

Washington State Elk Herd Plan

NORTH CASCADE (NOOKSACK) ELK HERD

Washington Department of Fish and Wildlife
Wildlife Program
600 Capitol Way North
Olympia, WA 98501-1091

Prepared by

Michael A. Davison, District Wildlife Biologist

March 2002

Director, Washington Department of Fish and Wildlife

Date

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ACKNOWLEDGMENTS

The North Cascade (Nooksack) elk herd planning process was a team effort. I would like to thank Washington Department of Fish and Wildlife personnel Lou Bender, Deer and Elk Biologist, Rolf Johnson, Deer and Elk Section Manager, and George Tsukamoto, Staff Biologist for their review and contributions to the plan. I would like to recognize the efforts of Lora Leschner, Regional Wildlife Program Manager, and Dave Ware, Game Division Manager for their leadership and editorial review.

We are indebted to the Point Elliot Treaty Tribes for their willingness to cooperate and contribute to the development of this plan. I would like to especially thank Chris Madsen, Wildlife Biologist for the Northwest Indian Fisheries Commission, who worked diligently to coordinate and make necessary arrangements for our plan meetings. The following individuals made valuable contributions throughout the planning process:

Harlan James - Natural Resources Policy Representative for the Lummi Nation
Dennis Anderson Sr. - Muckleshoot Hunting Committee Chairman
Frank Jerry Sr. - Muckleshoot Hunting Committee Vice Chairman
Melissa Calvert - Muckleshoot Wildlife & Cultural Resources Coordinator
David Vales - Senior Wildlife biologist for the Muckleshoot Tribe
Ken Johnny - Nooksack Hunting Commission
Jason Joseph - Chairman of the Sauk-Suiattle Tribe
Ernie DeCoteau - Public Safety Director, Sauk-Suiattle Tribe
Scott Schuyler - Natural Resources Policy Representative for the Upper Skagit Tribe
Jeff Tatro - Chairman of the Hunting Committee for the Stillaguamish Tribe.
Jen Sevigny - ESA Biologist, Stillaguamish Tribe
Merl Hayes - Fisheries Policy Coordinator, Suquamish Tribe
Todd Wilbur - Swinomish Fish and Wildlife Commission

NORTH CASCADE (NOOKSACK) ELK HERD PLAN

EXECUTIVE SUMMARY

The North Cascade elk herd is the smallest of ten herds residing in the state. It is a small herd and the northern most herd in western Washington. Nevertheless, it is an important resource that provides significant recreational, aesthetic, and economic benefit to Washington citizens and a valued cultural, subsistence, and ceremonial resource to the Native American people of the area.

This is a reintroduced herd resulting from successful augmentations in 1946 and 1948 of eastern and western Washington elk. The estimated peak population of 1,700 elk occurred in 1984. Since then, the population has sharply declined to a current estimate of about 300 elk.

The core population in the Nooksack game management unit occupies about 1,230 square kilometers (492 square miles). About 125 other elk live in the agricultural lands along the Skagit River; the remaining elk live in the higher elevation, forested lands north of the Skagit River.

Analysis of population and trend data shows good potential for this herd. Survey data, although limited in sample size, shows good calf production. Despite these favorable conditions, the herd has remained static and at low levels. Unaccounted mortality, despite hunting season closures, may be a significant factor preventing population growth.

Habitat changes caused by increased timber harvest should have been favorable for elk population growth. However, increased human access and visibility may have resulted in the unaccounted mortality that is suppressing this elk population. While elk damage and use on agriculture lands is also an issue, it is recognized that private lands along the Skagit River are important areas for elk and that habitat must be preserved and protected.

This plan's purpose is to provide direction for the management of the North Cascade elk resource into the future. This is a five-year plan subject to amendment. Before the fifth year, this plan should be updated, reevaluated, amended and implemented for another five-year period. It will be a valuable reference document and guideline for the Washington Department of Fish and Wildlife, tribes, agency cooperators, landowners and the public. Priority management activities can be carried out as funding and resources become available.

Three primary goals guide the North Cascade Elk Herd Plan: (1) to manage this herd for a sustained yield; (2) to manage elk for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing and photography; and (3) to manage and enhance elk and their habitats to ensure healthy, productive populations.

Specific elk herd and habitat management objectives, problems and strategies are identified in the plan. Priority objectives address specific problems in managing this elk herd and a variety of strategies have been developed to solve problems. The following objectives have been identified:

- Manage the North Cascade elk herd using the best available science.

- Increase elk population numbers to about 1,450 animals in the Nooksack unit and 200 in the Sauk unit and approximately 1,950 for the entire herd area.
- Promote expansion of this herd into potential range south of the Skagit River, in the Sauk unit.
- Reestablish tribal and non-tribal hunting seasons.
- Increase public awareness of the elk resource and promote viewing and photographic opportunities.
- Manage hunted elk units for post-season bull ratios consistent with the statewide plan (currently greater than or equal to 12 bulls per 100 cows) in combination with overall bull mortality rates of less than or equal to 50 percent.
- Minimize elk damage on private property.
- Encourage the forest service, state, and private timberlands to maintain current elk habitat capability.
- Preserve and enhance critical elk use areas.
- Develop diverse public/private partnerships to improve habitat and the management of elk.

Spending priorities have also been identified for the first five years. Achieving spending levels will be contingent upon available funds and the creation of partnerships. The recommended prioritized expenditures for the North Cascade elk herd are as follows:

<u>Priority Expenditures</u>	<u>1st Year</u>	<u>5 Years</u>
Establish reliable population estimates jointly with tribes.	\$7,500.00	\$7,500.00
Herd composition surveys (jointly with tribes)	\$12,000.00	\$60,000.00
Improve precision and accuracy of elk harvest data collection.	\$5,000.00	\$25,000.00
Augment elk into GMU 418 (Nooksack) and 437 (Sauk) jointly with the Tribes.	\$48,400.00	\$88,400.00
Maintain and advocate current research activities		
1. Movements and habitat description study	\$30,000.00	\$30,000.00
2. Advocate nutritional ecology study	\$0.00	\$0.00
3. Landscape habitat evaluation	\$5,000.00	\$10,000.00
4. Genetics study	\$5,000.00	\$5,000.00
Preserve critical elk winter range on private lands	\$20,000.00	\$500,000.00
Enhance habitat quality of the primary elk range	\$20,000.00	\$80,000.00
Damage program	\$5,000.00	\$25,000.00
Establish public viewing areas	\$0.00	\$50,000.00
Total	\$157,900.00	\$830,900.00

NORTH CASCADE ELK HERD PLAN

INTRODUCTION

The Plan

The North Cascade (Nooksack) Elk Herd Plan provides the historical background, current condition and trend of this important natural resource. It is essentially an assessment document that identifies management problems, develops solutions to overcome these problems, and sets direction. The plan outlines goals, objectives, problems, and strategies and helps establish priorities to resolve management issues concerning this elk herd. It also provides a readily accessible resource for biological information collected from the herd and identifies the current inadequacies of this scientific information.

This plan is one of ten elk herd plans under the umbrella of the Washington State Management Plan for Elk (Washington Department of Fish and Wildlife 1997) and the Environmental Impact Statement for Elk Management (Washington Department of Fish and Wildlife 1996). It is a five-year planning document subject to annual review and amendment. Once approved, this plan will remain in effect as amended or until canceled. The Washington Department of Fish and Wildlife recognizes the sovereign status of federally recognized treaty tribes and their relationship as co-managers of the elk resource and the right to implement their own hunting regulations. This document also recognizes the responsibility of the Washington Department of Fish and Wildlife and the Point Elliot Treaty Tribes, (Lummi, Nooksack, Muckleshoot, Upper Skagit, Sauk-Suiattle, Stillaguamish, Swinomish, Suquamish and Snohomish “Tulalip Reservation” to cooperate and collaborate. It further recognizes the pivotal role that private landowners and public land management agencies, notably the U.S. Forest Service and Washington Department of Natural Resources, play in assisting to manage and sustain this elk herd.

The Herd

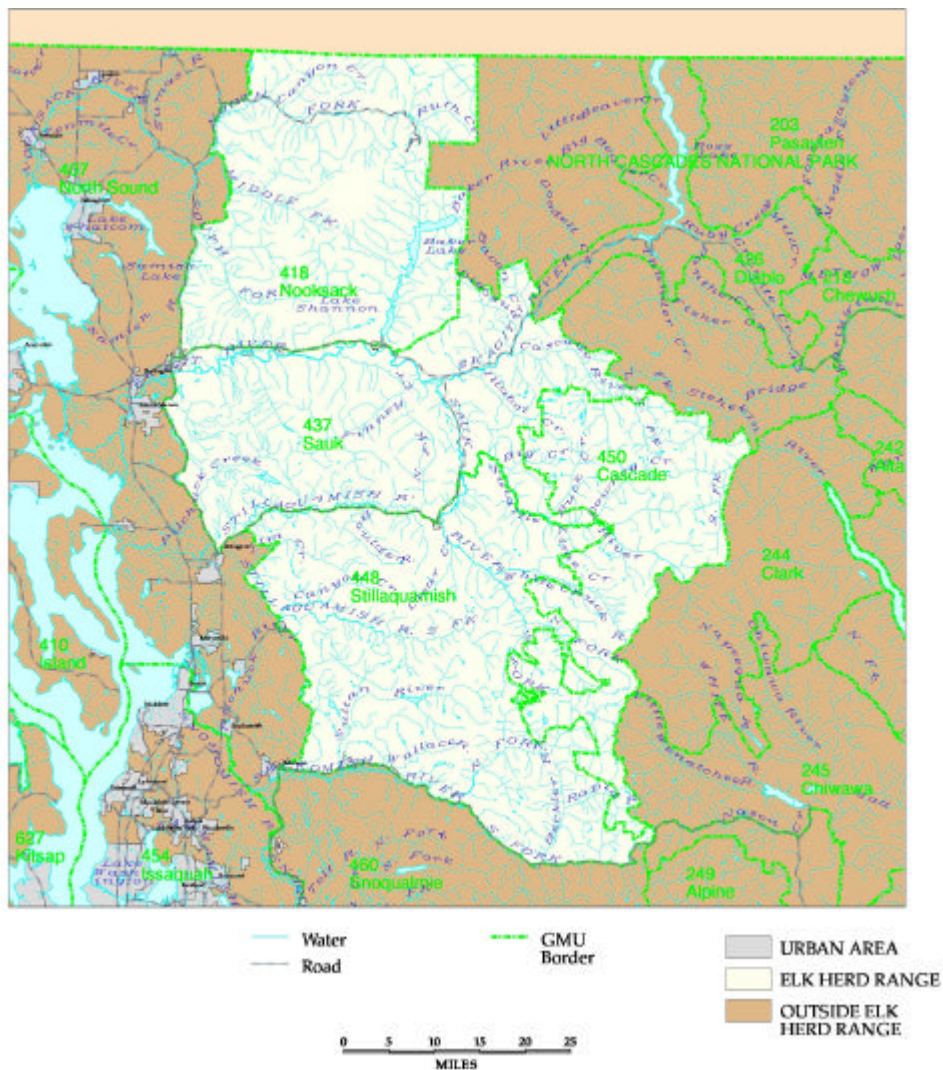
For management and administrative purposes the State has been divided into game management units (GMUs). The North Cascade elk herd is one of ten herds residing in Washington. In this context an elk herd means a population within a recognized boundary as described by a combination of game management units. The North Cascade elk herd includes the following GMUs: Nooksack (GMU 418), Sauk (GMU 437), Stillaguamish (GMU 448) and Cascade (GMU 450). The core herd stays mainly in the Nooksack unit. Other elk from the herd are peripherally distributed in the Sauk, Stillaguamish and Cascade units. These elk groups are small and relatively isolated, living in pockets of remaining useable habitat. A few scattered small groups of elk also live in the North Sound unit (GMU 407) and are not encouraged because of nuisance and damage. Expanding urban development threatens the continued existence of elk in this unit and for this reason is not included in the elk herd planning area as shown in Map 1.

HERD AREA DESCRIPTION

Location

The North Cascade herd area includes part or all of Whatcom, Skagit, Snohomish and King counties. The boundaries correspond approximately on the east with the North Cascade National Park and the Pacific Crest National Scenic Trail; on the south by Highway 2; on the west beginning at Monroe along the Woods Creek-Menzle Lake Road to Granite Falls, the Jordan Road to the power line and Mainline Road and 242nd St NE to Trafton and State Highway 530 to Arlington, State Highway 9 to Acme and the Mosquito Lake Road and State Highway 542 to Maple Falls and the Silver Lake Road to the U. S. border; and on the north by the U.S. border. The core elk area occupies only about 1,230 square kilometers (492 sq. miles) of habitat contained within the Nooksack unit.

Map 1. The North Cascade (Nooksack) Elk Herd Area.



Ownership

Land ownership within the herd area is distributed between private, state, and federal holdings. Private ownership accounts for 530 square kilometers (212 sq. mi) or 43 percent of the total North Cascade elk range. The Washington State Department of Natural Resources owns 420 square kilometers (168 sq. mi) or 34 percent, and the U.S. Forest Service owns 280 square

kilometers (112 sq. mi) or 23 percent. Commercial timber companies manage most of the private land.

Topography

The entire area is within the Northern Cascade physiographic province as described by Franklin and Dyrness (1973). Elevations in the North Cascade elk herd area vary from 61 meters (201 feet) along the State Highway 9 corridor to 3,267 meters (10,781 feet) at the summit of Mount Baker. Most of the herd area consists of low to mid-level mountainous terrain bordered by agricultural lands to the west and south. The steepest and least accessible range includes Mount Baker and peripheral slopes to the northeast.

Vegetation

Coniferous forests cover much of this herd area below timberline. Three major forest zones exist here, arranging themselves along elevational and moisture gradients (Franklin and Dyrness 1973). These zones are named after the climax conifer tree species and are, in order of increasing elevation; the western hemlock (*Tsuga heterophylla*), Pacific silver fir (*Abies amabilis*), and mountain hemlock (*Tsuga mertensiana*) zones.

The Western Hemlock Zone is the most important timber production zone. In the northern Cascades it generally reaches its upper limit at 600 meters (1,980 feet) in elevation. Major tree species are Douglas fir (*Pseudotsuga menziesii*), western hemlock and, on moist sites, western red cedar (*Thuja plicata*). Hardwood species, such as red alder (*Alnus rubra*) and bigleaf maple (*Acer macrophyllum*) occur mainly as pioneers on recently disturbed sites or in streamside habitats. Plant composition beneath these tall trees varies, depending on site moisture and soil class. Therefore, moist sites with better soils tend to be dominated by sword fern (*Polystichum munitum*) and its associates while poorer, dry soils often support the evergreen shrub, salal (*Gaultheria shallon*) and the like. Most elk winter ranges are within the western hemlock zone. Portions of this zone, in the foothills along the western and southern perimeters of the herd range, have been converted to agricultural use.

The Pacific Silver Fir Zone occurs from about 600-1,300 meters (1,980-4,290 feet). Wetter and cooler than the lower western hemlock zone, it has more winter snows and a shorter growing season. Typical plants growing beneath these trees are often herbaceous, such as various huckleberry (*Vaccinium*) and mock azalia (*Menziesia*) shrubs.

The highest forest zone in this herd area is the Mountain Hemlock Zone, characterized by heavy winter snow packs that often persist from six to eight months. This zone generally occurs between 1,300-1,700 meters (4,290-5,610 feet.). It gradually changes in structure from dense forests at its lower limit to open parklands of a distinct sub-alpine character near its upper limit.

Human Influences

The cumulative impacts of human activities within the primary range of the North Cascade elk herd is believed to be a cause of recent declines in this population. Intensive logging, primarily clear-cutting, appears to have compromised this herd's ability to survive on their winter range and reproduce on their summer range due to high road densities and excessive human disturbance.

Urban development and agricultural conversion are common along the western, southwestern and southern peripheries of the North Cascade elk herd area. Residential construction is widespread throughout most lowland areas once considered winter elk range. Agricultural conversion of low elevation forests is occurring at an accelerated rate, particularly along the Highway 9 and Highway 20 corridors. Agricultural activities include small acreage farms emphasizing beef and dairy, row and hay crops, orchards, horse ranching, and alternative livestock.

Human recreational use is particularly high throughout this elk range. Recent timber harvest reductions on U.S. Forest Service lands to the east have significantly shifted their management emphasis toward increased public recreational access in that area. Recreational activities are diverse and include camping, hiking, hunting, fishing, picnicking, bird watching, photography, mountain climbing, horse riding, riding motorcycles and All Terrain Vehicles (ATVs), snowmobiling on winter range, hang gliding and flying ultra-light aircraft, and cross country skiing.

Thomas and Toweill (1982) noted that elk response to human presence or activity is characterized by either high levels of adaptation or else extreme intolerance, depending upon variables in habitat condition, seasons of the year, previous exposure, and the degree of repetitive disturbance. Altmann (1952) and Craighead et al. (1973) both documented a high level of intolerance to human disturbance within hunted elk herds, as opposed to un-hunted populations that become conditioned to human activity more readily. Other researchers have confirmed varying degrees of disturbance response by elk to activities such as camping, fishing and picnicking, and vehicles stopped along roadsides, audible gunshots and sonic booms (Ward et al. 1973 and Ward 1976).

Physiological impacts and how elk use habitats differently when disturbed are discussed at length in the literature and, although differences of opinion occur regarding the degree and predictability of human disturbances, there is general agreement on the following: Suitable habitats (both resting and feeding) may be avoided by deer and elk because of human disturbance (Lyon and Basile 1980); access by elk to important breeding and calving areas may be obstructed by human disturbance (Roberts 1974), (Phillips and Alldredge 2000); and disturbing and harassing deer and elk can increase their metabolic rate and energy use needed for normal growth and reproduction (Geist 1978).

Other Related Species

Black-tailed deer (*Odocoileus hemionus columbianus*) occupy most of the North Cascade elk range. Mountain goats (*Oreamnos americanus*) represent the only other wild ungulate species known to permanently inhabit portions of elk range. Mountain goat populations occur only on U.S. Forest Service lands in the eastern part of the North Cascade elk range. Neither black-tailed deer nor mountain goats are sufficiently numerous or dispersed at this time to negatively affect the growth or management of this herd.

HERD DISTRIBUTION

Historic Distribution

Although generally regarded as a "reintroduced" population, the North Cascade elk herd currently occupies habitats historically used by the native Roosevelt elk (*Cervus elaphus roosevelti*) in

western Washington. Genetically, the North Cascade herd is considered predominantly the Rocky Mountain subspecies (*C. e. nelsoni*). However, it is known that Roosevelt elk were included in early releases. The first attempt at reintroducing elk into Whatcom and Skagit counties occurred in the central Skagit River drainage near Birdsvew on March 12, 1912 (Table 1). Of the animals trapped in Yellowstone National Park, 46 were released in Skagit County.

Table 1. History of Elk Releases in The North Cascade Elk Herd Area

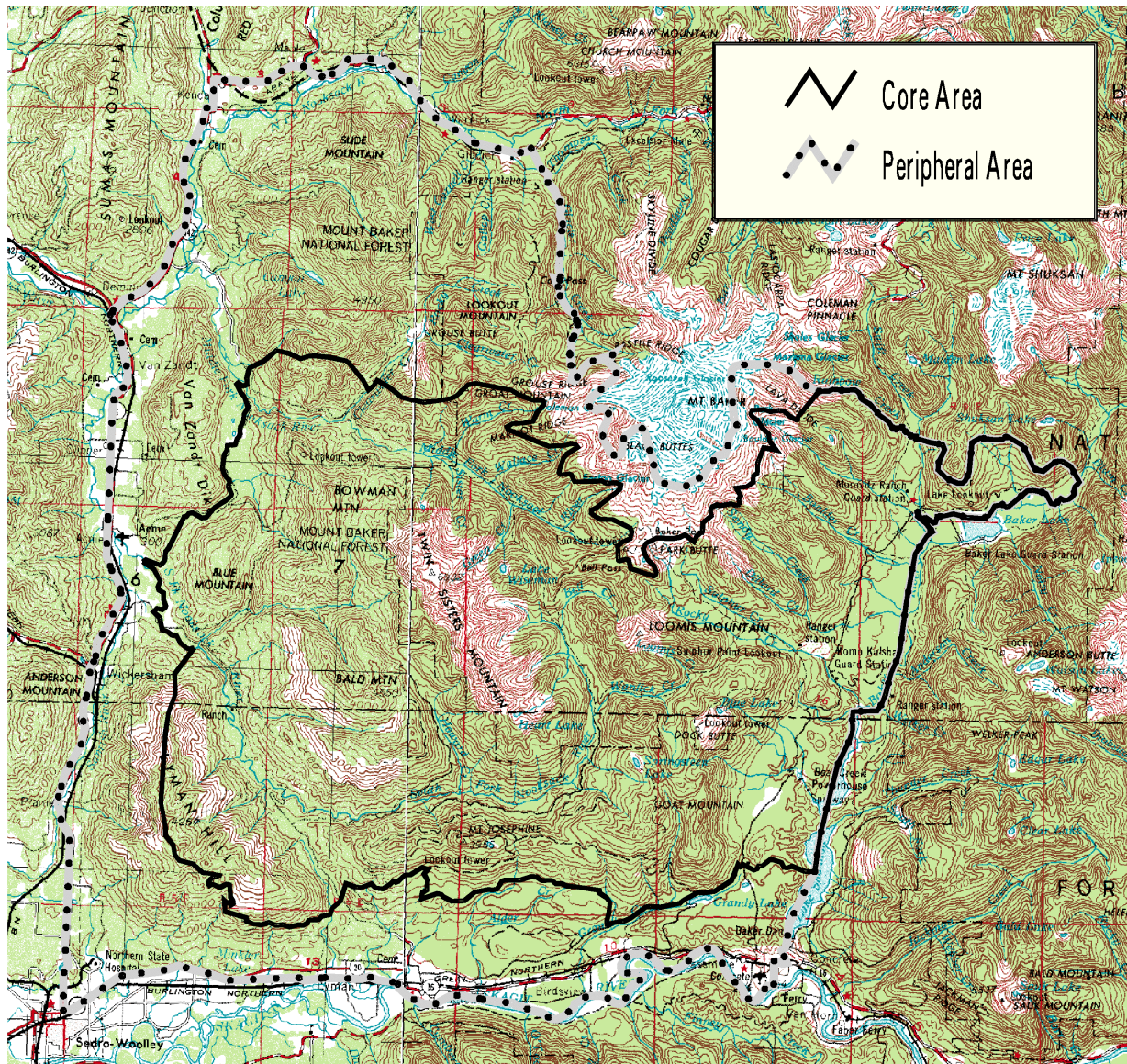
Date	Release site	Elk	Origin	Results	By
1912	Birdsvew, Skagit County	46	Gardiner, Montana (Yellowstone National Park)	Failed after 10 years	Skagit County
1946	S. Fork Nooksack River	15	9 from King County (6 believed to be Roosevelt elk from the Olympic Peninsula) 6 from Yakima County	Successful	Washington Game Dept.
1948	S. Fork Nooksack River	8	Yakima County	Successful	Washington Game Dept.

Following the reported elimination of these animals due to poaching, a second release of 15 elk in 1946 expanded throughout the drainages of the Middle and South forks of the Nooksack River and the north Skagit River. Eight additional elk from the Yakima area were released in the same general area in 1948 (Adkins 1978). These releases into the North Cascade area resulted in the mixing of Roosevelt and Rocky Mountain elk on what is considered historical Roosevelt elk (*C. e. roosevelti*) range. Testing of current elk populations will help decide their genetic makeup.

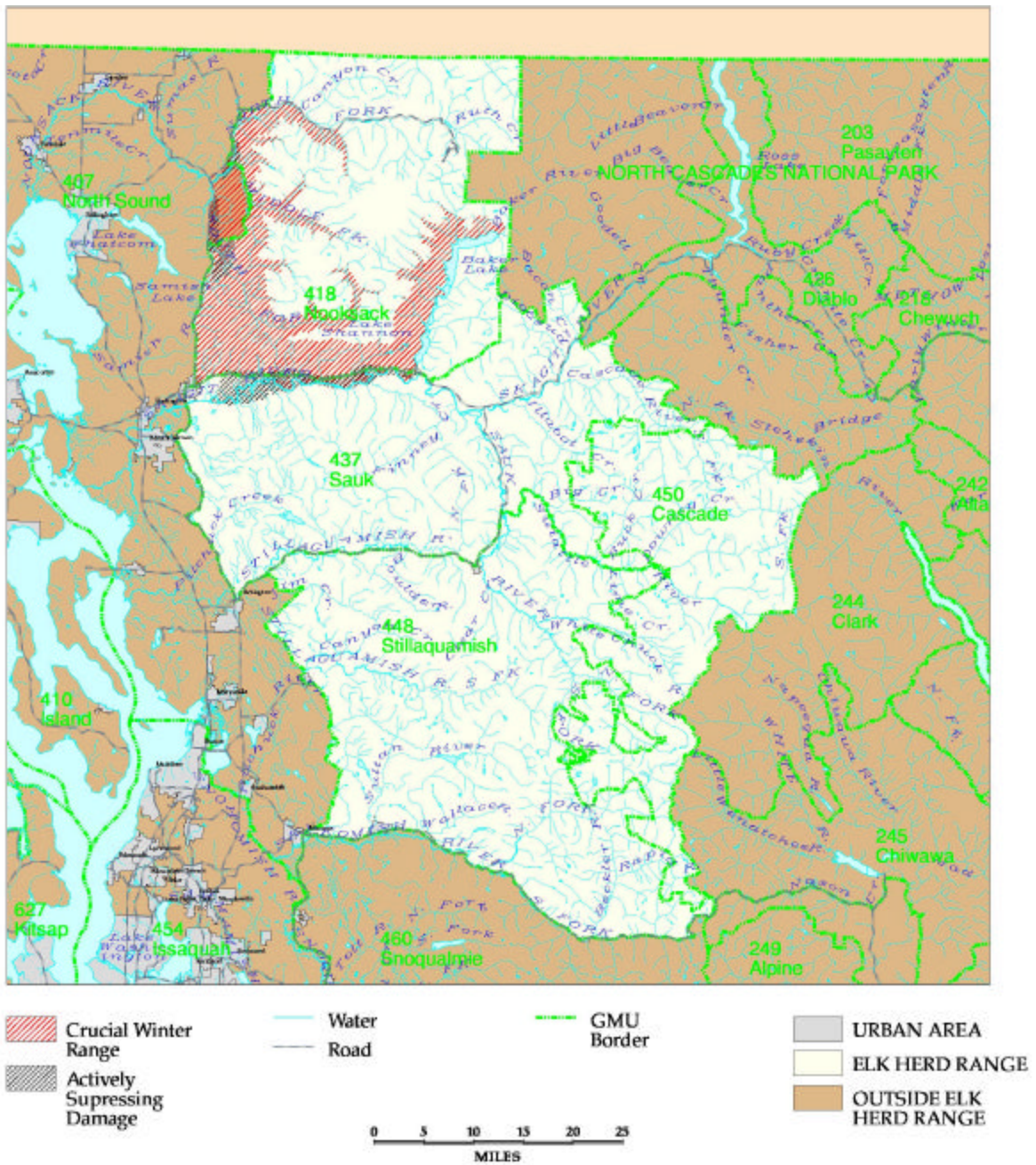
Current Distribution

The majority of this herd occupies the lands above 500 meters (1,640 feet) that drain the middle and south forks of the Nooksack River and the northern tributaries of the Skagit River within the Nooksack unit described as the core herd area (Map 2). At lower elevations elk distribution in this unit is fragmented and less contiguous with smaller satellite populations inhabiting agricultural, residential, and urban areas. It is estimated that about 57 percent of the herd presently live in these lower elevation habitats. The current distribution of elk in the Sauk, Stillaguamish and Cascade units are largely unknown. Recent elk immigration is suspected to have occurred from the Skagit River Valley south into the Sauk unit. These are widely scattered bands and isolated groups of elk that are confirmed by occasional sightings and reported harvest. In the Nooksack unit, crucial winter range occurs below 1,000 meters and includes the lowland valleys where elk sometimes cause agriculture and property damage. When elk damage is persistent these areas have been designated as “actively suppressing damage,” (Map 3).

Map 2. The core area of the North Cascade elk herd.



Map 3. North Cascade elk herd distribution and damage areas



Proposed Distribution

The Washington Department of Fish and Wildlife's first commitment is to fully recover the primary elk range north of Highway 20. Management recommendations also include adding the Sauk unit into the managed range for the North Cascade herd (Map 1). This area has historically been managed for deer instead of elk. Potential expansion and immigration would encourage elk to move into suitable habitats throughout this unit. Elk colonizing is anticipated to occur slowly, but could potentially result in the herd expanding north of Day Lake, into the upper Skagit River basin, and into both the Sauk and Suiattle rivers. The small, isolated populations in the Stillaguamish and Cascade units will be maintained.

HERD MANAGEMENT

History, Status, and Management Activities

The North Cascade elk herd steadily increased in size following successful reintroduction efforts in 1946 to an estimated peak of 1,700 animals in 1984 (M. Davison, Washington Department of Fish and Wildlife, unpublished data). Projected population estimates based on aerial and ground surveys made in 1997 and anecdotal information places the population at about 425 animals for the entire herd area, a 75 percent decrease. Currently, the North Cascade elk herd is considered a declining and fragmented population. A pattern of outward migration from the central range to peripheral agricultural areas, first observed in the late 1980s, has continued.

Estimated Population Size

Only about 300 elk currently live in the Nooksack unit, while the Stillaguamish, Sauk, and Cascade units each harbor less than 50 elk. The minimum sustainable population objective for the North Cascade herd is 1,950 elk (Table 2). The proposed population objective for the Nooksack unit is to recover elk numbers to a minimum of 1,450 animals and in the Sauk and Stillaguamish units to a minimum of 200 animals. The small isolated groups of elk in the Cascade and Stillaguamish units will be maintained within limits of landowner tolerance.

Table 2. Minimum North Cascade elk population estimates and objectives.

Game management unit	1984 population estimate	2000 population estimate	Desired population objective
Cascade	unknown	25	100
Nooksack	1,700	300	1,450
Sauk	unknown	50	200
Stillaguamish	unknown	50	200
Total elk	1,700	425	1,950

Herd Composition

Herd composition data in western Washington is collected primarily in August-September prior to the hunting season, because this is when the most unbiased information can be obtained. Post-season surveys are also conducted in February-March to determine final recruitment and post-season bull ratios. Pre-season (fall) herd composition information was not collected before 1981 in the North Cascade area. Since 1998 the Upper Skagit Tribe has funded fall elk surveys.

Following application of a 3-point antler minimum harvest strategy for bulls in 1984, fall herd composition from 1984 to 1990 averaged 31 bulls and 51 calves per 100 cows (Table 3).

Table 3. North Cascade elk herd aerial Pre-season composition survey data, 1984-2000.

Year	Month	Total classified	Adult bulls	Spike bulls	Total bulls	Cows	Calves	Ratio Bull/cow/calf
1984	August	490	22	59	81	289	120	28/100/41
1985	August	233	22	25	47	116	70	40/100/60
1986	August	296	29	28	57	147	92	39/100/62
1987	July	150	8	10	18	84	42	21/100/57
1988	August	357	24	30	54	195	108	28/100/55
1989	September	57	5	7	12	32	13	37/100/41
1990	July	241	21	18	39	139	63	28/100/45
1991	September	82	24	4	28	36	18	78/100/50
1992	August	123	9	8	17	74	32	23/100/43
1993	No survey	-	-	-	-	-	-	-
1994	August	148	11	17	28	84	35	33/100/41
1995	September	83	7	8	15	50	18	15/100/36
1996	June	92	11	13	24	49	19	49/100/39
1997	August	112	17	4	21	66	25	32/100/38
1998	September	45	10	4	14	24	7	58/100/29
1999	August	86	14	3	17	43	26	40/100/61
2000	August	136	15	6	21	68	47	31/100/69
Total		2731	249	244	493	1496	735	
Average 1984-2000		171	16	15	31	94	46	33/100/49

Fall herd composition surveys conducted from 1984 through 2000 averaged 171 animals classified. Only five years out of sixteen produced samples sizes larger than the average. The sixteen-year average ratio was 33 bulls and 49 calves per 100 cows. The bull ratios had a wide range over the sixteen-year period from 15 to 78 bulls per 100 cows. The calf ratios show this herd to be very productive.

Statewide objectives for bull to cow and cow to calf ratios are reported using spring (post hunting season) ratios to provide comparable objectives for western and eastern Washington. Spring elk herd composition data was not collected prior to 1991. No surveys were conducted in 1995, 1996, 1998 or 1999 (Table 4). The sample sizes and resultant ratios are highly variable and may not accurately reflect the composition of the population.

Table 4. North Cascade elk herd aerial post-season composition survey data, 1991-2000.

Year	Month	Total classified	Adult bulls	Spike bulls	Total bulls	Cows	Calves	Ratio Bull/Cow/Calf
1991	February	285	9	28	37	183	65	20/100/36
1992	February	116	11	2	13	86	17	15/100/20
1993	March	139	6	12	18	88	33	21/100/38
1994	March	203	5	11	16	126	29	13/100/23
1995	No survey	-	-	-	-	-	-	-
1996	No survey	-	-	-	-	-	-	-
1997	March	27	2	1	3	14	10	21/100/72
1998	No survey	-	-	-	-	-	-	-
1999	No survey	-	-	-	-	-	-	-
2000	March	57	13	4	17	28	12	61/100/43

The Washington Department of Fish and Wildlife established the current minimum bull elk survivorship goal of 12 bulls per 100 cows based on spring surveys (Washington Department of Fish and Wildlife 1997). The February-March herd composition surveys for the North Cascade herd show a wide range in bull to cow ratios (13 to 61 bulls per 100 cows) during the 6-years of surveys conducted between 1991-2000. The March 2000 ratio of 61 bulls per 100 cows is five times higher than the current management objective. This ratio may reflect the representation of older aged bulls in this herd resulting from limited harvest over the last five years. However, it may not accurately reflect the bull to cow ratio due to the small sample size.

Mortality

No elk mortality studies have been conducted in the North Cascade herd area. However, past bull elk mortality rates in this herd are believed to parallel those documented by Smith et al. (1994) during a four-year study where human-related mortality accounted for 82 percent of the total. According to Smith et al. (1994), in Washington State, 59 percent of total mortality was related to hunter harvest, 15 percent to poaching, 12 percent to malnutrition, 7 percent to wounding loss, 2 percent to predation, 1 percent to vehicle collisions, less than one percent to accidents, and 3 percent to unknown causes.

A measure of calf over-winter mortality can be determined from the previous years fall cow to calf ratio compared to the following spring ratio. Post-season ratios for 1991, 1992, 1993 and 2000 showed a calf ratio reduction of 20, 60, 12 and 38 percent respectively (Table 3 and 4).

Statewide bull to cow ratio objective is not being met in some localized areas. Reducing overall bull elk mortality to less than 50 percent would allow these areas to meet department objectives by increasing bull elk survival. A bull elk mortality rate of less than 50 percent combined with a fall bull to cow ratio of more than 25 bulls per 100 cows is needed to meet department escapement objectives for general hunt units (Lou Bender, Washington Department of Fish and Wildlife, personal communication).

Mortality rates between 1993 and 2000 are believed to be significantly different from historical rates. This is due to severely restricted hunting seasons (the core of the Nook sack unit has been closed to all elk harvest since 1993), extensive road access restrictions throughout much of the Nooksack unit, and reduced hunter effort.

Harvest currently occurs primarily in lowland areas in response to damage complaints. Here archery and muzzleloader hunters are allowed limited access onto private property. Elk harvest as reported by state hunters in this herd area from 1980 to 1989 was very different compared to 1991 to 1998 (Table 5). Non-tribal harvest from 1980 to 1989 averaged 99 elk, compared to 18 elk from 1991 to 2000.

Table 5. North Cascade elk herd (GMUs 407, 418, 437, 448 and 450) annual harvest.

Year	Total kill	State Hunters (questionnaire data) *						Tribal Hunters (reports)**		
		Antlered Elk	Antlerless Elk	Total Kill	Total Hunters	Total Days	Percent Success	Antlered Elk	Antlerless Elk	Total Kill (unknown sex)
1980	185	100	85	185						
1981	65	50	15	65						
1982	67	48	19	67	No data available			No harvest reports submitted		
1983	129	85	44	129						
1984	66	18	48	66						
1985	155	91	64	155	2,825	9,750	5			
1986	161	99	62	161	3,197	9,728	5			
1987	66	55	11	66	2,188	10,408	3			
1988	56	40	16	56	1,535	7,270	4	2	10	12
1989	42	29	13	42	1,429	4,930	4	5	23	38 (10)
1990	0	0	-	0	0	0	0	23	36	60 (1)
1991	73	28	8	36	1,448	5,814	3	15	22	37
1992	54	34	3	37	973	3,667	4	8	9	17
1993	12	3	0	3	193	619	2	4	5	9
1994	36	16	0	16	377	1,225	4	9	11	20
1995	43	14	3	17	482	2,036	4	7	9	16
1996	15	9	0	9	321	1,248	3	3	3	6
1997	12	9	8	17	30	146	57	2	2	4
1998	39	6	30	36	346	2,509	10	2	1	3
1999	15	5	8	13	214	1,101	6	1	1	2
2000	2	0	0	0	142	405	0	2	0	2
Total	1,293	739	437	1,176	15,700	60,856		80	131	222
Avg.	65	37	22	59	1,047	4,057	4.2	7	12	20

* Washington Department of Fish and Wildlife, Game Harvest Reports 1985-2000.

** From 1988-1996 individual Tribes submitted reports voluntarily. Beginning in 1997 NWIFC summarized the harvest reports for the western Washington Treaty Tribes.

During the past 21 hunting seasons (1980-2000), for which information is available, total annual harvest averaged 65 elk by an average of 1,047 hunters. From 1985 to present there was no harvest recorded from the Sauk unit. The North Cascade elk herd is currently closed to general hunting due to low population numbers except for GMUs 447 and 448.

Social and Economic Values

Elk Hunting

The number of hunters hunting in the North Cascade elk herd area declined significantly from 1986 through 2000. However, during the same period elk hunter success rates changed little averaging 4 percent (range 2-5 percent). Tribal hunter harvest for the period 1992 through 2000 declined significantly (Table 5). This was due to the fact that from 1993 to the present, state-authorized hunting was extremely limited because of declining elk numbers and effects of closed

seasons. Tribal hunting efforts were similarly reduced because some tribes also closed their seasons and there was an increasing trend towards more restricted access onto privately owned lands.

Tribal harvest reporting began in 1988, but not all tribes participated. Since 1997 the Northwest Indian Fisheries Commission has summarized tribal harvest in an annual report for the 19 western Washington Treaty Tribes (Northwest Indian Fisheries Commission 1998). This report does not provide information on which tribes reported or the proportion of the harvest each tribe took. Overall tribal harvest has ranged from a high of 60 animals in 1990 to a low of two animals in 1999 and 2000 (Table 5).

The revenue generated by elk hunters provides a significant economic boost to the local communities within the North Cascade herd's range. 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. Department of Interior et al. 1996). Using this \$860 average expenditure per hunter from the national survey, North Cascade elk hunters added \$297,560 to the local and state economy in 1998. This however, is an 84 percent decline from the average number of hunters seen from 1991 and earlier (2,104 hunters). Again, using the \$860 cost per hunter, this decline in hunter numbers represents a loss of \$1,511,880 in revenue to local and state economies.

Harvest Strategies

Specific harvest strategy recommendations will be made every three years as part of the current Washington Department of Fish and Wildlife Commission's policy of adopting hunting seasons for a three-year period while establishing permit seasons and necessary amendments annually. The three-year hunting package will serve as the harvest management implementation plan. Tribal participation in forming specific recommendations and harvest strategies begins at the regional level. Department regional staff and field personnel meet as needed with tribal representatives to coordinate harvest management strategies and other elk management activities.

The North Cascade elk herd has been managed using a variety of harvest strategies (Appendix A). Season formats have included any bull (any bull elk), three-point minimum (only bulls with three or more antler points can be harvested), and permit only (only hunters successfully drawing one of a limited number of permits can harvest bull elk). Appendix B summarizes unit boundary changes over time in the North Cascade elk herd area.

Hunting seasons (both general and damage related) traditionally have been designed to limit or prevent this elk herd from expanding into areas south of the Skagit River (the Sauk unit). Currently, the Nooksack unit of the North Cascade herd is closed to general hunting. The closure was placed into effect in 1993 in recognition of a severe population decline. The geographic area of the closure was changed several times since 1993 (Appendix B). Tribes participate in this closure on a voluntary basis in principle as co-managers.

Harvesting antlerless animals (cow and calf elk) only occurs during primitive weapons seasons (bow or muzzleloader), damage related kill permits, or tribal harvest. Both antlered and antlerless elk damage hunts continue to take place in the lowlands next to the Skagit River (between the towns of Sedro Woolley and Concrete).

Damage

Historically, elk damage in the North Cascade Elk Herd area has been concentrated in the Saxon/Acme area in the Nooksack River Valley and along the lower Skagit River Valley from Bacus Hill to the town of Concrete. Elk have damaged primarily commercial agriculture and horticultural crops and pastures. There have been little or no elk related silvicultural problems. From 1990 to the present, elk depredations have shifted entirely to the Skagit River Valley area, with a notable increase in elk use south of the river and on densely vegetated islands along the river channel itself. Particularly heavy damage is occurring in the Day Creek area (south side of the Skagit River) where approximately 125 elk compete with dairy and other cattle for food.

The Revised Code of Washington (RCW 77.36.040) requires that the Washington Department of Fish and Wildlife pay landowners for agricultural crop damage caused by deer or elk (Appendix C). To date, the department has made only one elk-damage related payment (\$5,000) in the North Cascade area. This was for elk damage to an apple orchard along Highway 20. The actual number of complaints received annually is relatively low (two to four a year). Only three animals have been harvested via special landowner preference permits to reduce this type of damage.

Muzzleloader area 941 was created in 1999 to address elk damage along the Skagit River in the Nooksack and Sauk units. This hunt was open to specified tag holders with late season opportunity for archery and muzzleloader hunting. The seasons were lengthy and designed to encourage landowners to allow hunters to pursue and take “any elk” during the season, thus relieving elk damage to their property.

Current management strategies for controlling or reducing elk damage problems include more traditional uses of primitive weapons seasons (archery and muzzleloader) in lowland areas with dispersed residences and associated human safety issues. Seasons of this type are generally stratified early, mid, and late season with regard to timing and can be either general season or permit only depending upon the degree of hunting pressure desired.

Two new strategies for reducing elk damage are currently implemented on an experimental basis in this area.

- Landowner preference permits allow landowners to kill an elk and is a form of compensation to landowners for damage.
- Landowner access permit damage hunts are based upon an allocation of a specific number of permits to the landowner that they distribute to hunters of their choice. The advantage of this technique is that landowners can select the hunters. Management of elk damage in other areas of the elk range utilizes hot spot hunts that emphasize removal of individual depredating elk.

Damage control hunts in any form within semi-populated areas are inherently controversial with human safety, livestock safety, fence damage, and trespass complaints as the more common issues. Strategies to address chronic elk damage throughout the Skagit River Valley and in the Nooksack River Valley around the town of Acme will emphasize suppressing damage-causing elk as opposed to totally eradicating them.

Tribal Values

The elk named **k a e g l c c d** by the Skagit and Kwawach by the Lummi has been an intrinsic part of tribal culture for thousands of years. It has helped Northwest Indian people survive throughout the centuries by providing a continual source of meat and marrow for sustenance and vitamins. This animal is used for religious purposes, clothing and drum making. To this day, the elk can still be found at traditional ceremonies and is essential for maintaining tribal culture. Ceremonial and subsistence needs are met by hunting deer and elk.

Other recreational Uses

The number of individuals participating in day hiking, backpacking, bird and animal watching and photography in Washington has increased because of a rapidly growing statewide human population. A recent survey conducted in Washington estimated that there were 304,000 participants in observing/photographing animals statewide. Day hiking in the mountain and forest trails is also a popular activity with about 279,000 participants (Washington State Interagency Committee for Outdoor Recreation 1999).

Public viewing of the North Cascade elk herd is rather limited. Elk are typically seen along Highway 20 and Highway 9 in agricultural fields. Managed public viewing opportunities do exist within their primary range but would require cooperative agreements and site development with other land managers (private timber companies, the Department of Natural Resources, and the U.S. Forest Service). Currently there are no such facilities in the North Cascade herd area.

HABITAT MANAGEMENT

The North Cascade elk herd's population is strongly limited by the cumulative impacts of human activities on the remaining habitat. This herd has experienced a population decline since the mid 1980s. Elk are frequently utilizing the agricultural areas in the lowland valleys despite the levels of human disturbance in these areas. It will require the combined cooperative efforts of the public and private land managers to provide elk habitats that will meet plan objectives.

Limitations and Losses

Both winter and summer ranges in the primary elk habitat area of the Nooksack unit have been in poor condition. Intensive logging, road densities in excess of prescribed levels, loss of thermal cover, high levels of human disturbance, and loss of critical travel corridors between low and high elevation habitats are collectively cited as the cause (Davison 1990). Analysis of 1979 Landsat satellite imagery data showed only about 20 percent of old growth stands remain within the North Cascade elk herd area. Cutting has continued since then and there are indications that this elk herd is limited by the lack of escape and thermal cover, caused by human disturbance (Davison 1990).

Timber harvesting operations, mostly clear-cutting, have greatly changed the structure of forests and tree ages in all three forest zones. This has compromised the carrying capacity of both winter and summer ranges where high road densities and excessive human disturbances persist. Clear cutting in the area has been over-prescribed, creating large blocks of habitat not used by elk. Additionally the increased use of herbicides to control competing vegetation on the clear cuts has impacted the quality of elk forage released from timber harvest.

Enhancement and Improvement Projects/Ideas

More recent studies by McCorquodale (1991), Merrill (1991), Cole et al. (1997) and Cook et al. (1998) suggest that thermal cover is less important on winter ranges when disturbance is low and high-energy food is present. Mitigating the loss of critical winter range has been accomplished with number of cooperative enhancement projects involving the Washington Department of Fish and Wildlife, Rocky Mountain Elk Foundation, Department of Natural Resources, U.S. Forest Service, and private timber companies (Table 6). Projects have included: (1) establishing habitat forage enhancement sites involving clearing, seeding, and fertilizing key areas that elk use; (2) road closures affecting enhancement sites and critical summer and winter habitats; (3) roadside seeding and fertilization; (4) placing mineral blocks throughout habitats immediately adjacent to damage areas.

Table 6. Habitat enhancement projects in the North Cascade elk herd area

Year	Project	Cost	Acres	Cooperators
1994	Larsen Flat forage seeding and fertilization	\$31,718	11	WDFW, Crown Pacific, Rocky Mt Elk Foundation, Nielsen Bros. Timber Co.
1994	South Fork Nooksack River forage seeding, fertilization and placing mineral blocks	\$15,101	10	WDFW, Crown Pacific, Rocky Mt Elk Foundation, Nielsen Bros. Timber Co.
1998	Nooksack/Bear Creek forage seeding and fertilization	\$3,800	45	LBR Logging, Crown Pacific, Rocky Mt Elk Foundation.
1998	Skookum Creek II forage seeding and fertilization	\$2,170	25	Rocky Mt Elk Foundation and Campbell Group
1999	South Fork Nooksack River plot grooming project (Mow Larsen Flats forage plot)	\$800	11	Rocky Mt Elk Foundation and Crown Pacific
1999	Elk Meadows forage enhancement (forage seeding, fertilization, placing mineral blocks)	\$2,900	15	Rocky Mt Elk Foundation and Crown Pacific

Elk use of established forage enhancement sites has been extensive regardless of the season, but is highest during winter and spring. Intensive logging continues at an accelerated pace on private timberlands. The Department of Natural Resources has recently developed a block timber management plan on the lower North Fork Nooksack River that specifically addresses the needs of resident elk on that portion of critical winter range. A recent acquisition of 2,300 acres of forested land by the Department of Natural Resources along the South Fork of the Nooksack River has also enhanced this elk herd's ability to survive through winter.

RESEARCH NEEDS

The highest research need for the Nooksack elk herd continues to be the development of a statistically accurate population estimate. Population levels can be obtained via population modeling using the Pop-II program (Appendix D).

Another priority is habitat evaluation analysis. Updated evaluation of the Nooksack unit (GMU 418) elk range utilizing Landsat satellite imagery, combined with geographical information systems (GIS) analysis, is needed to assess current habitat status and to project future carrying capacity of critical ranges. A similar analysis of the Sauk unit's habitats is also recommended to identify habitats suitable for elk expansion or potential reintroductions (augmentation).

Other research needs include evaluating the nutritional value of elk foods to determine the general health of the herd in relationship to its habitat, continued evaluation of genetic makeup and integrity of the North Cascade elk herd in light of past augmentations of Rocky Mountain elk in historical Roosevelt elk range, and migration studies to investigate elk seasonal movements and identify travel corridors used by this herd.

HERD MANAGEMENT GOALS

The goals of the North Cascade elk herd are to:

1. Manage the North Cascade (Nooksack) elk herd for a sustained yield.
2. Manage elk for a variety of recreational, educational, and aesthetic purposes including hunting, scientific study, cultural, and ceremonial uses by Native Americans, wildlife viewing and photography.
3. Preserve, protect, perpetuate, manage and enhance elk and their habitats to ensure healthy and productive populations.

MANAGEMENT OBJECTIVES, PROBLEMS AND STRATEGIES

Herd Management

Objective # 1

Manage the North Cascade elk herd using the best available science.

Problems

Harvest information (kill and hunter effort) collected from report cards and the hunter questionnaire is not providing accurate data for use at the game management unit level. Tribal harvest is not available from all tribes. Herd surveys and harvest data are critical elements for making management recommendations.

Strategies

1. Increase precision and accuracy of recreational and tribal harvest through mandatory reporting of hunting activity.
2. Work cooperatively to increase precision, accuracy, and timely exchange of tribal harvest data.
3. Develop valid techniques to accurately estimate the population level of this herd.

Problem

Biological surveys of herd condition and habitat status are limited or outdated.

Strategies

1. Increase level of herd composition surveys (fall and spring) necessary to complete population modeling in the Nooksack unit.
2. Monitor elk numbers and distribution in agricultural damage areas.
3. Monitor elk numbers and distribution in the Sauk unit.
4. Develop methods and standardize data collection between the department and tribes.

Problem

The North Cascade elk population was re-established by transplants of Rocky Mountain elk from eastern (1946) and western (1948) Washington. Historically, this area was native Roosevelt elk range.

Strategies

1. Continue to conduct genetics study of North Cascade elk to determine if it is a mixed genetic stock or is predominately Rocky Mountain (*C. e. nelsoni*) or Roosevelt (*C. e. roosevelti*) subspecies.
2. If genetic analysis, modeling, and peer consultation, suggest significant biological consequences of mixed genetic stock, it may be necessary to reassess the North Cascade elk augmentation.

Problem

The North Cascade elk herd area has experienced some dramatic landscape changes through the twentieth century, which are far different than pristine habitats used by native Roosevelt elk populations. Those changes should have benefited elk, yet today's population remains low.

Strategies

1. Update and expand GIS/Landsat habitat evaluation techniques to include potential range expansion in the Sauk unit.
2. Support continuing research to evaluate the nutritional condition of elk on a seasonal basis in GMU 418 and 437.

Objective # 2

Increase elk population numbers in the North Cascade elk herd to or above the late 1980's estimated level of 1,700 animals.

Problems

The North Cascade herd's population has declined from a 1987 peak of approximately 1,700 animals to a current estimate of 300 elk. Existing animals are sparsely distributed throughout their core range in the Nooksack unit, with as many as 125 other elk located in peripheral areas, causing private property damage.

Strategies

1. Continue the antlerless hunting closure in the Nooksack unit, until a minimum population of 750 elk is achieved.
2. Implement road management programs designed to protect and support specific sub-herds on impacted ranges.
3. Develop and implement habitat enhancement projects on a large scale. Projects should be widely dispersed throughout the herd's range and include both summer and winter habitat sites.
4. Augment the existing population with elk releases from other herds in the state or from adjacent states with surplus animals. (See Appendix D for a summary of population growth with and without augmentation and Appendix E for an augmentation plan for this herd).
5. Seek additional funding through partnerships with tribes and conservation organizations such as the Rocky Mountain Elk Foundation for augmentation and enhancement.

Problems

Damage-causing elk tend to stay on privately owned agricultural land, harming crops and other property. Gaining hunting access to these lands is limited for both tribal and state-authorized hunters.

Strategies

1. Work with local landowners to allow elk use of private property via conservation easements or other incentive programs.
2. Evaluate the potential for subsidizing cover crops in exchange for increased hunter access to private land.

Objective # 3

Promote expanding the North Cascade elk herd into potential ranges south of the Skagit River in the Sauk unit.

Problems

Increasing the North Cascade elk herd within its historical range (Nooksack unit) may be difficult. This herd is the smallest in Washington, occupying only 1,230 square kilometers (492 square miles). An estimated 125 elk (about 40 percent) currently occupy and damage agricultural lands along the Skagit River. Efforts to discourage elk from using this farmland may result in elk migrating into the Sauk unit. Without protection, elk moving into this unit would be hunted and the potential nucleus for a future population there would be lost. The Sauk unit has not been systematically evaluated as potential elk range for either migrating elk or possible augmentation.

Strategies

1. Maintain a state hunting closure in the Sauk unit, except damage hunts, until a minimum elk population level (200) is achieved. Hunting seasons, harvest levels, and management options are to be established as part of the existing three-year season setting process (See Appendix E – Hunting thresholds).

2. As long as damage is verified on agricultural lands adjacent to the Skagit River, use landowner damage hunts, kill permits, or hot spot hunts to target offending animals and encourage them to return to the Nooksack unit or migrate south into potential new areas in the Sauk unit.
3. Complete GIS/Landsat habitat analysis of the Sauk unit as potential elk range. Quantify summer and winter ranges, identify potential damage conflicts, and evaluate road densities and existing disturbance factors.
4. Evaluate the potential for augmentation (elk transplants) into the Sauk unit.
5. Begin aerial surveys in the Sauk unit to determine current elk use levels.
6. Place radio-collars on 10 to 15 elk in the damage areas to evaluate seasonal movements (both within the damage areas and in the adjacent Nooksack and Sauk units).

Objective # 4

Re-establish tribal/state authorized hunting seasons.

Problems

The current elk population is down 83 percent below its historical high in 1987 of 1,700 animals. Hunting the North Cascade herd is currently closed in the primary elk range areas, with limited hunting opportunity in damage areas. Targets for reopening the hunting season and for conservatively managing the herd need to be identified. Opportunities to provide access for tribal and state authorized hunters need to be developed.

Strategies

1. Increase elk population numbers to a minimum sustainable level of 750+ in the Nooksack unit and 200 animals in the Sauk unit.
2. Provide controlled harvest in these two units for bull only consistent with bull mortality objectives until the population objective is met.
3. Maintain existing road access when compatible with elk management objectives.

Objective # 5

Manage hunted elk units for spring bull ratios consistent with the statewide plan (currently greater than or equal to 12 bulls per 100 cows) combined with overall bull mortality rates less than or equal to 50 percent.

Problem

Target levels for conservatively managing the North Cascade herd must be established to ensure healthy sustained growth of the population once hunting seasons are re-established.

Strategies

1. Maintain management strategies for hunted game management units for at least 3 consecutive years to determine whether they achieve objectives for bull to cow ratios, bull mortality rates, and population growth.
2. Evaluate bull elk survivorship under a permit-only harvest strategy with regard to achieving bull to cow ratios, bull survivorship objectives, and population growth.
3. If recruitment levels are inconsistent with population objectives, harvest strategies will be adjusted and the cause will be investigated.

Objective # 6

Minimize elk damage to private lands.

Problem

Elk damage continues to occur in agricultural areas along the Skagit River and is likely to expand into additional areas if this segment of the population increases.

Strategies

1. Continue to use hot-spot hunts, landowner damage hunts, and tribal hunting to target depredating elk. In specified damage areas, special hunts and early or late season formats may be used.
2. Increase forage enhancement projects on public and industrial forestlands only within primary elk range and away from damage prone areas.
3. Work with individuals or landowner groups and develop incentive programs or conservation easements that reward them for maintaining or enhancing elk populations and elk use opportunities on their lands.
4. Discourage elk from increasing west of Highway 9, where potential conflicts are high.
5. Monitor and evaluate the effectiveness of damage control techniques used.

Problem

Public demand for recreational activities such as motorcycling, ATVing, horseback riding and hiking that are sometimes in conflict with elk and other wildlife has increased.

Strategy

1. Recommend placing recreational trail systems away from core elk areas.
Experiment by placing some of these trails in peripheral elk ranges immediately adjacent to damage areas, with the hope of moving elk from damage prone areas.

Objective # 7

Work cooperatively with Indian tribes to implement the North Cascade Elk Herd Plan.

Problem

Cooperation and coordination with federally recognized Treaty Tribes has been challenging in the past.

Strategies

1. Develop a framework of cooperation by meeting frequently and using open dialog to discuss management concerns for the North Cascade elk herd.
2. Maintain an atmosphere of mutual respect, trust, cooperation, and exchange of information.
3. Form partnerships for funding mutually acceptable projects to enhance and improve elk populations, habitat or advance research.

Objective # 8

Increase public awareness of elk and promote non-consumptive uses of elk, including viewing and photographic opportunities.

Problem

Developed public viewing sites do not exist in the North Cascade elk herd area.

Strategies

2. Work with private timber companies, Department of Natural Resources, U.S. Forest Service, local communities, Rocky Mountain Elk Foundation, land trust organizations and school districts to promote, identify, and fund elk viewing sites in Whatcom and Skagit counties.
3. Develop a brochure on where elk are likely to be found, their natural history and management.
4. Minimize human disturbance problems associated with managing all wildlife species and integrating wildlife viewing opportunities.

Habitat Management

Objective # 1

Maintain elk habitat capability on U.S. Forest Service, Department of Natural Resources, and private timberlands.

Problem

The Washington Department of Fish and Wildlife has management authority for elk in the state, but does not own or control the majority of the land supporting these elk herds. Management strategies for improving elk habitat quality rely on the cooperation and participation of individual landowners.

Strategies

1. Work with landowners, the Rocky Mountain Elk Foundation, and Treaty Tribes to develop agricultural and silvicultural methods on both primary elk winter and summer ranges to increase elk.
2. Provide technical advice for landscape level management plans with landowners, designed to preserve or enhance elk habitat on large tracts of land.
3. Conduct research to determine elk movements and identify important travel corridors that need to be protected.

Objective # 2

Preserve and enhance critical elk use areas.

Problem

Habitat availability and quality is decreasing on private, state, and federally owned public lands.

Strategies

1. Acquire management authority over critical elk winter and summer ranges through conservation easements, lease agreements, land exchanges, landowner incentives, and fee purchases.
2. Work with both public and private landowners to design development strategies that do not result in declines in winter range capability for elk.
3. Continue to work with the U.S. Forest Service and Department of Natural Resources to manage for no net loss of winter range from forest practices.
4. Continue efforts to reduce overall open road densities on primary elk range to one linear mile per square mile or less.
5. Coordinate with local governments to develop comprehensive land use plans (Growth Management Act) that maintain current winter range capability for elk.
6. Participate on district teams to review Forest Practice Applications and other project proposal review and regulatory processes to provide mitigative measures for their potential affects on elk habitat.
7. Continue forage enhancement plot projects in cooperation with the Rocky Mountain Elk Foundation, Department of Natural Resources, U.S. Forest Service, and private timber companies.
8. Cooperate on efforts to control noxious weeds on important elk habitats.

Objective # 3

Develop partnerships to improve habitat and elk management.

Problem

Effective management of the North Cascade elk herd is dependent upon a strong working relationship with all stakeholders and effective communication with the general public and legislative representatives.

Strategies

1. Seek funding and support from conservation organizations for elk herd and habitat management.
2. Work closely with agencies and industrial timber companies on road management and habitat enhancement.
3. Solicit volunteers to conduct projects and to participate in surveys.
4. Maintain close cooperation and coordination with Point Elliot Treaty tribes through annual meetings where counsels are held on elk herd status, trend, and condition and establish respective hunting seasons and rules.
5. Work closely with local community leaders and legislative representatives to insure that elk management issues reflect the needs of the community and assure that opportunities for social, cultural, educational, and economic development are not lost.

HERD AUGMENTATION

Augmenting the North Cascade elk herd is proposed as a viable strategy to bolster its population and reverse the declining trend. The Washington Department of Fish and Wildlife supports elk herd augmentation as a priority action.

Reasons for augmenting elk include: 1) Significant declines in the elk population; 2) Low level populations that are being held there because mortality is equal to or exceeds recruitment; 3) cow age structure that is aging; 4) when cessation of hunting does not result in an increase in population; and 5) where habitat does not appear to be limiting or where limitations are being addressed.

The Nooksack unit sub-herd appears to meet these criteria:

- This elk population peaked in 1984 and has declined approximately 82 percent through 2000.
- The 2000 estimate of 300 elk is well below the management objective of approximately 1,450 elk for this sub-herd.
- State and most Tribal hunting have been curtailed since 1993 without an increase in the population.
- Ongoing habitat enhancement projects have improved important elk forage areas.

For these reasons, herd augmentation is proposed for the Nooksack sub-herd. For more details on this proposed augmentation see Appendix E.

SPENDING PRIORITIES

The following priority investments are needed to implement the North Cascade Elk Herd Plan.

Priority # 1

Conduct fall and spring herd composition surveys

Fall and spring herd composition surveys in the North Cascade elk herd area should be increased with emphasis in GMUs 418 and 437. They are necessary during the closure period to gain information on population estimates and to monitor herd distribution and dispersal patterns.

Additionally, fall and spring composition surveys allow the estimation of both bull mortality rates and potential cow elk harvest rates. As the population grows increased funding may be necessary to adequately survey. Composition surveys facilitate the department's evaluation of implemented harvest strategies and trends. Jointly fund cooperative herd surveys.

Priority: High (fall surveys are highest priority)

Timeline: Annually (2001 - 2005)

Cost: \$12,000 per year

Priority # 2

Improve precision and accuracy of elk harvest data collection

Increase the precision and accuracy of estimating tribal and recreational harvests of the North Cascade elk herd by implementing mandatory hunter reporting.

Priority: High

Timeline: Currently underway

Cost: \$5,000 estimated per year

Priority # 3

Augment the North Cascade elk herd

Elk augmentation is proposed for the Nooksack sub-herd as a priority site to improve antlerless age structure and possibly increase recruitment. The Point Elliott Treaty Tribes consider this their highest priority. Other potential sub-herds that could also benefit from augmentation include Sauk unit.

Priority: High

Timeline: Start trapping in March 2003, and monitor released animals for approximately two years (see Appendix D for details)

Cost: \$48,400 1st year and about \$88,400 total (dependent on other partnership funding). The Tribes have committed to funding 50% of the cost of augmentation.

Priority # 4

Protect critical elk winter range on private lands

Purchase, lease, acquire easements and use other incentives to protect and enhance critical elk winter ranges located along the Skagit River bottomlands. Using \$10.00 per acre for conservation easements to enhance agricultural lands for elk and other wildlife a modest start of 2,000 acres would require only \$20,000.

Priority: High

Timeline: January 2001-December 2005

Cost: \$500,000 total over five-year period

Priority # 5

Enhance habitat quality on primary elk range

A high priority for recovering this herd is to maintain existing forage enhancement plots and establish additional habitat enhancement projects (road closures, control noxious weeds) on both winter and summer ranges in the core herd area. The Tribes support this as a high priority.

Priority: High

Timeline: Jan. 1, 2002 - Dec. 31, 2005

Cost: \$20,000 per year for about 4 years = \$80,000

Priority # 6

Maintain and/or advocate current study and research activities

a. Movements and Habitat Description Study

This ongoing cooperative study with the department, Rocky Mountain Elk Foundation and Point Elliot Treaty Tribes is designed to evaluate migration patterns, habitat use, mortality and habitat descriptions of elk range in the Nooksack unit.

Priority: High

Timeline: Portions ongoing through December 31, 2003. Complete as soon as possible.

Cost: \$30,000

b. Nutritional Ecology Study

This is part of a multi-state study to monitor and evaluate elk nutritional levels on a seasonal basis. Three recaptures of radio collared elk @ \$10,000 per capture.

Priority: High

Timeline: March 2000 - March 2002 (First year already funded)

Cost: The department is an advocate of this study and provides assistance in sampling elk in the state.

c. Landscape Habitat Evaluation

A landscape habitat evaluation needs to be conducted for the Sauk units prior to elk transplant.

Priority: High

Timeline: January 1, 2001 - December 31, 2002

Cost: \$5,000 per year for about 2 years = \$10,000 (re prioritize existing staff)

d. Genetics Study

The North Cascade elk herd genetic study will determine whether the remaining elk are Roosevelt, Rocky Mountain or a mixed breed and will help determine the appropriate source of elk for future transplants. Dependent upon current findings and analysis continuing assessment of the genetics of this herd may be necessary.

Priority: High

Timeline: January 1, 2000 - December 31, 2003.

Cost: \$5,000

Priority # 7

Establish reliable population estimates

Surveys designed to achieve statistically valid herd population estimates are the highest research priority for the North Cascade elk herd. Recent population declines coupled with elk moving from their primary range to damage areas have resulted in establishing a conservation closure (no hunting). Re-opening hunting seasons will require accurate population surveys to define population status and provide monitoring capability once harvest begins. An adapted Pop-II modeling procedure is recommended for establishing reliable population estimates (Point in time population estimate to be conducted every 3 to 5 years).

Priority: Moderate

Timeline: Start in year 2003

Cost: \$7,500 per year (re-prioritize existing staff)

Priority # 8

Damage control

Free ranging wild elk herds are commonly attracted to, forage on, and damage agricultural and commercial crops as well as cause other damage to private property. Washington State law states that the Washington Department of Fish and Wildlife shares the responsibility with private landowners to minimize and reduce damage to private property. The law also states that the department is responsible to monetarily reimburse landowners for their commercial crop losses caused by deer or elk. The success of recovering the Nooksack elk herd to objective levels will depend in large part in maintaining community support, particularly from the agriculture community in the Skagit Valley. It is essential to prevent and minimize elk damage to maintain that support. Typical non-lethal damage control techniques include but are not necessarily limited to; herding, hazing, scare devices, fencing, land purchases, purchasing/leasing crops, crop damage payments, damage hunts, fence repair, etc.

Priority: High

Timeline: Annually

Cost: \$5,000 to \$20,000 per year depending on conditions

Priority # 9

Establish public viewing areas

Public viewing of the North Cascade elk herd has been limited to chance encounters along state highways. Developing site-specific viewing areas (generally associated with forage enhancement projects) is practical in both Skagit and Whatcom counties, but would require joint partnerships between the department and individual landowners (private, state, federal) as well as numerous community-based organizations.

Priority: Moderate

Timeline: Establish Jan. 1, 2003 - Dec. 31, 2005

Cost: \$50,000

PLAN REVIEW AND MAINTENANCE

The North Cascade Elk Herd Plan is a five-year plan subject to annual review and amendment. As new information is gathered and conditions change it will be necessary to track strategies and their impact on the plan's goals and objectives in order to re-evaluate and modify this plan as needed. A free exchange of information and open communication between the Washington Department of Fish and Wildlife, Tribes, and cooperators will be key to this plan's success. An annual review meeting with delegates from the Point Elliot Treaty Tribes will be arranged through the Pacific Northwest Indian Fish Commission and the department's Region 4 Wildlife Program Manager, as similarly arranged for the development of this plan. Emergent issues can be addressed as needed, either at the technical or policy level.

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APPENDIX A State Hunting Seasons in The North Cascade Elk Herd Area

Year	GMU Number and Permit (#s)	Dates	Days	Legal Animal	Hunt Description and Tag Type
1980	400 (closed in Elk Area 31-Hamilton Dec. 6 - 14) & 424	12/06 - 01/04	30	Either-sex	Late Archery (WXYKM tags) plus stamp
	400, 418, 424, 426, 430, 433, 440, 442, 448, 450	11/09 - 11/19	11	Bulls with visible antlers	Modern Firearm General (W)
	Elk area 31 Hamilton (200)	12/06 - 12/14	9	Either-sex	Permit Only (MKWY tags)
1981	Bow area 4-Cavanaugh	09/12 - 10/04	23	Either-sex	Early Archery (WKXYAB tags) plus stamp
	400 (closed in Elk Area 31-Hamilton Dec. 5 - 13)	12/05 - 01/03	30	Either-sex	Late Archery (MKWXY tags) plus stamp
	400, 418, 424, 426, 430, 433, 440, 442, 448, 450	11/07 - 11/17 11/09 - 11/17	11 9	Bulls with visible antlers Either-sex	Modern Firearm General (W) Open to all elk hunters with (W) tag.
1982	Bow area 804	09/15 - 10/09	24	Either-sex	All Archery tags valid(WKXYAB) plus stamp
	400 Bow area 831	12/03 - 01/01 12/13 - 01/02	29 21	Either-sex Either-sex	Late Archery (WKXYAB tags) plus stamp
	400, 418, 424, 426, 430, 433, 440, 442, 448, 450	11/05 - 11/15	11	Bulls with visible antlers	Modern Firearm General (W)
	Elk area 031 Hamilton (100)	12/03 - 12/11	9	Either-sex	Permit Only (MKWY tags)
1983	Bow area 804	09/15 - 10/09	24	Either-sex	Early Archery (WKXYAB tags) plus archery stamp
	Bow area 831 400 and Bow area 822	12/12 - 01/01 12/03 - 01/01	21 29	Either-sex Either-sex	Late Archery (WKXYAB tags) plus archery stamp
	400, 418, 424, 426, 430, 433, 440, 442, 448, 450	11/05 - 11/15	11	Bulls with visible antlers	Modern Firearm General (W)
	Elk area 031 Hamilton (100)	12/03 - 12/11	9	Either-sex	Permit Only (W)
1984	400, 426, 430, 440, 442, 448, 450 418, 424, 433	09/05 - 09/09 09/10 - 09/19 09/05 - 09/19	5 10 15	Bull only Either-sex 3-Pt bull or antlerless	Early Archery General (WA)
	400 & Bow area 831 Bow area 822	12/10 - 12/31 12/08 - 12/31	22 24	Either-sex	Late Archery General (WA)
	Elk area 005-South Skagit	12/01 - 12/09	9	Either-sex	Muzzleloader (WM)
	400, 418, 424, 426, 430, 433, 440, 442, 448, 450	11/07 - 11/18 11/10 - 11/18	12 9	Bulls with visible antlers, except GMU 418, 424 & 433 3-Pt. Minimum	Modern Firearm General (WE) Modern Firearm General (WL)
	Elk area 031 Hamilton (100)	12/01 - 12/09	9	Antlerless Only	Modern Firearm Permit Only (W1 or WM)
1985	400, 426, 430, 440, 442, 448, 450 418, 424, 433	09/04 - 09/08 09/09 - 09/18 09/03 - 09/17	5 10 15	Bull only Either-sex 3-Pt bull or antlerless	Early Archery General (WA)
	400 & Bow area 822 Bow area 831	12/07 - 12/31 12/09 - 12/31	25 23	Either-sex Either-sex, 3-Pt. min.	Late Archery General (WA)
	Elk area 005-So. Skagit	11/30 - 12/08	9	Either-sex	Muzzleloader (WM)
	400, 418, 424, 426, 430, 433, 440, 442, 448, 450	11/06 - 11/17 11/09 - 11/17	12 9	Bulls with visible antlers, except GMU 418, 424 & 433 3-Pt. minimum	Modern Firearm General (WE) Modern Firearm General (WL)

Year	GMU Number and Permit (#s)	Dates	Days	Legal Animal	Hunt Description and Tag Type
1985 cont.	Elk area 031 Hamilton (100)	11/30 - 12/08	9	Antlerless only	Modern Firearm Permit Only (W1 or WM)
1986	400, 426, 430, 440, 442, 448, 450 418, 424, 433	09/03 - 09/07 09/08 - 09/17 09/03 - 09/17	5 10 15	Bull only Either-sex 3-Pt min. or antlerless	Early Archery General (WA)
	GMU 400, Bow area 831. Bow area 822	12/08 - 12/31 12/06 - 12/31	24 26	Either-sex Either-sex, 3-Pt min.	Late Archery General (WA)
	Elk area 005-So. Skagit	11/29 - 12/07	9	Either-sex	Muzzleloader General (WM)
	400, 418, 424, 426, 430, 433, 440, 442, 448, 450	11/05 - 11/16 11/08 - 11/16	12 9	Bulls with visible antlers, except GMU 418, 424 & 433 3-Pt. min	Modern Firearm General (WE) Modern Firearm General (WL)
	Elk area 031 Hamilton (100)	11/29 - 12/07	9	Antlerless only	Modern Firearm Permit Only (W1 or WM)
1987	405, 410, 418,426, 433, 440, 442, 448, 450	10/01 - 10/16	16	Either-sex, except Either-sex or 3-Pt min. in GMU 418 & 433.	Early Archery General (WA)
	405-Chuckanut Bow area 822B and 831B.	11/25 - 12/10 11/25 - 12/10	16 16	Either-sex Either-sex, 3-Pt. min.	Late Archery General (WA)
	405, 410, 418,426, 433, 440, 442, 448, 450	11/04 - 11/15 11/07 - 11/15	12 9	Bulls with visible antlers, except GMU 418 & 433 3-Pt. min.	Modern Firearm General (WE) Modern Firearm General (WL)
1988	405, 410, 418,426, 433, 440, 442, 448, 450	09/30 - 10/13	14	Either-sex, except Either-sex or 3-Pt min. in GMU 418 & 433.	Early Archery General (WA)
	405 Bow area 822 and 831	11/23 - 12/11 11/23 - 12/11	19 14	Either-sex Either-sex, 3-pt min.	Late Archery General (WA)
	405, 410, 418,426, 433, 440, 442, 448, 450	11/02 - 11/13 11/05 - 11/13	12 9	Bulls with visible antlers, except GMU 418 & 433 3-Pt. min.	Modern Firearm General (WE) Modern Firearm General (WL)
1989	405, 410, 418, 426, 433, 440, 442, 448, 450	09/30 - 10/13	14	Either-sex, except antlerless or 3-Pt. min. in GMU 418	Early Archery General (WA)
	405 433 Bow area 831 damage hunt	11/22 - 12/15 11/22 - 12/15 11/22 - 12/10	19 19 14	Either-sex 3-Pt. min or antlerless 3-Pt. min or antlerless	Late Archery General (WA)
	405, 410, 418,426, 433, 440, 442, 448, 450	11/01 - 11/12 11/04 - 11/12	12 9	Bulls with visible antlers, except GMU 418 3-Pt. min.	Modern Firearm General (WE) Modern Firearm General (WL)
1990	405, 410, 418, 426, 433, 440, 442, 448, 450	09/29 - 10/12	14	Either-sex, except antlerless or 3-Pt. min. in GMU 418	Early Archery General (WA)
	405, 433 Bow area 831 (damage hunt)	11/21 - 12/09 11/21 - 12/09	19 19	Either-sex 3-Pt. min or antlerless	Late Archery General (WA) Late Archery General (any archery tag)
	405, 410, 418,426, 433, 440, 442, 448, 450	10/31 - 11/11 11/09- 11/17	12 9	Bulls with visible antlers, except GMU 418 3-Pt. min	Modern Firearm General (WE) Modern Firearm General (WL)
1991	405, 410, 418, 426, 433, 440, 442, 448, 450	09/28 - 10/11	14	Either-sex, except antlerless or 3-Pt min. in GMU 418	Early Archery General (WA)

Year	GMU Number and Permit (#s)	Dates	Days	Legal Animal	Hunt Description and Tag Type
1991 cont.	405, 433 Bow area 831 (damage hunt)	11/27 - 12/15 11/25 - 12/15	21 21	Either-sex 3-Pt. min. or antlerless	Late Archery General (WA) Late Archery General (any archery tag)
	405, 410, 418,426, 433, 440, 442, 448, 450	11/06 - 11/17 11/09- 11/17	12 9	Bulls with visible antlers, except GMU 418 3-Pt. minimum	Modern Firearm General (WE) Modern Firearm General (WL)
1992	405, 410, 426, 433, 440, 442, 448, 450	09/01 - 09/14	14	Either-sex	Early Archery General (WA)
	418	09/01 - 09/14	14	3-Pt. minimum	
	405, 433 Bow area 831 (damage hunt)	11/25 - 12/15 11/25 - 12/15	21 21	Either-sex 3-Pt. minimum	Late Archery General (WA) Late Archery General (any archery tag)
	405, 410, 418,426, 433, 440, 442, 448, 450	11/04 - 11/15 11/07 - 11/15	12 9	Bulls with visible antlers, except GMU 418 3-Pt. minimum	Modern Firearm General (WE) Modern Firearm General (WL)
1993	405, 410, 426, 433, 440, 442, 448, 450	09/01 - 09/14	14	Either-sex	Early Archery General (WA)
	418	09/01 - 09/14	14	3-Pt. minimum	
	405, 433 Bow area 831 (damage hunt)	11/24 - 12/15 11/24 - 12/15	23 23	Either-sex 3-Pt. minimum	Late Archery General (WA) Late Archery General (any archery tag)
	405, 410, 418,426, 433, 440, 442, 448, 450.	11/03 - 11/14 11/06- 11/13	12 9	Bulls with visible antlers, except GMU 418 3-Pt. minimum	Modern Firearm General (WE) Modern Firearm General (WL)
1994	405, 410, 426, 433, 440, 442, 448, 450	09/01 - 09/14	14	Either-sex	Early Archery General (WA)
	418	09/01 - 09/14	14	3-Pt. minimum	
	405, 433 Bow area 841 (damage hunt)	11/23 - 12/15 11/23 - 12/15	23 23	Either-sex Either-sex	Late Archery General (WA) Late Archery General (WA)
	405, 410, 418,426, 433, 440, 442, 448, 450	11/02 - 11/13 11/05- 11/13	12 9	Bulls with visible antlers, except GMU 418 3-Pt. minimum	Modern Firearm General (WE) Modern Firearm General (WL)
1995	405, 410, 426, 433, 440, 442, 448, 450	09/01 - 09/14	14	Either-sex	Early Archery General (WA)
	418	09/01 - 09/14	14	3-Pt. minimum	
	405, 433 Bow area 841 (damage hunt)	11/22 - 12/15 11/22 - 12/15	24 24	Either-sex Either-sex	Late Archery General (WA)
	405, 410, 418,426, 433, 440, 442, 448, 450	11/01 - 11/13 11/04- 11/13	14 10	Bulls with visible antlers, except GMU 418 3-Pt. minimum	Modern Firearm General (WB) Modern Firearm General (WC)
1996	405, 426, 433, 440, 442, 448 418	09/01 - 09/14 09/01 - 09/14	14 14	Either-sex 3-Pt. minimum	Early Archery general (WA)
	405, 433 Bow area 841 (damage hunt)	11/27 - 12/15 11/27 - 12/15	19 19	Either-sex Either-sex	Late Archery general (WA)
	405, 418, 426, 433, 440, 442, 448	11/06 - 11/17 11/09 - 11/17	9 7	Bulls with visible antlers, except GMU 418 3-Pt. minimum	Modern firearm general (WG) Modern firearm general (WP)
1997	407, 410, 426, 448 437	09/01 - 09/14 09/01 - 09/14	14 14	Spike or antlerless Any elk	Early Archery general (WA)
	407, 437 and Bow area 841 437	11/26 - 12/15 10/04 - 10/10	20 7	Spike or antlerless Spike or antlerless	Late Archery general (WA) Early Muzzleloader General (WM)
		11/26 - 12/15	20	Spike or antlerless	Late Muzzleloader General (WM)
	407, 426, 437, 448	11/08 - 11/16 11/10 - 11/16	9 7	Spike bull only Spike bull only	Modern Firearm General (WG) Modern Firearm General (WP)
1998	407, 448	09/01 - 09/14	14	3-Pt. min. or antlerless	Early Archery General (WA)
	407 Elk Area 041 (damage hunt)	11/25 - 12/15 11/25 - 12/31	21 37	3-Pt. min. or antlerless Antlerless only	Late Archery General (WA) Late Archery General (WA)

Year	GMU Number and Permit (#s)	Dates	Days	Legal Animal	Hunt Description and Tag Type
1999	Elk Area 041	10/10 - 10/16	7	Antlerless only	Early Muzzleloader Only (WM)
	Elk Area 041 (damage hunt)	11/25 - 01/31	37	Any elk	Late Muzzleloader Only (WM)
	407, 448	11/07 - 11/15	9	3-Pt. minimum	Modern Firearm General (WG)
	407, 448	09/01 - 09/14	14	3-Pt. min. or antlerless	Early Archery General (WA)
	407	11/24 - 12/15	22	3-Pt. min. or antlerless	Late Archery General (WA)
	407, 448	11/06 - 11/14	9	3-Pt. minimum	Modern Firearm General (WF)
	Muzz. Area 941 damage hunt	10/01 - 01/31	123	Any elk	Muzzleloader Only (WM)
2000	407, 448	09/01 - 09/14	14	3-Pt. min. or antlerless	Early Archery General (WA)
	407	11/22 - 12/15	24	3-Pt. min. or antlerless	Late Archery General (WA)
	407, 448	11/04 - 11/12	9	3-Pt. minimum	Modern Firearm General (WF)
	ML Area 941 damage hunt (Muzzleloader only)	11/01 - 01/31	92	Any elk	Elk Hunts Open to Specified Tag Holders (WM)
	ML Area 941 (archery only)	10/01 - 10/31	31	Any elk	Elk Hunts Open to Specified Tag Holders WA)
2001	407, 448	09/01 - 09/14	14	3-Pt. min. or antlerless	Early Archery General (WA)
	407	11/21 - 12/15	25	3-Pt. min. or antlerless	Late Archery General (WA)
	407, 448	11/03 - 11/11	9	3-Pt. minimum	Modern Firearm General (WF)
	ML Area 941 damage hunt (Muzzleloader only)	11/01 - 01/31	92	Any elk	Elk Hunts Open to Specified Tag Holders (WM)
	ML Area 941 (Archery only)	10/01 - 10/31	31	Any elk	Elk Hunts Open to Specified Tag Holders (WA)

APPENDIX B North Cascade Elk Herd Area Boundary Changes

Year	Game Management Units and Elk Areas	Adjustments
1980	400 Lummi, 418 Nooksack, 424 Lyman, 430 Samish, 433 Rockport, 442 Tulalip, 448 Stillaguamish. Elk Area 31, Hamilton.	No changes from previous year.
1981	GMUs 400, 418, 424, 430, 433, 442, 448 Elk Area 5, S. Skagit Elk Area 31, Hamilton Bow Area 4, Cavanaugh	GMU 448 boundary description changed. Added Elk Area 5 and Bow Area 4.
1982	GMUs 400, 418, 424, 430, 433, 442, 448 Elk Area 031, Hamilton	Only one elk area and no bow areas.
1983	GMUs 400, 418, 424, 430, 433, 442, 448 Bow Areas 804 Cavanaugh, 822 Cultus Mt., and 831 Hamilton Elk Area 031, Hamilton	Bow Area 831 same as Elk Area 031. Bow Area 822 Cultus Mt. is new. Bow Area 831 is new.
1984	GMUs 400, 418, 424, 430, 433, 440, 442, 448 Bow Area 822 Cultus Mt., and 831 Hamilton Elk Area 005, South Skagit	No changes made from previous year.
1985	GMUs 400, 418, 424, 430, 433, 440, 442, 448 Bow Area 822 and 831 Elk Area 005 and 031	No changes made from previous year.
1986	GMUs 400, 418, 424, 430, 433, 440, 442, 448 Bow Area 822 and 831 Elk Area 005 and 831	Elk Area 031 is 831.
1987	GMUs 405, 418, 433, 440, 442, 448 Bow Area 822B and 831B	GMUs 400 and 430 combined to form 405 Chuckanut.
1988	GMUs 405, 418, 433, 440, 442, 448 Bow Area 822 and 831	No changes made from previous year.
1989	GMUs 405, 418, 433, 440, 442, 448 Bow Area 831	No changes made from previous year.
1990	GMUs 405, 418, 433, 440, 442, 448 Bow Area 831	No changes made from previous year.
1991	GMUs 405, 418, 433, 440, 442, 448 Bow Area 831	No changes made from previous year.
1992	GMUs 405, 418, 433, 440, 442, 448 Bow Area 831	Common boundary of GMU 448 and 450 modified slightly.
1993	GMUs 405, 417(closed), 418, 440, 433, 442, 448 Bow Area 831	GMU 417 Bald Mt. created from part of GMU 418 Nooksack and closed to elk hunting as a “conservation closure.” GMU 433 and 448-description clarification.
1994	GMUs 405, 417(closed), 418, 440, 433, 442, 448	GMU 418, 442, and 448 description clarification.

Year	Game Management Units and Elk Areas	Adjustments
	Bow Area 831	GMU 433 new description although area not substantially changed.
1995	GMUs 405,417(closed), 418, 440, 433, 442, 448 Bow Area 831	GMU 433 identified Sauk Valley Rd as SR 530.
1996	GMUs 405,417(closed), 418, 440, 433, 442, 448 Bow Area 831	No changes made.
1997	GMUs 407 North Sound, 418 Nooksack, 426 Diablo, 437 Sauk, 448 Stillaguamish. GMU 418, 437 (closed)	GMU 405 and 442 were combined to form 407, North Sound. GMU 417 and 418 were combined to form 418 Nooksack and closed as "conservation closure." GMU 433 and 440 were combined to form 437 Sauk and closed to elk hunting.
1998	GMUs 407, 418, 426, 437, 448 Elk Area 041 (Skagit) GMU 418 and 437 (closed).	Elk Area 041 described for late season hunts for modern firearm, muzzleloader and archery.
1999	GMUs 407, 426, 448 Muzzleloader Area 941 GMU 418 and 437 (closed).	Common boundary between GMU 497 and 410 clarified. GMU 426 boundary with wilderness area clarified. Muzzleloader area 941 late season damage hunts created.
2000	GMU 407, 448 GMU 418, 437 (closed) Muzzleloader Area 941	GMU 426 amended description, same area. GMU 437 boundary clarification.
2001	GMU 407, 448 GMU 418, 437 (closed) Muzzleloader Area 941	GMU 426 new description, same area.

APPENDIX C Management Authority For Controlling Elk Damage

RCW 77.36.005

Findings. (*Expires June 30, 2004.*)

The legislature finds that:

(1) As the number of people in the state grows and wildlife habitat is altered, people will encounter wildlife more frequently. As a result, conflicts between humans and wildlife will also increase. Wildlife is a public resource of significant value to the people of the state and the responsibility to minimize and resolve these conflicts is shared by all citizens of the state.

(2) In particular, the state recognizes the importance of commercial agricultural and horticultural crop production, rangeland suitable for grazing or browsing of domestic livestock, and the value of healthy deer and elk populations, which can damage such crops. The legislature further finds that damage prevention is key to maintaining healthy deer and elk populations, wildlife-related recreational opportunities, commercially productive agricultural and horticultural crops, and rangeland suitable for grazing or browsing of domestic livestock, and that the state, participants in wildlife recreation, and private landowners and tenants share the responsibility for damage prevention. Toward this end, the legislature encourages landowners and tenants to contribute through their land management practices to healthy wildlife populations and to provide access for related recreation. It is in the best interests of the state for the department of fish and wildlife to respond quickly to wildlife damage complaints and to work with these landowners and tenants to minimize and/or prevent damages and conflicts while maintaining deer and elk populations for enjoyment by all citizens of the state.

(3) A timely and simplified process for resolving claims for damages caused by deer and elk for commercial agricultural or horticultural products, and rangeland used for grazing or browsing of domestic livestock is beneficial to the claimant and the state.

[2001 c 274 § 1; 1996 c 54 § 1.]

NOTES:

Expiration date -- 2001 c 274 §§ 1-3: "The following expire June 30, 2004:

- (1) Section 1, chapter 274, Laws of 2001;
- (2) Section 2, chapter 274, Laws of 2001; and
- (3) Section 3, chapter 274, Laws of 2001." [2001 c 274 § 5.]

Effective date -- 2001 c 274: "This act is necessary for the immediate preservation of the public peace, health, or safety, or support of the state government and its existing public institutions, and takes effect July 1, 2001." [2001 c 274 § 6.]

RCW 77.36.005

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The legislature finds that:

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(3) A timely and simplified process for resolving claims for damages caused by deer and elk for commercial agricultural or horticultural products is beneficial to the claimant and the state.

[1996 c 54 § 1.]

RCW 77.36.010

Definitions. (Expires June 30, 2004.)

The definitions in this section apply throughout this chapter unless the context clearly requires otherwise.

(1) "Crop" means (a) a growing or harvested horticultural and/or agricultural product for commercial purposes; or (b) rangeland forage on privately owned land used for grazing or browsing of domestic livestock for at least a portion of the year for commercial purposes. For the purposes of this chapter all parts of horticultural trees shall be considered a crop and shall be eligible for claims.

(2) "Emergency" means an unforeseen circumstance beyond the control of the landowner or tenant that presents a real and immediate threat to crops, domestic animals, or fowl.

(3) "Immediate family member" means spouse, brother, sister, grandparent, parent, child, or grandchild.

[2001 c 274 § 2; 1996 c 54 § 2.]

NOTES:

Expiration date -- 2001 c 274 §§ 1-3: See note following RCW 77.36.005.

Effective date -- 2001 c 274: See note following RCW 77.36.005.

RCW 77.36.010

Definitions. (Effective June 30, 2004.)

Unless otherwise specified, the following definitions apply throughout this chapter:

(1) "Crop" means a commercially raised horticultural and/or agricultural product and includes growing or harvested product but does not include livestock. For the purposes of this chapter all parts of horticultural trees shall be considered a crop and shall be eligible for claims.

(2) "Emergency" means an unforeseen circumstance beyond the control of the landowner or tenant that presents a real and immediate threat to crops, domestic animals, or fowl.

(3) "Immediate family member" means spouse, brother, sister, grandparent, parent, child, or grandchild.

[1996 c 54 § 2.]

RCW 77.36.020

Game damage control -- Special hunt.

The department shall work closely with landowners and tenants suffering game damage problems to control damage without killing the animals when practical, to increase the harvest of damage-causing animals in hunting seasons, and to kill the animals when no other practical means of damage control is feasible.

If the department receives recurring complaints regarding property being damaged as described in this section or RCW 77.36.030 from the owner or tenant of real property, or receives such complaints from several such owners or tenants in a locale, the commission shall consider conducting a special hunt or special hunts to reduce the potential for such damage.

[1996 c 54 § 3.]

RCW 77.36.030

Trapping or killing wildlife causing damage -- Emergency situations.

(1) Subject to the following limitations and conditions, the owner, the owner's immediate family member, the owner's documented employee, or a tenant of real property may trap or kill on that property, without the licenses required under RCW 77.32.010 or authorization from the director under RCW 77.12.240, wild animals or wild birds that are damaging crops, domestic animals, or fowl:

(a) Threatened or endangered species shall not be hunted, trapped, or killed;

(b) Except in an emergency situation, deer, elk, and protected wildlife shall not be killed without a permit issued and conditioned by the director or the director's designee. In an emergency, the department may give verbal permission followed by written permission to trap or kill any deer, elk, or protected wildlife that is damaging crops, domestic animals, or fowl; and

(c) On privately owned cattle ranching lands, the land owner or lessee may declare an emergency only when the department has not responded within forty-eight hours after having been contacted by the land owner or lessee regarding damage caused by wild animals or wild birds. In such an emergency, the owner or lessee may trap or kill any deer, elk, or other protected wildlife that is causing the damage but deer and elk may only be killed if such lands were open to public hunting during the previous hunting season, or the closure to public hunting was coordinated with the department to protect property and livestock.

(2) Except for coyotes and Columbian ground squirrels, wildlife trapped or killed under this section remain the property of the state, and the person trapping or killing the wildlife shall notify the department immediately. The department shall dispose of wildlife so taken within three days of receiving such a notification and in a manner determined by the director to be in the best interest of the state.

[1996 c 54 § 4.]

RCW 77.36.040

Payment of claims for damages -- Procedure -- Limitations.

(1) Pursuant to this section, the director or the director's designee may distribute money appropriated to pay claims for damages to crops caused by wild deer or elk in an amount of up to ten thousand dollars per claim. Damages payable under this section are limited to the value of such commercially raised horticultural or agricultural crops, whether growing or harvested, and shall be paid only to the owner of the crop at the time of damage, without assignment. Damages shall not include damage to other real or personal property including other vegetation or animals, damages caused by animals other than wild deer or elk, lost profits, consequential damages, or any other damages whatsoever. These damages shall comprise the exclusive remedy for claims against the state for damages caused by wildlife.

(2) The director may adopt rules for the form of affidavits or proof to be provided in claims under this section. The director may adopt rules to specify the time and method of assessing damage. The burden of proving damages shall be on the claimant. Payment of claims shall remain subject to the other conditions and limits of this chapter.

(3) If funds are limited, payments of claims shall be prioritized in the order that the claims are received. No claim may be processed if:

(a) The claimant did not notify the department within ten days of discovery of the damage. If the claimant intends to take steps that prevent determination of damages, such as harvest of damaged crops, then the claimant shall notify the department as soon as reasonably possible after discovery so that the department has an opportunity to document the damage and take steps to prevent additional damage; or

(b) The claimant did not present a complete, written claim within sixty days after the damage, or the last day of damaging if the damage was of a continuing nature.

(4) The director or the director's designee may examine and assess the damage upon notice. The department and claimant may agree to an assessment of damages by a neutral person or persons knowledgeable in horticultural or agricultural practices. The department and claimant shall share equally in the costs of such third party examination and assessment of damage.

(5) There shall be no payment for damages if:

(a) The crops are on lands leased from any public agency;

(b) The landowner or claimant failed to use or maintain applicable damage prevention materials or methods furnished by the department, or failed to comply with a wildlife damage prevention agreement under RCW 77.12.260;

(c) The director has expended all funds appropriated for payment of such claims for the current fiscal year; or

(d) The damages are covered by insurance. The claimant shall notify the department at the time of claim of insurance coverage in the manner required by the director. Insurance coverage shall cover all damages prior to any payment under this chapter.

(6) When there is a determination of claim by the director or the director's designee pursuant to this section, the claimant has sixty days to accept the claim or it is deemed rejected.

[1996 c 54 § 5.]

RCW 77.36.050

Claimant refusal -- Excessive claims.

If the claimant does not accept the director's decision under RCW 77.36.040, or if the claim exceeds ten thousand dollars, then the claim may be filed with the office of risk management under RCW 4.92.040(5). The office of risk management shall recommend to the legislature whether the claim should be

paid. If the legislature approves the claim, the director shall pay it from moneys appropriated for that purpose. No funds shall be expended for damages under this chapter except as appropriated by the legislature.

[1996 c 54 § 6.]

RCW 77.36.060

Claim refused -- Posted property.

The director may refuse to consider and pay claims of persons who have posted the property against hunting or who have not allowed public hunting during the season prior to the occurrence of the damages.

[1996 c 54 § 7.]

RCW 77.36.070

Limit on total claims from wildlife fund per fiscal year.

The department may pay no more than one hundred twenty thousand dollars per fiscal year from the wildlife fund for claims under RCW 77.36.040 and for assessment costs and compromise of claims. Such money shall be used to pay animal damage claims only if the claim meets the conditions of RCW 77.36.040 and the damage occurred in a place where the opportunity to hunt was not restricted or prohibited by a county, municipality, or other public entity during the season prior to the occurrence of the damage.

[1996 c 54 § 8.]

RCW 77.36.080

Limit on total claims from general fund per fiscal year -- Emergency exceptions. (*Expires June 30, 2004.*)

(1) The department may pay no more than thirty thousand dollars per fiscal year from the general fund for claims under RCW 77.36.040 and for assessment costs and compromise of claims unless the legislature declares an emergency. Such money shall be used to pay animal damage claims only if the claim meets the conditions of RCW 77.36.040 and the damage occurred in a place where the opportunity to hunt was restricted or prohibited by a county, municipality, or other public entity during the season prior to the occurrence of the damage.

(2) The legislature may declare an emergency, defined for the purposes of this section as any happening arising from weather, other natural conditions, or fire that causes unusually great damage by deer or elk to commercially raised agricultural or horticultural crops, or rangeland forage on privately owned land used for grazing or browsing of domestic livestock for at least a portion of the year. In an emergency, the department may pay as much as may be subsequently appropriated, in addition to the funds authorized under subsection (1) of this section, for claims under RCW 77.36.040 and for assessment and compromise of claims. Such money shall be used to pay animal damage claims only if the claim meets the conditions of RCW 77.36.040 and the department has expended all funds authorized under RCW 77.36.070 or subsection (1) of this section.

(3) Of the total funds available each fiscal year under subsection (1) of this section and RCW 77.36.070, no more than one-third of this total may be used to pay animal damage claims for rangeland forage on privately owned land.

(4) Of the total funds available each fiscal year under subsection (1) of this section and RCW 77.36.070 that remain unspent at the end of the fiscal year, fifty percent shall be utilized as matching grants to enhance habitat for deer and elk on public lands.

[2001 c 274 § 3; 1996 c 54 § 9.]

NOTES:

Expiration date -- 2001 c 274 §§ 1-3: See note following RCW 77.36.005.

Effective date -- 2001 c 274: See note following RCW 77.36.005.

RCW 77.36.080

Limit on total claims from general fund per fiscal year -- Emergency exceptions. (Effective June 30, 2004.)

(1) The department may pay no more than thirty thousand dollars per fiscal year from the general fund for claims under RCW 77.36.040 and for assessment costs and compromise of claims unless the legislature declares an emergency. Such money shall be used to pay animal damage claims only if the claim meets the conditions of RCW 77.36.040 and the damage occurred in a place where the opportunity to hunt was restricted or prohibited by a county, municipality, or other public entity during the season prior to the occurrence of the damage.

(2) The legislature may declare an emergency, defined for the purposes of this section as any happening arising from weather, other natural conditions, or fire that causes unusually great damage to commercially raised agricultural or horticultural crops by deer or elk. In an emergency, the department may pay as much as may be subsequently appropriated, in addition to the funds authorized under subsection (1) of this section, for claims under RCW 77.36.040 and for assessment and compromise of claims. Such money shall be used to pay animal damage claims only if the claim meets the conditions of RCW 77.36.040 and the department has expended all funds authorized under RCW 77.36.070 or subsection (1) of this section.

[1996 c 54 § 9.]

RCW 77.36.900

Application -- 1996 c 54.

Chapter 54, Laws of 1996 applies prospectively only and not retroactively. It applies only to claims that arise on or after July 1, 1996.

[1996 c 54 § 10.]

RCW 77.36.901

Effective date -- 1996 c 54.

Sections 1 through 12 of this act shall take effect July 1, 1996.

[1996 c 54 § 13.]

**Pop-II Modeling of the North Cascade Elk Herd (Population Responses)
With and Without Augmentation**

Lou Bender, WDFW

Background

To evaluate potential management options for the Nooksack subherd, I used Pop-II software to build a deterministic population model. My goals were to mimic the: (1) minimum population trend estimates observed; (2) mortality rates derived from age-structure; and (3) observed sex and age ratios.

I used this simulation model to show seven different management options for the Nooksack subherd. These options are not intended to be exhaustive; rather, they provide an idea of the magnitude and timing of responses that might be expected from the Nooksack population. Each option was run for only the core population, with an initial population size of 100 elk. Pregnancy rates were assumed to be 10 percent for yearling cows and 85 percent for adults (except in Option 6).

Options

*Option 1. **Base:*** projection of the base population model with expected elk survival rates; assumes that the 100 elk act as a single population.

*Option 2. **MSI_5:*** projection of the base model with a mortality severity index (MSI) of 5 to simulate lower than expected survival of all sex and age classes. This might be expected if the 100 elk are acting as two or more distinct sub-populations, and experiencing small population effects.

*Option 3. **MSI_10:*** projection of the base model with an MSI of 10 to simulate lower than expected survival of all sex and age classes, such as may be expected with severe winters or dry summers.

*Option 4. **MSI_15:*** projection of the base model with an MSI of 15 to simulate the lowest expected survival level of all sex and age classes, based on interpretation of historical Nooksack subherd data.

*Option 5. **S_50:*** projection assuming that calf mortality rates are half that in the base model. This option results in population ratios similar to those observed in the Nooksack during the periods of rapid herd development (population increase).

*Option 6. **Augmentation:*** Identical to Options 1-4, except that the initial population is augmented by introducing 100 elk (25 bulls; 75 cows) prior to calving. The introduced 75 cows produce 25 calves, for a total one-time population augmentation of 125 elk (25 bulls, 75 cows, 25 calves).

Option 7. Stochastic model: projections incorporating variations in each survival or mortality rate of the base Pop-II model. Rates were distributed normally with the mean used in the base model, and with a range equal to one-half the mean estimate. This option results in a mean estimate for 100 runs of the model, with an estimate of the variance associated with the population estimate, and a range of population responses. (Not shown).

Results

Options 1 through 6 were each run for 20 years using the Pop-II modeling program and compared in terms of resultant population sizes. Only Option 5 results in significant growth of the Nooksack subherd with no augmentation. In no other option does the initial population (100) grow to exceed 250 elk within 20 years (Table 1; Figure 1) Options 1-5 no augmentation.

Figure 1. Expected population responses of the Nooksack subherd without augmentation. No population response exceeds 250 elk with the exception of Option 6 (calf mortality decreased by 50%).

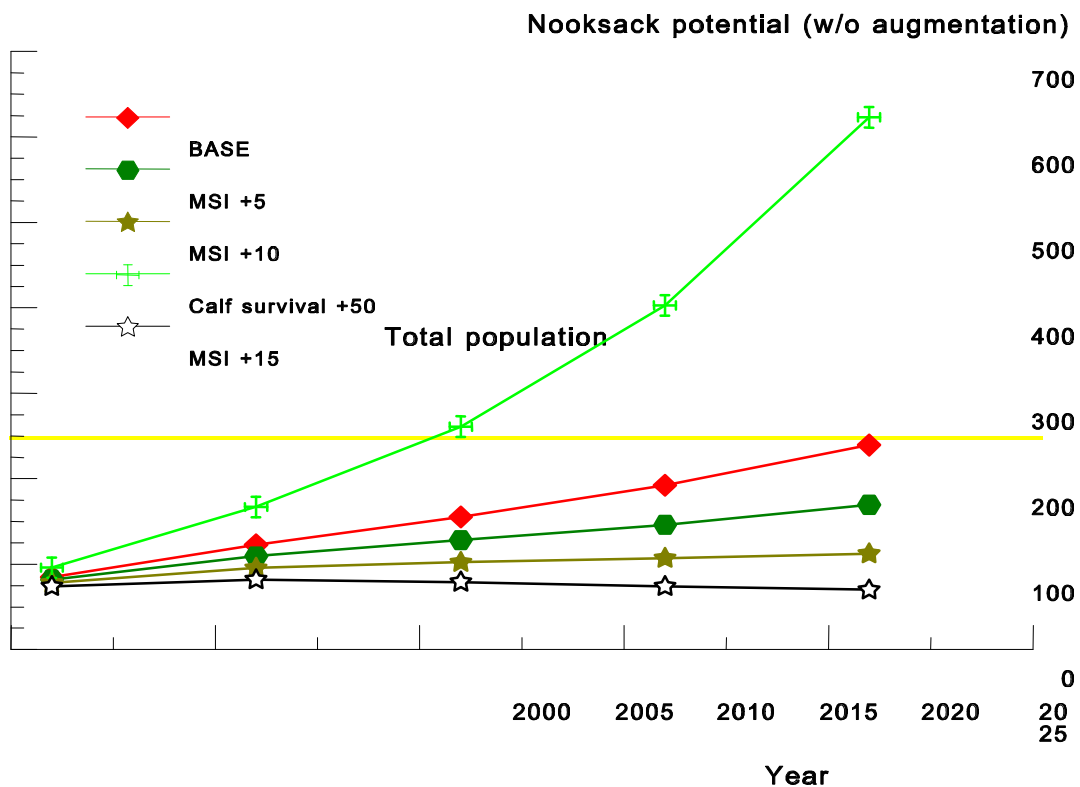
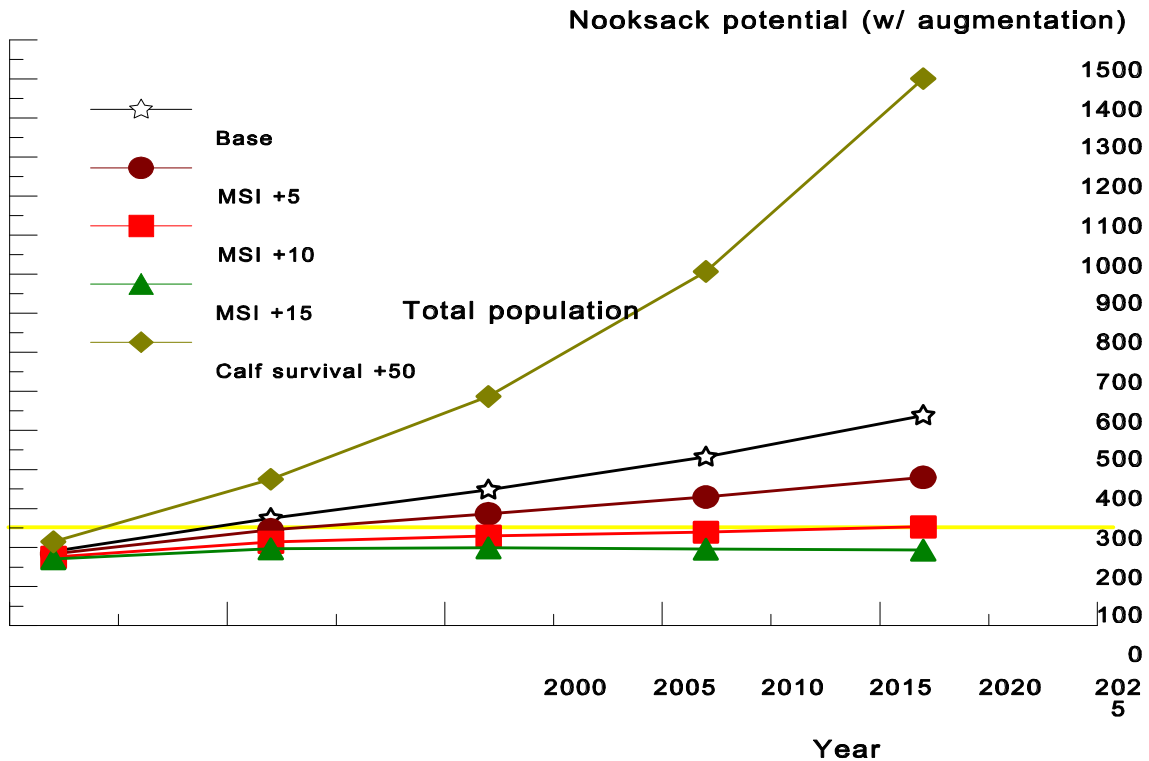


Figure 2. Expected population responses of the Nooksack subherd following augmentation. All options exceed 250 elk except the MSI_15 option.



Options 1-5 -- augmentation.

With augmentation, options 4 and 5 result in significant growth of the Nooksack subherd (Table 1; Figure 2). All options except the MSI_15 option exceed 250 elk.

Option 6.

Adding environmental variations to the deterministic population model provides an idea of the range of population responses due to chance alone. The base model without augmentation predicts a population of 285 elk, within a potential range of 154 to 474, after 20 years. With a one-time augmentation of 100 elk, the expected population after 20 years is 655 animals, within a range of 360 to 1,083. (Assumes no hunting mortality)

Table 1. Predicted Nooksack subherd population sizes, stabilized composition, stabilized survival rates, and stochastic population response estimates for the base model. Models projected include Base (deterministic and stochastic), MSI_5, MSI_10, MSI_15, and S_50. Under each model (for example, Base), the left column = non-augmented population, and the right column = the population response with augmentation.

Year	Base		MSI_5		MSI_10		MSI_15		S_50	
2001	85	191	82	184	78	176	74	171	96	215
2006	122	275	109	245	95	214	82	197	167	375
2011	155	348	128	287	102	230	79	199	261	587
2016	192	432	146	330	107	240	74	196	403	907
2021	239	538	169	380	112	253	70	194	623	1401
Stabilized composition ratios										
Bull to cow	58:100		56:100		54:100		51:100		62:100	
Calf to cow	48:100		47:100		45:100		44:100		53:100	
Stabilized survival rates										
Bulls	0.76		0.75		0.73		0.72		0.76	
Cows	0.87		0.86		0.85		0.84		0.87	
Calves	0.73		0.70		0.68		0.65		0.82	
Randomized population runs										
Mean	285	655								
SD	48	112								
Min	154	360								
Max	474	1083								

AUGMENTATION PLAN FOR THE NORTH CASCADE (NOOKSACK) ELK HERD

INTRODUCTION

Augmentation of the North Cascade (Nooksack) elk herd is a desirable option for accelerating herd population growth and expanding geographic range. POP-II modeling of the North Cascades elk herd (population responses) with and without augmentation clearly showed the potential of augmentation as a way of increasing elk populations (Bender 2000, Appendix D).

OBJECTIVES

The specific management objectives facilitated by augmentation include:

1. Increase elk population numbers in the North Cascade elk herd to a level at or above the late 1980's estimate of 1,700 animals GMU 418 (Nooksack).
2. Promote expansion of the North Cascade elk herd distribution into potential elk range south of the Skagit River in GMU 437 (Sauk), GMU 448 (Stillaguamish), and GMU 450 (Cascade). Population objectives for newly established elk range south of the Skagit River have not been established, but would be based upon a comprehensive landscape habitat evaluation utilizing GIS/Landsat mapping.

RELEASE CRITERIA

- The Wildlife Program will gain clearance from land management agencies, cooperate with Tribes, and reach consensus among private landowners of the affected area.
- Existing lethal options will be used to address damage problems should they arise.
- The proposal must meet the test of good science to achieve goals and objectives of the release site plan.
- Disease free certification
- Genetic assessment
- The release is affordable and beneficial.
- The augmentation is targeted to begin February-March, 2003.

COORDINATION AND COOPERATION

The Washington State Department of Fish and Wildlife (WDFW) is committed to a cooperative working relationship with landowners (state, federal, and private), the Rocky Mountain Elk Foundation, local sports clubs and community organizations, and federally recognized Indian Treaty Tribes. The North Cascade (Nooksack) elk herd occupies lands that fall within the ceded area of the Point Elliot Treaty Tribes (Lummi, Nooksack, Muckleshoot, Upper Skagit, Sauk-Suiattle, Stillaguamish, Swinomish, Suquamish and Snohomish >Tulalip Reservation=). The tribes have expressed support for augmentation of elk in GMUs 418 and 437, but are concerned about road access for ceremonial and administrative purposes. Approximately one-third of GMU 437 (Sauk) is in federal ownership administered by the U.S. Forest Service and would require

National Environmental Policy Act (NEPA) review and permitting for any releases on these federal lands.

POTENTIAL AUGMENTATION SITES

Two geographic areas have been identified as potential augmentation sites; (1) Primary (historical) range of the Nooksack elk herd - GMU 418 and (2) New (expanded) range south of the Skagit River in GMUs 437, 448, and 450.

A. Primary (Historical) Range of the GMU 418 (Nooksack) Elk Herd

Background and justification: The proposed release of elk into historical range of the Nooksack elk herd would include lands within GMU 418 (Nooksack) located east of Highway 9 and north of State Route 20 in Whatcom and Skagit counties. This represents an area of approximately 500 square miles. The estimated peak population of 1700 elk occurred in 1984. The North Cascade (Nooksack) Elk Herd Plan identifies a population objective for the North Cascade elk herd that would increase the current population (estimated at approximately 300 animals) to levels at or above the mid 1980's estimated population of 1,950 animals.

Specific release sites: Five proposed release areas have been identified within four different drainages. These include Canyon Creek (Whatcom County), the Middle Fork Nooksack River, Olivine Mine (300 RD - Crown), Rocky Creek, and Howard Creek (200 RD - Crown). These areas all provide main road access to strategic portions of the primary elk range allowing for optimal distribution of released elk in locations away from potential damage problems. Specific release sites within these general areas will be selected following coordination with landowners, tribal representatives, and local partners.

B. Extending Elk Range in GMU 437 (Sauk)

Background and Justification: The potential for extending the range of the Nooksack elk herd into lands south of the Skagit River has been identified in the North Cascade Elk Herd Plan. The primary focus for potential augmentation would be GMU 437 (Sauk) however, GMUs 448 (Stillaguamish) and 450 (Cascade) could ultimately be included in augmentation planning at some future date. GMU 437 (Sauk) represents a geographical area of approximately 640 square miles positioned south of the South Skagit Highway, east of Highway 9, west of the Concrete-Sauk Valley Rd, and north of the Darrington Highway (SR 530) in Skagit and Snohomish counties. Elk use of this area has been documented over the last 10 years but has been characterized as minimal and seasonally sporadic.

Specific Release Sites: Potential release sites for this area have not been identified pending a scheduled habitat analysis utilizing GIS/Landsat mapping. Primary winter range (volume and dispersal), road access, road density, habitat type, land ownership and potential migration corridors will all serve as the basis for future release site selection.

LAND OWNERSHIP

The U.S. Forest Service, Washington State Department of Natural Resources, Crown Pacific, Inc., and The Campbell Group all own and manage forest lands in GMU 418 (Nooksack).

Three of the potential release sites are located on U.S. Forest Service lands. Approval of augmentation activities on federal land will require coordination with the Forest Service via a NEPA review. This review process ordinarily takes from 30 - 45 days. Preliminary discussions and plans to begin the NEPA review have already begun. In GMU 437 (Sauk) the U.S. Forest Service, Washington State Department of Natural Resources, The Campbell Group, Longview Fiber Company and Arbor Pacific (Grandy Lake Forest) represent the predominant landowners.

ACCESSIBILITY

Access to the release sites is not anticipated to be a problem under normal weather conditions. Most potential release areas are accessible by well-maintained gravel roads. Road management programs presently exist on federal, state, and private timber lands and is currently under review and renegotiation. There are no pre-existing road management programs related to elk management in GMU 437 (Sauk). The majority of existing roads is currently gated and subject to seasonal and/or year around restricted access.

POTENTIAL CONFLICTS AND RESOLUTIONS

Potential Dispersal: The GMU 418 (Nooksack) elk range is a geographically small region bordered by agricultural lands on three sides. Although all of the proposed release areas have been selected based upon the potential to maximize the distance from lowland agricultural areas, none of the sites selected will allow for more than 8 miles separation from damage sensitive areas.

Although GMU 437 (Sauk) is slightly larger than the historical elk range in GMU 418 (Nooksack), this unit parallels the problems identified in the Nooksack region in that the relative distances from the central portion of the area to adjacent agricultural lands is small. Agricultural lands border this unit on all four sides with the predominant land use being pasture for beef and dairy cattle. GIS/Landsat habitat analysis will also play a significant role in evaluating potential dispersal of transplanted elk.

Damage: Two issues have been identified that need to be addressed. They are; (1) the potential for increase damage to agricultural crops on private lands adjacent to primary elk range and (2) tribal concerns regarding access to lands under road management (road closure) programs.

It is important to note that elk related damage problems currently occur throughout the entire periphery of elk range in GMU 418 and have historically occurred at levels considerably higher than exist today. The more relevant management issues associated with augmentation of the North Cascades herd with elk from other herds are suitability of the local habitat to support new (additional) animals and the possibility that introduced elk may have difficulty acclimating to a new area or that relocated animals may have a higher affinity for agricultural damage. Preliminary results from an ongoing research project funded and implemented by Washington Department of Fish and Wildlife, Rocky Mountain Elk Foundation, and local Indian Tribes indicates that elk nutritional levels in the North Cascades herd are among the highest in western Washington as compared to other herds. Radio telemetry monitoring of resident animals also confirms that substantial portions of the historically used range are currently unutilized and therefore available to

support additional animals. This suggests that introduced elk would be well supported on potential release sites and less likely to migrate to lowland agricultural areas. Radio monitoring of resident elk also indicates that local animals within the core or central portion of the primary range rely very little on adjacent farmland. It is reasonable to expect that introduced elk will initially interact with resident elk in the core area and would therefore be more likely to demonstrate the same tendency to avoid damage sensitive areas.

The issue of elk damage to agricultural lands adjacent to GMU 437 (Sauk) differs from that of GMU 418 (Nooksack) in two ways; 1) except for elk depredation problems in the Day Creek area (south of the Skagit River) there is little historical documentation of elk damage throughout the majority of GMU 437 and 2) the potential for elk damage in GMU 437 (Sauk) is substantially higher than that experienced in GMU 418 (Nooksack) in that farm and agricultural lands surround the Sauk unit on all four sides as compared to only two sides in GMU 418. Although these differences do not preclude elk introductions south of the Skagit River, they do obligate the Department and working partners to a higher degree of analysis in the planning process. The first step in this process involves a detailed GIS/Landsat habitat analysis of the entire land base in GMU 437 (Sauk) with emphasis upon the identification and delineation of potential summer and winter range areas, natural travel corridors, road density patterns and vegetative components. This project would be completed prior to completion of a final release site plan and would assist in the selection of potential release sites, as well as, facilitate a NEPA review on federal lands.

Road Management: Tribal concern regarding land access on private properties is an issue requiring discussions with private timber companies. Preliminary conversations with timber company representatives attending the public hearing for the North Cascade (Nooksack) Elk Herd Plan indicate that private land managers are willing to meet with WDFW and tribal representatives to explore options.

Damage: The following summary of mitigation-s recommended to address damage problems:

- ! Capturing and relocating animals only from locations that currently do not experience damage problems will address the concern regarding the potential predisposition of introduced elk to cause damage.
- ! Location of release sites as far to the interior of the GMU as practical.
- ! WDFW will adopt an Azero tolerance@policy in responding to any damage occurring as a result of elk introductions. This contingency plan prioritizes lethal removal of offending animals as opposed to spending considerable time and expense relocating problem elk that are likely to repeatedly return to damage areas.
- ! Establishment of road management (road closure) program designed to minimize human disturbance.
- ! Placement of forage enhancement plots on or near selected release sites.
- ! Under kill permits provide the animal carcass for Tribal use.

BIOLOGICAL CONSIDERATIONS

Numbers and composition of elk: We propose as many as 75-100 or more animals to be released in each of the identified augmentation areas depending upon availability.

Genetics: The North Cascade elk herd is considered a mixed genetic stock resulting from multiple re-introductions occurring in 1912, 1946, and 1948. The Nooksack region is generally considered as having been a northern extension of the historical Roosevelt elk (*C. e. roosevelti*) range. Although not specifically referenced in the literature, the lands south of the Skagit River in GMU 437 (Sauk) were likely included in the northern extension of the historical Roosevelt elk (*C. e. roosevelti*) range. The proposed source for augmentation elk is the Olympic Peninsula, which would increase Roosevelt elk genetic characteristics in the herd. The Washington Department of Fish and Wildlife has completed some genetic analysis of elk in the area and will continue to do so.

Transport: Elk will be transported in cattle trucks or large stock trailers. Winter accessibility is not a concern for this area in normal weather conditions.

Timing of capture and release: The capture of cows/calves and yearling bulls will primarily occur in January - March 2002. Introduction of elk into GMU 437 (Sauk) is considered a secondary priority behind the augmentation in GMU 418.

MONITORING OF RELEASED ANIMALS

Marking: A minimum of 20% of the animals will be radio collared. All released animals will be marked with colored collars or plastic ear tags (color coded/numbered).

Monitoring: Radio collared elk will be monitored a minimum of twice monthly for approximately 12 months using volunteers and Department personnel. More frequent monitoring will occur following the initial release. Particular attention will be given to movements onto private lands and potential damage conflicts. Department personnel will maintain a record of sightings of marked elk. Radio collared elk will primarily be monitored by ground surveys with occasional aerial surveys by helicopter or fixed wing aircraft. Monitoring is estimated to require approximately 4 hours of flight time per survey with a minimum of three flights. Radio telemetry equipment and other monitoring tools will be purchased. Helicopter flight time costs are estimated to be \$7,500 for the 12 hours needed.

ONGOING RESEARCH

An ongoing cooperative study with the Department, Rocky Mountain Elk Foundation and Point Elliot Treaty Tribes is focused upon two elements of herd research 1) Movements and Habitat Description and 2) Nutritional Ecology. The addition of 20 new radio collared elk and approximately 80+ marked animals associated with augmentation efforts will greatly enhance the research projects currently in progress provided that supplementary funding can be acquired. The nutritional component of the research is part of a multi-state study to monitor and evaluate nutritional levels on a seasonal basis. The estimated cost of adding the 20 new radio collared elk to ongoing research efforts is \$10,000 per capture @ 3 re-captures per year = \$30,000. The newly tagged animals will also facilitate mark/re-sight population modeling.

There is currently no ongoing elk research being conducted in GMU 437 (Sauk). However it will be necessary to complete the GIS/Landsat habitat analysis prior to final planning and potential introduction of elk. The addition of new radio collars on released elk in GMU 437 (Sauk) does open the possibility of extending the ongoing movements/habitat utilization and nutritional ecology research in GMU 418 (Nooksack) to the range south of the Skagit River in GMU 437.

ISSUES ANALYSIS

The costs associated with capture, transport and release of elk into the Nooksack elk range (GMU 418) and GMU 437 (Sauk) will be cost effective. Economic analysis by Myers (1999) concluded that the value of elk to the state and local economy was as high as \$1,945 per harvested animal in the Blue Mountains. The economic benefits generated from public viewing are less clearly defined but are considered positive with a high degree of growth potential in the future.

The release of up to 200 elk into the North Cascade (Nooksack) elk herd area will increase the herd's potential to reach management objectives, accelerate the current growth rate, increase recreational opportunity, increase financial returns to the local economy, and facilitate re-establishment of both tribal and non-tribal hunting opportunities.

Augmentation does present some social and political challenges. Although the local community as a whole is very supportive of elk introductions, the potential for increased agricultural damage is an ongoing concern of farmers. WDFW commitment to a zero tolerance policy regarding damage problems associated with released elk will be controversial with some community groups and will require significant discussion and information exchange prior to actual release of elk. In GMU 437 (Sauk) the social and political challenges associated with the potential for increased agricultural damage resulting from elk introductions are compounded by the fact that elk have little recent history of use throughout this unit. Adjacent farmland owners have little or no previous experience with elk and therefore have little tolerance for elk damage. Resolving local concerns will require a substantial commitment to community based information and education meetings and assurances to potentially impacted landowners and political representatives that the Washington Department of Fish and Wildlife commitment to monitoring and a zero tolerance policy is both genuine and practical.

Road management (closures) currently exists within the herd area but some are due for re-negotiation with private timber companies. Gated and/or administratively restricted roads are controversial with the general public and the tribes. From an elk management perspective, strategically placed road closures are considered essential to the ultimate success of both habitat enhancement and augmentation projects. Private landowners and government land managers alike support and establish road closures in order to control vandalism, garbage dumping, cedar theft, fire danger, and liability. Re-establishment of existing road closures and potential establishment of new closures will necessitate coordination with landowners, tribal representatives and the local community.

Public safety is a consideration when elk routinely cross major roads like Highway 20 and State Route 9. The potential for introduced elk to create a chronic safety problem is generally considered low and would ordinarily be resolved by non-lethal control measures like hazing and site specific traffic signing in cooperation with the Department of Transportation

PUBLIC PROCESS

The following description of the remaining public involvement and implementation process is provided as a general guideline.

- ! Completion and finalization of the North Cascade (Nooksack) Elk Herd Plan (Augmentation Plan included):
 - \$ Completion of public comment.
 - \$ WDFW Executive Management Team input.
 - \$ WDFW Director approval.
- ! Completion of the augmentation plan for the North Cascade (Nooksack) elk herd:
 - \$ Tribal review and input.
 - \$ Landowners and land management agency review and input.
- ! U. S. Forest Service NEPA review and public involvement where required:
 - \$ Draft an Environmental Analysis (EA).
 - \$ USFS decision.
 - \$ USFS permitting
- ! Elk Augmentation implementation

ESTIMATED COST

The estimated costs of capturing, transplanting and monitoring released elk is presented in Table 1. The costs of monitoring released elk will be borne by the Washington Department of Fish and Wildlife and Point Elliott Treaty Tribes. Seasoned and trained volunteers will be used where appropriate in the capture operation. During transport and release volunteers with their vehicles and trailers will be used where available.

Table 1. Estimated costs of capturing, transplanting and monitoring elk.

Helicopter Immobilization (Excludes permanent personnel)	Costs
Helicopter/Drugs	\$43,000.00
Disease testing	\$3,000.00
Labor trapping (volunteers)	\$00.00
Transport (mostly volunteers)	\$2,400.00
Radio transmitter collars	\$10,000.00
Monitoring	\$30,000.00
Total	\$88,400.00

HUNTING THRESHOLDS

The following thresholds will be used as guidelines to re-establish hunting seasons following elk herd augmentation and in cooperation with the Point Elliott Treaty Indian Tribes.

Nooksack Unit

Established baseline criteria as follows:

1. Hunting season establishment will not be considered for a minimum of 1 year following end of elk augmentation (damage hunting seasons removal excluded).
2. A population level of \$400 elk in balance with the habitat.

3. There is an agreement amongst the parties on total harvest and Treaty/Non-treaty sharing.
4. Bull harvest criteria.
 - The spring estimated population size is \$ 400 elk.
 - Elk population shows a 2-year positive growth trend.
 - The spring calf per cow ratio \$25 calves per 100 cows (assumes and requires \$88 percent female survival).
 - The fall bull per cow ratio approximately 25 per 100 cows consistent with sound biological principles.
5. Cow harvest criteria.
 - The spring estimated population is \$750 elk.
 - Elk population shows a 2-year positive growth trend.
 - The spring calf per cow ratio \$25 calves per 100 cows.
 - The fall bull per cow ratio approximately 25 per 100 cows consistent with sound biological principles and a quality management objective for this elk herd.
6. Continue habitat improvement projects.
7. Use elk paintball mark-recapture and/or mark-recapture from collared elk to estimate populations every 3-5 years or as needed. Continue to conduct spring surveys and use calves per 100 cows ratio information to monitor population trends and establish hunt criteria and harvest numbers.

Sauk Unit

A hunting threshold model will be developed for the Sauk Unit in cooperation with the Point Elliott Treaty Tribes when elk augmentation and/or elk population numbers approach the management objective established. A conceptual habitat model will also be developed.

PLAN APPROVAL AND IMPLEMENTATION

This document is an implementation plan for WDFW. Upon review and approval by the Director of WDFW it will be implemented and used as guidance.

REFERENCES

- Bender, Lou. 2000. Pop-II modeling of the north Cascade elk herd (population responses) with and without augmentation. Washington Department of Fish and Wildlife. Olympia. 4pp.
- Myers, W. L. 1999. An assessment of elk population trends and habitat use with special reference to agricultural damage zones in the northern Blue Mountains of Washington. PR Project W-96-R. Washington Department of Fish and Wildlife. Olympia. 172pp.