# A DRAFT STRATEGIC PLAN FOR MANAGEMENT OF HANFORD ELK

(Revised 12-20-99)

## INTRODUCTION

As a result of a rapidly expanding population of Rocky Mountain elk (Cervus elaphus nelsoni) on the Arid Lands Ecology (ALE) reserve of the Hanford site, it has become necessary for Washington Department of Fish and Wildlife (WDFW) to develop a strategic plan for the management of this elk population. The ALE is a restricted access area with unique habitats and is currently administered by the U.S. Fish and Wildlife Service. The potential risk of damage to the ALE reserves unique habitats and the peripheral impacts of elk to adjacent private lands with high risk of crop and property damages are key factors that necessitate the development and implementation of a strategic plan for management of the elk resource. This plan will provide the base information, discuss alternative actions and set direction for the cooperative management of the elk population on ALE and adjacent lands.

### History and Description of the Problem

In Washington the Roosevelt elk (Cervus elaphus roosevelti) is indigenous to the Pacific coastal region of Washington and Rocky Mountain elk reside primarily in eastern Washington. Washington ranked sixth in North American continental elk population in 1995 (Bunnell, 1997). The statewide estimate of 62,200 is about equally represented by the two subspecies.

Zooarchaeological evidence suggests elk historically inhabited the arid shrub steppe habitats of the Columbia Basin, but were hunted to extinction by 1850 (McCorquodale 1985, Dixon and Lyman 1996). Elk were reintroduced to various locations throughout the state. In 1913, 50 elk from Montana were released in the Naches River area of Yakima county, resulting in the reestablishment of the Yakima herd (McCall 1997a). Additional transplants between 1913 - 1930 into the Blue Mountains and the Colockum area resulted in the reestablishment of these major elk herds in eastern Washington (Appendix E).

The elk population in Washington was estimated at 15,000 in 1930 and peaked in 1970 at approximately 69,000 (McCall 1997b). More recently, populations have shown a declining trend with the exception of the Yakima and northeastern Washington populations. The Hanford elk herd, considered a sub-population of the Yakima herd, has shown a dramatic and continuous increase during its history.

According to Rickard et al. (1977) the Hanford elk herd had its beginning in 1972. It is speculated that these animals came from the Yakima population directly west of the ALE some 30 airline miles distance.

WDFW has attempted to control the Hanford elk population through liberal hunting seasons. Harvest has been inconsistent from year to year primarily because of poor hunting access onto private lands and no access onto the ALE by hunters.

**Description of the site:**
The Hanford elk population utilizes the Fitzner-Eberhardt Arid Lands Ecology (ALE) Reserve; a 330-km² (127 mi²) portion of the U.S. Department of Energy's Hanford Site. The site is characterized by shrub-steppe vegetation, primarily grass-shrub associations dominated by big sagebrush (*Artemisia tridentata)* and blue bunch wheatgrass (*Agropyron spicatum)*, Sandberg bluegrass (*Poa sandbergii)*, or cheatgrass brome (*Bromus tectorum)* and is surrounded by a 110-cm, 5-strand barbed-wire fence that does not restrict elk movements. Annual precipitation on the arid site varied about a long-term mean (1965-82) of 16 cm (McCorquodale et al. 1988).
Public access to the Hanford site and the ALE is closed and strictly guarded. Portions of the area were grazed by domestic livestock until 1968 when grazing was eliminated. The ALE has historically supported a small resident population of mule deer (*Odocoileus hemionus).*

The most prominent feature of the region is Rattlesnake Mountain that rises to 1,074 m near the southern boundary of the ALE. Rattlesnake Mountain and hills are an east-west trending mountain range located between the cities of Yakima and Richland. The Columbia River and Yakima River intersect at the Tri-cities. Intense agriculture occurs along the Yakima River. The Rosa and Sunnyside canals provide irrigation water for farming generally below 400 m in elevation (Appendix A).

**Land ownership:**
The majority of the area is in private ownership. The following major ownerships are recognized for the area:

| | |
|---|---|
| WDFW | Rattlesnake Slope Wildlife Area. |
| USFWS | Fitzner-Eberhardt Arid Lands Ecology Reserve and Saddle Mountain National Wildlife Refuge and Wahluke Wildlife Area |
| DOE | Hanford Site |
| US Army | Yakima Training Center |

The Hanford Reserve is a highly sensitive area because of its use in nuclear material production and as a nuclear waste depository. The ALE is an ecological reserve to protect natural resources and remains a buffer for the Hanford Reserve, but administered by U.S. Fish and Wildlife Service. Public access is strictly controlled. The Yakima Training Center is another restricted access area used by the U.S. Army for military training. Public access on this site is controlled, and limited recreational hunting opportunity is provided.

**Cooperators:**
The following federal, state and local governments are cooperating and coordinating with each other and private landowners in the development and implementation of this plan.

| | |
|---|---|
| U.S. Fish and Wildlife Service | U.S. Department of Energy |
| Washington Department of Fish and Wildlife | Benton County |
| Yakima County | Yakama Indian Tribe |
| Nez Perce Tribe | U.S. Army - Yakima Training Center |
| Private landowners | |

The Washington Department of Fish and Wildlife, Final Environmental Impact Statement (FEIS) for Washington State Elk Management Plan was approved by the Director on January 29, 1997. The development of the FEIS complied with the State Environmental Policy Act. During the formal public comment period on the Draft EIS, four public meetings were held in the state and copies of the draft were sent to more than 500 organizations, including agencies, sporting groups, counties, environmental groups, Indian tribes, and private industry for review and comment. Copies were also sent to 600 individuals. Input received during this extensive review process helped shape the FEIS. The FEIS contains five alternatives for managing elk populations in Washington, including WDFW's Proposed Action (McCall 1997b).

A statewide elk management plan was written from the preferred alternative, approved by the Fish and Wildlife Commission and implemented as a guidance document for management of the species. The following statewide elk management **policies** apply to the Hanford elk population:

- Discourage elk populations from increasing in Benton County.
- Place higher priority on acquiring management control of critical elk habitat and assist private landowners to manage their property for elk.
- Increase involvement in partnerships, interagency cooperation, consultation, and planning to protect and enhance elk habitats.
- Discourage human development in areas critical to elk by working with counties and municipal governments.
- Acknowledge that WDFW manages elk cooperatively with federally recognized treaty tribes where federally secured hunting rights of off-reservation treaties are exercised. Work with tribes, on all levels of elk management within ceded areas where tribal and non-tribal hunting occurs; to report and distribute harvest, identify the geographic extent of treaty rights, enforce tribal hunting activities, and maintain and enhance elk populations.
- Reduce damages caused by elk to human property and inform the public on how to live compatibly with elk.
- Reduce human/elk conflicts in sensitive areas by identifying elk exclusion zones.
- Reduce elk damage to private land by increasing enhancement of habitats on state land.
- Improve hunter ethics to enhance public images of hunters and hunter/landowner relations.

The following Washington Department of Fish and Wildlife elk statewide **goals** apply to the Hanford elk population:

- Use the best scientific information to manage elk populations for sustained yields as long as populations are compatible with tolerance for elk on private land.
- Manage elk for a variety of recreational and educational uses including harvest, hunting, viewing opportunities, and study.
- Maintain and enhance elk habitats to ensure productive populations.
- Cooperate in management of elk with federally recognized treaty tribes where off-reservation hunting rights are exercised.
- Make information on elk management more readily available to the public.

HANFORD ELK POPULATION BIOLOGY

**Surveys:**

The U.S. Department of Energy has supported research on Hanford elk soon after elk arrival. Detailed observations of the ALE herd started in 1982-83 winter when a telemetry study was initiated. Earlier records (1975-81) were based on maximum counts made during approximately weekly aerial security patrols of the ALE Reserve (McCorquodale et. al, 1988). Currently, annual elk surveys are conducted by Pacific Northwest National Laboratories (PNNL) under contract with the DOE.

**Elk distribution and seasonal movements:**

Current elk distribution is centered in the ALE on a year-long basis. Movement out of the ALE to adjacent landownership has become more frequent as the population has grown. Elk have established what appears to be permanent residency (1998-1999) outside of the ALE in the vicinity of the Sagebrush Ridge south of Rattlesnake Hills (Stream, 1999 personal communications). Elk have also been periodically observed north of the Columbia River on the Wahluke Wildlife Area in Franklin and Grant counties.

Several small elk herds have been observed south of Highway I-82 in Benton County. Hunter harvest locations provided by WDFW biologists confirm elk were legally harvested in these areas. These southern populations are presumed to have been started from animals coming off of the ALE.

Elk are also moving out of the ALE into the Army's Yakima Training Center (YTC).
In recent years a herd of over 100 elk has been utilizing the YTC in the Badger Gap area. These animals immigrated from the Umtanum and have caused damage in the Badger Pocket area (Stream, 1999 personal communications).

Elk are frequently observed on the Rattlesnake Hills and Yakima Ridge in Yakima and Benton counties. As would be expected the most frequent observations are adjacent to the ALE western and southern borders.

Movements in and out of the ALE are common occurrences. The core area of distribution has been the ALE and in particular the Cold Creek Valley area. The initiation of hunting on the perimeter of the ALE has generated movements in and out of the ALE to escape harassment. During the hot-dry summer months daily movements to key watering sites occur.

**Population estimates:**

The ALE elk population expanded from an estimated eight individuals in 1975 to a documented 89 individuals in 1986 (McCorquodale et al., 1988). Eberhardt et al. (1996) continued with the elk surveys on the ALE. At least five aerial counts were conducted annually for the post calving season and post hunting seasons (Dec-Feb) estimates. Maximum counts in each of these survey periods were used as population estimates (Table 1). Brett Tiller, Pacific Northwest National Laboratory provided the updated information in Table 1.

**Table 1 Maximum count elk population estimate for the ALE herd**

| Year | Males | | | Females | | | Total Calf's | calf/ cow | calf/ adult cow | Total Elk | growth rate |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | adult | yrl. | total | adult | yrl. | total | | | | | |
| 1983 | 5 | 3 | 8 | 16 | 3 | 19 | 13 | .68 | .81 | 40 | |
| 1984 | 7 | 12 | 19 | 20 | 1 | 21 | 15 | .71 | .75 | 55 | .272 |
| 1985 | 18 | 7 | 25 | 21 | 8 | 29 | 17 | .59 | .81 | 71 | .225 |
| 1986 | 22 | 8 | 30 | 29 | 9 | 38 | 21 | .55 | .72 | 89 | .200 |
| 1987 | 14 | 5 | 19 | 32 | 16 | 48 | 27 | .56 | .84 | 94 | .053 |
| 1988 | 12 | 13 | 25 | 33 | 14 | 47 | 23 | .49 | .70 | 95 | .010 |
| 1989 | 18 | 10 | 28 | 38 | 13 | 51 | 23 | .45 | .61 | 102 | .068 |
| 1990 | 22 | 12 | 34 | 49 | 11 | 60 | 21 | .35 | .43 | 115 | .113 |
| 1991 | 19 | 12 | 31 | 70 | 9 | 79 | 23 | .29 | .33 | 133 | .545 |
| 1992 | 30 | 11 | 41 | 93 | 12 | 105 | 44 | .42 | .47 | 190 | .300 |
| 1993 | 33 | 19 | 52 | 102 | 25 | 127 | 59 | .46 | .58 | 238 | .202 |
| 1994 | 43 | 21 | 64 | 117 | 37 | 154 | 73 | .47 | .62 | 291 | .182 |
| 1995 | 46 | 30 | 76 | 141 | 33 | 174 | 96 | .55 | .68 | 346 | .159 |
| 1996 | 58 | 33 | 91 | 179 | 66 | 245 | 119 | .49 | .66 | 455 | .239 |
| 1997 | 95 | 59 | 154 | 220 | 60 | 280 | 157 | .56 | .71 | 591 | .230 |
| 1998 | 136 | 78 | 214 | 276 | 78 | 354 | 144 | .41 | .52 | 712 | .170 |
| 1999* | 196 | 72 | 268 | 338 | 72 | 410 | 160 | .39 | .47 | 838 | .150 |

*Maybe adjusted after 1999 post-hunting survey results (Brett Tiller, PNNL).

**Elk Herd Trends:**

The Hanford elk have shown a consistently high level of productivity over the 17 years that data has been collected. The average calf/adult cow ratio over the period of measurement was 58/100. The long term (1983-1993) growth trend for the Hanford elk herd averages a 20% increase annually. Eberhardt et al. (1996) observed that an elk population can achieve a sustained rate of increase of 30%/year, but speculated that a rate approaching 28% may be a likely maximum.

**Population Dynamics and projections:**

Lou Bender, WDFW's Deer and Elk Specialist, modeled the Hanford elk herd based on PNNL population information provided at that time. Some adjustments were made in the 1998 data following additional survey information therefore the population data used in this model are not exactly the same

as found in Table 1.

Minimum population counts on the Hanford Arid Land Ecology Reserve (ALE) elk population indicated a growth from 40 elk in 1983 to 738 elk in 1998 (Table 1). This rate of population growth is equivalent to an annual rate of increase of ~20%, similar to that modeled by Eberhardt et al. (1996). To evaluate potential management options for the ALE herd, Pop-2 software was used to build a deterministic population model of the ALE herd. The goal for the model was to (1) mimic the minimum population estimates observed on the ALE; (2) mimic mortality rates derived by Eberhardt et al (1996); and (3) mimic observed herd sex and age ratios.

Less emphasis was placed on sex and age ratios than the first two criteria, since these ratios tended to vary substantially in a manner that suggested counting biases rather than a biological phenomenon. The developed Pop-2 model closely mimicked the observed population trends of the ALE herd (Figure 1).

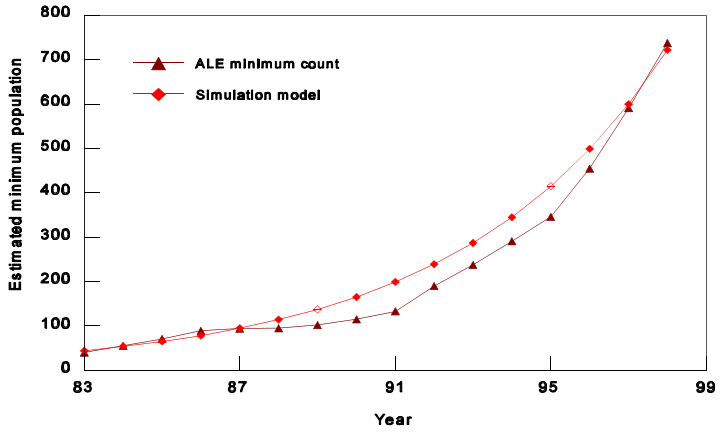


***Figure 1.*** *Minimum annual population counts of the ALE herd and simulated population size using the Pop-2 model*

The simulation model was used to model 3 management options for the ALE herd. These options are not intended to be exhaustive; rather, they provide an idea on the magnitude and timing of removals necessary to decrease the ALE herd to 3-400 elk and stabilize it at this level.

*Option 1.* A one time decrease of the ALE herd to 3-400 elk, followed by annual removals to stabilize the population at 3-400 elk.

*Option 2.* A gradual (3-4 yr) decline of the ALE herd to 3-400 elk, starting in (December) 1999, followed by annual removals designed to stabilize the herd at that level.

*Option 3.* A gradual (3-4 yr) decline of the ALE herd to 3-400 elk, starting in 2000, followed by annual removals designed to stabilize the herd at that level.

For all options, an attempt was made to maintain a "natural" ratio of bulls-to-cows in the population.

***Option 1.***

Option 1 would require a one-time removal of 200 bulls, 250 cows, and 100 calves to reduce the population to ~300 elk, resulting in a post-calving population of ~350. This population could be stabilized at ~350 elk by an annual harvest/removal of 25 bulls and 30 cows (Figure 2).

***Option 2.***

Option 2 would require the removal/harvest of 50 bulls/year from 1999-2002 and 150 cows starting in 2000 (1999 post hunting season), followed by 100 cows annually 2000-2002. This would result in a remaining population of ~300-350 elk post-calving, from which an annual removal/harvest of 25 bulls and 25-30 cows would be required to stabilize (Figure 2).

***Option 3.***

Option 3 is similar to Option 2, but initiates removal starting in (December ) 2000. Option 3 would require the removal of 50 bulls annually for 2000-2002 in combination with the removal of 200 cows in 2000-2001 followed by 100 in 2002. These removals would result in a reduced population of ~300 elk, which could be stabilized by an annual removal of 25 bulls and 25 cows (Figure 2).

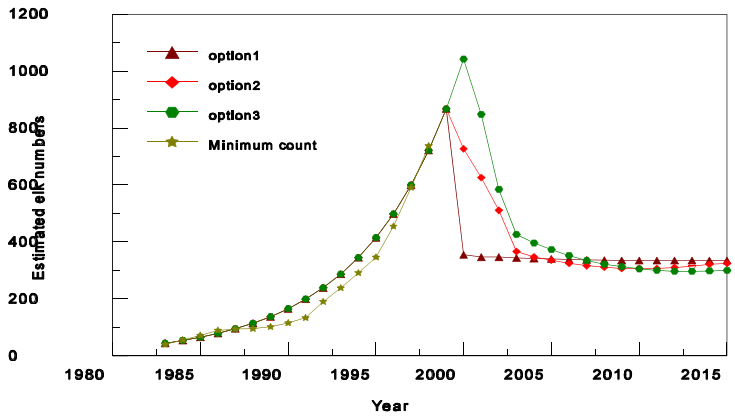


***Figure 2.*** *Projected ALE elk population trends under management Options 1,2 and 3.*

Table 2 summarizes the options for removal of elk from the ALE. The total number of elk by sex and age class to be removed by trapping will have to be adjusted by the number of animals harvested during the general hunting season.

**TABLE 2 REMOVAL OPTIONS FOR MANAGEMENT OF ALE ELK**

| YEAR | BULLS | COWS | CALVES | MINUS HARVEST | TOTAL TRAPPING | TOTAL REMOVED |
|---|---|---|---|---|---|---|
| **Option 1** | | | | | | |
| **1999-2000** | **200** | **250** | **100** | | | **550** |
| **yearly harvest thereafter** | **25** | **25** | | | | **50** |
| **Option 2** | | | | | | |
| **1999-2000** | **50** | **150** | **0** | | | **200** |
| **2000-2001** | **50** | **100** | **0** | | | **150** |
| **2001-2002** | **50** | **100** | **0** | | | **150** |
| **yearly harvest thereafter** | **25** | **25** | **0** | | | **50** |
| **Option 3** | | | | | | |
| **1999-2000** | **0** | **0** | **0** | | **0** | |
| **2000-2001** | **50** | **200** | **0** | | | **250** |
| **2001-2002** | **50** | **200** | **0** | | | **250** |
| **2002-2003** | **50** | **100** | **0** | | | **150** |
| **yearly harvest thereafter** | **25** | **25** | **0** | | | **50** |

RECREATIONAL ELK HUNTING ADJACENT TO HANFORD

Annual elk hunting seasons have been open adjacent to the Hanford site for many years. Appendix B provides a history of the elk hunting season types, dates, and legal animal descriptions authorized by the Fish and Wildlife Commission. No hunting has occurred on the Hanford site since its establishment. The ALE has also been closed to hunting and trespass. Hunting on the Yakima Training Center is authorized by permission of the U.S. Army.

**Harvest:**

Legal elk harvest for Game Management Unit 372, Kiona has been monitored through post season questionnaire and report card returns of successful harvest. Both methods of harvest monitoring are totally voluntary. Post season hunter activity questionnaires are designed to sample approximately 10% of the licensed hunters and follow-up notices (3 waves) are sent to address non-response bias. The report card surveys samples only the successful hunting activity. No information is collected through report cards from unsuccessful hunters.

At the Game Management Unit level, the accuracy of the harvest information collected is suspect. Appendix C records the post season hunter harvest questionnaire data for GMU 372 from 1980-1998.

The reported harvest in the Kiona Unit has ranged from 3 to 88 animals for the period 1984-1998, with the exception of 1990 when no harvest questionnaire survey was conducted. Harvest has varied widely from year to year and over the long term.

Prior to 1995 a single Game Management Unit, GMU 370 (Priest Rapids) was described for the area west of the Hanford site. In 1995, GMU 370 was split with the northern portion; The Yakima Training Center to I-90 was described as GMU 371 (Alkali) and south of The Yakima Training Center was described as GMU 372 (Kiona). In an attempt to determine where the harvest of elk was occurring, an analysis of the harvest report cards from 38 successful hunters from 1996-1998 (Appendix D) provided some information on kill locations with inference to elk distribution during the hunting season.

## THE PROBLEM

The Hanford elk population has shown a typical sigmoidal growth and is currently estimated to be more than 800 animals. Based on the current growth rate the Hanford population is expected to exceed 1000 animals in year 2000. As the population has grown, the numbers of animals leaving the ALE site either temporarily or permanently has increased. It is speculated that many of the satellite populations that have been identified recently are animals from the Hanford population. Hanford elk are also spending increasing amounts of time outside the ALE. A recent population of approximately 120 animals has established, what appears to be, permanent residence on the Sagebrush Ridge area north of the town of Prosser.

Landowners are increasingly fearful of significant damage occurring as elk advance further into high value crop (orchard and vineyard) areas. Only recently have written complaints of damage on farm crops been received. In the vicinity of Cold Creek, near the northwest boundary of the Hanford Reserve, some elk damage to orchards has occurred and orchardists have installed fencing. These relatively recent agricultural developments are especially susceptible to damage. Once elk become habituated to agricultural crops it will be increasingly difficult to eliminate damage problems.

Most reports of damage to agricultural crops and rangelands have been received verbally by WDFW. To date one formal damage claim has been received although more are expected. Elk damage to private range lands results from direct competition with domestic livestock and fence destruction. Elk use of grain crops is an increasing concern as more elk have been observed utilizing this crop and for longer periods of time.

There is also concern that Hanford elk will damage the natural vegetation within ALE. Evidence for damage is anecdotal, however, WDFW believes the damage to natural vegetation on the ALE will become a major issue if elk herd growth is not curtailed. Increasing numbers of elk on the ALE is a threat to the sensitive shrub-steppe habitats of the area. Concentrations of animals appear to be having

some adverse impacts to the vegetative resources. Increased frequency of elk emigration from the ALE to adjacent areas also suggests social and/or habitat saturation.

In 1988, Pacific Northwest National Laboratory (PNNL) and USFWS placed four big-game exclosures on the ALE in sagebrush stands used extensively by elk. Plans are to measure vegetative differences inside versus outside the exclosures in the fall of 1999. PNNL has taken photographs of areas on ALE depicting extensive elk trails through the vegetation. A series of trail density samples throughout ALE was collected the summer of 1999. Element occurrences (high quality plant communities) have been mapped on the ALE by The Nature Conservancy, but there have not yet been any concentrated studies to evaluate the overall use or impacts of elk within those communities. Much of the winter use of elk on ALE occurs in the cheatgrass dominated flats adjacent to Highway 240 (Brett Tiller, 1999 personal communications).

While hunting may be the most economical and effective tool for controlling elk populations, the ALE and some private lands act as refuges during the hunting season. The efficiency of harvest is greatly reduced because of access limitations and in some circumstance renders hunting unsuccessful. One of the more serious problems occurring on private lands is management of elk hunters. There is a wide range of tolerance or intolerance by landowners for elk, hunters, or both. Archery hunting to reduce elk populations is viewed as an inefficient method of control. Some landowners expressed concern that these hunts should not be viewed as recreational opportunity, but rather as a population control necessity.

One of the biggest problems is that not all private landowners are in agreement as to the need to control elk and/or possibly designating the Rattlesnake Hills and the south slope of the Rattlesnake Mountain as an elk-free zone. A few elk are often tolerated, even welcomed and protected. Increasing numbers of elk in proximity to agriculture or urban developments generally result in damage to private property and the predicted outcome is increasing levels of intolerance.

Elk hunting opportunities have developed with the arrival of elk on private property. Initially this was viewed as a positive event. As the WDFW relaxed regulations to encourage removal of elk an interesting culture has developed. There are landowners that view elk hunters as worse than the elk. Still, other landowners have vigorously guarded hunting opportunities for themselves and their closest friends. As long as the ALE remains closed to hunting and large acreage of private lands are closed or limited to a few select individuals, the effectiveness of recreational hunting to control overall elk populations in the area will be compromised.

Local political leaders including the Benton County Commission and State Legislatures have expressed concern for the rapidly increasing elk herd in the area. Their expectation is that some elk reduction measures be implemented as soon as possible to avoid any further elk damage conflicts with the local residents and their property. The County Commission has held public hearings on the issue and have requested action by the responsible parties.

GETTING TO THE SOLUTION

Washington Department of Fish and Wildlife is responsible for the protection and management of resident wildlife including elk. Wildlife damage issues are also the responsibility of WDFW. Damages of private property caused by elk are subject to damage claims submitted by injured parties. Hunting is a preferred management tool used by WDFW to control wildlife populations. WDFW is directed to maximize public recreational opportunities without impairing the supply of wildlife (RCW 77.12.010).

DOE and USFWS also bear some responsibility for damage caused by elk from the ALE on private lands outside of their jurisdiction. Where elk population growth has been allowed to go unchecked, the liability from damage caused by elk also grows.

HANFORD ELK MANAGEMENT GOALS AND OBJECTIVES ON THE ALE

Elk populations residing on the ALE and surrounding areas have had both positive and negative impacts to people and property. Since multiple jurisdictions are involved, it is imperative that an environment of coordination and cooperation exist. Elk are native to the Columbia Basin, but they were not present for many years prior to 1972. Emigrating elk from adjacent areas have now established a thrifty and productive herd on the ALE and adjacent areas primarily because they have been fully protected from hunting and natural predators are essentially absent.

Elk populations of the area must be managed at realistic goal levels. Otherwise, damage and nuisance problems will arise and escalate over time. Maintaining elk on the ALE will require management actions to control growth of populations. The densities of animals on the ALE are now at such a level that most local residents of the area agree that the elk population should be reduced. There are some people who disagree with the establishment of a minimum goal level of 300-350 elk to be maintained on the ALE. Others disagree that such a goal level is either too low or too high and still others have expressed the view that the area should be declared an elk-free zone and managed accordingly.

POPULATION CONTROL TECHNIQUES (Tactical Options)

Wildlife management techniques used to control population levels are varied in their utility, social acceptance, and success.

**Lethal removal**

Lethal removal is an option that requires few personnel to administer. It is a technique that requires detailed planning to insure humaneness and social acceptance. Lethal removal can be accomplished by use of trained sharpshooters or by lethal injection of drugs using a dart delivery system.

Shooting with trained sharpshooters - WDF&W and/or U.S. Government (USFWS or APHIS-Animal Damage Control) personnel could harvest the elk. We estimate that a team of four could harvest and process five elk per day. Agency hunters would concentrate efforts after the 23 days of elk season to maximize harvest outside of ALE.

Overall cost of this option could be reduced by hiring people to care for the meat. The estimate of $250/day/man is based on using enforcement personnel. The estimated cost of removing 475 animals would be $95,000.

Using four "shooters" with a large number of "processors" would decrease the cost. Using a helicopter to remove dead elk out of the field to a processing area may reduce processing time but increase cost.

An important benefit would be the salvage of the carcasses for the needy and for Native American use or sale to help defray cost of the removal program. This method of control has a serious social stigma that may prevent its application even though a majority express approval.

Lethal Injection (darting)- This is probably the least desirable method of removal because of high cost of drugs and helicopter rental. This method has the same social stigma as killing by shooting, and there would be no salvage of edible parts. Use of drugs presents additional hazards to involved personnel.

Hunting - Hunting by licensed hunters is an option that provides recreational opportunity as a primary benefit. Hunting can be managed to maintain populations and provide opportunities for hunting including all citizens' hunts, special permit hunts, Advanced Hunter Education (AHE) hunts or other special hunting seasons established by Fish and Wildlife Commission authority. As co-managers of the wildlife resources tribal hunting may also be utilized as an elk population management tool/opportunity.

Using hunting as a tool to reduce current elk populations on the ALE and surrounding area would require gaining hunter access onto private lands and the ALE. Hunting on the ALE would require sanctioning by USFWS and obtaining legal authorization. An elk hunting season on the ALE would need regulatory approval by the Fish and Wildlife Commission regardless of land ownership. There would be no lack of hunters volunteering to participate in a hunting program on the ALE based on the very high demand for recreational elk hunting in Washington.

Allocating the Hanford elk resource to various user groups under current policy will be challenging to WDFW since the primary impetus and objective for the immediate management need of this resource is not to provide recreational opportunity but to control the growth of the elk population and lessen the adverse impacts of elk in the area as soon as possible. Hunting safety issues are also of concern since hunting would be held in proximity to human developments. After the initial push to reduce elk populations is completed, administration of a hunt would be much easier.

One approach might be to have WDFW staff act as "guides" for 5-10 hunters per day (Bernatowictz, 1999). The number of "hunts" would be determined by elk movements. Hunting would be concentrated during the current seasons, with an objective of moving elk back onto private lands with hunter access agreements. However, hunting could continue through January if neighboring landowners were agreeable. Attempts would be made to harvest elk on private lands if they move off ALE. Small herds south and west of I-82 would also be targeted.

Improving access would increase the harvest, but it is doubtful adequate access could be obtained to remove 500+ elk as identified in the elk population objective option 1. Assuming we are successful in increasing the harvest on adjacent private lands by 50% (75 animals), 475 would need to be harvested on ALE. Assuming an average of 8 hunters per day and a 50% success rate, 119 controlled access hunts would be required. Approximately 30 hunts per year would be required to meet the elk population objectives on option 2 or 3.

We estimate 100 person days would be needed per year to harvest 150-200 elk. The cost per officer/biologist is $250/day. Total cost of option 2 or 3 is ~$75,000 - $100,000 (Bernatowicz 1999). All estimates are median numbers. Success rates in controlled hunts have been as high as 80%. However, it is difficult to control the movement of elk or the skill level of selected hunters. Success rates may also drop as the season progresses.

Hunting alone is currently not a preferred option in reducing herd size. The success of large scale guided control hunts is questionable and is currently not allowed within ALE. The elk may move into undesirable areas and/or create more damage. WDFW also does not currently have the staff or organizational infrastructure to administer a large-scale controlled guided hunt as described and the public may find it objectionable.

Hunting used as a management tool to maintain control of elk numbers on the ALE could be accommodated and easily administered once the population is reduced to or near objective levels. Limited entry hunting would be a logical way to control the number of hunters and the number and sex of animals removed through harvest. A liberal general hunting season, longer than currently allowed, on lands adjacent to the ALE would provide significant harvest annually as long as private landowners cooperate. However, hunting alone will not provide immediate relief as long as the ALE remains closed.

**Live removal**

Permanent corral drive trapping - Live capture removal includes a variety of techniques that can be very effective under certain conditions. Drive trapping is perhaps the least expensive method of capture over the long term. Animals are herded via a helicopter, and guided by wing fences toward a corral. The gate to the corral is closed when animals enter within the confines of the pen. Animals that escape while being driven between the wing fences or the corral pen may become “trap shy” and be very difficult, or impossible, to drive into a trap again. The advantage of this method of trapping is the relative low cost of constructing a trap. However, one of the biggest disadvantages is the permanent location of the trap. Large numbers of animals may be captured in a single attempt, although multiple attempts in a single day aren’t likely. Helicopter rates were estimated at $475/hr. Bulls would be darted and antlers removed once in the corral.

There are two options in corral trapping - a permanent trap or portable trap. Relative costs of the two options are estimated as follows:

| | Permanent Corral | Portable Corral |
|---|---|---|
| 1) Helicopter contract - | $15,000 | $15,000 |
| 2) Materials for corral (50 panels) and wing fence - | $ 7,000 | $25,000 |
| 3) Drugs for darting bulls - | $10,000 | $10,000 |
| 4) Technical staff including veterinarian- | $ 9,000 | $10,000 |
| 5) Contract Labor * - | $ 5,000 - $25,000 | $ 3,000 - $15,000 |
| 6) Transport to new area - | $10,500 | $10,500 |
| 7) Disease testing for instate transplant | $ 9,500 | $ 9,500 |
| Total | $66,000 - $86,000 | $83,000 - $95,000 |

*Low figure using Washington Conservation Corp (WCC), high figure using state engineering.

Estimating the efficiency of this method is difficult. Elk location, group size, cooperation and pilot skill will determine the success of the operation. All costs are probably high. Labor costs could be further reduced with Americorps or other volunteers.

There are significant advantages to the use of a portable corral trap. Counting on a single trap location can be risky, especially when animals become trap shy and the element of surprise is lost. An added advantage is that the trap can be moved to a new location and animals will not have to be herded extreme distances to remove specific segments of a population. The cost of manufacturing a portable corral trap is higher than constructing a permanent trap, but the utility of a portable trap and its use in other locations when needs and conditions change offset any cost differential. Corral trapping is safest for people and animals.

Corral trapping on the ALE will require archeological clearance. Sites where historical artifacts are present require more effort and expense for site clearance.

Helicopter net gunning - Net gunning operations provide a great amount of flexibility in capture operations. This technique is the most expensive but requires no trap site clearance and far fewer support personnel to handle animals. Capture locations could be changed daily with little on the ground preparation. With two helicopters working at the same time, it would be possible to capture approximately 50-70 animals in a single day, but not consecutive days. Carl Meyer (1999 personal communications) of Hawkins and Powers Aviation stated, *"Experience has taught us that the pressure placed on a resident elk herd by the presence of the helicopter will in very short order drive that herd out of a given area, regardless of their normal reluctance to leave. We feel that the proposal to net gun all 500 animals may be an optimistic number as the elk will probably leave the immediate area following the capture of the first hundred or so animals."* Given this fact, net gunning operations should be conducted in a spaced out schedule over several weeks or months.

Estimates of cost for net gunning operations ($300-$350/elk) from two reputable companies that have considerable experience in net gunning elk capture operations suggest a combination of corral drive trapping and net gunning for remaining animals. A net gun operation could occur after the hunting

season, using a professional wildlife capture crew. A conservative cost of $325 per elk was estimated using the aerial net gunning technique. Trucking to release locations (assuming volunteers are not available) is estimated by using a rate of $1.90 per mile and 25 elk per truck. Personnel cost calculated assumes a minimum of four people per day for 12 days.

Net gunning would have the least impact to the soil and vegetation within ALE, but has higher risk to personnel and animals. The operation is very mobile but the most expensive.

## DISPOSITION OF ANIMALS REMOVED

Animals that may die will be salvaged and carcasses provided to charitable organizations or Indian Tribes. Nonedible parts could also be salvaged and provided to native Americans. Non- salvageable animals will be disposed of on-site.

Live animals will be used for augmentation within Washington for which site clearance has been approved in advance. Transplant sites within the state will receive first priority. Several potential sites and special requests for augmentation have been identified initially as follows:

(1) Blue Mountains - GMU 175 (Lick Creek) in Garfield and Asotin counties
(2) Pend Oreille - GMU 113 (Selkirk) and GMU 117 (49 Degrees North) in Pend Oreille County.
(3) Nooksack - GMU 418 (Nooksack) in Whatcom County.
(4) Green River Watershed - GMU 485 (Green River) in King County.

Several questions about the advisability of moving elk from eastern Washington to western Washington have been voiced. GMUs 418, 478, and 485 are in historical Roosevelt elk range, however, these sites have previously received Rocky Mountain elk and are currently considered genetically mixed. The State of Washington received a total of 412 elk (Appendix E) from Yellowstone National Park from 1912 - 1930, Thomas et al. (1982). No DNA analysis has been done on the existing populations in the potential augmentation sites or on the Hanford site.

Several states are actively engaged in an elk transplant or augmentation planning and clearance process. Kentucky is currently actively releasing elk and dependent upon outside sources (Roy Grimes, 1999 personal communications). They have a very ambitious program to restore a free ranging, huntable, population of elk in southeastern Kentucky. They are interested in receiving elk from Washington. The Washington Department of Fish and Wildlife Director has the authority to transfer animals out of state as authorized by RCW 77.12.140.

## RELEASE CRITERIA

- A release site plan must be written and approved by the Wildlife Program and formal clearance has been received from Land Management Agencies and private landowners of the affected area.
- A release site plan will address specific actions to handle damage problems should they arise.

- ! There is sufficient biological justification for release of elk into the proposed site.
- ! The proposal meets the tests of good science to achieve the goals and objectives of the release site plan.
  - (1) Disease free certification
  - (2) Genetic compatibility
- ! The release is cost effective.

Highest priority based on the criteria at this point are the Blue Mountains and Pend Oreille release sites.

RELEASE SITE PLANS

**1. BLUE MOUNTAINS ELK AUGMENTATION SITE PLAN - GMU-175 LICK CREEK**

A. Background and Justification

The proposed release of Hanford elk into the Blue Mountains would occur in GMU-175 Lick Creek. The elk population management objective for this unit is 1000 elk. The current (spring 1999) population in GMU-175 is 680 elk, which is 320 below the management objective. A transfer of approximately 200 elk from Hanford would increase this population's potential to reach the management objective quickly.

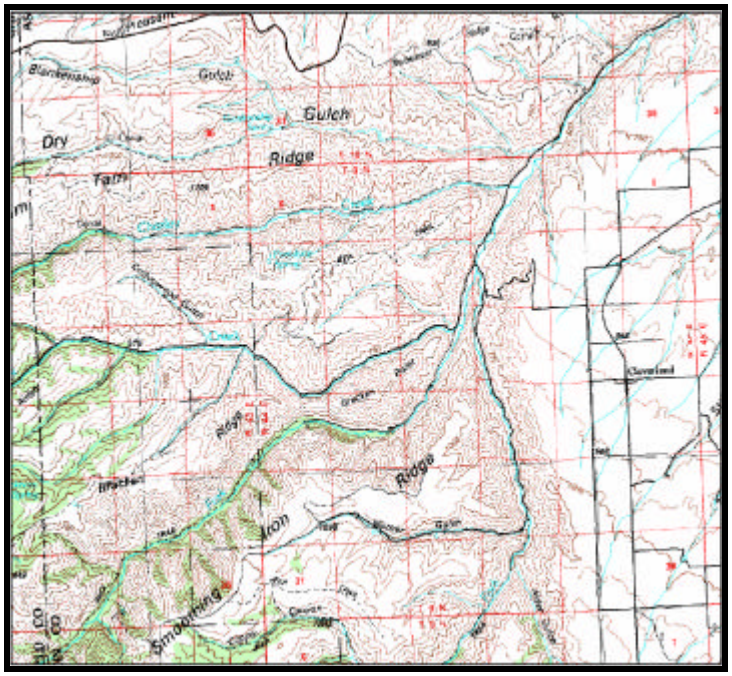


**Figure 3 Lick Creek site on the Asotin Wildlife Area**

B. Site Description

1) The proposed release site is on WDFW property in the Lick Creek drainage. The area known as the Asotin Wildlife Area (Figure 3), is adjacent to the Umatilla National Forest. Access should not be a problem. No alternate site is necessary.
2) The Lick Creek unit (GMU-175) is bordered on the north by the elk drift fence. However, the fence ends at the east section line of T9N, R43E, Sec. 2, which does not prevent elk from occasionally moving around the fence onto agricultural land in GMU-178 Peola. Also, any significant movement of released elk to the east (5 air miles) would put them on private agricultural lands. Two major landowners are adjacent to the Asotin Wildlife Area. Their level of support for the release will be assessed.
3) The Forest Service has been contacted regarding the proposed release, and did not express concern with the WDFW proposed release site.

4) The proposed elk release site, GMU-175 Lick Creek, is located within the ceded area of the Nez Perce tribe. The Nez Perce possess hunting rights, guaranteed by treaty, on open and unclaimed lands east of the Tucannon River in southeast Washington. Elk are an extremely significant cultural and spiritual resource for the Nez Perce, and tribal member desire to see the Lick Creek population continue to exist as a viable herd. WDFW is committed to working with the tribe to cooperatively manage the Lick Creek herd. The tribe has expressed support for the augmentation of elk in this site pending radiological clearance of Hanford elk. WDFW and the Tribe have also begun discussions which will lead to cooperative monitoring, population assessment and management of the LickCreek herd.

C. Biological Considerations

1) A minimum of 100 to a maximum of 200 elk is proposed for release in GMU-175. Preferred composition of elk released would consist of at least 80% females and 20% males. Preferred age of females would be from 1-8 years of age, and males less than five years of age.
2) No genetic concerns have been expressed with releasing Hanford elk into GMU-175 Lick Creek.
3) Elk will be transported in cattle trucks or large stock trailers. Winter accessability is not a major concern.
4) The WDFW will contact the following stakeholders to obtain their support and comments on the proposal:
   a) Adjacent landowners
   b) The Pomeroy Ranger District, USFS.
   c) Nez Perce Tribe: (already involved).
5) The capture and release of cows\calves and yearling bulls could occur from February thru March. Adult bulls should be captured after antler drop in late March and early April, to facilitate handling during capture.
6) The Nez Perce tribe has expressed concern about potential stress-related complications resulting from the capture and transport operations. WDFW will work to minimuze stress to animals related to capture.

D. Monitoring of Released Animals

1) Marking can be done with large, plastic, color coded ear tags. If animals are radio collared, a sample of 10-20 should be collared. All released elk should be marked with ear tags.
2) Radio collared elk will be monitored twice monthly for approximately 12 months using volunteer(s). Sightings of ear tagged elk will be recorded by department personnel when observed in the field or by the public.

   a) Radio collared elk will be monitored from the air by fixed-wing aircraft and on a limited basis from ground surveys. Monitoring at this site is important to address risk of elk depredations to agricultural crops. It is estimated that monitoring will require approximately 3 hours of flight time per survey and a minimum of 13 aerial flights. Radio telemetry equipment and other monitoring tools will need to be purchased. Overall monitoring cost for the Blue Mountains is estimated to be about $17,000.

E. Issue Analysis

The financial expenditure to capture and release 100-200 Hanford elk into GMU-175 will be cost effective. The value of elk to the state and local economy was estimated to be as high as $1,945 per harvested elk in the Blue Mountains (Myers 1999). The 1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation reported that trip and equipment expenditures for big game hunting in 1996 averaged $860 per hunter (U.S. Dept. of Interior, et al. 1996). There were 5,501 elk hunters reported hunting the Blue Mountains of Washington in 1998. Using the $860 average expenditure per hunter from the National Survey, Blue Mountain elk hunters added $4,730,860 to the local and state economy in 1996. Releasing 100-200 Hanford elk into the Lick Creek elk population will increase the herd's potential to reach management objective, increase recreational opportunity and increase financial returns to the local economy.

The social and political realities of the proposal present some challenges. An augmentation of elk on the Asotin Wildlife Area could potentially be a major concern to local agricultural producers. There is a long history of damage related problems with elk. The elk proof fence has helped to address this problem but does not completely prevent elk from occasionally moving onto private land. Agricultural damage complaints could increase if transplanted elk move around the fence or to agricultural land five miles to the east. Personal contacts with large landowners adjacent to the proposed release site will be made. Any agricultural damage complaints resulting from transplanted animals will be addressed consistent with established response protocol and procedures. Control methods include: herding, hazing, landowner preference permits, hot spot hunts and monetary payment for assessed damage.

For an elk augmentation program to be successful, all hunting may require close monitoring and short term hunting closures to take full advantage of increased productivity, and vigor from released animals. Tribal and all citizens hunting and harvest of elk in the release site should be coordinated and managed cooperatively by agreement. Hunting closures or other restrictive recreational harvest strategies must be agreed upon and implemented cooperatively if necessary to ensure success of the augmentation. Some local residents may oppose the release of elk if Tribal hunting is unregulated.

**2. PEND OREILLE COUNTY ELK AUGMENTATION SITES PLAN - GMUs 113 and 117**

A. Background and Justification

While elk are widely distributed through most of Pend Oreille County, many people feel the area can support greater numbers. There is support for increasing the elk population to improve hunter and watchable wildlife opportunities, and in turn tourism. The WDFW Draft Selkirk Elk Herd Plan also states an objective of increasing the population in the Pend Oreille Population Management Unit (PMU) which includes all of Pend Oreille County.

The augmentation of elk to the south-central portion of Pend Oreille County is suggested because there has been a dramatic increase in the amount of early successional forest stands due to the diversity of landowners and the intensity of forest management activities. Elk are present in small scattered groups throughout this area. There is speculation that elk are unable to break through or beyond the environmental resistance factors limiting population growth. An augmentation of 20-50 animals into a

drainage may surge the population beyond some threshold of the current population dynamics, allow survival to exceed mortality, and give us the desired population growth.

B. Site Description

1) Specific release sites: On the east side of the Pend Oreille River in GMU 113 the target area is the East Branch LeClerc Creek, Mill Creek, and Cee Cee Ah Peak. The best logistical site for release is the WDFW LeClerc Creek Wildlife Area land on the West Branch LeClerc Creek County Road, T35,R44,S6 (Figure 4) . If access is available (snow, mud) we would prefer to release off the Mill Creek Forest Road 1200 (USFS, Newport Ranger District) or a nearby road into rock pits owned by Stimson Lumber Company near Loop Creek, T35,R44,S33 or T34,R44,S4.

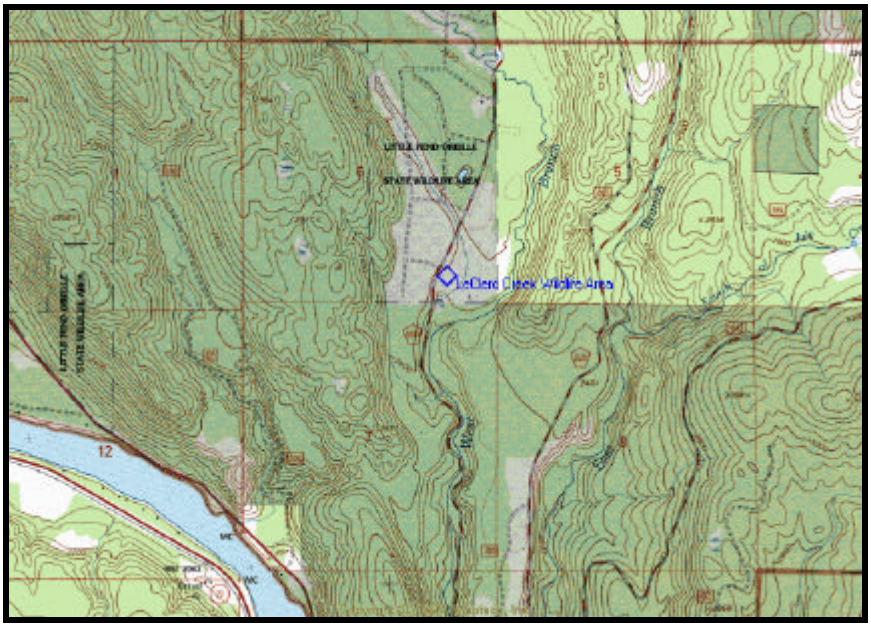


**Figure 4 LeClerc Creek release site**

On the west side of the Pend Oreille River in GMU 117 the target area is the Calispell Creek watershed. The best logistical site is off the Flowery Trail County Road or rock pit site at Gletty Creek, (USFS and Stimson) T32,R42,S12 (Figure 5). An additional or alternate site is the BartlettMiddle Fork Calispell Road (USFS), T32,R43,S21.

Another site near Indian Creek T32, R45, S17 in GMU 113 holds promise. This site has received considerable RMEF funded habitat project improvements and road closures.

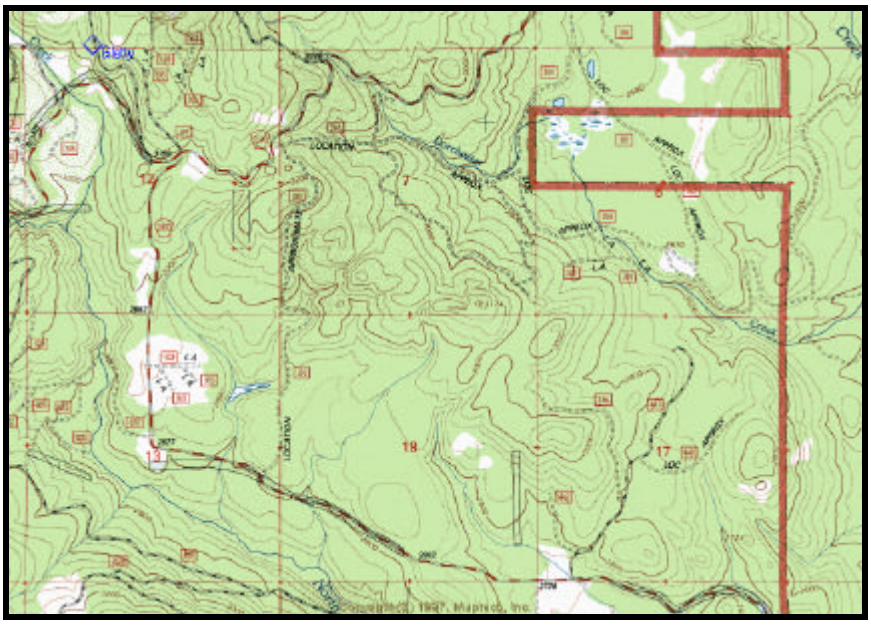

**Figure 5 Calispell Creek Watershed, Gletty Creek site**

There have been at least 11 elk habitat improvement projects funded through RMEF and carried out by primarily USFS, but also include WDFW, Kalispel Tribe, and Pend Oreille County Sportsmen's Club in the general areas described for elk release. RMEF has funded at least $50,740 worth of projects and these were matched with $52,520 from cooperators. Completed projects (Power Winchester Habitat Improvement, Dry Canyon Burn, Cee Cee Ah Habitat Improvement, Pend Oreille East Habitat Improvement, LeClerc Creek Habitat Enhancement, July Creek Burn, South Dry Canyon Burn) fall right into the proposed release locations. These projects date from 1989 to 1998.

2) Potential dispersal: Often relocated animals disperse over many miles and we expect some of these elk to do that too. Generally though we expect the released elk will associate with the fragmented groups of elk in the watersheds targeted above and utilize much the same habitats. Some individuals will likely strike out for longer movements but will not be unlike the elk that currently emigrate from the area regularly now.

3) Land ownership: The Colville National Forest, Newport and Sullivan Lake Ranger Districts have been contacted and generally support the effort to increase elk. There are concerns that these particular elk may move to open farm fields more readily than the current local elk and could pose a problem to local hay and cattle ranchers. The USFS livestock grazing permitee was contacted and is supportive of the elk release. The release sites proposed here are acceptable but there may be other sites recommended to keep numbers down at any one site or to encourage elk dispersal into other areas.

Stimson Lumber Company was contacted and recognizes the local interest in elk viewing and hunting and their role as a major forest landowner in the county in providing elk habitats. They

generally support the release of elk, but have some concerns for damage by elk to young conifer plantations and how the WDFW might address a problem if it occurs. They will be supportive in terms of the logistics of roads or parking for release sites.

The Department of Natural Resources has not had any history of problems with elk and does not expect any related to a release on their lands.

Several hay and cattle ranchers near Calispell Lake were contacted by a representative of the local sportsmen's club because they currently have a few elk coming into their fields each spring. They do not oppose a release in the Calispell watershed.

The wildlife biologist with the Kalispel Tribe (KT) was supportive of the proposal and generally agreed to the proposed release sites.

The Pend Oreille County Commissioners have sent letters of support and encouragement for the augmentation proposal.

While many sportsmen indicate a desire to have larger numbers released there was a common thread to the agencies, KT, and Stimson Lumber Company comments. All recognized that elk exist throughout the area now and they hope new animals do well. There is the lingering question of why the current animals are not doing better if we expect these new animals to flourish. Everyone recognizes the risk of these animals becoming a damage problem. One common recommendation is that WDFW not release more than 50 elk at a single site. There is a consensus that an elk augmentation is something many people in the county want and these major land managers support those wishes.

4) Coordination and cooperation: The primary sportsmen's organizations and agencies involved in this augmentation proposal are:

    Pend Oreille County Sportsmen's Club
    Inland Northwest Wildlife Council
    Rocky Mountain Elk Foundation
    Stimson Lumber Company
    Washington Department of Natural Resources
    Washington Department of Fish and Wildlife
    Colville National Forest
    Kalispell Tribe of Indians
    Pend Oreille County Commissioners
    Pend Oreille County Road Department

News releases and media will be coordinated through Madonna Luers, WDFW, Spokane. The local newspaper is the Newport Minor.

5) Site Clearance: Depending on the snow or mud (county restrictions) we may need to

coordinate with the Pend Oreille County Road Department. Landowners have indicated that they would agree to working out arrangements to release elk at the proposed sites if logistically feasible.

6) Potential Conflicts and Resolutions: There is a potential for elk causing damage to farms or forest plantations. WDFW needs to make it clear to those interested in increased elk numbers that elk must be managed within biological and social constraints. Where damage becomes a problem, WDFW will use the tools available, e.g., hot spot cow hunts, to alleviate these problems. Landowners prefer small releases of elk; the use of smaller transport vehicles; and multiple release sites. Road restriction or access difficulties due to snow or soft roads could present problems. Smaller vehicles and lighter loads are advisable. Soliciting volunteers to plow out access roads to release sites may be needed.

C. Biological Considerations

1) Number and composition of elk: The current plan is to release 100 elk in Pend Oreille County with approximately 50 going to each side of the river. It would be preferred if more than one site on each side of the river can be used so that the release at each site can be held to 30 or less, to alleviate landowner concerns. The age and composition of the released animals are not an issue as they will mix with resident elk.

2) Genetics: Elk in the Selkirk Herd are Rocky Mountain Elk (*Cervus elaphus nelsoni).* Elk were translocated from the Yakima Herd to Pend Oreille County in 1969 and 1970 and are considered the source of the present population. Hanford elk are probably genetically similar to Selkirk elk. Genetics is not considered to be a factor.

3) Transport: There have been offers from sportsmen's organizations to organize volunteers with stock trailers or trucks. Region 1 of WDFW has one 6-horse stock trailer that could transport about 10 elk.

4) Contingencies: Should there be a need to euthanise an injured animal at the release sites, the animal would be processed by volunteer sportsmen and donated to a local food bank. In the event any drugs, not compatible for human consumption, were administered to animals then those must be disposed of properly.
Damage problems caused by elk in central Pend Oreille County have not been a significant concern to date. Agriculture is primarily limited to cattle and grass hay production rather than seed crops or alfalfa. Some elk do frequent farm fields during spring green-up and likely cause damage to fences but formal complaints have not occurred. The Hanford elk will likely mix in with the resident elk and some may be associated with those that show up in agricultural fields but like the resident elk, we expect they will pull back to the forest cover as spring approaches. Formal damage complaints by the released elk will be handled as any depredation complaint and whatever tools are available will be employed to resolve the problem. Sportsmen have suggested they would volunteer to assist with efforts to haze elk or fix fence to help make this augmentation a success. This augmentation is certainly an experiment that has some potential to

cause damage and if serious chronic depredation problems result, they will be addressed with increased harvest strategies over time.

5) Timing of capture and release: The animals would likely adjust best to a release as the snow is melting and the new forage growth is beginning, near the first of April. While we may see use of some private fields at this time there should also be snow-free access to the forested lands and early successional browse areas available for elk use. Primary state and county road restrictions should be off by that time. Soft forest roads will still likely be a problem so that is why the release sites have been planned for low elevations and primary roads. Releases in December or January would be possible where roads are plowed (or agreements could be made to get them plowed) because they are frozen and firm at that time. The severity of the particular winter would be the primary factor in consideration for the animal's welfare. In a relatively mild winter this should work well but if the winter is severe the elk may not have an opportunity to locate the appropriate cover and forage necessary for survival.

D. Monitoring of Released Animals

1) Marking: All the released animals will be ear tagged. At least 1 in 10 will be fitted with a radio telemetry collar. At this point the recommendation is to collar only females so that the most information possible can be gathered (calving, group movements, lower mortality than bulls).

2) Monitoring: Volunteers with the Pend Oreille Sportsmen's Club, Inland Northwest Wildlife Council (INC), and Rocky Mountain Elk Foundation (Newport Chapter) will be provided with equipment and training to do radio telemetry tracking and monitor movements or mortality. Local wildlife biologists will provide training, assistance, and compile and summarize the data provided.

The INC will provide aerial telemetry tracking of the same elk as they become a problem for the ground crews to locate due to wide distribution or difficulty in determining direction of a signal. We expect about four flights in the first four months and another four flights during the following winter.

Tracking animals in the first month or two will provide initial movements and survival. As we near June we will learn valuable information on areas used for calving. During the following winter we expect the collared elk to intermix with the resident elk and provide valuable data for mapping elk winter range. Elk have never been studied in northeast Washington and very little is actually known about their movements or winter use areas. This study will help provide the needed data to target areas for habitat improvement projects such as burns, road closures, and seeding. The public and agency forest workers will be asked to report locations of tagged animals to supplement the data gathered from the radio marked individuals.

This project is proposed to utilize volunteers to aerially monitor radio collard elk and also ground survey marked elk to determine movements and habitat selection. This cooperative project is estimated to cost about $7,000 for one year.

E. Issue Analysis

Elk are currently widely distributed in Pend Oreille County. An augmentation of approximately 100 elk in the area could have some positive benefits by establishing additional herds and increasing distribution and density of elk throughout the area where currently vacant and underutilized habitats exist.

The local citizens of the area are very supportive of this proposal. They recognize the potential for providing additional hunting and wildlife observation opportunities in the region. The expenditures of funds to achieve this plan is viewed as cost effective and good for the local economy in the long term. The Pend Oreille County Commission has written a letter of support for this project. Natural Resource agencies, Timber Companies, and Tribes have expressed support. Agricultural producers contacted have endorsed the augmentation of elk into the area.

There is some concern for released elk causing damage to local agriculture.

ANIMAL HEALTH AND PROCESSING OF CAPTURED ANIMALS

Disease Testing:
Elk health certification will be achieved by sampling approximately 25 animals and testing them for Brucellosis, Leptospirosis, Anaplasmosis, Johne's, Blue tongue, and other diseases and parasites as needful. WDFW will conduct these disease tests prior to full scale trap initiation. If animals are approved for shipment out of state, the receiving state will encumber costs of health testing and quarantine prior to shipment. Disease testing may require holding animals for up to 72 hours while tests are completed.

The cost of pretesting for disease prior to releasing animals within the state is estimated to cost about $9,500. A project to fund this amount has been proposed to the Rocky Mountain Elk Foundation for $4,750 matched with $4,750 from the Inland Northwest Wildlife Council. The largest expense for disease testing will be capturing animals for sampling.

Radiological Testing:
There is some concern that elk from the ALE have been exposed to radiation from Department of Energy activities on the Hanford Reservation. Although frequent monitoring of vegetation, air, water on and adjacent to the Hanford reservation has been ongoing there are continued concerns that elk are contaminated. Past testing of deer and other animals, on and near the site, have tested well below radiological threshold concerns.

The PNNL research and monitoring team will continue to sample and test elk from the ALE. Hunter harvested animals adjacent to the Hanford site will be sampled during the 1999 hunting season and an

additional five animals will be collected from the ALE to test for radiation contamination. Results of past testing and current samples tested will be made available to the public. PNNL personnel have offered to hold a public meeting to answer questions concerning safety in handling and consuming elk from the Hanford Reservation and vicinity.

All captured elk will be ear-tagged for future identification. A sample of approximately 10% of the animals will be radio collared for follow-up monitoring on releases made within the state. There will be some unavoidable stress to elk and increased risk of injury to animals as tagging, collaring and blood collection is conducted.

It is anticipated that transportation costs will be offset by local conservation organizations. Volunteers who offer their equipment and time to provide transportation of elk will be welcomed.

## ELK DAMAGE CONTROL

A damage contingency plan will help to facilitate acting on any elk damage problems resulting from ALE released animals. The following elements must be implemented:

- An immediate response by WDFW personnel, cooperators and agricultural community is necessary to insure success in relieving a problem or potential problem. When landowners and others observe released elk on agricultural lands it must be reported to the Wildlife or Enforcement programs without delay. Released elk damage reports and sightings on agricultural crops will be serviced as a priority.
- Herding elk out of agricultural lands using a helicopter can be an effective way of avoiding more serious problems in the future. This technique is especially helpful when used to move wandering elk back behind the elk proof fence in the Blue Mountains.
- Formal damage complaints caused by released elk will be handled expeditiously and with whatever tools are available.
- If serious and chronic depredation problems result, then the problems will be addressed with kill permits, hot spot hunts, landowner damage hunts, and other harvest strategies as appropriate.
- Contingency funding to address damage must be available to insure quick response by WDFW. This is especially true in terms of herding elk out of agricultural fields. Helicopter rental fees may be the most cost effective method of controlling damage in some cases.
- The elk proof fence in the Lick Creek area of the Blue Mountains must be maintained. Extension of this fence to increase its effectiveness is a high priority.

## COST ANALYSIS

In review of the various techniques identified for the removal of surplus elk from the ALE, the most cost effective is hunting. This comes as no surprise since little out of the ordinary effort is required to accommodate this option for WDFW. The USFWS on the other hand must complete an

Environmental Assessment of this option which is currently in process. Removal of elk from the ALE using various live trapping techniques will require an investment of more than $100,000 (Table 3). Trapping cost are subject to the number of animals harvested through the general hunting seasons and other uncontrolled factors.

**Table 3 Cost Comparison of Removing 400 Elk From the ALE Population**

| ACTIVITY | PERMANENT TRAP | PORTABLE TRAP | NET GUNNING | SHARP SHOOTING | SPORT HUNTING |
|---|---|---|---|---|---|
| Materials, equipment, contract services | $31,000 | $50,000 | $130,000 | $40,000 | zero |
| Transportation ($1.90/mile) | $10,500 | $10,500 | $10,500 | zero | zero |
| Disease testing | $9,500 | $9,500 | $9,500 | zero | zero |
| Released elk monitoring (3 sites) | $39,500 | $39,500 | $39,500 | zero | zero |
| Technical Staff Support | $9,000 | $9,000 | $12,000 | $40,000 | $9,000 |
| Contract Labor (WCC or Americorp) | $12,000 | $7,500 | zero | zero | zero |
| TOTAL | $111,500 | $126,000 | $201,500 | $80,000 | $9,000 |
| Cost per elk | $278.75 | $315.00 | $503.75 | $200.00 | $22.50 |

TIMETABLE

Trapping period:

There is some urgency in implementing recommended actions of this plan. As the elk population grows, the potential for significant elk damage problems can be expected. The timing of elk removal has several driving issues as follows:

(1) Sufficient lead time to implement a plan of action will be required considering the monumental task of coordination and organization. It is estimated that at the earliest elk trapping operations begin in February 2000.

(2) Handling of bull elk with antlers presents a safety hazard to people as well as other animals. The antler drop is anticipated to begin by March 1, consequently elk trapping and transporting could be delayed until then.

(3) Elk trapping is not advised from April 1 through August 31 in consideration of young calves and bulls with growing antlers.

(4) Animal condition is a significant issue, especially if elk are to be moved long distances. Normally, animal condition deteriorates rapidly as the winter progresses and probably reaches its lowest point in March-April. Adult cows would be in their third trimester of pregnancy in

March with a potential for mortality of fetuses as well as adults. Local experts indicate that elk on the Hanford site are robust and body condition doesn't deteriorate significantly. The area is mostly snow free during the winter and forage is readily available.

(5) Access to desirable elk release sites may be problematical during the winter months. March-April coincides with the time period when road conditions may be at their worst in terms of thawing and road stability. An earlier time period raises the issue of too much snow to allow access by large trucks or truck and trailer hauling elk.

(6) The 1999 hunting seasons in GMU 372 (Kiona) are set for October 5-13 for antlerless, October 30-November 7 for any elk, and December 9-13 for antlerless. Trapping could be conducted on the ALE where hunting is not currently allowed. Elk trapping could impact the hunting seasons in GMU 372.

(7) Elk trapping may need to be conducted in several time periods using a variety of techniques. If this is the case, an earlier trapping schedule would be advisable. If animals are to be transported extreme distances and require quarantine for disease testing before release an early trapping period would be advisable.

(8) An antlerless only capture could be initiated in December or January to avoid some of the road access problems at release sites and stress on pregnant cows.

Contingencies:

(1) Elk removal from the Hanford area is contingent upon sufficient funds to pay for the operation and available personnel.

(2) The reliance on volunteers will require advanced planning and follow-up.

(3) Trapping is viewed as a management tool to address an immediate need to remove elk. The preferred method of controlling elk populations on the ALE is an annual hunting program that removes annual surplus animals to maintain a desired population level.

(4) If the population goal of 300-350 animals on the ALE continues to be problematic a reassessment of the goal must be made.

(5) Hunting is assumed to be an acceptable program that will be authorized and implemented on the ALE in the year 2000 and thereafter so long as elk are maintained on the area.

PREFERRED AND ALTERNATIVE ACTIONS

**Preferred Action:** (Hunting and trapping option)

The preferred action uses a combination of recreational hunting and trapping to reduce the ALE elk population over a period of years rather than a single year. This action proposes to remove a total of 200 elk (Feb.-March, 2000) from the ALE by using a combination of the general hunting seasons and corral trapping. The proposal extends the program of herd reduction over a three year period and makes it more manageable in terms of budget, personnel, and disposition of animals.

The preferred action will implement the following management actions:

- **!** Establish an elk population goal of 300 - 350 for the Hanford elk population on the ALE.
- **!** Establish GMU 372 (Kiona) as an "elk-free zone" and maintain a liberal elk hunting season to remove elk from the area.
- **!** Remove/harvest 50 bulls/year from 2000-2002 and 150 cows in 2000 followed by 100 cows

annually in 2001-2002 (Table 2). This could be accomplished by a combination of hunting and live trapping to meet each year's removal target. Implement the reduction program with the 1999 hunting season and follow-up with trapping immediately thereafter. This would require 150 cows and 50 bulls removed between October 1,1999 through March 15, 2000. The 1998 harvest data indicates 82 animals removed through hunting of which 59 were bulls and 23 cows/calves. Some of these elk were harvested south of Highway I82 and elsewhere and no longer part of the ALE herd. It is hard to predict the harvest coming from the ALE, but for planning purposes it is estimated that 40 bulls and 130 cows will need to be live trapped during the period January 1, 2000 through March 15, 2000.

In the year 2000, implement a hunting season on the ALE with a target to remove approximately 30 bulls and 20 cows/calves. In addition live trap and remove 100 elk (80 cows and 20 bulls) for transplant for three years (2000-2002). The proportion of animals to be harvested by hunters versus those live trapped and transplanted are negotiable.

- The preferred trapping technique is herding into a corral using a portable corral trap and holding facility. Herding is to be accomplished by helicopter. Use helicopter net gunning as an alternate technique to "cleanup" after the herding and corral trapping technique becomes inefficient or ineffective.
- The first priority use of captured elk is to meet in state needs for augmentation on sites that have been cleared and approved.
- Offer other state or provincial wildlife agencies elk for transplant pending availability.
- Coordinate and cooperate with federal, state, county and local governments, Indian tribes, private landowners, Rocky Mountain Elk Foundation, and sportsmen in the development and implementation of this plan.

Justification:

This alternative reduces the number of animals to be removed over a period of years rather than all in one year. This will soften the effort and expense and spread it out more than three years. A hunting program would be implemented on the ALE in the Fall of 2000. Some animals will still need to be trapped for transplanting. However, the smaller numbers of animals trapped reduces the total effort significantly.

**Alternative Actions Considered:**

**Alternative A:** (Trapping and transplant option)

This alternative action proposes to reduce the elk population in one year. Following the Fall 1999 elk hunting seasons the elk reduction program will continue using the corral trapping technique to remove an additional 350 - 400± elk. Helicopter net gunning is proposed as a contingency technique in the event the efficiency of the corral technique fails. This action requires making a decision on disposal of a significant number of animals that is targeted for capture. Out of state disposal of elk is recommended. Alternative A will implement the following management actions:

- Establish a realistic elk population goal (estimated at 300-350 for the Hanford elk population on the ALE).
- Establish GMU 372 (Kiona) as an "elk-free zone" and maintain a liberal elk hunting season to remove elk from the area.

- Remove 550± elk through hunting and by implementing an elk trapping program on the Hanford elk population starting in mid-December 1999 and concluding mid-March 2000. Remove 200 bulls, 250 cows and 100 calves.
- The preferred trapping technique is herding into a corral using a portable corral trap and holding facility. Herding is to be accomplished by helicopter. Use helicopter net gunning as an alternate technique to "cleanup" after the herding and corral trapping technique becomes inefficient or ineffective.
- Implement a hunting program on the ALE to control elk populations at goal level.
- The first priority is to meet in state needs for elk augmentation on sites that have been cleared and approved for augmentation.
- Offer other state or provincial wildlife agencies elk for transplant pending availability.
- Coordinate and cooperate with federal, state, county and local governments, Indian tribes, private landowners, Rocky Mountain Elk Foundation, and sportsmen in the development and implementation of this plan.

Justification:
The elk population on the Hanford area is growing at a rapid rate and could reach 1,000 animals by the year 2000. Increasingly, elk are emigrating to adjacent habitats and creating damage and nuisance problems on private lands. It is imperative that the population is reduced immediately to a manageable level. Hunting on the ALE is not now a viable alternative to address the problem. There are some justified uses for animals to augment existing populations in Washington and possibly other out of state requests. The preferred alternative would address the concerns of the landowners of the area and possibly bring immediate relief from current sustained damage to private property and agricultural crops.

**Alternative B:** Hunting Option
The alternative relies totally on expanding hunting opportunities as a means of reducing the elk population. It also anticipates the implementation of a hunting program on the ALE. The key to the success of this alternative is greatly expanding effective hunting opportunity. This will require close cooperation from landowners in providing hunting access. The season is proposed to be from September through January or longer if necessary. A Kill Quota could be established so that harvest would not exceed a preset maximum. Modern firearms would be the legal equipment for this program. Any Elk Tag would be valid and Any Elk could be legally taken.
The hunting option will implement the following management actions.

- Establish a realistic elk population goal (estimated at 300-350 for the Hanford elk population on the ALE).
- Establish GMU 372 (Kiona) as an "elk-free zone" and maintain a liberal elk hunting season to remove elk from the area. Hunting seasons established within a September - February time period with an Any Elk legal animal description and Any Tag valid with the use of modern firearms only.
- Implement a kill quota harvest strategy.
- Implement a hunting program in the ALE that would achieve the population management goals.
- Provide a tribal hunting season on the ALE.

- Implement a consistent elk hunting program on the Yakima Training Center to maintain an "elk free" population management objective on the YTC. Closely manage elk that are causing damage adjacent to northwest corner of YTC in the Badger Pocket area and account for movement of Hanford elk into the YTC.

  Justification:
  The most efficient and cost effective method of controlling a rapidly growing elk population on the ALE and YTC is through a science based harvest strategy using a combination of general hunting seasons, special permit seasons and other unique adaptive management prescriptions. The costs associated with implementing this option is directly related to technical staff support to administer the harvest program, monitor populations and harvest.
  The relatively recent phenomenon of significant elk movements into the YTC from the ALE has been recognized. In addition, a rapidly growing elk population competing with mule deer and causing agriculture damage near Badger Pocket area is being addressed through an elk hunting program administered cooperatively by YTC and WDFW.

**Alternative C:** No action option
The no action alternative is essentially status-quo.

This alternative suggests no change from the status quo. Hunting would continue to occur adjacent to the ALE in GMU 372 (Kiona). Hunting on the ALE would remain closed. Elk immigration out of the ALE would result in establishment of populations throughout the Kiona Unit. Elk damage problems would increase in numbers and severity. Damage payment claims are likely. Increased conflict would occur between landowners and sportsmen, federal and state agencies and the community.

Justification:
There is little or no justification for this option. Local residents and political leaders would oppose maintaining the status quo in light of the observed trends and growing problems. Elk need to be managed responsibly.

PUBLIC PROCESS

Public hearings have already been held to review the problems and discuss potential solutions. There is a level of expectation that the USFWS, WDFW, tribes, and DOE will coordinate and cooperate to implement a sound, responsible plan to address the problems of too many elk. The public will have a 30 day comment period and public meetings will be held in the Hanford Area as well as the vicinity of each of the proposed release site plans. At this point the release site plan meetings would be in Newport for the Pend Oreille release and Clarkston for the Asotin Wildlife Area release.

PLAN APPROVAL AND IMPLEMENTATION

This plan is a guidance document for WDFW. Upon review and signing by the Director of WDFW it will be used as such.

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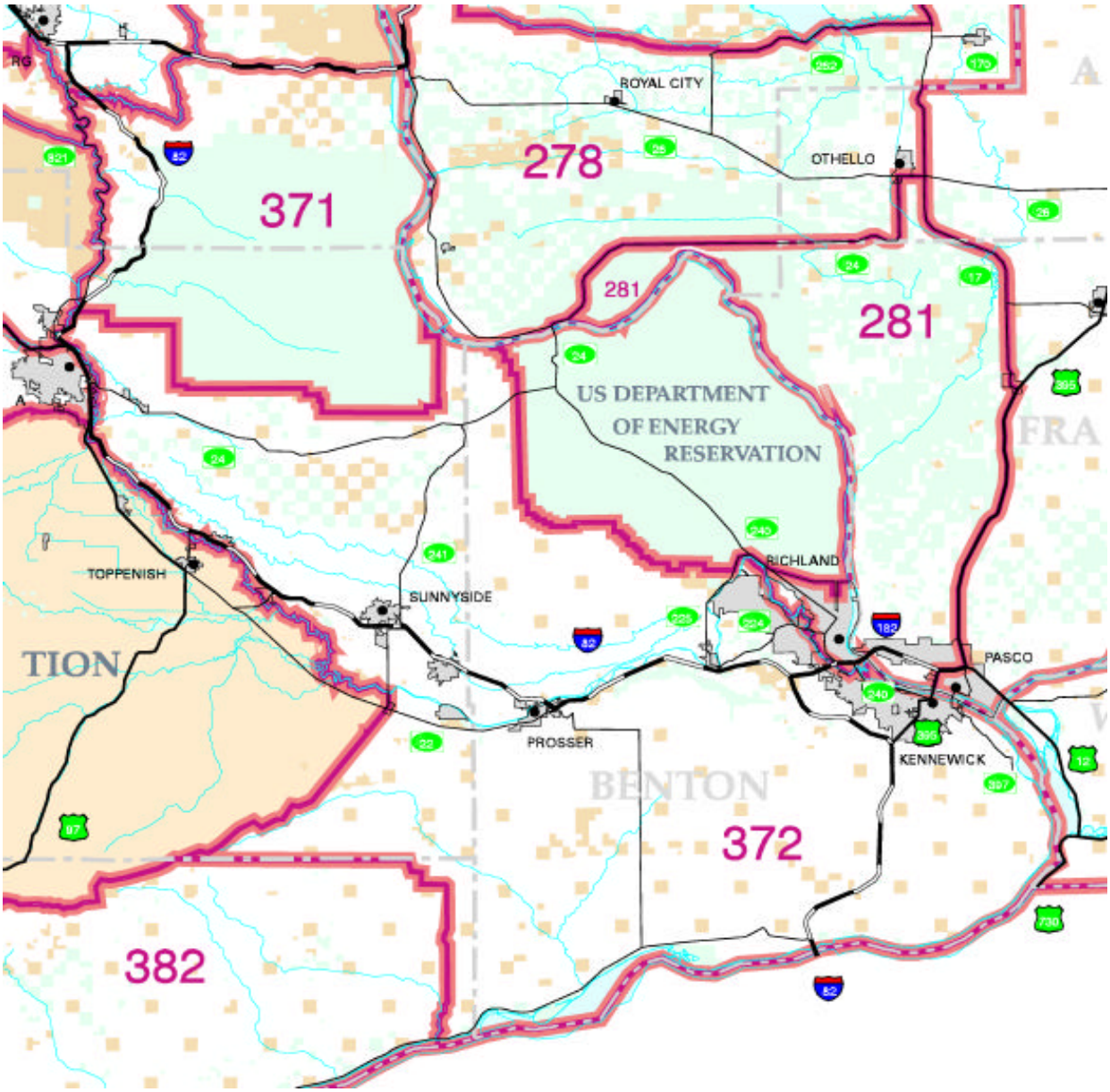
**APPENDIX A**

**LOCATION MAP OF THE HANFORD ELK POPULATION**

**(ALE located west of Highway 24 and 240 in the Hanford Reservation)**



## APPENDIX B
## ELK HUNTING SEASONS IN GMU 372 KIONA, WEST AND SOUTH OF HANFORD

| YEAR | GMU | DATES | LEGAL ANIMAL | TAG TYPE |
|---|---|---|---|---|
| 1999 | 371 Alkali | 10/30 - 11/07<br>09/01 - 14 | Any Elk<br>spike or antlerless | modern firearm<br>archery |
| | 372 Kiona<br><br><br><br>South of Yakima River | 10/05 - 13<br>10/30 - 11/07<br>12/09 - 13<br>09/01 - 14<br>10/30 - 11/15 | Antlerless<br>Any Elk<br>Antlerless<br>Any Elk<br>Any Elk | modern firearm<br>modern firearm<br>modern firearm<br>archery<br>any elk tag by weapon type |
| 1998 | 371 Alkali | 10/05 - 13 | Antlerless | modern firearm |
| | 372 Kiona | 10/31 - 11/08<br>12/09 - 13<br>09/01 - 14 | Any Elk<br>Antlerless<br>Any Elk | modern firearm<br>modern firearm<br>archery |
| 1997 | 371 Alkali | 10/25 - 11/02<br>10/27 - 11/02 | spike only<br>spike only | modern firearm<br>modern firearm |
| | 372 Kiona | 10/27 - 11/02<br>10/25 - 11/02<br>10/27 - 11/02<br>09/01 - 14<br>11/01 - 15 | spike only/ any bull<br>spike only/any bull<br>Any Elk<br>Any Elk | modern firearm<br>modern firearm (unsuccessful permit applicant)<br>archery<br>any elk tag |
| 1996 | 371 Alkali | 11/05 - 15 | Male/Visible antler or<br>Spike Bull | modern firearm |
| | 372 Kiona | 11/08 - 15<br>09/01 - 14<br>11/05 - 15 | spike only or any elk<br>Either Sex | modern firearm (unsuccessful permit applicant)<br>archery<br>CM,YG,YP,YM tag holders by weapon type |
| 1995 | 371 Alkali | 11/05 - 15 | Male/Visible antler | modern firearm |
| | 372 Kiona<br>(former GMU 370 split into 2 units) | 11/08 - 15<br>09/01 - 14<br>11/05 - 15 | Male/Visible antler<br>Either Sex<br>Either Sex | modern firearm (unsuccessful permit applicant)<br>archery<br>CM,YB,YC,YM tag holders by weapon type |
| 1994 | 370 Priests Rapids | 11/05 - 15<br>11/08 - 15<br>09/01 - 14<br>11/05 - 13 | Male/Visible antler<br>Male/Visible antler<br>Either Sex<br>Either Sex | modern firearm<br>modern firearm (unsuccessful permit applicant)<br>archery<br>CM,YE,YL,YM tag holders by weapon type |
| 1993 | 370 Priests Rapids | 11/05 - 13<br>11/08 - 13<br>10/01 - 14<br>11/05 - 13 | Male/Visible antler<br>Male/Visible antler<br>Either Sex<br>Either Sex | modern firearm<br>modern firearm (unsuccessful permit applicant)<br>archery<br>CM,YE,YL,YM tag holders by weapon type |
| 1992 | 370 Priests Rapids | 11/05 - 13<br>11/08 - 13<br>10/01 - 14<br>11/01 - 30 | Male/Visible antler<br>Male/Visible antler<br>Either Sex<br>Either Sex | modern firearm<br>modern firearm (unsuccessful permit applicant)<br>archery<br>CM,YE,YL,YM tag holders by weapon type |
| 1991 | 370 Priests Rapids | 11/05 - 13<br>11/08 - 13<br>09/28 - 10/11<br>11/01 - 30 | Male/Visible antler<br>Male/Visible antler<br>Either Sex<br>Either Sex | modern firearm<br>modern firearm (unsuccessful permit applicant)<br>archery<br>CM,YE,YL,YM tag holders by weapon type |

| | | | | |
|---|---|---|---|---|
| 1990 | 370 Priests Rapids | 11/05 - 13<br>11/08 - 13<br>09/29 - 10/12<br>11/01 - 30 | Male/Visible antler<br>Male/Visible antler<br>Either Sex<br>Either Sex | modern firearm<br>modern firearm (unsuccessful permit applicant)<br>archery<br>CM,YE,YL,YM tag holders by weapon type |
| **APPENDIX B (continued)** | | | | |
| **YEAR** | **GMU** | **DATES** | **LEGAL ANIMAL** | **TAG TYPE** |
| 1989 | 370 Priests Rapids | 11/05 - 13<br>11/08 - 13<br>09/30 - 10/13<br>11/01 - 30 | Male/Visible antler<br>Male/Visible antler<br>Either Sex<br>Either Sex | modern firearm<br>modern firearm (unsuccessful permit applicant)<br>archery<br>CM,YE,YL,YM tag holders by weapon type |
| 1988 | 370 Priests Rapids | 11/01 - 12<br>11/04 - 12<br>10/01 - 14<br>11/01 - 30 | Male/Visible antler<br>Male/Visible antler<br>Either Sex<br>Either Sex | modern firearm<br>modern firearm (unsuccessful permit applicant)<br>archery<br>CM,YE,YL,YM tag holders by weapon type |
| 1987 | 370 Priests Rapids | 11/01 - 12<br>11/04 - 12<br>11/01 - 30 | Male/Visible antler<br>Male/Visible antler<br>Either Sex | modern firearm<br>modern firearm (unsuccessful permit applicant)<br>CM,YE,YL,YM tag holders by weapon type |
| 1986 | 348 Squaw (Kittitas)<br>372 Moxee<br>376 Horse Heaven | 11/05 - 16<br>11/08 - 16<br>10/01 - 03<br>10/04 - 10 | Either Sex<br>Either Sex<br>Bull Only<br>Bull Only | modern firearm<br>modern firearm (unsuccessful permit applicant)<br>archery early<br>archery late |
| 1985 | 348,372,376<br><br>348,372 | 11/05 - 09<br>11/09 - 17<br>10/01 - 04<br>10/05 - 11 | Bull Only<br>Either Sex<br>Bull Only<br>Either Sex | modern firearm YE tag<br>modern firearm YE,YL tag<br>archery early<br>archery late |
| 1984 | 348 Squaw<br>372 Moxee | 11/01 - 18<br>11/10 - 18<br>10/01 - 05<br>10/06 - 12 | Bull Only<br>Either Sex<br>Bull Only<br>Either Sex | modern firearm YE tag<br>modern firearm YE,YL tag<br>archery early<br>archery late |
| 1983 | 348 Squaw<br>372 Moxee | 11/06 - 20<br>11/12 - 20<br><br>11/12 - 18 | Bull Only<br>Bull Only<br><br>Either Sex | modern firearm YE tag<br>modern firearm YE,YL tag (unsuccessful permit applicant)<br>modern firearm YE & YL tag |
| 1982 | 348 Squaw<br>372 Moxee<br>376 Horse Heaven<br>GMU 348 and 372 | 11/07 - 21<br>11/13 - 21<br><br>11/13 - 19 | Bull Only<br>Bull Only<br><br>Either Sex | modern firearm X (YE) stamp area<br>modern firearm Y (YL) stamp area (unsuccessful permit applicant)<br>X or Y Stamp area |
| 1981 | 348 Squaw<br>372 Moxee<br>376 Horse Heaven | 11/01 - 15<br>11/07 - 15 | Bull Only<br>Bull Only | modern firearm X tag<br>modern firearm Y tag (unsuccessful permit applicant) |
| 1980 | 348 Squaw<br>372 Moxee<br>376 Horse Heaven | 11/02 - 16<br>11/08 - 16 | Bull Only<br>Bull Only | modern firearm X tag<br>modern firearm Y tag (unsuccessful permit applicant) |

**APPENDIX C**

**ELK HARVEST ADJACENT TO THE HANFORD SITE ACCORDING TO HUNTER QUESTIONNAIRE DATA.**

| YEAR | BULL KILL | COW KILL | TOTAL | % SUCCESS | # HUNTERS | HUNTER DAYS |
|---|---|---|---|---|---|---|
| 1998 | 59 | 23 | 82 | .19 | 429 | 1562 |
| 1997 | 5 | 0 | 5 | .02 | 208 | 973 |
| 1996 | 8 | 8 | 16 | .04 | 374 | 781 |
| 1995 | 23 | 11 | 34 | .08 | 404 | 858 |
| 1994 | 15 | 13 | 28 | .10 | 290 | 919 |
| 1993 | 14 | 5 | 19 | .12 | 154 | 727 |
| 1992 | 5 | 0 | 5 | .03 | 191 | 704 |
| 1991 | 10 | 3 | 13 | .04 | 306 | 1424 |
| 1990 | NO DATA | | | | | |
| 1989 | 16 | 5 | 21 | .05 | 459 | 1126 |
| 1988 | 13 | 43 | 56 | .14 | 389 | 1577 |
| 1987 | 16 | 72 | 88 | .11 | 813 | 2576 |
| 1986 | 20 | 8 | 28 | .12 | 229 | 768 |
| 1985 | 6 | 18 | 24 | .08 | 299 | 799 |
| 1984 | 0 | 3 | 3 | .01 | 251 | 1191 |
| 1983 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1982 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1981 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1980 | 0 | 0 | 0 | 0 | 0 | 0 |

## APPENDIX D

### HANFORD ELK HARVEST REPORT CARD KILL LOCATIONS (1996-1998)

| OBSERVATION | YEAR | GMU | SEX | LOCAL |
|---|---|---|---|---|
| 1 | 96 | 372 | BULL | ? |
| 2 | 96 | 372 | COW | RATTLESNAKE |
| 3 | 96 | 372 | BULL | RATTLESNAKE |
| 4 | 96 | 372 | CALF | RATTLESNAKE |
| 5 | 96 | 372 | BULL | RATTLESNAKE RIDGE |
| 6 | 97 | 371 | COW | ? |
| 7 | 97 | 371 | COW | ? |
| 8 | 97 | 371 | BULL | ? |
| 9 | 97 | 371 | COW | EATON RANCH |
| 10 | 97 | 371 | COW | ? |
| 11 | 97 | 371 | BULL | LMUMA |
| 12 | 97 | 371 | COW | MANASTASH |
| 13 | 97 | 371 | COW | YAKIMA CANYON EATON PROPERTY |
| 14 | 97 | 371 | CALF | YAKIMA TRAINING CENTER |
| 15 | 97 | 371 | BULL | COLUMBIA RIVER RATTLE SNAKE |
| 16 | 97 | 371 | BULL | RATTLESNAKE RIDGE |
| 17 | 98 | 371 | BULL | ? |
| 18 | 98 | 371 | CALF | ? |
| 19 | 98 | 371 | BULL | ? |
| 20 | 98 | 371 | BULL | ? |
| 21 | 98 | 371 | BULL | ? |
| 22 | 98 | 372 | BULL | ? |
| 23 | 98 | 372 | COW | ? |
| 24 | 98 | 372 | BULL | ? |
| 25 | 98 | 372 | COW | ANDERSON RANCH |
| 26 | 98 | 372 | COW | COLD CREEK |
| 27 | 98 | 372 | BULL | COLD CREEK |
| 28 | 98 | 372 | COW | HORSE HEAVEN |
| 29 | 98 | 372 | BULL | RATTLESNAKE |
| 30 | 98 | 372 | COW | RATTLESNAKE |
| 31 | 98 | 372 | BULL | RATTLESNAKE |
| 32 | 98 | 372 | COW | RATTLESNAKE HILLS |
| 33 | 98 | 372 | BULL | RATTLESNAKE HILLS |
| 34 | 98 | 372 | COW | RATTLESNAKE |
| 35 | 98 | 372 | BULL | ROBERTS RANCH |
| 36 | 98 | 372 | COW | ROBERT RANCH |
| 37 | 98 | 372 | COW | ROBERT RANCH |
| 38 | 98 | 372 | BULL | SILVER DOLLAR |

## Appendix E

**Number of live elk trapped and shipped to Washington State from Yellowstone National Park**

| YEAR | STATE | TOTAL | RELEASE LOCATION |
|---|---|---|---|
| 1912 | Washington | 186 | Snohimish Co (60)<br>Skagit Co. (46)<br>King Co. (80) |
| 1913 | Washington | 121 | Yakima Co. (50)<br>City of Spokane (6)<br>Walla Walla Co. (25)<br>Garfield Co. (40) |
| 1914 | Washington | 25 | Stevens Co. (25) |
| 1916 | Washington | 50 | Kittitas Co. (50) |
| 1930 | Washington | 30 | Columbia Co. (50)<br>Izaak Walton League - Dayton |
| TOTAL | | 412 | 9 Releases excluding City of Spokane. |