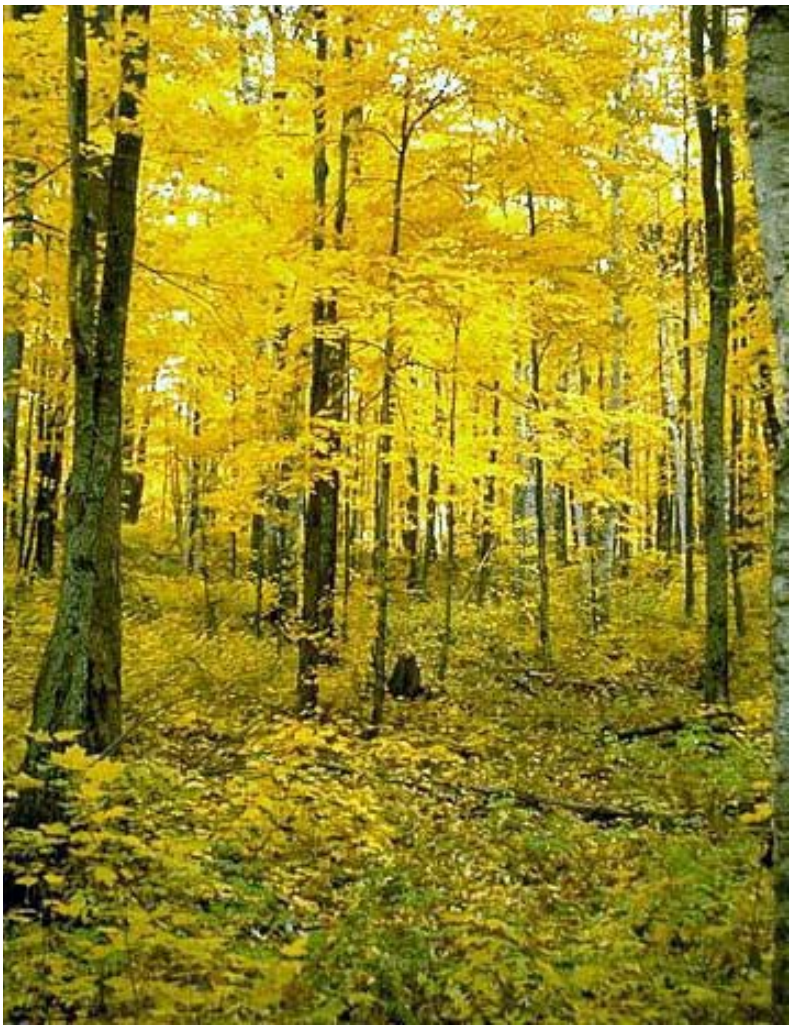
Appendix L
Analysis of Elk Habitat in Relation to Forest Plan Alternatives



Appendix L

Appendix L

Appendix L

Analysis of Elk Habitat in Relation to Forest Plan Alternatives

Background

In 1989 the State Legislature directed the Wisconsin Department of Natural Resources (WDNR) to determine the likelihood of reintroducing elk, moose, and caribou into the state (Anderson 1999). The WDNR subsequently published the "Feasibility Assessment for the Reintroduction of North American Elk, Moose, and Caribou into Wisconsin" (Parker 1990) and determined elk had the best potential for reintroduction. After considering several sites for reintroduction, the Bayfield Peninsula was selected as the best location and a management plan (Parker 1991) was prepared. In 1991, the Natural Resources Board of the WDNR voted against reintroducing elk at this site due to lack of public support, funding, and area for the animals to inhabit (Anderson 1999). As a result of this decision the Wisconsin Elk Study Committee (WESCO) was formed and analyzed other potential release sites. The committee determined the Great Divide Ranger District (GDRD) of the Chequamegon National Forest (CNF) near Clam Lake was most suited for elk reintroduction.

In 1993, the Wisconsin State Legislature authorized the University of Wisconsin-Stevens Point (UWSP) to evaluate the potential for reintroducing elk into the CNF. UWSP and WESCO submitted a proposal to the Forest Service requesting permission to conduct a four-year project to determine the feasibility of maintaining an elk herd and to assess the potential impacts on other resources of the CNF. After preparing an Environmental Assessment and soliciting public comments, this request was approved in February 1994. In spring 1995, with cooperation from the WDNR, Michigan DNR and Rocky Mountain Elk Foundation, UWSP released 25 elk into the CNF that were trapped in Michigan. The WDNR assumed management responsibility for the Clam Lake Herd in 1999 and completed a management plan for the herd in 2000. As of June 2003, there were approximately 120 elk in the Clam Lake Herd, with a majority of these animals within the core range around the release site (Wisconsin Department of Natural Resources 2003).

Current Management Direction

The WDNR Clam Lake Elk Management Plan (EMP) can be viewed on-line at the following web site: (http://dnr.wi.gov/org/land/wildlife/elk/Plan.htm). The management plan establishes a core and a buffer range for the herd in Ashland, Bayfield, and Sawyer Counties (Figure 1).

The core elk range (Zone A) is a 288 mi^2 area located in the center of the GDRD and encompasses the U.S. Department of Navy's Extremely Low Frequency (ELF) Communication System. The ELF line is an X -shaped grid similar to a utility corridor, kept free of trees and shrubs. Each segment is approximately 18 miles long and 33 yards wide.

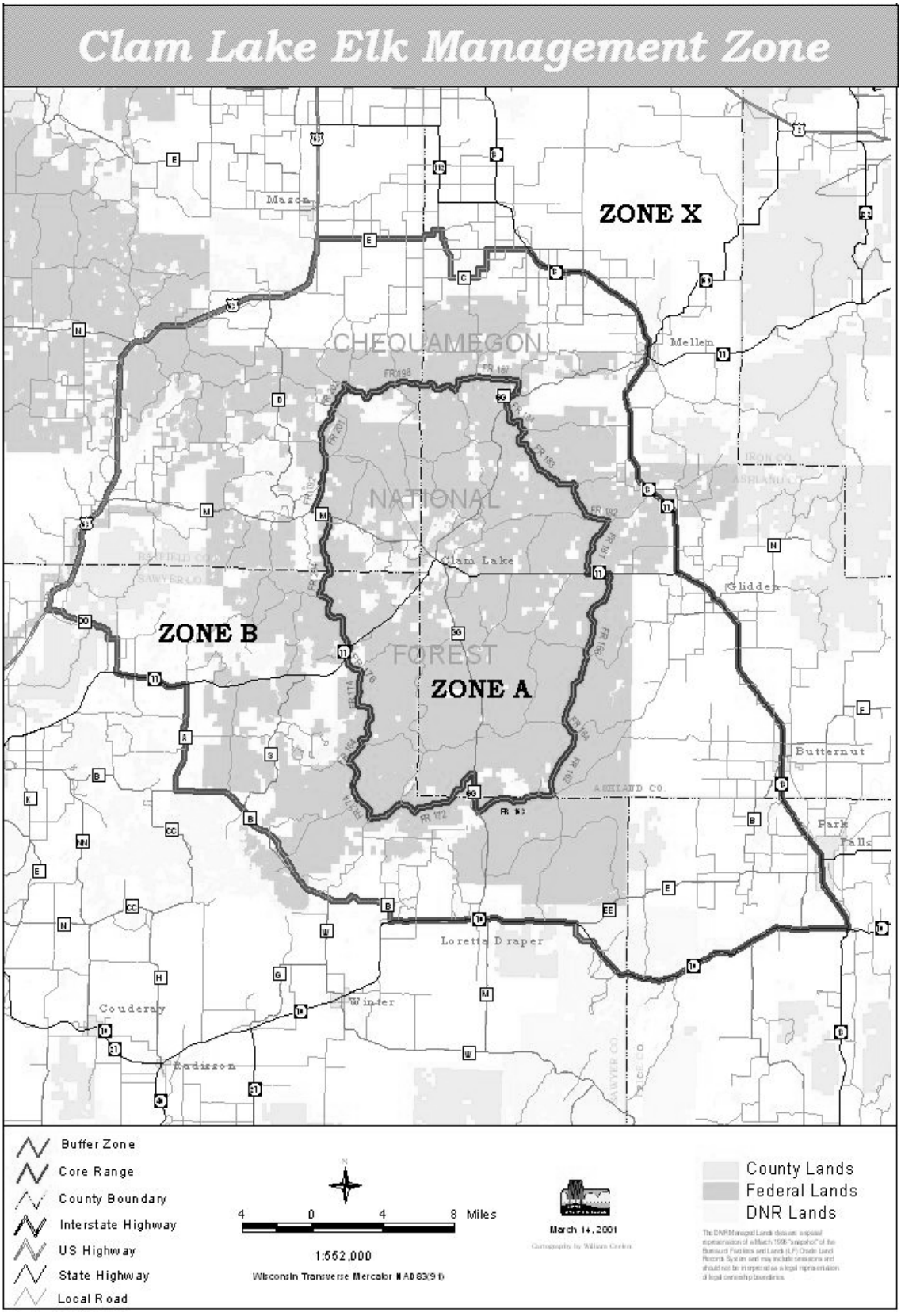


Figure L-1. Elk Management Zones for the Clam Lake Herd.

The buffer elk range (Zone B) is an 824 mi^2 area that surrounds the core range. Land ownership in the buffer range is a mix of National Forest, county forest, and private land. Inside the National Forest boundary there is little agricultural land within the buffer range although there are numerous residential areas, primarily associated with Lake Namekagon, Lost Land Lake, and Moose Lake. These areas were excluded from the core range to minimize the potential for habituation problems with elk (Wisconsin Department of Natural Resources 2000).

The elk management plan identifies a population goal for the herd of approximately two elk per square mile over the core range or approximately 576 animals and an undetermined, but lower density in the buffer range. The selected method for achieving this population goal is through natural growth of the existing herd. The management plan calls for the use of public hunting to maintain the herd at target levels. A limited hunting season will be established once the herd reaches 150 animals. The WDNR has assumed management of the elk herd. The authority for elk habitat management lies with the Forest Service as the primary landowner in the designated elk range. The other lands in the elk range are primarily in private ownership and have similar vegetation composition to the national forest (Wisconsin Department of Natural Resources 2000).

A Habitat Suitability Index model developed for the elk herd in the northern part of Lower Michigan was applied to habitat in the core range in the early 1990s to determine its potential suitability as elk range. The three most important factors in the HSI model were spring food, winter food, and winter cover. Non-forested lands with grasses, forbs, and young aspen provide quality spring forage. Winter food includes cover types such as northern white cedar, and young-age aspen and northern hardwoods. Winter cover is provided by lowland conifer types and to a lesser degree by upland conifer and mature deciduous trees.

The proportion of existing vegetation types being managed under the 1986 Forest Plan (USDA 1986) direction were deemed adequate for the elk herd. Management within the elk core range is focused primarily on northern hardwoods and aspen, with a small area of upland conifer emphasis. Current management is thought to be highly compatible with elk, since the reintroduced herd has survived and grown steadily since the release. In the elk management plan (p. 39), "The Department [*Wisconsin DNR*] recommends maintaining current levels of aspen in the core range through continued harvest of timber, but without converting other cover types to aspen solely to increase habitat quality for elk (Parker 1991). No special habitat management considerations for elk outside of the core range are recommended."

Comparison of Revision Alternatives

Potential changes in the amount of preferred elk habitat for each plan revision alternative (1-7, 9 and the Selected Alternative) were analyzed by making 10 and 100-year projections of vegetation composition within the core elk range. The entire GDRD was analyzed in a similar manner, as the district comprises the approximate extent of National Forest ownership in the buffer range (projected acreage figures were not available for GDRD however for Alternative 1 at the time of the analysis). Preferred habitats were determined from the results of a habitat selection study on the Clam Lake elk herd in which the proportion of available habitats were contrasted with the actual use of those habitats (J. Schmidt *unpublished data*; Figure L-2). Existing acres of preferred habitat types were summed by season for both the core range and buffer range. This existing condition was then compared to acreage projections for the same types, at 10 years and 100 years, by alternative. These projected acreages assume that proposed plan direction would stay the same throughout the 10 year and 100 year period. Spreadsheets showing the actual acreage comparisons, summarized below, are available as part of the planning record.

Core elk range habitat – 10-year projection

1. The quantity of spring habitat will decrease in all alternatives (range -0.6 to -2.7%) except Alternative 3, which will increase by 0.9 %. These decreases are mainly due to a reduction in hardwoods acres. Under the Selected Alternative, the quantity of spring habitat will decrease by 2.4% in ten years.
2. The quantity of summer habitat will decrease in all alternatives (range -0.3 to -1.2 %) except Alternatives 1, 2 and 6, which will show increases by 0.5, 0.2, and 0.3, respectively. Increases are mainly due to an increase in red pine habitat. Under the Selected Alternative, the quantity of summer habitat will decrease by 0.6% in ten years.
3. Fall habitat will decrease in quantity under all alternatives (range -0.3 to -2.6 %), due mainly to reductions in the quantity of hardwood and aspen habitats. Under the Selected Alternative, the quantity of fall habitat will decrease by 1.6% in ten years.
4. Winter habitat will decrease in quantity in all alternatives (range -0.1 to -2.1%), due to reductions in aspen habitats. Under the Selected Alternative, the quantity of winter habitat will decrease by 0.2% in ten years. It is important to note that the preference for non-forested lowland areas during winter is based on data from winter 1997-98, which was one of the warmest on record, with little snow accumulation. Since elk were not restricted to heavy cover, it is possible they were using these areas as loafing sites (J. Schmidt *pers. comm.*).

Summary

In general, the quantity of preferred elk habitat within the core range will decrease in most alternatives at the 10-year composition projection. However, these decreases are minor and are mainly due to decreased acres in upland hardwoods and aspen habitat that are used primarily as a food source. Increases in summer habitat under some alternatives are due to an increase in the quantity of upland conifer and red pine habitat. Overall, these small reductions in habitat are not expected to have a pronounced impact on elk because they are very opportunistic feeders and can utilize a wide variety of plant species.

TO: Forest Plan Revision Team – Wildlife
RE: Elk Habitat Use
FROM: L. John Schmidt

The results of the seasonal habitat use analysis of elk locations during May 1996 – May 1999 were:

FEMALES selected (n=12, p<0.0001)	**MALES** selected (n=3, p<0.0001)
Spring	Spring
Sugar Maple	Sugar Maple
Upland Conifer	Non-Forested Upland
Non-Forested Upland	
Lowland Conifer	
Summer	Summer
Upland Conifer	No selection
Non-Forested Upland	
Red Pine	
Fall	Fall
Aspen	Non-Forested Upland
Non-Forested Upland	Aspen
Sugar Maple	
Non-Forested Lowland	
Winter	Winter
Lowland Conifer	Lowland Conifer
Aspen	
Non-Forested Lowland	

Elk were located in these Forest Service managed cover types more frequently than would be expected (as determined by a Chi^2 test followed by a Bon Ferroni Z test) based on the percentage of area considered available on the landscape.

Important habitat types to consider from an elk perspective are:

- **Non-Forested Uplands (Openings) –** Particularly for Spring foods and Fall rutting activities (<0.5% available within the elk range).
- **Sugar Maple –** Calving grounds within open understory stands and possibly some spring forage.
- **Aspen –** Fall forage and rutting activity within the younger age classes.
- **Lowland Conifer –** Winter cover and possibly forage in Cedar swamps.

Figure L-2. Communication between L. John Schmidt and U.S. Forest Service regarding Elk habitat use.

Core elk range habitat – 100-year projection

1. Spring habitat will increase in quantity in all alternatives (range +0.9 to +6.3%), due to an increase in hardwood and upland conifer habitats. Under the Selected Alternative, the quantity of spring elk habitat will increase by 4.0% by 100 years.
2. Summer habitat will increase in quantity in all alternatives (range +0.2 to +4.0%) except Alternatives 3 and 5, which will decrease slightly (0.4% and 0.1%, respectively). Increases are due mainly to an increase in upland conifer and red pine habitat in those alternatives. Under the Selected Alternative, summer elk habitat will increase in quantity by 0.4% by 100 years.
3. Fall habitat types decrease in quantity in all alternatives (range -1.8 to -4.1%), due to a reduction in aspen habitat. Under the Selected Alternative, fall elk habitat will decrease in quantity by 1.8% by 100 years.
4. Winter habitat will decrease in quantity in all alternatives (range -2.6 to -9.1%), due to a reduction in aspen habitat. Under the Selected Alternative, winter elk habitat will decrease in quantity by 5.6% by 100 years.

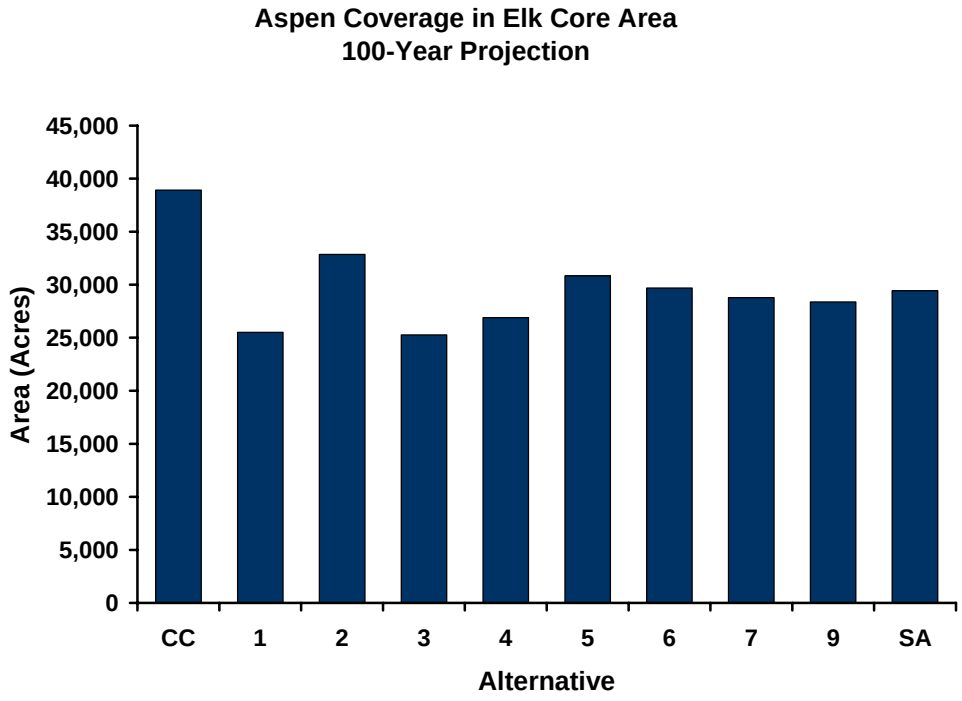


Figure L-3. Aspen coverage in the 100-year projection for the Core Area. "CC" represents current conditions and SA represents the Selected Alternative.

Summary

In the 100-year habitat composition projection within the core elk range, the quantity of preferred elk habitat will increase in spring and summer due to an increase in upland conifer and hardwood habitats, and will decrease in fall and winter due to a reduction in aspen habitat (Figure L-3). Small reductions in preferred habitat area should not

negatively impact elk due to their opportunistic feeding behavior. However, reductions in aspen (range -6,066 to -13,665 acres) could negatively impact the elk herd through a reduction in forage. Winter food and habitat use studies on the Clam Lake herd showed they consumed proportionally more twigs of trembling aspen than were available (Lizotte, 1998) and also selected proportionally more aspen stands than were available during winter (Anderson 1999, Schmidt *unpublished data*). Reduced quantity or quality of nutrition could affect winter survival, particularly of calves. In a worst-case scenario, it could also lead elk to move further in search of quality forage, possibly outside of the core range. However, it is difficult to make long-range predictions based on current management on a fairly small and highly regulated herd.

GDRD elk habitat – 10-year projection

1. The quantity of spring habitat will decrease in all alternatives (range -0.3 to –2.4%) except in Alternative 3 (+0.8%), due to decreases in hardwood and upland conifer habitat. Under the Selected Alternative, spring elk habitat will decrease in quantity by 1.7% by 10 years.
2. Summer habitat will decrease in all alternatives (range -2.9 to -3.8%), due to a reduction in upland conifer habitat. Under the Selected Alternative, the quantity of summer elk habitat will decrease by 3.5%.
3. The quantity of fall habitat will decrease in all alternatives (range -1.4 to -2.8%) with the Selected Alternative showing a decrease of 2.1%. These results are similar to those for the Elk core range projections.
4. The quantity of winter habitat will decrease in all alternatives (range -0.5 to -2.4%) with the Selected Alternative showing a decrease of 0.7%. These results are similar to those for the Elk core range projections.

Summary

The 10-year projections for Elk habitat Management Zone B are similar to those for the core range. The greatest difference between the projections is in summer elk habitat where reductions in Zone B are greater (by percentage) than in Zone A. This difference is the result of a larger decrease in upland conifer habitat in Zone B when compared to Zone A. This summer habitat is mostly used as loafing sites by elk to escape the heat of day (Anderson 1999). It is possible that an increase in the acreage of white pine would compensate for the reduction in other upland conifer stands and thus minimize the impact to the elk population.

GDRD elk habitat – 100 year projection

1. The quantity of spring habitat will increase in all alternatives (range +2.3 to +8.0%), due to an increase in hardwood and upland conifer habitats. Under the Selected Alternative, the quantity of spring habitat is projected to increase by 6.3%
2. The quantity of summer habitat will decrease in all alternatives (range -2.3 to -3.7%), due to a decrease in upland conifer habitats. Under the Selected Alternative, the quantity of summer habitat is projected to decrease by 3.0%
3. Fall habitat projections are similar to those for the 100-year core range. The quantity of habitat is projected to decrease in all alternatives (range -1.8 to -4.4%) with the Selected Alternative decreasing by 1.8%.

4. Winter habitat projections are similar to those for the 100-year core range. The quantity of habitat is projected to decrease in all alternatives (range -5.5 to –11.0%) with the Selected Alternative decreasing by 7.7%. Decreases are due to the reduction in aspen in Management Zone B.

Summary

Habitat projections for Management Zone B (GDRD) are similar to those for the 100-year core range.

Conclusion

In conclusion, there are likely to be decreases in elk habitat within a 10-year period. However, changes in habitat availability would be minor and are unlikely to result in substantial impacts to the herd. Projected changes in habitat availability following a 100-year period are more pronounced, primarily due to loss of aspen habitat, which is an important fall and winter habitat component. The overall impacts of the proposed management direction on achieving or maintaining elk population goals are difficult to predict. Any prediction based on projections of management activities over 100 years is speculative at best. Additionally, information is lacking on:

- Thresholds at which any of the important habitat features become limiting factors;
- The relationship between habitat quality and quantity and elk population dynamics; and
- The levels at which the amount of preferred habitat produces diminishing returns.

Nevertheless, the potential exists for negative impacts to the Elk herd in the long term, mainly under Alternatives 3, 4, and 9 through substantial reductions in aspen habitat in these alternatives.

Literature Cited

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

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

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.

USDA Forest Service, Eastern Region. 1986. Land and resource management plan, Chequamegon National Forest.

Wisconsin Department of Natural Resources. 2000. Management Plan and Environmental Assessment for the Clam Lake Elk Herd, 2000. p. 77.

Wisconsin Department of Natural Resources [online]. 2003. Clam Lake elk herd update: April – June 2003. [cited 27 October 2003]. Available: http://www.dnr.state.wi.us/org/land/wildlife/Elk/Latest_CL_Update.htm.