection of 50,000 applications ($4.00/application) for every permit ($100.00/permit) available. Population goals of options 1, 2, 3, 4 and 5 are 150, 150, 50, 300 and 0 animals, respectively. The projected harvest would be 19, 19, 6, 39 and 0 for options 1, 2, 3, 4 and 5 respectively.

| Source | Revenue | | | | |
|---|---|---|---|---|---|
| | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 |
| License applications | $200,000 | $200,000 | $200,000 | $200,000 | $0 |
| License sales | $1,900 | $1,900 | $600 | $3,900 | $0 |
| Total | $201,900 | $201,900 | $200,600 | $203,900 | $0 |

**APPENDIX B - Biological Assessment of Potential Impact by Elk on Lupine, Karner Blue Butterflies, and Other Rare Plants and Animals in Central Wisconsin.**

February 25, 2001

By: Adrian P. Wydeven, William R. Mytton and Michelle A. Kastler

Elk (*Cervus elaphus*) are being considered for reintroduction into the Black River Falls State Forest and adjacent areas of eastern Jackson County, Wisconsin. The area is well within the original range of elk in the state (Jackson 1961, Schorger 1954). Areas of central Wisconsin being considered for elk restoration are also habitat for the federally endangered Karner blue butterfly (*Lycaeides melissa samuelis*) and other rare organisms (Kirk 1996, Wisconsin DNR 1999). Therefore it is necessary to assess the potential impact elk may have on ecosystems in central Wisconsin. We examine the literature on elk food habits, foraging behavior, and habitat use to determine if negative impacts are likely to occur from elk restoration.

Elk Distribution

Elk are large cervids that are adapted to ecotonal habitats and are generalized feeders that seem to prefer grazing (feeding on herbaceous plants), but also use browse (woody plants) (Kufeld 1973, Geist 1982). Originally elk (=red deer) were the most broadly distributed cervid in the world, occurring across temperate regions of North America, Europe, Asia and north Africa (Bryant and Maser 1982). Elk and red deer occupied a wide variety of habitats including deciduous forests, conifer forests, savannas, steppe, grasslands and montane meadows. American elk are more adapted to grazing and ecotonal habitats than the Eurasian red deer (Geist 1982). Original distribution of elk in North America was from western New England to northern Georgia and North Carolina and westward to the Pacific coast; distribution northward went to northern Alberta and British Columbia, and southward to central Mexico (Bryant and Maser 1982). All of Wisconsin was originally within the range of the now extinct eastern elk (*Cervus elaphus canadensis*) (Jackson 1961). Rocky mountain elk (*Cervus elaphus nelsoni*) have been used successfully as a surrogate for re-establishing elk in eastern North America, in Michigan (Moran 1973), Pennsylvania (Eveland et al. 1979), Arkansas (Cartwright 1999), Ontario (Jost et al. 1999), and recently to northern Wisconsin (Anderson 1999, Lizotte 1998).

Elk Food Habitats

Elk are adapted to use a wide variety of plants for food (Hunt 1979, Jost et al. 1999, Kufeld 1973, Lizotte 1998, Marcum 1979, Martinka 1969, Merrill 1994, Moran 1973, Nelson and Leege 1982, Osborn et al. 1997, Wydeven and Dahlgren 1983). Generally graminoids (grass and grass-like plants) make up a major portion of the diet on a year-round basis in most areas (Nelson and Leege 1982). Elk have adaptations to feeding on grass (large and specialized rumen) but dentition is more intermediate between that of a grazer and browser (Geist 1982). Elk are somewhat intermediate between specialize grazers such as bison that feed almost exclusively on graminoids, and *Odocoileus* deer, that are highly adapted to browse, especially in winter (Geist 1982). In areas that have heavy snowfall, elk diets switch to mostly browse in winter (Kufeld 1973, Lizotte 1998, Moran 1973, Nelson and Leege 1982, Telfer and Cairns 1979). When highly

nutritious forbs are available in summer, elk diets are usually dominated by forbs. (Hayden-Wing 1979, Kufeld 1973, Marcum 1979, Martinka 1969, Merrill 1994) But graminoids dominate the diet in other areas, especially if warm-season grasses are available (Hobbs et al. 1979, Telfer and Cairns 1979, Wydeven and Dahlgren 1983). The leaves of shrubs and trees are also important summer forage in heavily forested areas (Hunt 1979, Jost et al. 1999).

Elk normally feed on a wide variety of plants. Kufeld (1973) examined 48 studies on food habitats of Rocky Mountain elk, and found 313 species or genera contributing at least 1% of the diet in a study. Jost et al. (1999) found elk using 66 of 165 plant species in elk range in Ontario. Elk in western Montana fed on 86 different plant species in summer (Marcum 1979). Wydeven and Dahlgren (1983) found 61 species or genera in rumens of 30 elk collected year-round in the Black Hills/Great Plains region of southwest South Dakota. It appears that elk probably feed on a large proportion of graminoids, forbs, and shrubs that occur within the range occupied by them.

Elk Habitat in Northern Wisconsin vs Central Wisconsin

The proposed elk range in central Wisconsin is considered somewhat similar to elk range in northern Wisconsin (Lizotte 1999) and northern Michigan (Beyer 1987, Moran 1973), but central Wisconsin has some major differences. Although both northern and central Wisconsin elk range lie in the northern mixed hardwood forest, floristic provinces, the proposed elk range in Jackson County lies in the Tension Zone between northern and southern plant communities (Curtis 1959). Jackson County has many plants associated with prairie, savanna, and southern hardwood forests (Cochrane and Iltis 2000). Therefore food habitats are likely to differ somewhat from Lizotte (1999) for northern Wisconsin or Moran (1973) for northern Michigan. Food habitat studies in ponderosa pine forest (Pinus ponderosa) - prairie interface in South Dakota (Wydeven and Dahlgren 1983) may be more similar to patterns in Jackson County. Northern Wisconsin elk range consisted of 26% aspen, 38% hardwoods, 24% upland conifer, 11% swamp conifers and hardwoods and 3% openings (Lizotte 1998). Core range within Jackson County would consist of 9% aspen, 20% oak, 41% upland conifers, 5% lowland hardwoods, 12% shrub or herbaceous wetlands, and 5% grass (John W. Hulbrehder, pers. comm.).

Buffer elk range in Jackson County would include 23% aspen, 23% oak, 23% upland conifer, 3% tamarack, 19% shrub and herbaceous wetland (Jon Schweitzer, pers. comm.) and about 6% grass (Brian Dhuey, pers. comm.). Central Wisconsin would lack northern white cedar (*Thuja occidentalis*), the most highly selected species in northern Wisconsin during winter (Lizotte 1998). Eastern Jackson County has little northern hardwoods, but has extensive areas of oak forest, which are lacking in northern Wisconsin elk range. Upland conifers are at similar amounts in Jackson County, but consist mainly of pine, especially jack pine (*Pinus banksiana*), while upland conifers in northern elk range include fir (*Abies*), spruce (*Picea*), but little jack pine. Jackson County also has more grassland areas and many oak and jack pine stands are somewhat open savanna areas, or could be converted to savannas through cutting and prescribed burning.

Forage plants found in South Dakota (or similar species) (Wydeven 1979, Wydeven and Dahlgren 1983) that may also be important forage plants for elk in Jackson County would include: Big bluestem (*Andropogon gerardi*), little bluestem (*Schizachyrium scoparium*), bluegrasses (*Poa* spp), upland sedges (*Carex* spp), needgrasses (*Stipa* spp), wheatgrasses (*Agropyron* spp), white sagewort (*Artemia*

*ludoviciana*), heath aster (*Aster ericoides*), sweet clovers (*Melilotus* spp), lead plant (*Amorpha canescens*), sumac (*Rhus* spp) and wild rose (*Rosa* spp).

Use of Lupine by Elk

Of special concern in central Wisconsin is potential use of wild lupine (*Lupinus perennis*) by elk, and any potential negative impact on Karner blue butterflies. Karner blues were listed as federally endangered by the U.S. Fish and Wildlife Service in 1992 (Wisconsin DNR 1999). Wild lupine is the only known larval food of Karner blue butterflies, thus the presence of this legume is critical to persistence of the butterfly. The proposed Jackson County elk range lies in some of the highest concentrated occurrence of Karner blue butterflies. No food habits studies on elk have identified wild lupine in the diet, but currently elk range overlaps little of the range of wild lupine. Other species of lupine have been identified in elk food habit studies (Kufeld 1973, Nelson and Leege 1982). Kufeld (1973) reported 17 studies showing use by Rocky Mountain elk of *Lupinus* spp., and an update of this list by Nelson and Leege (1982) reported an additional 4 studies with lupine use. Most of these food habitat studies occurred in Montana and adjacent areas. Lupine were listed as highly valuable for 9 studies evaluated by Kufeld (1973), including 3 in winter, 1 in summer, and 5 in fall. Lupine was also reported in food habitat studies by Canon et al. (1987) in western Montana (44% of fall rumens and 4% of volume). It appears that where lupine is prevalent, it often becomes an important forage species for elk, despite poisonous alkaloids found in most species (McKee 1948).

High use of velvet lupine (*Lupinus leucophyllus*) by elk were reported by Martinka (1969) for the Jackson Hole area of Wyoming. Forbs comprised 65% of forage used in summer, and velvet lupine comprised 65% of the forbs use in July and August. Martinka (1969) did not report any impact to lupine by elk at a density of about 14 elk/mile$^2$, but evaluation of impact may not have been done. The habitat included extensive areas grasslands.

Impact of Elk on Lupine and Other Plants

Based on these food habitats, it appears that elk potential may feed extensively on wild lupine in Jackson County. Other herbivores that feed on wild lupine include deer (*Odocoileus virginianus*), woodchuck (*Marmota monax*) and insects (Wisconsin DNR 1999). Deer at very high densities in Ontario consumed 30 to 90% of lupine plants and may have contributed to extirpation of the Karner blue butterfly (Boyonski 1992). Apparently lupine patches with healthy Karner blue butterfly populations have been able to persist in central Wisconsin despite deer populations of 30-50 deer/mile$^2$.

Damage to other legumes by elk has generally been associated with feeding on agricultural crops. Elk sometimes cause damage to alfalfa plantings, but damage often seems most severe for grain crops (Lyon and Ward 1982, Moran 1973, Osborn et al. 1997). Highly fertilized areas alone may act to attract elk (Lyon and Ward 1982).

In Wind Cave National Park, South Dakota, I found cases of elk intensely feeding on isolated patches of sweet clovers (*Melilotus* spp) (Wydeven 1979, Wydeven and Dahlgren 1983). Sweet clovers, an exotic legume, had very patchy distribution in Wind Cave National Park, occurring mainly along disturbance sites

along edges of roadways. Sweet clovers were not found used by elk at feeding site examination, but comprised 35% of rumen content of 5 elk collected near roadways early in the morning (Wydeven and Dahlgren 1983). These elk had apparently intensely grazed on sweet clovers during darkness when such grazing was not observed, and elk could feed undisturbed. There was no evidence that this concentrated feeding was affecting sweet clovers, which were an invader in this habitat, but perhaps elk grazing prevented the spread of sweet clover into adjacent grasslands.

In the northern Yellowstone Elk Range, where densities ranged historically from 11 to 33 elk/mi$^2$, elk were not found to cause retrogression in herbaceous plants, and spring grazing was not believed to impact native grasses and forbs in spring (Coughenour and Singer 1996, Houston 1982). Elk were estimated to remove about 10% of the net primary production of herbage on the northern range that consisted of about 50% steppe (Houston 1982). Damage reported by elk in Yellowstone to vegetation is generally on woody plants such as willow (*Salix* spp) and aspen (*Populus tremuloides*) (Coughenour and Singer 1996, Houston 1982).

Elk damage to aspen and other woody plants have been reported for other areas of the Rocky Mountains (Olmsted 1979) as well as in Michigan (Moran 1973), and Pennsylvania (Hunter et al. 1979). In Michigan, browsing by elk at densities of 4-11 elk/mi$^2$ impacted woody plants by browsing and bark stripping (Moran 1973). Elk densities of 0.7 to 2.0 per mi$^2$ affected woody plants in Pennsylvania, but deer were also a major factor (Eveland et al. 1979, Hunter et al. 1979). Elk browsing and bark stripping suppressed woody plants in areas of mixed woody/herbaceous vegetation and reverted or maintained these areas in more open herbaceous cover (Hunter et al. 1979, Moran 1973).

Elk reintroduced into eastern Jackson County will probably result in elk feeding on some lupine, and probably also consuming some larva, pupae and eggs of Karner blue butterflies. Elk normally feed on forbs just before, during or shortly after the plant comes into bloom (Hayden-Wing 1979). This would include time periods that larva are feeding on lupine, pupation occurs on the plant, and eggs are laid on the plant (Wisconsin DNR 1999). Elk feeding on forbs and woody plants in spring and summer include use of more of the structural parts (stem, twigs and petioles) than do deer, but both feed on inflorences of forbs (Collins and Urness 1983, Houston 1982). Elk tend to be most selective in spring and summer when actively growing, highly nutritious plants are available (Houston 1982, Merrill 1994). Elk are not as selective as deer in forage choices (Collins and Urness 1983, Geist 1982, Hobbs et al. 1983). Therefore although elk may feed on some lupine, they will probably also feed on many other plants nearby that they readily select. Sedges and green grasses, as well as other growing forbs, will likely be readily used by elk. Warm season grasses, such as big bluestem and little bluestem, will likely become important forage to elk as they begin green-up in late spring (Wydeven and Dahlgren 1983). Other legumes such as leadplant are likely to become important forage in summer months (Wydeven and Dahlgren 1983). Elk tend to be highly mobile foragers when forage quality is relatively high (McCordquodale 1993), and this mobile foraging behavior may reduce overgrazing of individual patches of highly nutritious plants. The presence of wolves in central Wisconsin (Wydeven and Wiedenhoeft 2000) may also affect foraging of ungulates; elk with history of exposure to wolves were more vigilant and more likely to abandon feeding sites after hearing wolves (Berger et al. 2001). Therefore the occurrence of wolves in central Wisconsin may help reduce the risk of overgrazing in forage patches.

Although elk will probably graze on some lupine plants, and may consume some Karner blue butterfly larva, such feeding may not have major negative impacts on Karner blue populations. The proposed elk goal of 2 per $mi^2$ (Wisconsin DNR 2000) would likely not have much more of an impact than the current deer population of 30-40 deer/$mi^2$. Concentrated use by elk of some areas may cause some local displacement of deer (Nelson 1982, Wydeven and Dahlgren 1985), and might therefore reduce grazing affects of deer on lupine. Grazing by elk and deer may also produce compensatory plant growth in lupine, as occurs in other species (McNaughton 1983).

Elk could potentially have other positive affects on wild lupine. Browsing and bark stripping patterns by elk have maintained or produced savanna-like conditions in Michigan (Moran 1973) and Pennsylvania (Hunter et al. 1979). Impact of elk was greatest at forest edge or in areas of mixed herbaceous plant/woody cover. Such browsing by elk may improve growth and spread of lupine plants that are adapted to savanna environments, and generally are most abundant in open woodland canopies of <40% (Boyonski 1992, Celebreeze 1996, Wisconsin DNR 1999a).

In general, it is very likely that elk presence and their foraging activity will not have major negative impact on wild lupine and the Karner blue butterfly. Factors that may help reduce impact of elk foraging could include: highly mobile grazing patterns of elk, displacement of some deer from lupine patches, compensatory plant growth by lupine, and improved environments for spread of lupine by elk feeding on woody plants. Prior to European settlement, elk probably co-existed with most patches of lupine across eastern U.S.; the savanna habitat suitable for lupine, was probably also important habitat for elk. Lupine and the Karner blue butterfly that depended on savanna habitat apparently have become adapted to grazing patterns of local herbivores including elk.

Potential Mitigations for Reducing Impact of elk on Wild Lupine

It appears that elk will likely not have a major impact on lupine and the Karner blue butterfly, but if impacts do begin to occur, several management procedures can be used to reduce such impacts. Mitigations that could reduce elk impact on lupine patches would include the following:

1. Increase area of barrens habitat to provide more habitat for lupine and elk.
2. Increase prescribed burning in scattered, patchy pattern to spread out elk grazing impact.
3. Planting lupine in existing patches and new areas to provide greater areas of lupine.
4. Reduce size of elk population through hunting to adjust the population to a level compatible with lupine and any other rare plants.
5. Provide food plots as diversionary feeding areas to draw elk away from lupine patches.

Oak and pine barrens are plant communities in which wild lupine reaches its maximum presence (Curtis 1959). Many barrens communities have grown up into dense oak or pine forest, or have been planted to pine plantation. Currently the Black River State Forest consists of 20% oak, 22% jack pine, and

10% red pine (*Pinus resinosa*) (John W. Hulbrehder, pers. comm.); most of the later are probably plantation. Thus oak and xeric pine forests cover about 52% of the Black River State Forest, and much of these habitats could potentially be converted to barrens habitat. Combinations of tree cutting and burning can be used to revert dense pine/oak forest to barrens habitat (Vogl 1970, Wisconsin DNR 1999A). Thus, if elk grazing on lupine becomes excessive, expansion of barrens habitat can be used to provide additional habitat for lupine expansion, and additional foraging habitat for elk.

Prescribed burning is used occasionally to improve foraging habitat for elk (Canon et al. 1987, Lyon and Ward 1982). Burning can be used to create high quality foraging areas in grassy and brushy areas. Increasing the use of burning in many scattered patches could spread out grazing pressure by elk, and reduce concentration within a specific area.

Area of lupine sites can be expanded by direct seeding or planting of lupine plants (Wisconsin DNR 1999). Additional seeding and planting can be used to offset grazing impact by elk if found to be necessary. Lupine planting can be used to expand existing stands or establish lupine in new areas.

The elk management plan for Black River State Forest proposes a population density of 2 elk/mile$^2$ within the core area of 70 miles$^2$, and would allow harvest of bulls once the overall population exceeds 150 (Wisconsin DNR 2001). An additional 250 miles$^2$ would be used as buffer zone to support additional elk. If elk at this density causes significant problems for lupine plants, the elk population could be reduced to a lower density through public hunting. If elk spread out naturally over the core and buffer area, it seems unlikely that elk would cause overgrazing on lupine at densities of 2 elk/mile$^2$.

An additional procedure that can be used to disperse elk feeding and divert elk from areas of valuable crops is the use of food plots or planted forage (Beyer 1987, Lyon and Ward 1982). Generally such food plots consist of Eurasian grasses and legumes that are planted after tillage and fertilization. Although fertilization alone may also improve forage and attract elk to certain areas (Lyon and Ward 1982). Use of food plots need to be carefully balanced with concerns for managing for biological diversity. Food plots should not be planted into stands of native grasses. Food plots should be planted into areas of exotic grass mixes such as quackgrass (*Agropyron repens*), or old farm field areas that are covered by exotic herbaceous vegetation. Use of feed plots is probably the least desirable of mitigations because it can cause unnatural concentration of elk. Overgrazing or overbrowsing on plants near food plots condition elk to use forage found on agricultural areas and increase agricultural depredation, and also reduce local biodiversity if food plots are poorly located.

Potential Monitoring Useful for Assessing Impact of Elk on Lupine

Several monitoring programs will probably be necessary to assess impact of elk on lupine and other plants.

Lupine patches should be located throughout the areas of the Black River State Forest and adjacent areas. Monitoring programs for lupine and Karner blue as described in the Karner Blue Butterfly Habitat Conservation Plan should be conducted in the area (Wisconsin DNR 1999). Attempts should be made to locate all major patches of lupine, especially those that contain Karner blue butterfly. Large patches that contain substantial patches of lupine should be evaluated annually to determine changes in abundance of

lupine plants.

Additionally, it may be important to evaluate impact of elk grazing on key lupine sites such as at Bauer Road barrens or Dike 17 area by setting up some fenced areas or cages to assess impact. Cages or fenced areas should enclose selective samples, with similar unfenced areas nearby for evaluation.

Detailed study of elk food habits will be necessary to assess the impact of elk grazing on local ecosystems. Food habitats can be assessed by fecal analysis, feeding site examinations, and browse surveys (Litraitis, et al. 1996). Such surveys will help determine major forage plants in the area that should be monitored for elk use, and determine if certain species are receiving excessive use.

The reintroduced elk population will need to be carefully monitored as occurred with elk reintroduction in Clam Lake (Anderson 1999, Lozotte 1998). All released animals will be radio-collared and monitored intensely to determine home range, major foraging areas, and use of other habitats. If problems begin to occur with damage to certain plants, radiotelemetry locations would determine areas of concentrated elk activity. Telemetry surveys would be ongoing monitoring activity for the first 5 to 10 years of the reintroduction. Live capturing of calves and additional adults would be made most years to radio collar additional areas, or replace old radio collars. Such monitoring activity will provide an early warning system if damage is occurring to the ecosystem due to elk reintroduction.

## Literature Cited


Anderson, S.C. 1999. Experimental elk reintroduction in northern Wisconsin: planning and initial results. M.S. Thesis. University of Wisconsin, Stevens Point, WI. 103 pp.

Berger, J., J. E. Swenson, and I. Persson. 2001. Recolonizing carnivores and native prey: conservation lessons from Pleisatocene extinction. Science 291: 1036-1039.

Beyer, D.E. 1987. Population and habitat management of elk in Michigan. Ph. D. Dissertation. Michigan State University, Lansing, MI. 148 pp.

Boyonski, A. 1992. Factors affecting the establishment and maintenance of *Lupinus perennis* (wild lupine). M.S. Thesis, University of Guelph, Ontario.

Bryant, L.D. and C. Maser. 1992. Classification and distribution. pp. 1-59 *in* J.W. Thomas and D. E. Toweill, editors. Elk of North America: Ecology and Management. Stackpole Books, Harrisburg, PA. 698 pp.

Canon, S.K., P.J. Urness, and N.V. DeByle. 1987. Habitat selection, foraging behaviors, and dietary nutrition of elk in burned aspen forest. Journal of Range Management. 40:433-438.

Cartwright, M.E. 1999. An Update on Arkansas' Elk Management program. Eastern States Elk Management Workshop (Abstracts). Wisconsin Department of Natural Resources, February 28-March 3, Cable, WI.

Celebreeze, T.M. 1996. Spatial patterning of lupine (*Lupinus perennis*): Implecation for metapopulation viability analysis of the endangered Karner blue butterfly (*Lycaeides melissa samuelis*). M.S. Thesis, University of Wisconsin, Madison, WI. 65 pp.

Cochrane, T.S. and H.H. Iltis. 2000. Atlas of the Wisconsin prairie and savanna flora. Wisconsin Department of Natural Resources, Technical Bulletin No. 191, Madison, WI. 226 pp.

Collins, W. B. and P.J. Urness. 1983. Feeding behavior and habitat selection of mule deer and elk on Northern Utah summer range. Journal Wildlife Management, 47: 646-663.

Coughenour, M.B., and F.J. Singer. 1996. Elk population processes in Yellowstone National Park under the policy of natural regulation. Ecological Applications 6:573-593.

Curtis, J.T. 1959. The vegetation of Wisconsin: an ordination of plant communities. University of Wisconsin Press, Madison, WI. 657 pp.

Eveland, J. F., J. L. George, N. B. Hunter, D.M. Forney, and R.L. Harrison. 1979. A preliminary evaluation of the ecology of elk in Pennsylvania. pp. 145-151. *in* M. S. Boyce and L. D. Hayden-Wing,editors. North American elk: ecology, behavior and management. University of Wyoming, Laramie, WY. 294 pp.

Geist, V. 1982. Adaptive behavioral strategies. pp. 219-277 *in* J. W. Thomas and D. E. Toweill, editors. Elk of North America: Ecology and Management. Stackpole Books, Harrisburg, PA. 698 pp.

Hayden-Wing, L.D. 1979. Elk use of mountain meadows in the Idaho Primitive Area. pp. 40-46 *in* M. S. Boyce and L. D. Hayden-Wing, editors. North American elk: ecology, behavior and management. University of Wyoming, Laramie, WY. 294 pp.

Hobbs, N.T., D. L. Baker, J. E. Ellis, and D. M. Swift. 1979. Composition and quality of elk diets during winter and summer: a preliminary analysis. pp. 47-53 *in* M. S. Boyce and L. D. Hayden-Wing, editors. North American elk: ecology, behavior and management. University of Wyoming, Laramie, WY. 294 pp.

Hobbs, N. T., D. L. Baker, and R. B. Gill. 1983. Comparative nutritional ecology of montane ungulates during winter. Journal of Wildlife Management 47:1-16.

Houston, D. B. 1982. The northern Yellowstone Elk: Ecology and Management. Macmillan Publishing Co., Inc., New York, NY. 474 pp.

Hunt, H. M. 1979. Summer, autumn and winter diets of elk in Saskatchewan. Canadian Field-Naturalist. 93:282-287.

Hunter, N. B., J. L. George, D. A. Devlin. 1979. Herbivore-woody plant relationships on a Pennsylvania clearcut. pp. 105-111. *in* M. S. Boyce and L. D. Hayden-Wing, editors. North American elk: ecology, behavior and management. University of Wyoming, Laramie, WY. 294 pp.

Jackson, H. H. T. 1961. Mammals of Wisconsin. The University of Wisconsin Press, Madison, WI 504 pp.

Jost, M.A., J. Hamr, I. Filion, and F. F. Mallory. 1999. Forage selection by elk in habitats common to the French River - Bur wash region of Ontario. Canadian Journal Zoology. 77:1429-1438.

Kirk, K. 1996. The Karner blue community: understanding and protecting associated rare species of the barrens. Final Report to U.S. Fish and Wildlife Service, Wisconsin Department of Natural Resources. Madison, WI. 96 pp.

Kufeld, R.C. 1973. Foods eaten by the Rocky Mountain elk. Journal of Range Management. 26:106-113.

Litvaitis, J. A., K. Titus, and E.M. Anderson. 1996. Measuring vertebrate use of terrestrial habitats and foods. pp 254-274 *in* T. A. Bookhout, editor. Research and Management Techniques for Wildlife and Habitats. The Wildlife Society, Bethesda, Maryland. 740 pp.

Lizotte, T. E. 1998. Productivity, survivorship, and winter feeding ecology of an experimentally reintroduced elk herd in Northern Wisconsin. M.S. Thesis. University of Wisconsin, Stevens Point, WI. 86 pp.

Lyon, L. J. and A. L. Ward. 1982. Elk and land management. pp. 443-447 *in* J. W. Thomas and D. E. Toweill, editors. Elk of North America: Ecology and management. Stackpole Books, Harrisburg, PA. 698 pp.

Marcum, C. L. 1979. Summer-Fall food habits and forage preferences of a western Montana elk herd. pp. 54-62. *in* M. S. Boyce and L. D. Hayden-Wing, editors. North American elk: ecology, behavior and management. University of Wyoming, Laramie, WY. 294 pp.

Martinka, C.J. 1969. Population ecology of summer resident elk in Jackson Hole, Wyoming. Journal of Wildlife Management. 33:465-481.

McCordqnodale, S.M. 1993. Winter foraging behavior of elk in the shrub-steppe of Washington. Journal of Wildlife Management. 57:881-890.

McKee, R. 1948. The legumes of many uses: a general view of the Leguminosae. pp. 701-726 *in* U.S. Department of Agriculture. Grass, the yearbook of Agriculture 1948. U. S. Government Printing Office, Washington D.C. 892 pp.

McNaughton, S. J. 1983. Compensatory plant growth as a response to herbivory. Oikos 40:329-336.

Merrill, E. H. 1994. Summer foraging ecology of wapiti (*Cervus elaphus roosevelti*) in the Mount St. Helens blast zone. Canadian Journal of Zoology. 72:303-311.

Moran, R. J. 1973. The Rocky Mountain elk in Michigan. Michigan Department of Natural Resources, Research and Development Report No. 267. Lansing, MI. 93 pp.

Nelson, J. R. 1982. Relationships of elk and other large herbivores. pp. 415-441 *in* J. W. Thomas and D. E. Toweill, editors. Elk of North America: Ecology and Management. Stackpole Books, Harrisburg, PA. 698 pp.

Nelson, J. R. and T. A. Leege. 1982. Nutritional requirements and food habits. pp. 323- 367. *in* J. W.

Thomas and D. E. Toweill, editors. Elk of North America: Ecology and Management. Stackpole Books, Harrisburg, PA. 698 pp.

Olmsted, C. E. 1979. The ecology of aspen with reference to utilization by large herbivores in Rocky Mountain National Park. pp. 89-97 *in* M. S. Boyce and L. D. Hayden-Wing, editors. North American elk: ecology, behavior and management. University of Wyoming. Laramie, WY. 294 pp.

Osborn, R. G., J. A. Jenks, and W. F. Jensen. 1997. Diet of North Dakota elk determined from rumen and fecal analysis. The Prairie Naturalist. 29:237-248.

Schorger, A. W. 1954. The elk in early Wisconsin. Wisconsin Academy of Science, Arts and Letters. 43:5-23.

Skovlin, J. M. 1982. Habitat requirements and evaluations. pp. 369-413 *in* J. W. Thomas and D. E. Toweill, editors. Elk of North America: Ecology and Management. Stackpole Books, Harrisburg, PA. 698 pp.

Telfer, E.S. and A. Cairns. 1979. Bison-wapiti interrelationships in Elk Island National Park, Alberta. pp. 114-121 *in* M. S. Boyce and L. D. Hayden-Wing, editors. North American Elk: ecology, behavior and management. University of Wyoming, Laramie, WY. 294 pp.

Vogl, R. J. 1970. Fire and the northern Wisconsin pine barrens. pp. 175-209. *in* Proceedings of the Annuaql Tall Timber Fire Ecology Conference. Number 10.

Wisconsin Department of Natural Resources. 1999. Wisconsin statewide Karner Blue Butterfly Habitat Conservation Plan and Environmental Impact Statement. Wisconsin Department of Natural Resources, Madison, WI. Volume 1 and 2, 386 pp and Appendices (Volume 3).

Wisconsin Department of Natural Resources. 2001. Management plan and environmental assessment for the Black River elk herd. Wisconsin Department of Natural Resources, Madison, WI.

Wydeven, A.P. 1979. Food habits and ecological relationship of elk to other herbivores in Wind Cave National Park. M.S. Thesis. Iowa State University, Ames, IA. 208 pp.

Wydeven, A. P. and R. B. Dahlgren. 1983. Food habits of elk in the northern Great Plains. Journal of Wildlife Management. 47:916-923.

Wydeven, A.P. and R. B. Dahlgren. 1985. Ungulate habitat relationships in Wind Cave National Park. Journal of Wildlife Management. 49:805-813.

Wydeven, A.P. and J.E. Wiedenhoeft. 2000. Gray wolf population 1999-2000. Wisconsin Wildlife Surveys. 10:130-137.

**APPENDIX C – Public Comments and Department Responses to the preliminary Draft Management Plan and Environmental Assessment for the Central Forest Elk Herd**

As included in part of the Environmental Assessment process, a Draft Management Plan and Environmental Assessment for the Central Forest Elk Herd were available for public comment and review starting in March 2001. Public meetings were held to describe project alternatives and present related materials and to hear the publics concerns or support for the plan. Meetings were held in October of 2000 Neillsville, Tomah and Black River Falls. With the overwhelming feeling stemming from these meetings being in support of the introduction of more elk into the state, there were concerns expressed as well. The representation of the citizens from the various areas in the state was relatively good. A total of 91 non-DNR people attended the meetings with the largest turnout at the Black River Falls site. There was some concern expressed in face-to-face conversation at non-hearing times, but these people apparently opted not to attend any of the meetings for comment.

Specific comments received during the public meetings are documented below.

Robert Sebesta, S. Clark county-He stated that sandhill cranes, bear, deer and turkey are already eating his crops. He will vote NO to a reintroduction and will close his land to all public hunting if this goes through (he currently allows public hunting on his lands and harvests about 12 deer a year).

**Department Response:** Concerns regarding potential agricultural damage have to be taken into consideration from the onset. In Clark County Mr. Sebesta is already eligible for deer, bear and turkey damage abatement and compensation. Because wildlife are part of the landscape landowners are expected to tolerate a limited amount of agricultural damage. For species covered under the Wildlife Damage Abatement and Claims Program (WDACP) this tolerable level is established by state law at $250. Beyond that agriculturists can receive compensation up to $15,000, and may receive assistance with prevention methods.

The Department supports adding sandhill cranes and elk to the WDACP. However, because sandhill cranes and elk are not currently hunted species, and because the WDACP is totally funded by hunters the Department can only support adding these species if other non-hunter generated funds were to be provided. The Clam Lake Elk Management Plan calls for adding wild elk to the WDACP covered species list once they become a hunted species, and that a limited bull hunt should be established once that herd reaches 150 animals. At the current rate of growth this should occur by 2003. In the mean time the Department shall remove through capture, harassment or lethal means any elk found to be causing damage.

He also spoke out against elk on another occasion saying that if they come on his land, he'll shoot them.

**Department Response:** The policy as to whether elk will be established in the Central Forest shall be made by the Natural Resources Board. Elk damage risks and the management of elk damage will be a consideration in that decision. If elk are established,

and an individual illegally kills any of these elk, the Department shall take appropriate law enforcement action.

Unsigned comment-What is the money trail for the Clam Lake project (who's paying for what)? From the onset of the Clam Lake Herd, what has it cost?

**Department Response:** The initial 4 years of the Clam Lake elk project was a University of Wisconsin-Stevens Point study. The Department's involvement was merely as consultant and Department costs were minimal. It is our understanding that those 4 years of program cost approximately $500,000 and was funded by $50,000 of state General Purpose Revenues (GPR) funds and the remainder was funded by the Rocky Mountain Elk Foundation (RMEF), which is a private, non-profit conservation organization. For the current DNR biennium, July 1, 1998 through June 30, 2001, the Claim Lake Elk project is funded by $79,780 from State tribal gaming monies and a $66,000 contribution from the RMEF. It is the Department's intent that as soon as there is a viable population of 150 elk in Clam Lake elk range, a limited bull season will be established and that license fees generated from this season will augment the elk management funding, including damage management.

Jeff Fritz, commercial elk farmer-He said that he is not opposed to elk reintroduction, but has concerns. Elk can/will rip a fence apart. What will happen if a wild bull and his penned bull go head to head and destroy the fence allowing his elk to get out? Who is responsible for the health of his elk if it gets injured and who's responsible for any fence damage?

**Department Response:** Game farm elk are classified under state law as "livestock", therefore, once wild elk are covered under the WDACP, injuries or losses of game farm elk caused by a wild elk would be covered to up $15,000. Until such time wild elk are included in the WDACP the Department shall remove wild elk causing such damage by capture, harassment or by lethal means.

Kay Finch, cranberry grower-She expressed a concern about crop damage. Aware of no damage money available until elk are a hunted species. What is the proximity of elk range to agriculture in Michigan and Clam Lake? Where is release site? Who makes decision where release site will be?

**Department Response:** Proximity of elk range to agriculture in Michigan is similar to the Central Forest potential elk range. Proximity of elk range to agriculture in the Clam Lake area is approximately 4 miles from the core range boundary to significant agricultural fields, however, the distance from elk concentrations to those fields is about 16 miles. There have been significant problems with agriculture damage in Michigan, which have been solved through liberal harvests on agricultural lands and by farm owners becoming involved in fee hunting circumstances. Agricultural damage problems have not yet occurred in the Clam Lake area.

She also feels that health and agriculture should be our number one concerns.

**Department Response:** The Department agrees totally and have attempted to safeguard animal health and agriculture through thorough herd disease testing prior, during and after release, and through an intensive damage response protocol prior to establishment of WDACP coverage for elk. Once an elk-hunting season is established the department expects that there will be ample revenue to fully support funding needs for elk damage management and compensation costs.

Unsigned comment: Will money come from SEG funds be used to pay for elk? Sportsmen are once again going to foot the bill for a non-game species.

**Department Response:** While elk are considered a non-game species the cost of management will primarily be through private and non-hunting funds coming from the RMEF and state revenues from tribal gaming. Once a hunting season is established the RMEF contributions will continue, however, a significant portion of the remaining funding will be SEG funds. Because of the Department's desire to continue and expand alternative funding sources, such as the existing tribal gaming funds, it will seek continuation of these types of funding sources. However, the Governor and Legislature determine funding sources.

Unsigned comment: If Clam Lake Herd is hunted, will money be available for damage in the Central Forest?

**Department Response:** The statutory language that the Department has suggested in its biennium budget recommendation would establish statewide coverage once a Clam Lake zone hunting season is established. However, the Legislature and the Governor's office will determine final statutory language. The Department expects that statewide coverage would be approved, however, because this change requires statute change, the final decision will belong to the Legislature and Governor's office.

Unsigned comment: How will cranberries and farms be effected by the elk and who will pay for fences if needed?

**Department Response:** If elk are included in the WDACP agriculturists where high profile fencing is deemed cost effective would be eligible for 75% cost-sharing for approved project fences. Typically such justification is easily obtained for 8-ft. high woven wire fences to prevent deer damage on cranberry properties. The stature of elk is so much greater then deer, and because elk are more social animals, it is likely that there would be even greater likelihood of fence approval regarding elk damage situations. However, the Department has made an effort while identifying suitable restoration areas to exclude high-risk areas, thereby reducing the likelihood of such problems.

Unsigned comment: Can elk get around without effecting corn fields, etc.?

**Department Response:** Through the Department's efforts to identify suitable restoration areas and eliminating agricultural areas as high damage risk we sought to greatly reduce damage problems. This way elk would be placed where there aren't cornfields or cranberry marshes. However, when elk leave such suitable areas and enter unsuitable areas with agricultural operations, the Department shall remove problem animals through capture, harassment or lethal control methods. If there are isolated agricultural areas within the buffer elk range, then WDACP abatement measures such as fencing might be practical. If not, removal measures will be considered.

Unsigned comment: With so much Amish/Menonite fields, how do we assess damage on their fields?

**Department Response:** With the current high Wisconsin deer population Amish/Menonite fields are already subject to deer damage and are currently eligible for WDACP services through that program. Appraisal methods for elk damage would be the same as those methods already established for deer damage.

Unsigned comment: Will elk damage have more of an impact than deer? Other than the already obvious size difference?

**Department Response:** Elk have been found to cause agricultural damage in other parts of the nation. They are social animals which group together so that, even though overall average densities might be only 2 animals per square mile of elk range local numbers may reach a couple dozen. An elk is about 5 times the size of a deer and may consume up to 22 pounds of food daily (deer eat about 4 pounds dry weight of vegetation daily). This is why areas identified as having significant amounts of agricultural land use were identified by the department as unsuitable for elk and the management plan calls for active exclusion of elk from such areas. This exclusion would be accomplished through location of elk in areas comprised of primarily public land, little or no agricultural land use, and in areas where the local community want them. The management plan calls identification of a core management area and a buffer management area where elk would be allowed, but where management would be implemented to restrict elk to those limited areas. If elk leave those areas and enter areas where they cause agricultural problems, then the Department shall remove those animals through capture, harassment or lethal means.

Unsigned comment: In experimental stage, who is liable for damage?

**Department Response:** Whether "experimental" or not, at present no one is liable for damage caused by wild free roaming elk. Courts have established the legal principal that damages caused by free roaming wild animals are natural acts that no one person or entity is liable for. The State Legislature though has authorized limited compensation for agricultural damage caused by deer, bear, geese and turkeys, but not for elk, in the current wildlife damage program. Legislation is being considered to add elk to the damage program.

Unsigned comment: Claims on damages, allowed for compensation, wasn't there money available for the Clam Lake Herd for agricultural damage?

> **Department Response:** No money was earmarked to cover agricultural damage by the Clam Lake herd, nor were any complaints made.

Unsigned comment: Damage program lacking. Wouldn't support elk because of poor damage program.

> **Department Response:** The Department's position on the status of the current damage program is that the program is being implemented in compliance with state statutes; that requiring farmers to implement appropriate damage prevention methods is the correct priority for the program (an ounce of prevention is worth a pound of cure); that the maximum claim should be set at $15,000 (at levels over $5,000 permanent woven wire fences or night sharp-shooters become cost effective abatement to prevent $15,000 worth of damage); that requiring farmers to allow hunting access to those who fund this program 100% is fair and proper; and that to exceed the current level of coverage would be an inefficient use of public resources.
>
> However, we do support the changes to the program proposed by the Deer 2000 project, which seek to make this program more user friendly, more consistently and fairly implemented, and which provide farmers and growers with more options for dealing with and reducing their wildlife damage losses.

Unsigned comment: What would happen to an animal causing damage?

> **Department Response:** Prior to establishing coverage by the WDACP, elk causing damage shall be removed by the Department through capture, harassment, or lethal removal, in that order of priority. After coverage by the WDACP additional options will be added, such as exclusion woven wire fencing.

Unsigned comment: Doesn't like current agricultural damage program. Frustrated by deer and crane damage.

> **Department Response:** The Deer 2000 Agricultural Damage Study Group, comprised of representatives from agriculture, hunting groups and the local, state and federal agencies which partner in managing the programs involved in damage control, has spent the last year reviewing the existing program and developing improvements. They have recommended changes that seek to make this program more effective in reducing damage, gives growers more options, and provides a more consistent and fair program. The Department supports these recommendations and has initiated the statutory and rule making processes for implementing these changes. The statute changes will require Legislative action. The Department has incorporated the Deer 2000 changes into its biennium budget proposal, which will be reviewed for incorporation into the Governor's proposed budget, then tackled

by the Legislature next session. The rules package will be viewed by the Natural Resources Board for their approval to take it out to public hearings.

Unsigned comment: If $400,000 is available for elk-do they have money available for damage?

**Department Response:** That $400,000 was funding provided by the Rocky Mountain Elk Foundation for the Clam Lake restoration study. The Rocky Mountain Elk Foundation is an independent, private, non-profit conservation organization, dedicated to their mission "to ensure the future of elk, other wildlife and their habitat". They do not and are not likely to fund damage abatement and compensation programs. They leave that to state and federal agencies. There have been no funds or statutory authority provided to the Department for servicing damage cause by elk. The Department has submitted a request for these changes through our biennium budget recommendation process.

Bill Hunyadi, Rocky Mountain Elk Foundation: RMEF will support DNR's position and give money to assist with the elk program year after year.

**Department Response:** The Department welcomes and greatly appreciates our partnership with the Rocky Mountain Elk Foundation. Elk would not be here now, nor would the future of elk be assured without conservation groups such as the Rocky Mountain Elk Foundation.

Unsigned comment: Suggestion-give landowner permission to shoot problem elk.

**Department Response:** At least in the early stages of our statewide elk management the Department wants the opportunity to attempt non-lethal means first. If these do not succeed we may need to remove problem elk by lethal means. The public places a high value and expects us to preserve this valuable resource whenever we can. Once the various elk populations become abundant and viable we will be able to issue such shooting permits. This damage management style of capture/relocation priority, augmented by shooting permits where necessary is identical with the management style currently used for bear damage problems and is excepted by the public and is effective.

The following comments are concern over fencing issues and can all be noted and responded to in one answer.

Unsigned comments: Is standard fence in Wisconsin elk proof (5-strand fence)? Will elk jump or go straight through a fence? Fencing, elk can jump at a standstill over a 4 ft high fence. Would cranberry fences be effective to repel elk if they now work for deer?

**Department Response:** The Department's current standard deer exclosure fence under the WDACP is an 8-ft. high, high tensile woven wire fence. This is the same stature fence approved by regulation for all Cervid (deer family) species game farms in Wisconsin. However, this stature fence is the result of 16 years of permanent fence evolution. In 1984 the standard fence was a 5-ft. high, 5-strand electric fence. A couple years later the standard

was upgraded to 6-ft. high, 7 strand electric. In 1992 the standard was upgraded to 9 strands electric. In 1996 electric fences were dropped as permanent deer exclosure fencing and replaced with the current woven wire fence standard. Though almost all permanent deer fences since 1996 approved by DNR have been woven wire, dozens of existing program permanent electric fences still exist in the Central Forest Region. Though these existing electric fences will be helpful in preventing ingress by deer and elk, we know that deer are learning to broach these fences. We attempt to manage these problems by issuing shooting permits to remove these "smart" deer. The reason we've moved to woven wire for new and replacement fences is because they are the best barrier for deer and with increased deer numbers more deer have learned to beat our electric fences.

Though Wisconsin does not have any experience with elk exclosure fences, we do have experience with elk enclosure fences in the form of elk farm fencing. Pennsylvania has used electric and woven wire fences for years and they also have a growing elk herd. It has been their experience that 4, 5, or 6 foot high electric fencing is not effective in keeping elk out and have moved to the 8-ft. high woven wire (R. Coogan, Pers. Comm.). Their experience is that elk go right through electric fences. Existing cranberry fences may or may not be effective. It depends on the type of fence, the time of year, and the availability of other food sources and open areas. Any situations warranting permanent fencing to prevent deer or elk damage to agricultural crops needs to be 8 ft. high, high tensile woven wire.

The following issues/questions concern the biology and demographics of elk and can be addressed in a single response.

Unsigned comments: What is the main food source? How nomadic are elk? How far will elk travel from the release site? What is the home range of elk? How will elk effect the white-tailed deer population? Will it reduce the number of deer? What kind of geographical expansion is being seen in Clam Lake? What can be expected in the Central Forest? Projected expansion of the herd? If it started at 25-35 animals, how fast will the population grow? What is the carrying capacity in the Central Forest area for elk? How are wolves going to impact elk?

**Department Response:** The research literature indicates that elk are even more feeding generalists than deer—eating more of a variety of plants than deer. Where elk and white-tailed or mule deer exist, both populations seem to grow to abundance without significant competition between each other—they seem to compartmentalize feeding. One strategy elk seem to use, and it's been observed in the Clam Lake herd, is that they move frequently so as to "rotate pasture". The average home range for a male elk in the Clam Lake herd is 16 square miles, while cows have a home range of 11 square miles. Compared to a deer's 1 square mile home range elk can "rotate pasture" over a wide area so as to lessen impact on an area's vegetation. We are currently 100%, 87% and 107% over goal in deer management units 6, 13 and 14 which comprise the deer management units in the Clam Lake area, yet the elk herd grew 30 to 40 percent from last year. It's apparent that elk and deer are co-existing just fine. However, we will continue to monitor this interaction in order to detect any competition or environmental affects . This monitoring in the Clam Lake area indicates that

elk select for stands with a significant amount of aspen and winter browsing indicates they have a preference for aspen sprouts.

As for elk movements, in the arid west they are 'nomadic' in the sense that they prefer cool, moist conditions, so they travel up the mountains in the spring and move down the mountains with winter. This can result in some lengthy movements. However, in the east elk have adopted a more sedentary lifestyle, moving relatively little. This is primarily because the temperate forest provides all an elk's needs in a relatively small area, therefore elk move less. This has been the experience in Pennsylvania, Michigan and in the Clam Lake area. On the other hand, Kentucky has been engaged in an extensive and intensive restoration project, getting and moving elk from several western sources and some of these elk have moved to Virginia where they are unwanted. <Though there was some irratic movements during the initial release in the Clam Lake area, 85% of the elk have stayed in a 43 square mile area and have not yet outgrown that area. The sex and age characteristics and the location and logistics of release are likely to influence any initial dispersal in a Central Forest restoration project. Once the initial release occurs and elk have time to adjust, we expect the elk to find the Central Forest as a very comfortable location and will even be more inclined to stay put.

As stated above, if a Central Forest herd has similar growth to that of the Clam Lake herd we may have over 100 animals in 5 years if we start with 35 animals. The carrying capacity of the Central Forest is likely similar to other prime habitats elsewhere at about 2 elk per square mile of elk range. Total contiguous elk range in the Central Forest hasn't yet been identified, but is likely about 300 square miles, which translates to about 600 elk. Though wolves are present in the Central Forest, they are also relatively abundant in the Clam Lake area, even more so. We have only 2 known calf losses and no know adult losses to wolves in the past 5 years at Clam Lake. We don't expect high losses in the Central Forest, especially in light of even higher deer numbers in the Central Forest than in the Clam Lake area (about 40 deer per square mile of over winter range in the Central Forest compared to about 27 in the Clam Lake area).

Unsigned comment: Where are the holding pens going to be in Jackson County? Dike 17?

**Department Response:** A "soft release" holding pen release strategy will be used, similar to that used in the Clam Lake project. A "soft release" offers the elk the opportunity to adopt over time to their new home. This prevents irratic dispersal with the associated problems. We want the elk to stay where we want them and not move where they may cause problems. Just where would be the best location or locations has not been determined, because the state hasn't decided yet to go forward. We are concerned about proximity to cranberry growers and Interstate 94, so if we do go ahead these concerns will be taken into consideration.

Unsigned comment: Can't we get elk for the release from elk farms in the area (captive elk)?

**Department Response:** Captive elk were considered as a source for the new population. The choice was made not to consider elk farms as a source due to uncertainties about (1) undetected disease problems (such as Chronic Wasting Disease), (2) their wild origins and genetic background, and (3) their behavioral unsuitability to survive in the wild after generations in captivity.
Captive elk are domesticated elk, elk used to people. Such elk will cause habituation and damage problems and be more subject wolf predation and a variety of human related mortality factors. We want any restored elk population to be a "wild" elk herd. A herd that can take care of themselves in the wild. Our experiences with game farm pheasants and turkeys show that such reared animals are generally unable to take care of themselves in the wild.

Unsigned comment: Could we get elk from another state?

**Department Response:** We are currently looking into those options. We prefer our source in Michigan because this is a very aggressively disease sampled population and is a eastern temperate forest adapted herd, less apt to disperse to where we don't want them. Furthermore, some of the western sources are risky from a Chronic Wasting Disease standpoint.

Unsigned comment: When we got animals from MI originally (for the Clam Lake release) did the deer herd have TB at that time?

**Department Response:** Yes, when the elk were brought from Michigan in 1995, TB had been diagnosed in a hunter harvested Alpena County deer, and the Michigan Dept. of Agriculture and USDA vets had tested all the cattle in a five-mile radius of where that deer was shot. TB had actually been diagnosed in another deer in Michigan's Alcona County 20 years earlier.
It had not been discovered at that point. However, since discovery of TB in Michigan deer, Michigan has tested all elk killed during their elk hunting season, and have tested up to 10 percent of their herd and there has been one case of TB being detected in the Michigan elk herd. Furthermore, WDNR followed the US Department of Agriculture's and Wisconsin Department of Agriculture, Trade and Consumer Protection's disease testing protocol for import of livestock, including TB testing.

Unsigned comment: Any problems with TB in Michigan elk?

**Department Response:** Even though the elk range in Michigan overlaps with the area where TB has been found in white-tailed deer, only one case of TB has been found in wild elk. Since 1984, all hunter-harvested elk (100-300 per year) have been examined for signs of disease. Since TB testing in Michigan began in 1996 for a variety of wildlife, 848 elk have been tested for TB. As mentioned above there has been one positively TB tested elk found in the Michigan herd where Michigan has done extensive testing on live and harvested elk.

Unsigned comment: Disease testing and protocol-comment-not confident of accuracy of test. Concerned about disease issue.

> **Department Response:** We will make the assumption that the commentator is speaking about TB and the TB testing protocol. The comparative cervical skin test used by the USDA and state Departments of Agriculture when testing elk is not 100% accurate; no test, including that used for TB testing in cattle, is. However, the TB test used on the elk imported to Clam Lake and that will be used for any elk imported for a Jackson County herd is the standard test mandated and approved for acceptable accuracy by USDA. Individually testing each imported elk, along with the negative results from extensive tb testing done on the wild elk in Michigan, gives a high degree of confidence that TB-free elk will be imported.

Unsigned comment: How close was the nearest farm and/or residence in Clam Lake?

> **Department Response:** The nearest farm to the Clam Lake core range is 4 miles. There are no notable amount of agricultural land and residences located in areas where the elk currently exist. The elk restoration project in the Clam Lake area has been very positive with the local public—they continue to be very positive.

Unsigned comment: At Clam Lake, what percentages of cows were pregnant during the original release?

> **Department Response:** All of the adult cows and an estimated 40% of the heifer cows were pregnant at the original release.

Unsigned comment: Is personal safety a concern? (i.e. folks using the forest for hiking, camping, snowmobiling, etc.) Will elk act aggressively towards them and cause personal injury?

> **Department Response:** Any wild animal has potential for causing injury, should be treated with respect and should be enjoyed from a distance, however, there have been no serious injuries caused by the Clam Lake elk. There was a car/elk collision, which eventually caused the death of the elk and there was one hunter who was nudged by a bull elk's antlers, but no treatable injuries.

Unsigned comment: Would any recreational activities (skiing, snowmobiling, ATV use, etc.) be curtailed because of elk? Would trails be closed?

> **Department Response:** Although, the National Forest Service is placing greater restrictions on ATV trail use in the Chequamegon/Nicolet National Forest, it's not because of the elk, but rather, because of environmental abuses caused by some ATV users. Initially there would be no recommendations to close recreational trails.

Jackson County Board: Supervisor's have already said that they will not close any trails on Jackson County land.

**Department Response:** Noted

Unsigned comment: How do animals respond to pressure (human activity)?

**Department Response:** The University study and during recent Department monitoring of dog/bear hunting, snowmobiling, ATV use, grouse and deer hunting, no significant impacts on elk activity have been observed for the Clam Lake elk herd. It can be reasonably expected that elk, like other wild animals found within Jackson County, including deer, bear, wolves, trumpeter swans, fishers and a myriad of other species will adapt to the presence of humans in proposed elk range. Habituation concerns will be addressed as stated in the management plan by hazing, relocation or lethal means. The Department will not reduce use of or close recreational trails due to the management of elk management**.**

Unsigned comment: What is the top number (goal) before hunting is initiated? What is our population limit?

**Department Response:** Currently we are estimating a population goal of 2 elk/square mile of elk range. This would be approximately 500 elk for a population goal. However, if the elk range is increased or decreased because of a shift in land ownership and habitat quality this number could change. Hunting would be initiated when the population reached 150 animals. A bull only harvest would be conducted with a limited number of tags available through a random drawing.

Unsigned comment: Hunter density in the Central Forest is going to be a much larger factor than in Clam Lake. What is the potential for displacement and poaching problems?

**Department Response:** While we are aware that hunter densities are higher in the Black River Falls area than Clam Lake, we plan on having an active education and enforcement strategy that will hopefully keep at a minimum any accidental shootings or poaching of elk. At this time we foresee a displacement of elk during the gun season but anticipate the animals will quickly repopulate the forest when hunting season comes to a close.

Unsigned comment: How much more law enforcement would expect to be needed?

**Department Response:** At this point we do not foresee a need to increase law enforcement in the Central Forest solely due to an elk reintroduction. However, any additional wardens would be utilized in a wide spectrum for enforcement activities in the forest.

Unsigned comment: In regards to Ho-Chunk nation, will they get a percentage of permits?

**Department Response:** Since the Black River area does not fall within any ceded territory the Ho-Chunk nation and it's tribal members would have to apply for tags in the state wide drawing when hunting is permitted on the Black River herd.

Unsigned comment: What does Michigan charge for applications and hunts?

**Department Response:** As of 1999, applications were $4 and the "authorization" to hunt elk is $100.

Unsigned comment: If we see a wounded elk (during the hunting season) what should we do?

**Department Response:** Call a conservation warden. Do not shoot the animal yourself.

Unsigned comment: How many square miles of elk range are there in the Central Forest?

**Department Response:** Approximately 320 square miles has been designated as elk range. However, this number could change if other counties agree to be part of the elk management area and if land ownership or habitat suitability changes.

Unsigned comment: Have they planted food plots in Clam Lake to keep elk within the forest? Is this something we would consider in the Central Forest?

**Department Response:** The Forest Service did create some limited amount of clearings in the vicinity of the release pen, but these have not been fertilized and maintained beyond just keeping them mowed. No food plots have been planted for the Clam Lake herd. Reintroduction of elk into the Black River area would not be the major factor in way we manage the forest but rather based on ecosystem management. No special habitat management considerations for elk outside of the core range are recommended. Management for other species may benefit the elk.

Unsigned comment: How are we going to manage to keep elk away for I-94? Will we put up a large fence?

**Department Response:** It is unforeseen at this time if elk will be a problem on I-94. However, the core and buffer range of the elk do not include the interstate to minimize any possible accidents that may occur if elk crossed the highway. Signs warning motorists of elk in the area and future research will need to be conducted. To construct a fence to keep elk off the interstate would cost about almost $400,000 using WDACP 8 ft. woven wire standards. It would cost about three dollars per linear foot for materials and installation, and this still may not prevent elk from crossing the interstate.

Unsigned comment: Are there opportunities to participate in the project if elk were brought in?

**Department Response:** The department is always looking for volunteers on any projects it may have going on. You will need to contact your local biologist to see if they need any assistance.

Unsigned comment: Next step is NRB, then what's next?

> **Department Response:** If approved by the Natural Resource Board we will plan on a winter of 2003 release. This will require WDNR to find a source of elk and the availability of taking 35-50 elk from them. We will then attempt to trap elk, quarantine the trapped elk in for 90 days, and then move them to Wisconsin in late winter of 2003 where they will be placed in a holding pen for a soft release several weeks later.

Unsigned comment: Is there an EA and management plan available for comment?

> **Department Response:** The management plan and EA will be available for public comment in March of 2001

Unsigned comment: How are you going to report public comments to the NRB? Will there be public hearings?

**Department Response:** There will be a public hearing and a summary that will be presented to the Natural Resources Board.

Unsigned comment: Department of Agriculture would not grant any new elk farms in elk area- please comment.

> **Department Response:** Not allowing any new elk farms in the Jackson County elk range could reduce the risk of disease transmission between captive and wild elk. However, since farmed elk are legally livestock, just like cattle, there is currently little legal basis by which the Dept. of Agriculture could ban new elk farms in the wild elk range.

Unsigned comment: A motion to put it to a vote in the November 7th election (a referendum on elk).

> **Department Response:** Noted.

Tom Lochner, Cranberry growers: Said that a management plan and EA was not presented to the public. Cranberry growers and Farm Bureau are against elk. Tremendous amount of damage to cranberry growers out west. Upset that they have not been contacted.

> **Department Response:** There was a meeting with agricultural folks only and Tom was aware of this and had heard about it and knew what was discussed. The Department had notified the Cranberry Association and held a meeting, encouraging the Cranberry Growers, local Farm Bureaus and solicited help from local County Land Conservation Departments to seek other agricultural interest groups. All of these groups attended and shared their concerns at said meeting. The Department does not have the information that would allow it

to invite every cranberry grower or farmer in the Central Forest region. We feel that we acted reasonably and responsibility in our holding said meeting.

Local Dairyfarmer: Stated that he was pleased with the protocol on animal testing and quarantine before bringing any animals into the state. He stated that this was his biggest concern, but was pleased with how we were going to handle it.

**Department Response:** The DNR is working with the Wisconsin and Michigan Departments of Agriculture to protect the livestock industry in Wisconsin by making sure that any elk released in Jackson County are healthy and are free of diseases such as bovine tuberculosis and brucellosis.

Agricultural damage and disease risks are 2 of our biggest concerns regarding restoration of elk in the Central Forest. We look forward to working with Agriculturists in managing wildlife, especially elk, in preventing any negative impacts in these areas.

## APPENDIX D - Letters From Public Interest Groups

REPLY TO ATTENTION OF

**DEPARTMENT OF THE ARMY**
HEADQUARTERS, FORT McCOY
FORT McCOY, WISCONSIN 54656-5226

November 15, 2000

Office of the Commander

Ms. Michele Kastler
Wildlife Biologist
Department of Natural Resources
Route 4, Box 5
Black River Falls, Wisconsin 54615

Dear Ms. Kastler:

We appreciate having the opportunity to comment on the introduction of elk into Jackson County. Mr. Kim Mello informed me of his meeting with you on this matter. He also attended the public meeting in Tomah. Although I do not see any major conflicts with elk and our training mission at Fort McCoy, we do have a few concerns that we need to share with you.

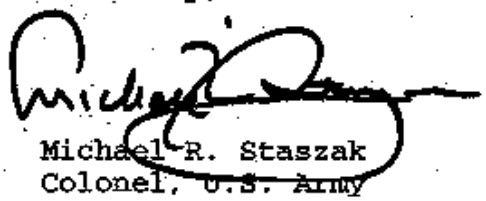
As you are aware, we have a very large North Impact Area (NIA) which will certainly attract elk because of the habitat quality within that area. This area does contain unexploded ordnance, which may pose a hazard for the elk. Rounds are also fired into the impact area as part of our training mission. In addition, this would also limit any surveys within the NIA that may be involved with monitoring the animals.

Our second concern would involve the potential for eventual conflicts with our neighbors who are involved with farming, orchards, and/or cranberries around the fort's boundaries. These conflicts could occur if the elk take up residence on the fort, and their population starts to expand. In this case, we assume that the Department would take the responsibility of dealing with this potential problem. If this were to happen, we would offer whatever assistance we could.

If you have any questions, please feel free to contact Mr. Mello on this matter. We enjoy the working relationship and

partnerships that have been developed over the years with the Wisconsin Department of Natural Resources, and look forward to continued interactions with you. Good luck with this program.

Sincerely,



Michael R. Staszak
Colonel, U.S. Army
Commanding Officer

FORT McCOY - TOTAL FORCE WARFIGHTING TRAINING CENTER

**Wisconsin State**
**Cranberry Growers**
**Association**

FOUNDED 1887

May 7,2001

Michelle Kastler, Wildlife Biologist
Wisconsin Department of Natural Resources State Highway 54
Black River Falls, WI 54615

Dear Michele,

These comments are provided on behalf of the Wisconsin State Cranberry Growers Association regarding the proposal to establish a herd of elk in the central forest region in Jackson County near Black River Falls. I am submitting written comments since I have a commitment out of state that conflicts with the hearing scheduled for May 8. I would appreciate it if you could make sure that these comments become part of the permanent record.

We are concerned about the process as it has unfolded and the position that the department and proponents have put our growers and other farmers in. We have legitimate concerns about the introduction of a new wildlife species as is being proposed. Because we have expressed concerns and asked that they be addressed we have been characterized unfairly as opposed to the project and implicated as "the bad guys". I believe that, while you personally have worked in good faith to hear our concerns, others in their enthusiasm to see this project go forward have attempted to minimize the concerns of farmers. We have heard comments from proponents that only "a few cranberry growers are against the proposal" or that there will be an elevation of the issue of public access to cranberry properties if growers continue their opposition. These really do not serve to provide for a constructive debate or opportunity to resolve these issues.

I would also ask that the characterization of my comments in Appendix B page 66 of the draft be corrected. At the public meeting I asked questions on the process that would be followed for making a decision. I asked about the role of the Natural Resources Board and the opportunity for public participation. DNR staff responded that they had been working with the Wisconsin State Cranberry Growers Association on the issue. I merely asked who the staff had been in contact with because I had not been involved nor had received any communication as was being described. I became aware of a landowner meeting after it had been held in August when one of our members contacted me. I simply stated that it was not accurate for the department to say they had been working with the WSCGA when in fact they hadn't. I was not asking the department to invite every cranberry grower as is in the department's response. I was simply asking you to refrain from saying that they were working with the association when in fact you were not. We did alert our growers to a meeting held after the public forums in October of 2000.

I would respectfully ask that the information on page 66 to be deleted or corrected to accurately reflect the concerns I expressed.

I also want to raise a question with respect to the introduction to Appendix B. The statement says that the department held a series of public meetings on the Draft Management Plan in March of 2001. It also implies that the plan was the subject of the public meetings in October of 2000 at which it was presented and received strong support. The record should be clarified that no plan was presented at the October meetings and the March meetings only included a preliminary discussion of the draft.

The presentations in October of 2000 were on the release in Clam Lake and interest in Jackson County. There was no presentation of a management plan. A meeting was held in Black River Falls in March 2001 with interested landowners. We did invite a number of our growers to participate. I do not believe that the feelings of those at the meetings could be characterized as supporting the introduction of elk.

Thank you for considering our views and including them in the record. If you have any questions or comments on them please feel free to contact me.

Sincerely,

Tom Lochner

Executive Director

P.O. Box 365 .Wisconsin Rapids, WI 54495 .715-423-2070 wiscran@wctc.net .www.wiscran.org

***Management Plan and Environmental Assessment Black River Elk Herd WSCGA Comments***

In April, 2001 the Wisconsin Department of Natural Resources issued a draft management plan for the introduction of elk in the Black River Falls area of Jackson County. On April 19, 2001 the agency issued an assessment of the impacts of elk introduction on Lupine and Karner Blue Butterflies. These comments are provided by the WSCGA on those two documents.

*Background The Wisconsin State Cranberry Growers Association was formed in 1887 as an educational organization for the state's cranberry growers and to provide public representation. Today WSCGA membership is made up of family farmers accounting for over 80% of the state's cranberry production. Cranberries are the state's largest fruit crop and Wisconsin leads the world in cranberry production accounting for about 45% of the world's supply offruit.*

Jackson County is the third largest cranberry producing county in the state with over 2,750 acres of cranberry vines. Wood and Monroe Counties which are immediately adjacent to the proposed release area lead the state in production with over 4,000 and 3,000 acres respectively. Juneau County nearby ranks fourth in production with over 1,500 acres. The four counties represent two-thirds of the state's cranberry production Because of this concentration of cranberry acreage in the areas near the central forest we have a number of concerns about the proposal to establish a herd of elk. These concerns are primarily economic but also question the wisdom of releasing a species in an area that includes and is surrounded by intensive human activity. This presents a potential for numerous conflicts.

Cranberry growers have been put in a no win situation by raising legitimate concerns over the impacts of the proposed release. The growers are all sportsmen and conservationists. They enjoy hunting, fishing and the outdoors and appreciate all the various forms of wildlife that inhabit their marshes. Growers actively manage their land to provide improved habitat for a wide and diverse population of flora and fauna. Some travel west to hunt elk as well so they understand and appreciate the benefits associated with elk. But there are legitimate questions about the project which to date have not been answered either by the department directly or through the draft management plan.

*Crop Damage Issues*
There are documented cases of severe and long-term damage done by this species of elk to cranberry farms in the Pacific Northwest growing states of Oregon and Washington. University Extension faculty, wildlife managers and growers in these states have detailed these problems.

Attached to these comments in Appendix 1 are pictures that detail the damage that elk have caused to one cranberry farm in Oregon. The damage shown is the result of vines trampled by elk(Figures 1 and 2) and a washout caused by digging and pawing in a reservoir dike (Figures 3, 4 and 5). In addition elk cause damage through feeding on vines and fruit. They vividly demonstrate the damage that the animals have done and give us cause for concern that we face the real possibility of this type of damage as a result of the project.

Dr. Kim Fatten, Associate Professor, Washington State University has worked with wildlife biologists in Washington on the issue. Based on his observations of elk he reports that they can be very troublesome to cranberry farmers for the following reasons:

1. Elk can consume up to 50 pounds of ripe fruit a night per animal.
2. They have caused severe damage to irrigation systems by breaking off sprinkler heads.
3. They cause extensive permanent damage by digging up and pawing the beds.
4. Each elk foot print can cause up $.10 to $.20 in crop loss. Multiply that by four times 30 to 60 per minute per elk and you have the potential for extensive crop loss.

According to Dr. Fatten, the cost to avoid elk damage is extensive fencing. These costs are detailed late in these comments. Dr. Fatten concludes that introducing elk into a cranberry growing reason is "a sure fire way to cause problems for both the elk and the farmers".

The draft management plan, in dealing with crop damage on pages 23-24 and 39-40, does not address or mention the problems specific to cranberries detailed above. Since the department was aware of specific concerns about cranberry crop damage the management plan would be expected to be more thorough in its analysis in this area. The draft needs to be modified to include a more detailed analysis of the problems in western states particular to cranberries but also other crops including row crops, corn, soybeans, alfalfa, vegetables, Christmas trees, etc.

At the present time farmers in the area do not have to deal with problems caused by elk. By the action of the state at the urging of a special interest group of proponents, farmers now have one more problem to deal with that did not exist before and the potential to have substantial costs placed upon them.

Most growers have erected fences for the purpose of protection from deer damage. These fences are ineffective against elk and would have to be replaced. The proponents of the project and the department need to cover all of the costs of the project up front in order to gain the support of the WSCGA. WSCGA has not received such a commitment nor does the draft plan contain anything that would even remotely cover these costs.

According to DNR the only effective method of crop protection is construction of an eight foot woven wire mesh fence. Current construction rates for such fences are $3 to $4 per foot. Using an average of$3.50 per foot one grower estimated that their cost would be $328,000. Even with a 75% cost share (as suggested by the WDAP) the grower would incur a cost of $82,000. It is simply unfair and inexcusable to expect growers to absorb these costs as part of the project.

WSCGA would respectfully ask that the department select Alternative 5 in its plan until at a minimum all of the issues can be resolved. Absent this, WSCGA asks that adequate resources be provided to farmers to cover!!! costs of abatement procedures including fencing for those farms in the core and buffer areas before any release. In addition adequate resources be provided to cover the full costs of fencing in the future when the elk stray from the areas into neighboring land.

WSCGA recommends the Crop Damage Response Protocol on page 39 be amended to include fencing of all farms in the core and buffer areas to protect them from damage. Further the WSCGA offers its cooperation to work with DNR staff on this new protocol. WSCGA recommends that no release be allowed until such satisfactory protocols have been developed and are implemented by the agency.

The analysis of crop damage under the different alternatives does not include an analysis of crop damage under Alternative #5. In fact all of the issues need to incorporate an analysis of the impacts under Alternative 5.

*Elk Distribution Black River elk range as shown in Figure Ion page 12 of the plan consists of a core and buffer range. The boundaries run along state, county and federal highways. The core range -the area where elk would be released and tolerated is bounded by Interstate 94 on at least two points. It also includes state Highway 54 in its northern portion. The range is surrounded by land intensively used by humans. The core and buffer ranges also include public and private areas open for hunting, fishing, forestry management, farming, recreational trails and other activities. The plan calls for management objectives to keep elk in the core areas which will result in little if any impact on other activities. It is legitimate to question whether the animals can actually be contained in the range.*

Once elk are present and the deer hunting season begins WSCGA believes that the elk will move to avoid humans, especially those engaged in hunting. When the recreational trails used for snowmobiles, ATV's and motorcycles are in heavy use the animals may move as well. It is only natural that the animals will move to areas where they are not disturbed and food is available regardless of how far they need to move. There is a very real probability that they will end up on private land. WSCGA is concerned that despite the department's best efforts to limit this dispersal it will occur and set the stage for severe crop damage or other conflicts before the agency can respond and relocate the animals.

As these animals move into areas outside the core and buffer areas as well as within them there is a risk of vehicular collisions especially with an Interstate Highway on the edge of the core area. WSCGA believes that the draft while recognizing the risk of vehicular collisions it understates this safety concern and offers no solution.

*Costs Of Elk Management*

The costs associated with the project over the course of 5 years is estimated to be over $443,600. Anticipated revenues assuming a hunting season are less than half that amount. This leads to the obvious question as to how the balance will be made up.

The costs however do not reflect the full cost of the project. As detailed earlier, estimates for fencing for damage abatement are in the range $3-4 per foot. One grower estimated the cost of protecting their crop (using $3.50 per foot) would be $328,000. These are not included in the management plan and there is no method to account for them. The plan needs to address these costs and identify full funding for them outside of the Wildlife

Damage and Abatement Program. WSCGA recommends that the plan be amended to include a more detailed and accurate analysis of costs and funding sources.

In addition the department needs to fully disclose the costs of management of the project as well as the revenues to cover them. DNR staff have devoted a large amount of time to the project to date. Have these costs been included in the analysis? Reliance on Indian gaming as a source of revenue for the future may not be wise. It also seems to be inappropriate to have hunting license fees pay for the project, which is currently the case since department wildlife management staff working on the project are funded by hunting and other license fees. This is especially true in light of statements in the draft that it is inappropriate to use license fees to cover abatement and damage costs of the elk.

WSCGA is also concerned about the precedent being set by the analysis of the impacts on Karner Blue Butterflies. The analysis states that even though elk will destroy and consume habitat and "may consume KBB larvae, such feeding will not have a major negative effect". WSCGA is impressed that the department so easily dismisses this impact. WSCGA questions whether this same standard will be applied to private development or projects on private

land. The analysis does set the stage for a double standard that can and will be perceived as unfair. The department may want to review this analysis and to insure that all projects are treated equally in their review. It is also unclear as to whether the Fish and Wildlife Service agrees with this analysis and will approve such an incidental take.

*Summary These comments, presented by the WSCGA, deal specifically with the impacts on cranberry farming of the introduction of the non-native species of elk proposed to be released in what is referred to as the Central Forest Region of Jackson County in West Central Wisconsin. Theyare limited primarily to the economic issues and costs associated with property damage and abatement as a result of the release. The WSCGA is recommending that the department adopt Alternative 5 from page 10 of the April 200 1 draft management plan at least until damage issues and crop protection are adequately addressed.*

**If any other alternative is chosen WSCGA believes that all costs of abatement, including construction of fences, be borne by the department or other proponents prior to the release of any animals. The association believes that by dealing with all of the costs up front, a positive future relationship will develop between the farming community and the special interest group that is promoting the release of the animals.**

# Town of Komensky

Jackson County, Wisconsin
N9140 County Road
N8887

April 28, 1999

Mr .Gary Onstad
Elk Foundation
401 Tyler
Black River Falls, WI 54615

Dear Mr .Onstad:

At the Annual Town Meeting ofApri120, 1999 the residents of the Town of Komensky unanimously voted to support the re-introduction of elk into Jackson County.

We hope all of your hard work and time spent on this project will prove beneficial to Jackson County .

Sincerely,

Town of Komensky

Gail M. Jass, Clerk

JACKSON COUNTY FARM BUREAU

Route 1 • Box 27D
Black River Falls, WI 54615
715/284-2522

April 15, 1999

The Jackson County Farm Bureau Board of Directors supports the reintroduction of elk on the eastern side of Jackson County and State Forest property.

Due to concerns of possible elk population migration, we feel I that as agriculture landowners we must have some legal authority in controlling the migration of elk onto our privately owned property.

All landowners in Jackson County to have a permit to harvest one elk on their own land annually during a 10 day fall season.

No charge to the landowner for this permit.

*Steven Kling*

President

# Town of Brockway

P.O. Box 484
236 Gebhardt Road
Black River Falls, Wisconsin 54615

**Phone** 715-284-5234 Fax 715-284-9321

March 22, 1999

**Mr. Allen Jacobson**
**Rt# 1 Box 147**
**Hixton, WI 54615**

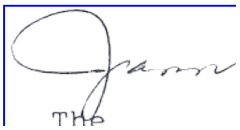
Dear Mr. Jacobson;

The Town Board of the Town of Brockway would like to thank the Jackson County Wildlife organization for the informative presentation regarding the reintroduction of elk into Jackson County.

Following review of this proposal, the Town Board of Supervisors for the Town of Brockway unanimously voted on March 10, 1999 to formally extend their support and acceptance of this program. We are also pleased to state that all persons in attendance at this meeting were in favor also.

Good luck with your endeavors and please keep the Board informed of your progress.

**Respectfully:**



Town Board of Supervisors
Town of Brockway
**Jann Dahl**
**Clerk/Treasurer**

jd

Resolution # _____

Re-Introduction of Elk (Cervus canadensis) to Jackson County

To The Honorable Jackson County Board of Supervisors

Whereas, Elk were native species in Jackson County until their extirpation in the late 1860's, and

Whereas, The reintroduction of elk into Jackson County is appears beneficial from both a biological and social perspective, and

Whereas, Sufficient public lands exist in eastern Jackson County to support a herd, and the distribution expansion of the herd canwill be controlled through various management practices such as hunting, trapping & relocation, or other meansto be determined by the Wisconsin Department of Natural Resources, and

Whereas, Governor Thompson has included funding in the 1999-01 state budget to expand Wisconsin s elk population;

Whereas, The Jackson County Wildlife Fund is proposing to sponsor the reintroduction of elk through solicitation of donations through local and national sponsors, and

Whereas, The Jackson County Board of Supervisors supports the reintroduction of elk to eastern Jackson County at the earliest date possible.

Now, Therefore Be It Resolved that the Jackson County Board of supervisors hereby request that the Wisconsin Department of Natural Resources initiate development of a comprehensive management plan for the reintroduction and management of an elk herd in Jackson County as rapidly as practical.

Be It Further Resolved that the management plan will contain appropriate measures to minimize risks to agricultural interests, and control herd expansion.

Respectfully Submitted:

Jackson County Forestry Committee

_____ Norman Stoker

_____ Eugenia Chemliecki

_____ Allan Olson

_____ Gary Olson

_____ Donald Evenson - Chair