OREGON'S
ELK MANAGEMENT
PLAN
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INTRODUCTION

The purpose of Oregon's Elk Management Plan is to guide elk management in Oregon for the next 10 years, with an interim review at 5 years. This plan will be used by the Oregon Department of Fish and Wildlife (ODFW) to guide management decisions related to elk, and to identify ODFW elk management policies and strategies to the public, other agencies, and private landowners. The elk management plan is an integral part of ODFW's wildlife management strategy. Species plans guide management for individual species, but also fit into ODFW's mission to manage all wildlife within the state of Oregon. This elk management plan reflects conditions in 2002 and those anticipated for the next 10 years. For a more detailed description of conditions and issues prior to 1992, the reader is referred to Oregon's Elk Management Plan, July 1992. An "Assessment and Review of Topics, Issues, and Strategies Identified in Oregon's Elk Management Plan, 1992" was completed during March to June 2002 and is available as a separate document. Information compiled in the assessment and review was used in formulation of the current draft of Oregon's Elk Management Plan.

The Elk Plan is a compilation of policy, biological principles, and public input. The Oregon Fish and Wildlife Commission adopted the first Elk Management Plan for Oregon on July 15, 1992. Implementation of this plan is subject to the availability of funds and personnel. Changes in management also may result from improvements in technology, research, adaptive management, or Commission action during the plan period.

ODFW manages elk based on management objectives (MOs) for winter population size and post-season bull ratios in each Wildlife Management Unit (WMU) in the state. The Oregon Fish and Wildlife Commission first adopted MOs for most of Eastern Oregon in 1981. MOs were updated and adopted for all WMUs, except Alsea and Snake River, in 1994 after an extensive public input process.

MOs for winter population size are targets that guide elk herd management. It is recognized that due to migration between summer and winter ranges in many areas, elk numbers can be different in summer than winter in many WMUs. Measurement of total numbers in any wildlife population is difficult. Any improvements in census and modeling methods that result in more accurate population estimates will be used by ODFW to update MOs. Management objectives will be reviewed every five years as required by statute.

Post-season bull escapement MOs are management targets for the number of bulls/100 cows after the hunting season for each WMU. Bull ratio MOs also were established for WMUs in 1994.

GOALS AND OBJECTIVES

The goals and objectives of this plan cannot be accomplished without sufficient funding and, because of limits to ODFW management authority, the cooperation of the public land management agencies [U.S. Forest Service (USFS) and Bureau of Land Management (BLM)], private landowners, hunters and other citizens of Oregon.

Goals

Manage elk populations in Oregon to provide optimum recreational benefits to the public, be compatible with habitat capability and primary land uses, and contribute to a healthy ecosystem.

Objectives

1. Maintain recruitment of calves into elk populations at levels that support desired population levels while providing optimum recreational benefits.
2. Maintain bull ratios at or above management objective levels.
3. Maintain populations at or near established Mos.
4. Maintain, enhance, and restore elk habitat.
5. Maintain consumptive and nonconsumptive recreational uses of Oregon's elk resource.
6. Minimize elk damage consistent with the guidelines of the adopted damage policy.

BACKGROUND AND HISTORY

Two subspecies of elk are native to Oregon: Rocky Mountain elk (*Cervus elaphus nelsoni*) and Roosevelt elk (*C. e. roosevelti*). Rocky Mountain elk inhabit most of Eastern Oregon with major populations occurring in the Blue Mountains and South-central Oregon. Roosevelt elk occupy most of Western Oregon, with concentrations in the Cascade and Coast ranges. The subspecies overlap in the Cascade Mountains. For management purposes, elk are considered to be Roosevelt west of the east boundary of the current Cascade elk season boundary (Highway 97) and Rocky Mountain east of that boundary.

History of Elk in Oregon

Historic records indicate both subspecies of elk were numerous and widely distributed in Oregon prior to arrival of non-native settlers. According to Vernon Bailey in his "The Mammals and Life Zones of Oregon" (1936), Rocky Mountain elk occupied the whole of the Blue Mountain Plateau in Northeastern Oregon. There are records of elk being plentiful in the Enterprise area in the Wallowa Mountains, and sightings and remains are reported from the Burns area and the John Day River. Bailey reported seeing old elk antlers at ranches throughout the Blue Mountains in 1895-96 and was told there were still a few elk in the wildest parts of the Blue Mountains. Roosevelt elk were apparently abundant in much of Western Oregon in the early 1800s. The Lewis and Clark expedition heavily depended on elk for survival during the winter of 1805-06 at the mouth of the Columbia River. Numerous other historical reports indicate elk were plentiful throughout most of Western Oregon, although less so on the extreme southern coast and in the Siskiyou and south Cascade mountains.

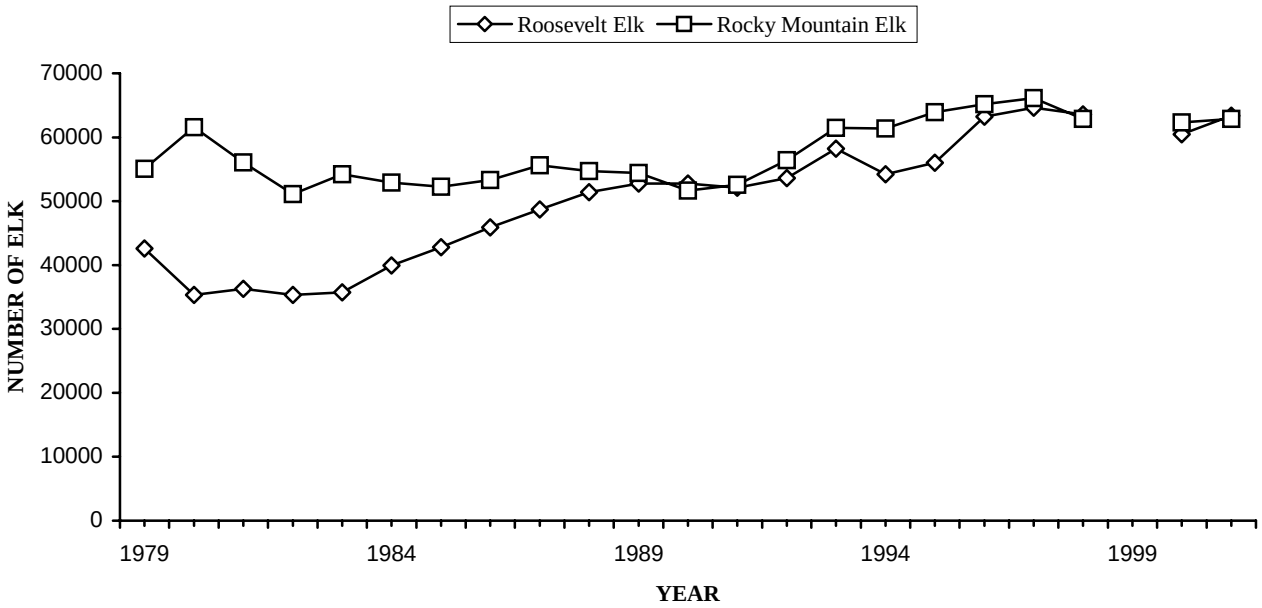
Settlers hunted elk as a primary source of meat and harvest was unregulated. During the latter half of the 19th century 'market hunting' and human encroachment on elk range took a heavy toll on Oregon's elk populations. Market hunters killed thousands of elk for meat, hides and antlers. These products were sold in population centers in Oregon and shipped throughout the nation.

Reports of elk scarcity became common during the late 1880s. Elk populations were reduced to only a few small herds along the coast, in the Cascades, and Northeast Oregon and reached their lowest ebb by about 1910. The Oregon Legislature provided protection for elk in 1899 by making it illegal to sell meat from wild animals and by closing elk season from 1909 through 1932.

Concern for the future of elk continued after the season was closed. Early conservation efforts concentrated on restocking, and 15 elk from Jackson Hole, Wyoming, were released in an enclosure at Billy Meadows in Wallowa County on March 19, 1912. A second introduction of 15 elk to Billy Meadows from Jackson Hole was made in 1913. Elk from Billy Meadows were subsequently transplanted to other areas in Oregon. The first transplant occurred in 1917, when 15 elk were moved to Crater Lake National Park.

The scale of transplanting in the early 1900s was limited and alone does not account for the rapid increases in elk numbers and distribution. Recovery of elk in Oregon and elk expansion into much of their original range is largely the result of total protection of local remnant populations. By 1922, elk numbers had increased greatly in Umatilla, Baker, Union, Grant, Wallowa, Clatsop, and Tillamook counties, but authorities did not consider it possible to re-establish elk as a game animal at that time. However, by 1924 there were numerous complaints about competition between elk and domestic livestock. Elk hunting was re-established in Eastern Oregon in 1933 and in Western Oregon in 1938. Both subspecies of elk continue to increase in numbers and expand their range in several areas. However, elk numbers have stabilized in some areas after the adoption of MOs in 1994 (Fig. 1) and have declined in some Northeast Oregon WMUs. Elk continue to expand their range and numbers in the Siskiyou, Coast, Cascade, and Ochoco mountains and in the desert area of Southeastern and South-central Oregon.

Fig. 1. Elk populations estimates in Oregon, 1979 - 2001.



History of Hunting Regulations

Elk were provided total protection from hunting from 1900-03. A one-month hunting season with a one-bull bag limit was in effect from 1904-08. Elk hunting again was closed statewide from 1909 through 1932. Elk season was reopened in 1933 from October 23 through October 25, with a one-bull, two-points-or-better bag limit, in portions of Baker, Wallowa, Union, and Umatilla counties. Approximately 2,440 hunters killed 579 bulls during this season. From 1934-37, elk season was moved to a 10-day, mid-November season with a one antlered-bull bag limit, throughout the same area of Eastern Oregon. Klamath County was added to the hunt area in 1937. Clatsop County was opened for bull elk hunting during the first seven days of September in 1938. During the first season in Western Oregon, 1,243 hunters killed 294 bulls.

Elk populations and damage complaints continued to increase during the 1930s. In response to increasing damage complaints, the first cow season was authorized in 1939 with 500 permits in Eastern Oregon counties that were open to bull hunting: 379 cows were killed. General either-sex hunting was authorized for Eastern Oregon in 1941 with no restrictions on hunter numbers. Tag sales more than doubled over 1940 levels, 3,741 elk (two-thirds of which were cows) were killed, and hunter success was 43 percent. Elk season was closed in Clatsop County in 1941 because of the war. Portions of Coos and Douglas counties were reopened for the first time that year. The War Department closed all Western Oregon seasons in 1942, and Eastern Oregon antlerless harvest reverted to a permit system. Elk populations increased significantly during World War II due to reduced harvest levels.

In 1943, the War Department closure was lifted and the Western Oregon elk season was moved to early November to run concurrently with Eastern Oregon seasons and to protect bulls during

rut. Southeastern Oregon was opened to either-sex elk hunting in 1943 to control elk populations and reduce potential competition with mule deer.

A three-point-or-better regulation was established in Western Oregon in 1945. The three-point regulation cut harvest approximately in half from the previous year with an any-bull bag limit. Elk damage problems continued to increase during the late 1940s and early 1950s. During this period numerous special antlerless hunts were authorized, and an either-sex elk season was held in parts of Northeastern Oregon in 1949. Elk damage also intensified in Clatsop County, which resulted in two either-sex hunts near agricultural land during 1950 and 1954. General season hunting pressure more than doubled from 12,625 hunters in 1945 to 27,858 in 1954. Antlerless hunting was authorized by permit only on a WMU basis beginning in 1955 in an attempt to achieve better distribution of hunters and harvest. Concern about illegal killing of spikes under a three-point regulation prompted an any-bull regulation in Southwestern Oregon. Results of this any-bull regulation indicated a 30 percent decrease in illegal kill, a 130 percent increase in bull harvest, and no change in annual calf production. Bull hunting in Clatsop County was conducted under a permit system from 1961-63 with 5,000 permits annually. Spikes were legal during this period. The annual harvest was 24 percent higher than the previous three-point regulation.

Beginning in 1964, separate bull elk tags were issued for Eastern and Western Oregon. Hunting pressure increased in Western Oregon as a result; with 34 percent of elk hunters choosing Western Oregon in 1964, compared to 24 percent in 1963. In 1966 the Western Oregon season was delayed until mid-November to accommodate a late deer season, which reduced the number of hunters choosing Western Oregon to 26 percent.

Elk populations remained fairly stable during the late 1960s, in spite of increasing hunter numbers that reached 80,000 in 1970. An extensive trapping and transplant program for Roosevelt elk was undertaken in the late 1960s and 1970s (1,826 elk were transplanted prior to 1980) to increase distribution of this subspecies, particularly in the Cascades.

Rocky Mountain elk populations increased by 45 percent during the 1970s but bull ratios decreased. Rocky Mountain bull season remained 19 days long with the antlerless season concurrent during the last 5 days. Season length was decreased as concern over declining bull ratios increased for Rocky Mountain elk. Bull ratios reached a minimum for both subspecies in 1974 and 1975 with 3 to 6 bulls/100 cows for Rocky Mountain elk and 5 bulls/100 cows for Roosevelt elk.

Limited-entry bull hunting for Rocky Mountain elk was first established in 1972 in response to low bull ratios. Antler point regulations also were used in an attempt to increase bull ratios in the Snake River, Tioga, and Saddle Mountain units beginning in 1978. Season length was adjusted in other units in an attempt to maintain bull ratios in the face of increasing hunter numbers, more road access, and diminishing escape cover. During the 1970s, hunter numbers averaged 97,600, compared to 62,700 during the previous decade. Elk damage complaints remained relatively stable with an annual average of 143, with 83 from Western Oregon.

Split seasons with two hunt periods were initiated in 1979, for both Eastern and Western Oregon, in an effort to disperse hunting pressure and increase bull escapement. Following these

regulation changes, an increase was recorded in bull ratios, and the population trend continued to rise for Roosevelt elk. From 1979 to 1985, Rocky Mountain elk populations experienced a small increase and bull ratios improved as a result of efforts to spread the distribution of hunters over a greater time span and area. In the early 1980s, Rocky Mountain elk continued to increase their distribution into new areas, especially in Central and Southeastern Oregon. Hunter numbers increased to an average of 124,000, compared to 97,600 during the 1970s. Average annual harvest increased from 12,500 to 18,000, of which 73 percent were Rocky Mountain elk. Antlerless tag numbers nearly doubled between the years 1979 and 1985.

MOs for population size and post-season bull ratios for most Rocky Mountain elk WMUs were adopted by the Oregon Wildlife Commission in 1981. Mos were established through a lengthy public process involving hunters, land management agencies, and agricultural and forest interests. Population MOs were set based on habitat conditions and the ability to resolve complaints on private land. The adopted population goals were generally below 1980 population levels, and antlerless permit numbers were increased significantly during the 1980s to reduce elk populations to MO.

Concern about increasing hunter numbers, more roads, and reduced escape cover, with the resulting impact on bull ratios, stimulated ODFW to initiate a major public involvement process in 1984-85. Workshops were held in 22 communities throughout Oregon and were attended by more than 5,000 people. Results from these workshops, in addition to information garnered from more than 42,000 questionnaires, were used in development of Oregon's first Elk Management Plan in 1992. Reducing hunter crowding, increasing mature bulls and reducing open road access were priority issues identified by this process.

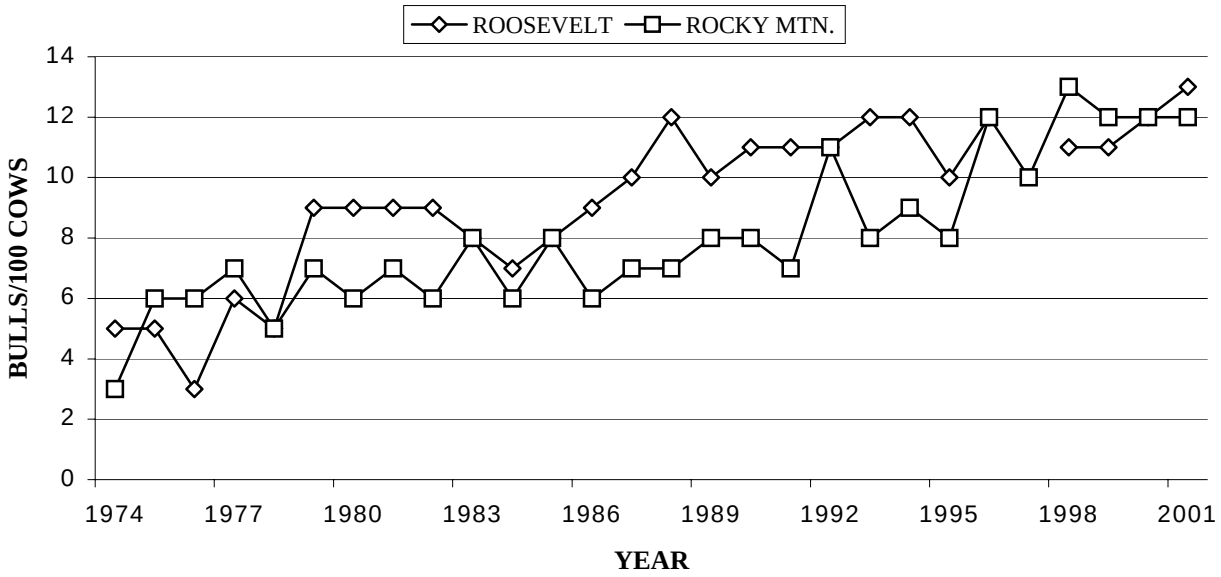
In response to concerns regarding low bull ratios expressed during this process, several changes were made in elk hunting regulations beginning in 1986. In the Cascades, an earlier bull elk season was adopted, which resulted in a 20 percent increase in bull ratios, accompanied by a mean conception date shifting 7 to 8 days earlier, and pregnancy rate increased from 62 percent to 88 percent for adult cows. Two additional WMUs were placed under a three-point-or-better regulation on the south coast and 11 WMUs in the Malheur-Ochoco zone were placed under limited-entry bull hunting. These regulation changes resulted in fewer hunters and increased bull ratios.

After the 1992 Elk Management Plan was completed, MOs were adopted in 1994 for all WMUs (except Alsea and Snake River) for population and post-season bull ratios. Since then, the Powers WMU adopted a limited entry spike-only hunt in 1994. Bull ratios increased from about 5 bulls/100 cows in 1994 to 11 bulls/100 cows by 2001. After a lengthy public input process in 1995, a spike-only regulation was adopted in Northeastern Oregon in 1996. Bull ratios in those WMUs more than doubled from a mean of 4 bulls/100 cows in 1995 to 9 bulls/100 cows in 2000. A decrease of 16,858 rifle hunters and an increase of 10,850 archery hunters were experienced in 8 Northeastern Oregon WMUs during the period. In 1999, the Wilson and Trask WMUs implemented a general, spike-only season. Preliminary data indicate a significant improvement in bull escapement. In addition, most seasons were shortened in coast range WMUs to four days for first season and seven days for second season.

An elk hunting season framework was adopted as part of the 1992 Elk Plan. As strategies were implemented to improve bull ratios and age structure, and address other issues and concerns, the framework also has evolved (Appendix, Table C).

As a result of the various changes in hunting regulation beginning in the 1970s, bull ratios increased for both subspecies after 1974 and stabilized at about 8 bulls/100 cows for Rocky Mountain elk and 10 bulls/100 cows for Roosevelt elk during the late 1980s and early 1990s (Fig. 2). After several regulation changes instituted in the mid-1980s though the 1990s, an increase in bull ratios to an average of about 12 bulls/100 cows for both Rocky Mountain and Roosevelt elk was achieved (Fig. 2).

Fig. 2 . Post-season bull ratios in Oregon, 1974 - 2001



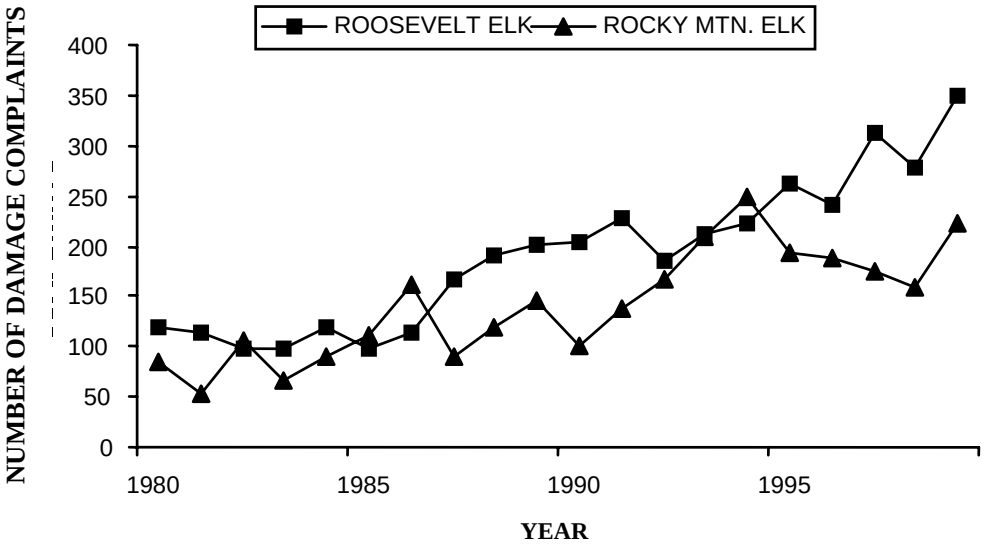
A bow was a legal weapon for hunting elk at least as early as 1936. The first special archery elk hunts were authorized in the Canyon Creek and Mt. Emily areas in 1949. The number of hunters participating in these early archery seasons was not well documented and harvest cannot be estimated.

The first statewide archery elk season was authorized in 1979 in an attempt to draw hunters away from crowded rifle seasons. This season was 47 days long, with an either-sex bag limit; 12,204 hunters killed an estimated 1,985 elk. Season length was reduced to 37 days in 1980 and was again shortened to the present length of 30 days in 1983.

Late-season muzzleloader hunting for Rocky Mountain elk was first authorized in 1982 and has continued to the present. The first late muzzleloader season for Roosevelt elk was authorized in 1977, but was discontinued after that year. Muzzleloader hunting for Roosevelt elk was reintroduced in 1990.

Elk damage complaints continued to increase during the late 1980s and 1990s in Western Oregon, primarily due to increasing numbers and expanding distribution of elk (Fig. 3). Severe winters in Eastern Oregon caused damage complaints to increase during the early 1980s. Rocky Mountain elk populations declined during the 1990s after population MOs were set and efforts were initiated to decrease populations that were above MO (Fig. 1). The decline in populations in Northeastern Oregon was balanced against increased numbers in expanding herds in South-central and Southwestern Oregon. Damage complaints increased for Rocky Mountain elk during the late 1980s and early 90s due to drought conditions. As a result of reducing populations in Northeastern Oregon, damage control efforts, and an end to drought conditions, damage complaints for Rocky Mountain elk peaked in 1994 at 250 and have generally declined since then (Fig. 3).

Fig. 3. Elk damage in Oregon, 1980 - 1999

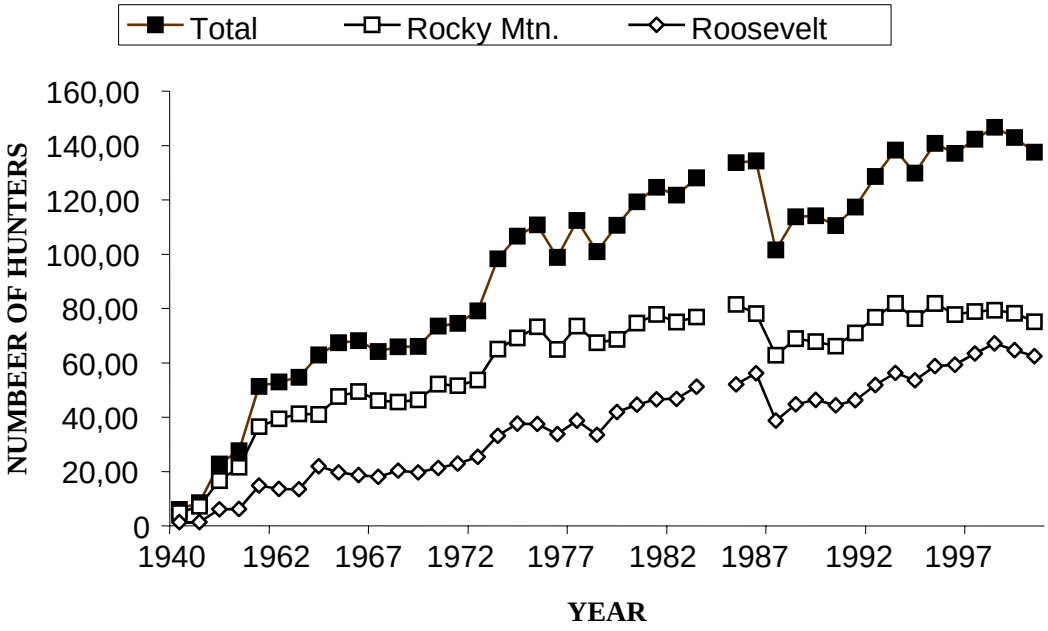


Hunting Pressure and Harvest

During 2000, more than 700,000 hunters pursued a herd of almost one million elk across western Canada and the United States with a harvest of about 160,000 elk annually. Of this total, approximately 12 percent of the elk, 14 percent of the hunters, and 10 percent of the harvest occurred in Oregon. Oregon has consistently been represented in the top five western states for elk, hunter numbers, and harvest.

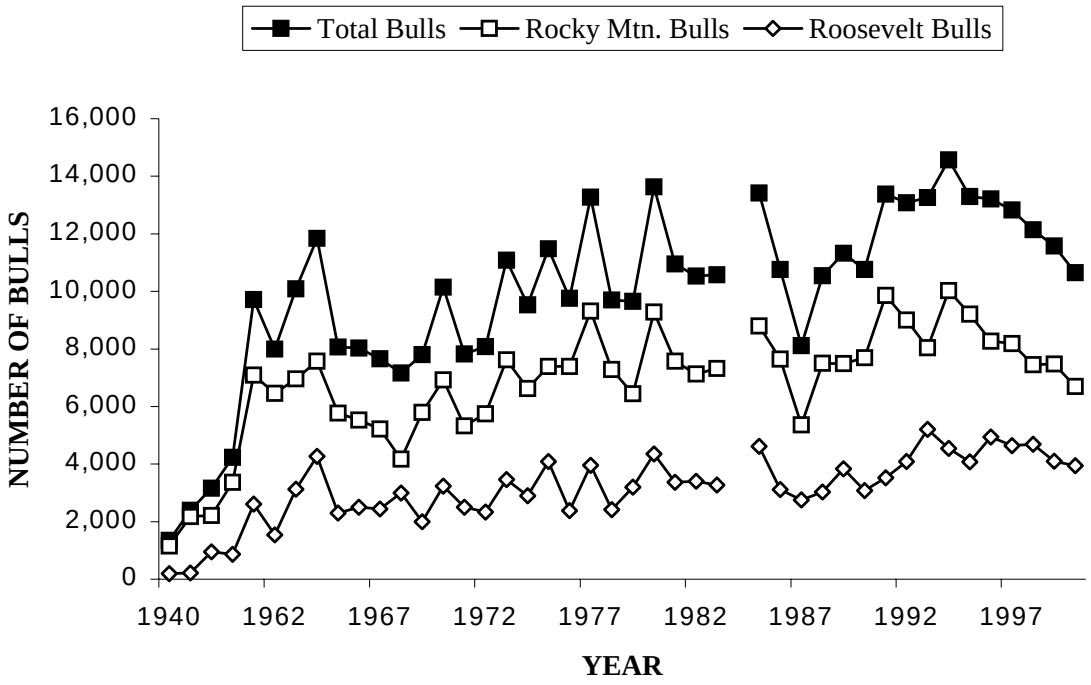
After elk season reopened in the 1930s, hunter numbers (i.e., rifle, archery, antlerless, etc.) for both Rocky Mountain and Roosevelt elk generally increased to 137,000 by the year 2000; primarily as a result of expanding herds (Fig. 4). Rocky Mountain elk hunters were 60 percent of the total by 1990, but only 55 percent by 2000. Both were due both to increases in Roosevelt elk populations and declines in Rocky Mountain elk hunting opportunities in some areas.

Fig. 4. Number of elk hunters in Oregon, 1940-2000.



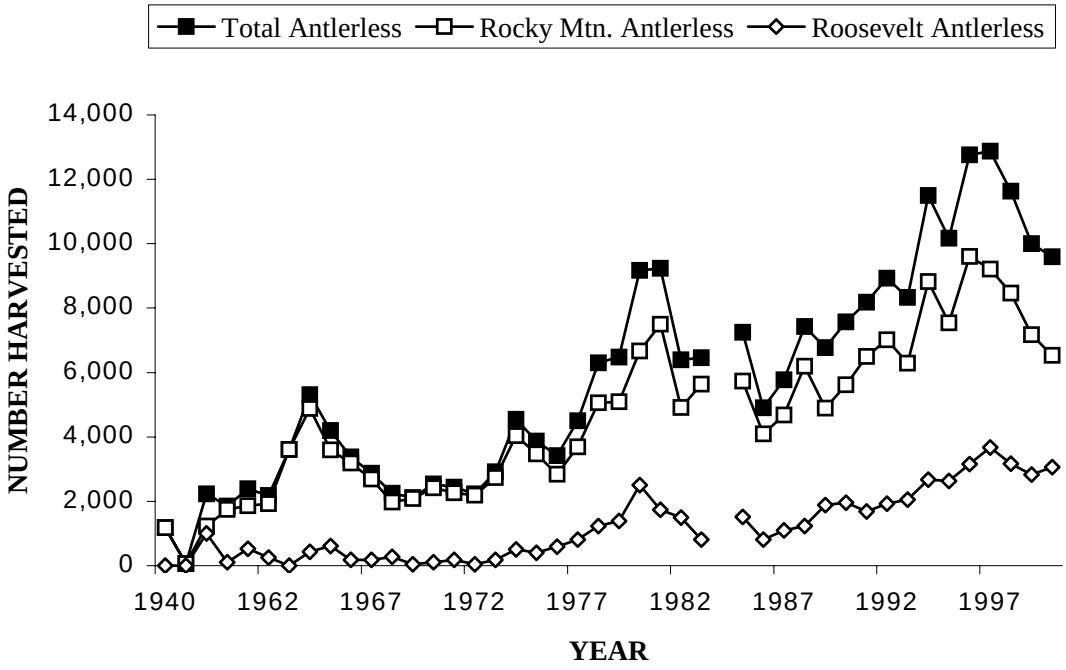
Bull harvest in both Eastern and Western Oregon reached a peak in the mid-1960s, then declined for several years (Fig. 5). Since then, harvest of Rocky Mountain bulls has fluctuated, but generally increased, until a downward trend began in 1994, primarily a result of spike-only regulations and declining calf ratios in Northeastern Oregon. The trend in Roosevelt bull harvest has shown a gradual increase; however, harvest has been flat or slightly declining since 1993 as a result of efforts to increase bull ratios (Fig 5).

Fig. 5. Number of bulls harvested in Oregon, 1940 - 2000.



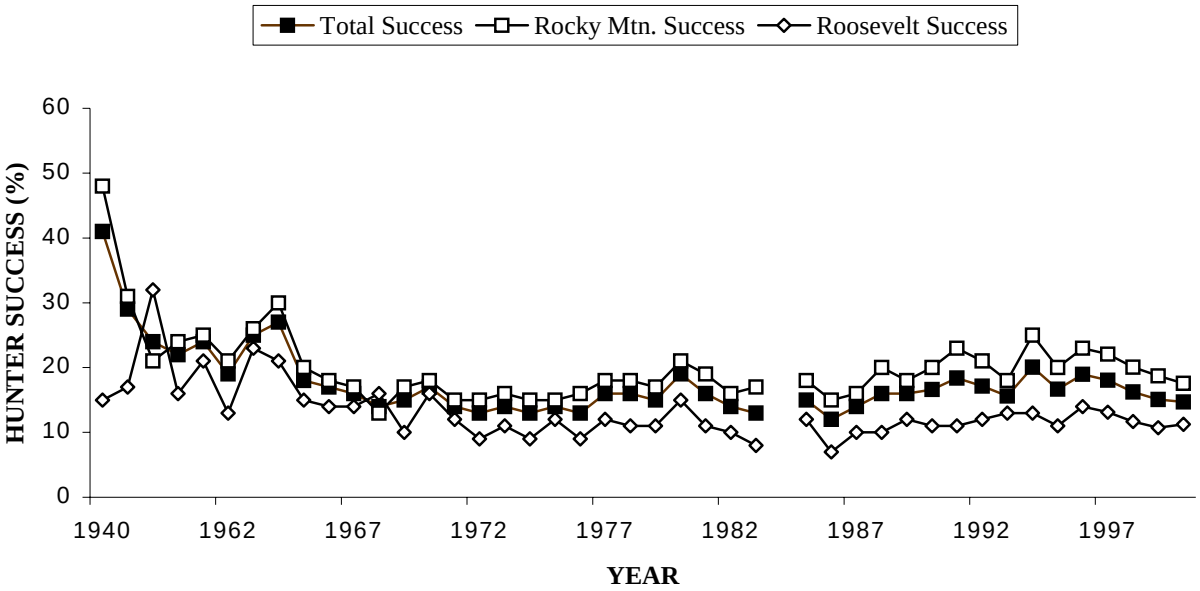
The first antlerless elk season was authorized in 1939 in Eastern Oregon. Antlerless hunting first took place in Western Oregon in 1950 with an either-sex season near agricultural land in Clatsop County. Harvest of antlerless Rocky Mountain elk increased sharply from the early 1940s through the mid-1960s; then, declined sharply and remained at approximately 2,000 animals until the early 1970s (Fig 6). Antlerless harvest then generally increased along with the population (Fig. 1) to a peak of about 9,600 in 1996 and has since declined as a result of declining calf ratios and populations at or below population MOs in several areas in Northeastern Oregon (Fig. 6). Harvest of antlerless Roosevelt elk varied annually but with a few exceptions, remained below 1,000 animals until 1978 (Fig. 6). Antlerless harvest of Roosevelt elk has steadily increased since 1986 in response to increased populations, wider elk distribution, and damage.

Fig. 6. Antlerless elk harvest in Oregon, 1940 - 2000.



Associated with increased hunter numbers and harvest through the 1970s was a decrease in hunter success (Fig. 7) and statewide bull ratios. Since the early 1970s, hunter success (for bulls and cows) for both subspecies remained relatively stable at about 18 percent for Rocky Mountain elk and 11 percent for Roosevelt elk (Fig. 7).

Fig. 7. Elk hunter success in Oregon, 1940 - 2000.



ELK BIOLOGY

Nutrition and Reproduction

Elk are polygamous, meaning that one bull, given the opportunity, can mate with more than one cow. Breeding behavior involves a complex social system, which revolves around mature bulls gathering harems. Mature bulls (defined here as 3½ years and older) typically begin gathering harems of cows in late August or early September and, under natural circumstances, conduct most of the breeding. Young bulls (yearlings and 2½-year-olds) typically cannot maintain harems in the presence of older males, and yearlings usually reach breeding maturity later in the year than older bulls. This complex process may be altered if bull/cow ratios and/or mature bull/young bull ratios become skewed toward cows and/or young bulls. Calf recruitment and survival is resilient over a wide range of bull/cow ratios. However, studies on Roosevelt elk in Western Oregon suggest that fewer than 3-10 older bulls/100 cows during the breeding season could cause delays in conception, affect conception rates, and may reduce calf survival (Hines and Lemos, 1979).

Research at the Starkey Experimental Forest and Range (Starkey Project) evaluated the effect of bull age on conception dates and pregnancy rates of Rocky Mountain cow elk during the 1990s. In two five-year replications, a single cohort of bulls was allowed to mature from 1½ to 5½ years and function as principal herd sires. All other bulls were removed from the population. As bull age increased, the length of time from the earliest to the last conception dates decreased (Noyes, et al., 1996, 2002). This compression in timing of breeding may enhance the chance of elk calf survival the next spring during the birth cycle, as has been shown with wildebeest calves (Estes, 1976). When conception dates fall within a narrow timeframe, the dates of calf births the next spring will be similarly compressed. In theory, synchronous births may function to overwhelm predators, increasing the number of calves surviving their first 10 days of life when they are most vulnerable.

The second result of the breeding-bull study at Starkey was the shift of the average date of conception from early October to mid-September as bull age increased (Noyes, et al., 1996, 2002). Earlier conception is thought to benefit calf survival. Calves born earlier in the spring have more time to gain weight before the onset of their first winter. Larger calves have been shown to have higher rates of survival than smaller calves in some studies (Cook, et al., 2002). Likewise, survival of red deer calves (Guinness, et al., 1978) and bighorn sheep lambs (Festa-Bianchet, 1988) is affected by birth date and presumably body size.

Philosophies vary widely on the post-season bull/cow ratio and age structure required for optimal breeding success. European managers of red deer suggest bull ratios of 67-83 males/100 cows, male life spans of 14-16 years, and female life spans of 15-17 years (Clutton-Brock, et al., 1982). In such situations, bulls seldom breed before five to eight years of age. Bull/cow ratios in most hunted North American elk herds range from 3 to 20 bulls/100 cows (post-season), and Bubenik (1982) suggested 25 bulls/100 cows as an optimum number. Herds with post-season bull-cow ratios of less than 4/100 cows depend heavily on yearling males for breeding. Information from Colorado indicates that calf/cow ratios declined as bull/cow ratios declined (White, et al., 2001).

Research results from the Starkey Project indicate that to achieve early and synchronous breeding, mature bulls are required (Noyes, et al., 2002). Achieving this age structure is difficult without a minimum post-season bull ratio of 10/100 cows to allow for some mature males to exist within elk populations. Many Oregon elk herds have consistently been managed under conditions that resulted in extremely low post-season bull ratios. In 1996 spike-only management was implemented in most units in Northeastern Oregon to address perennially low bull ratios. Since that time, bull/cow ratios have recovered to minimum desirable levels in most WMUs (Oregon Department of Fish and Wildlife, 2000).

Twins are uncommon in elk. Reproductive success of elk is closely related to nutrition, body condition, physical health, and age of females (Cook, 2002). Cows in good body condition during breeding will generally have birth rates and calf survival higher than cows that are nutritionally stressed. Females in good body condition often breed earlier than those in poor physical condition. Yearling cows are capable of breeding, but breeding is highly dependent on body condition and varies annually. The weight of newborn calves is related to female body condition during winter, and survival of calves has been related to birth weight (Thorne, et al., 1976; Keech, et al., 2000). The heavier the calf at birth, the greater its chance of survival (Clutton-Brock, et al., 1987).

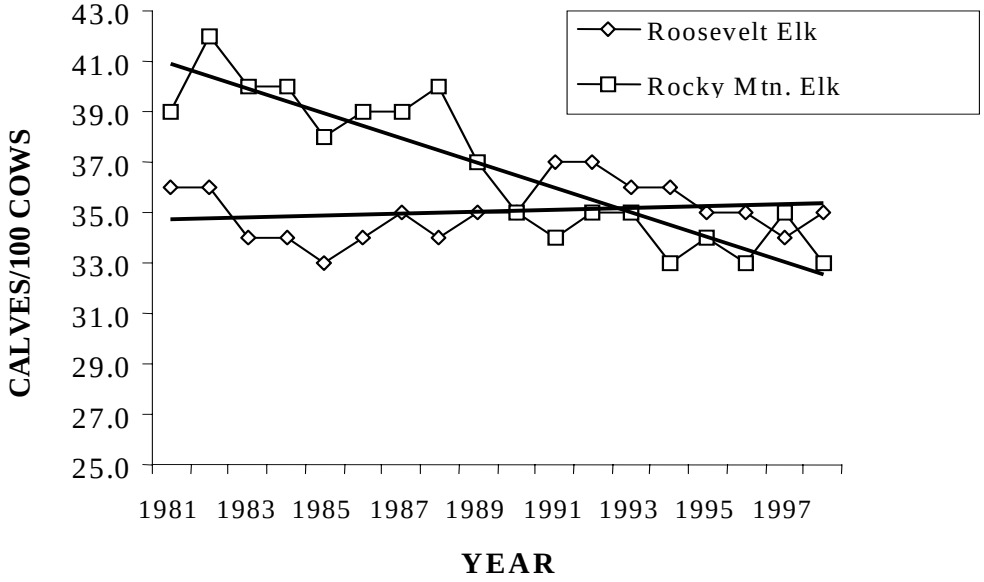
The ability of cows to reproduce in successive years is affected by nutrition. Roosevelt elk cows that nursed a calf during summer are less likely to conceive during the fall than non-nursing cows (Trainer, 1971). In 1 area, only 51 percent of lactating 3 to 10 year-old Roosevelt elk cows were pregnant compared to 84 percent of nonlactating cows (Trainer, 1969). All of these cows had access to the same nutritional resources, but lactating cows had significantly smaller fat reserves (indicative of poor body condition) than did nonlactating cows. Reduced levels of physical condition and lower pregnancy rate of lactating cows indicated that the plane of nutrition in this particular area was not sufficient to allow many of the lactating cows to reproduce in successive years. This finding was similar to other studies that indicate that lactation is very costly to the energy reserves of the female (Cook, et al., 2002).

Poor nutrition affects the onset of puberty in both sexes and antler development of yearling males. Low levels of nutrition in areas where breeding is primarily carried out by yearling bulls may cause additional problems because of delayed reproductive maturity.

Rocky Mountain elk historically have been more prolific than Roosevelt elk. Late winter herd composition records from 1946-1984 show Roosevelt elk averaged 39 calves/100 cows; 17 percent lower than Rocky Mountain elk, which averaged 47 calves/100 cows, during the same period (ODFW, 1992). Likewise, examination of female reproductive tracts collected during November-December hunting seasons from 1964-1982 showed 51 percent of Roosevelt elk cows pregnant, while 67 percent of Rocky Mountain elk cows were pregnant. Since that time, pregnancy rates have not changed, but Rocky Mountain elk calf ratios have declined. For 1996-98, Rocky Mountain elk calf ratios dropped to a 3-year average of 33 calves/100 cows, which is slightly less than Roosevelt elk with an average of 35 calves/100 cows during the same period

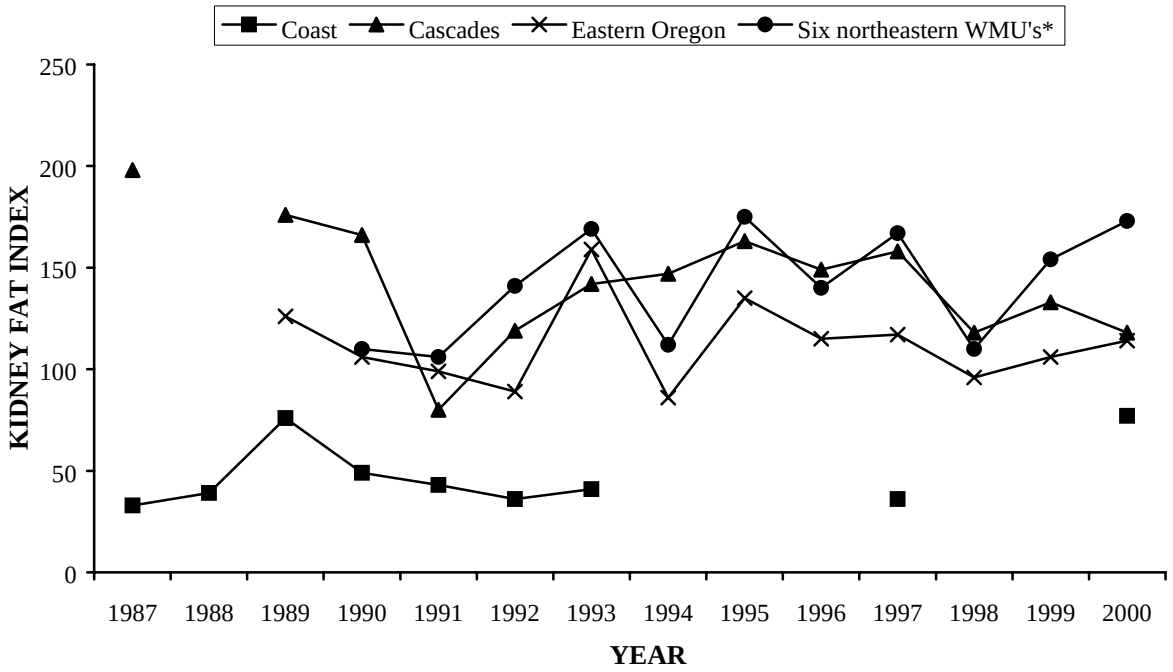
(Fig. 8). This drop can mostly be attributed to declines in calf ratios in the extreme northeast corner of the state in Wallowa and northern Umatilla counties.

Fig. 8 Calf ratios in Oregon, 1981 – 2000.
Points are three year running averages.



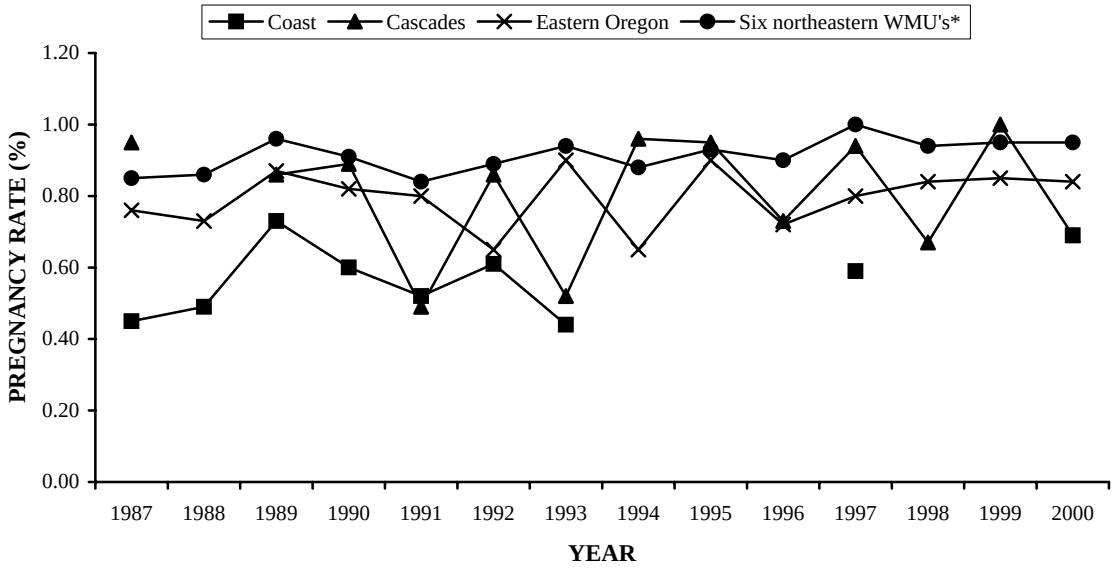
The cause of the drop in Rocky Mountain elk calf ratios is unclear. Habitat degradation, density dependant interactions (i.e., lower productivity and survival as population of elk increase), and predation have all been cited as potential causes for the drop in calf/cow ratios in these areas. However, data collected on body condition and pregnancy rates from cow elk harvested in Oregon during November-December indicate that habitat in Northeastern Oregon is not inhibiting reproduction or causing poor body condition, thus predisposing elk to predation or starvation. Body condition, as indicated by kidney fat index, of elk in Northeastern Oregon has generally been better than elk in other areas of the state (Fig. 9). In addition, pregnancy rates have consistently been above 90 percent and usually higher than other areas (Fig. 10). To determine what factors are most responsible for the recent trend in low calf/cow ratios, a study of the effect of nutrition and predation on elk calf ratios was initiated in the fall of 2001 in the Wenaha and Sled Springs WMUs and in Southwestern Oregon. Preliminary results will not be available until fall of 2003.

Fig. 9. Body condition of elk in Oregon, 1987 - 2000.



*NE Units: Snake River, Imnaha, Chesnimus, Sled Springs, Minam, and Wenaha.

Fig. 10. Pregnancy rates of elk in Oregon, 1987 - 2000.



*NE Units: Snake River, Imnaha, Chesnimus, Sled Springs, Minam, and Wenaha.

Antler Development

Antlers serve several functions in elk. They are used primarily as a visual signal to other elk. Even the slightest head movement is greatly accentuated at the tips of the antlers. This advertises both bull presence and rank. Experienced bulls seem to be able to estimate the social rank of other bulls by the size and shape of their antlers. Antlers also function as weapons in combat with other bulls and for defense against predators.

Elk shed their antlers annually. The annual antler cycle is initiated by day length, which stimulates testosterone production, which in turn regulates antler growth. Nutrition, disease and overall body condition also influence growth. This process begins during the fall of a male calf's first year, and is initiated by small amounts of testosterone production. Actual antler growth begins the following June and July and is generally completed between late August and mid-September; the first set of antlers is typically a single tine (spike) on each side. Two-year-old bulls typically begin growing their antlers from late April to early May. The second set of antlers is usually a small, branched rack with three to five points on each side. Each set of antlers is shed from March to mid-April the following year.

Each successive set of antlers is larger than the last one. This pattern continues up to a certain age, at which time antler growth begins to degenerate. The timing of degeneration is dependent on the social structure of the herd, and can occur at from approximately nine to 12 years of age or older. Prime bulls with good nutrition will develop antlers weighing 4 percent to 6 percent of their body weight, with a few animals achieving antlers of up to 8.2 percent of their body weight

Nutrition, age, and genetics all play important roles in antler development and size. Antler size is important as it affects a bull's social status. The bull's status determines its ability to gather and maintain a harem, ultimately influencing its success as a breeder. Bulls with the genetic makeup for large antlers usually will be the most successful breeders. Nutrition plays a very important role in antler growth. Growing antlers requires a large intake of food and minerals. A bull must eat approximately 16 pounds of dry matter (or 73 pounds of fresh food) daily to grow hardened antlers weighing 30.8 pounds and to meet its energy and mineral requirements for body growth and maintenance. Age is usually the most limiting factor in allowing the full potential of the bull's antlers to be expressed because young animals are still increasing in body size. In most moderately-to-heavily hunted populations, bulls rarely grow old enough to express the genetic potential of their antlers.

Migration and Movements

Elk sometimes make significant movements in response to disturbances from humans and predators, and changes in seasonal weather patterns. Numerous studies have shown both Rocky Mountain and Roosevelt elk are sensitive to human disturbances such as motorized travel on and off roads (Rowland, et al., 2000). Roads are generally avoided by elk when they are open for use, but can be heavily utilized by elk as travel corridors when closed. Hunting seasons can drastically affect movements and distribution of elk. Herds exposed to 'opening day' hunting pressure usually disperse to cover areas and often break up into smaller bands. In some cases, elk

move to private lands from public lands to avoid harassment, which can create damage problems on those lands (Conner, et al., 2001).

Rocky Mountain elk sometimes undergo long seasonal migrations that result in the movement of herds from one WMU to another. Telemetry studies have shown elk herds in a given summer range may move to different winter ranges depending on where they have traditionally wintered (Wilt, 1987). Most elk have an affinity for certain ranges and generally will use the same areas throughout their life. The severity of winter can often influence how far and at what elevation elk will move to avoid adverse weather. During mild winters, elk may not move far from summer range. Elk may use intermediate areas called transition range. Transition range is typically used in the late fall or early spring as migratory elk move between summer and winter ranges. Even with Rocky Mountain elk, some reside year-round in traditional winter and transition range.

Many Cascade elk show migration patterns, but their seasonal movements are generally shorter than the Rocky Mountain subspecies. Telemetry work conducted by ODFW has shown that some Cascade elk summer in Central Oregon and winter on the west slope of the Cascade Range. Like Rocky Mountain elk, some Cascade elk are resident animals that exhibit little or no seasonal movements.

Roosevelt elk of the Coast Range are primarily resident animals and rarely have distinct and defined seasonal ranges. They typically show some seasonal movements in elevation, especially if snow is present at higher elevations. During mild winters, they generally show very little movement from summer range.

Migratory movements across WMU boundaries can pose challenges for wildlife managers who are trying to quantify elk numbers in relation to population MOs during winter and set tag numbers for fall hunting seasons. Elk that are hunted during the fall in one WMU may cross the boundaries of one to two other WMUs to winter. This requires close coordination between biologists within larger geographic areas to ensure that management goals are met.

Diseases and Parasites

Wild elk are hardy and have not been significantly impacted by diseases and parasites in Oregon. However, they can be subject to viral, bacterial and fungal diseases, and parasites. Brucellosis, chronic wasting disease (CWD), foot and mouth disease (FMD), and tuberculosis (TB) are the greatest disease threats to free-ranging elk herds; although, none of these diseases has been diagnosed in wild elk in Oregon.

Brucellosis: Sexually transmitted bacterial disease that causes abortion and infertility. There are no other clinical signs. It is infectious to people, and deer and elk are susceptible. It is present in several populations of elk and bison near Yellowstone Park. There is no vaccine for wild cervids. Considerable effort has been expended to eradicate this disease due to public health concerns and economic importance of the cattle industry. Control methods consist of eradicating infected animals as no known practical method for treatment exists.

CWD: Cervid form of transmissible spongiform encephalopathy (TSE) affecting North American deer and elk. Infected animals lose condition, grow thin, and die. Before death, animals display abnormal behavior that may include head pressing, staggering, excessive salivation, and diminishing fear of humans. There is no test in live elk and no cure. CWD is in the family of diseases related to mad cow disease in cattle, scrapie in domestic sheep, and Creutzfeld-Jacob disease in humans. To date there is no evidence that CWD can be transmitted to humans. Little is known about how the disease is transmitted and spreads among deer and elk. It may take up to three years before animals show symptoms. It has been found in captive and wild elk and deer in 10 states and 2 Canadian provinces, and in South Korea from elk imported from the United States. Large numbers of captive deer and elk in the U.S. and Canada have been quarantined and/or euthanized in an effort to control the disease. The number of infected wild deer and elk is unknown, but considered a serious threat to some wild populations in Nebraska, Wyoming, South Dakota, New Mexico, Colorado, Wisconsin, and Saskatchewan. In some areas of Wyoming and Colorado herds have a projected infection rate of 15 percent.

In response to this threat, a number of states and provinces have enacted management programs that further regulate captive cervids, including banning importation, and quarantining and/or eliminating infected herds. Additional efforts are being undertaken to determine the extent of infection in wild populations, including the sampling of known or suspected populations that have CWD. Plans are in place in Colorado and Wisconsin to kill thousands of deer and elk in an effort to control the spread of the disease. The effectiveness of this strategy is unknown, and has caused significant controversy among the public and hunters. Oregon is currently in the second year of a planned multi-year monitoring program in which hunter-harvested animals are tested to determine the presence of CWD. No evidence of CWD was found in 97 samples tested in 2001.

FMD: Fast spreading virus to which all cloven-hoofed animals are susceptible. Infected animals can lose the ability to eat or walk, and the disease can be spread in many ways. The U.S. Department of Agriculture classes it as a 'Highly Contagious Animal Disease.' It has not been detected in North America since the 1950s, but occurs in many other parts of the globe.

TB: Bacterial disease that manifests itself in the lungs and infects a wide range of animals including humans, livestock, and wild cervids. The disease can be transmitted to humans through contact with milk, meat, body fluids or breath. There is no practical treatment for large numbers of domestic or wild cervids. The bacteria can lie dormant for years. Tests for live elk are only 70 to 80 percent effective. TB has been found at game ranches in 14 states and 5 provinces.

In Oregon a concerted effort by the livestock industry eliminated TB in cattle by 1989. However, in late 2001, it was confirmed in a single elk from an elk ranch in Northeastern Oregon. The outbreak caused considerable concern because of the potential threat to the cattle industry and possible spread to wild elk within the state. The ensuing investigation indicated the elk had been infected prior to entering the state. All captive elk and cattle at the ranch subsequently tested negative for TB, indicating the one positive elk was an isolated case. ODFW is planning to test deer and elk killed during hunting season around the facility where the diseased elk was held to determine if wild animals have been infected.

The effects of any of these diseases could be catastrophic for Oregon's elk and deer, as well as the livestock industry. Any of these diseases in wild elk or deer will be difficult and costly to detect, very costly to control, and could be impossible to eradicate. In addition, other states, as well as Oregon, have found considerable public resistance to depopulation of potentially infected elk and deer in large geographic areas.

Parasites: Elk are subject to a variety of external and internal parasites, which do not seem to pose the threat to wild elk that diseases do. Perhaps the greatest parasite threat to elk in Oregon could come from an illegal importation of white-tailed deer, infected with meningeal worms from the eastern U.S. The meningeal worm occurs in eastern white-tailed deer and causes the deer few problems. In other cervids, such as elk, it can have devastating health effects.

HABITAT

Basic Elk Habitat

Habitat refers to the basic elements required by all living things: food, water, shelter, and space. Quality, quantity, and arrangement of these habitat components influence distribution, abundance, and productivity of elk. Availability and location of these components ultimately determines the number of elk an area can produce and the amount of public recreation that can be provided.

Elk are in their poorest physical condition in late winter and early spring. As temperatures warm, day length increases, and snowmelt occurs, plants break dormancy with a profusion of growth. On elk ranges this is called 'spring green-up' and it provides elk with highly nutritious forage essential for their recuperation from winter. This period also coincides with the movement of migratory herds between winter and summer ranges. Nutritional needs remain high throughout spring and into the summer. Cows need a diet that provides for themselves as well as their newborn calves. Bulls need a nutritious diet to sustain antler growth and achieve peak body condition.

Summer elk forage consists of a combination of lush forbs, grasses, and shrubs high in nutrients and easily digestible. Generally, higher elevation wet meadows, springs, and riparian areas in close proximity to forested stands offer these conditions for the longest period. Such areas provide nutritious forage and moist, cool places for bedding and escaping summer heat and insects.

Elk achieve peak body condition during late summer and fall. Winter survival depends on fat reserves animals are able to store, thus, quality forage during summer and fall is crucial. Additionally, this forage is needed to meet the rigors of breeding and migration for those animals moving to winter ranges. The late summer/fall period can be critical on many elk ranges during drought years. As forage plants wither and dry on forest and rangelands, some elk respond by moving to irrigated private croplands. As Oregon's elk population has increased, depredation on private lands has become a problem and management challenge.

Winter is when elk survival is severely tested. Day length shortens, temperatures drop, and rain and snow increase. Forage becomes less abundant and accessible, and nutritional quality declines. Elk energy requirements can be high, and during this time they are dependent on stores of body fat. At this time they increasingly seek out an environment that helps minimize energy consumption. Such areas typically provide protection against weather and offer security for minimizing harassment or disturbance. During a typical winter, elk may loose 20 to 25 percent of their body weight. Elk losing more than 30 percent body weight likely will not survive.

Roles of Cover in Elk Management

Cover is an important component of elk habitat and provides both thermal and hiding properties. During summer it provides cooler, shaded areas for elk to bed during the heat of the day. During winter it provides a warmer, protected environment out of the cold, wind, rain, or snow. Lichens and other plants associated with cover can be an important source of forage for wintering animals. Adequate thermal cover reduces the energy needed by elk and contributes to over-winter survival.

Hiding cover is also referred to as security cover and allows elk to escape and hide from intrusions or disturbances. These intrusions can be human (hunters, vehicles, hikers, etc.) or natural (predators). Factors affecting elk security are topographic relief, vegetation density, and proximity to human activity. Hiding cover becomes more important if other components that provide security are absent. This can be particularly important where predator numbers or human intrusions are high. Inadequate security or hiding cover can make elk more vulnerable to predators, harvest by hunters, or other sources of mortality that can lead to abandonment of traditionally used areas. Regulating hunters can sometimes help, however this provides little benefit if predation and/or other human disturbance are occurring.

Intrusion from sources other than hunting is increasingly a problem for elk managers. Oregon's main elk ranges lack large blocks of unroaded wilderness that are present in some western states. This is particularly true on multiple-use federal lands where access by motorized and non-motorized traffic is largely unrestricted and increasing. Traditional elk habitat models recognized the impacts from access, and used road density in order to evaluate impacts of proposed land-management actions. This approach was better suited to the 1980s when most proposed projects were timber sales and associated roads needed for them. Since the early 1990s both road building and timber sales have decreased while recreational, non-motorized and motorized cross-country activities and facilities have dramatically increased. While road density is still important, the impact from recreational access that doesn't use designated roads or trails is emerging as a pressing issue. Most federal lands are open to cross-county travel by any means unless specifically closed (i.e., wilderness, seasonal area closures, etc.). The growth of motorized and non-motorized recreational pursuits is believed by elk managers to threaten some herds and have contributed to shifts of elk from some public lands onto adjacent private lands.

Forage

Adequate quality forage greatly influences the size and productivity of elk herds occupying an area. Elk meet nutritional requirements by selecting their diet from a variety of plant species available within the area they inhabit. Grasses, forbs, and browse from shrubs and trees all may

be used. Forage palatability, digestibility, nutrient content, and availability influence diet selection. Seasonal variation in these factors influences the importance of various forage plants and specific areas used by feeding elk. When forage quality falls below what elk need to maintain nutritional requirements, body fat reserves are utilized and ultimately physical condition deteriorates. If this occurs over an extended period, such as a long, hard winter, fat reserves are depleted and loss of muscle occurs. During such conditions animals are more susceptible to accidents, disease, predation, and winterkill. Among pregnant cows, calf production and survival are reduced when cows experience a weight loss of more than 15 percent of their body weight. Death is likely for an elk if over-winter weight loss exceeds 30 percent of body weight.

Current forage conditions on most elk ranges are the result of forest and range management, and livestock grazing, which are under the control of public land management agencies (i.e., USFS and BLM) and private landowners. ODFW has direct management authority over very little habitat. On some public lands, developments such as roads, trails, and campgrounds, and disturbance from recreational and management activities increasingly influence available forage. On some ranges, disturbance has been severe enough to displace elk onto adjacent private lands. Forage use on private lands also is an issue. The challenge is generally one of addressing damage complaints due to elk using forage intended for livestock and damage to fences.

Management Practices Affecting Elk Habitat

Forest Management: Logging, thinning, prescribed burning, road management, and other forest management practices can maintain, enhance, or degrade elk habitat. The effects of these activities depend on whether elk habitat was a consideration during project design and how the project objectives relate to the habitat requirements of elk in the area. Valuable cover or forage can be lost through removal or rendered unusable by continued or increased human disturbance as a result of the project. However, if the project was designed with elk as an objective, management can improve the distribution of cover and forage, enhance forage quality and quantity, and maintain cover structure to meet thermal and security requirements.

Forest management on public lands in Oregon has changed emphasis in the past decade. Emphasis is now on ‘Ecosystem Restoration’ that seeks to obtain balanced and functioning plant and animal communities. New Forest Plan standards and guidelines have been introduced into the local Forest Service operational plans. In Western Oregon, the “President’s Forest Plan” has placed an emphasis on maintaining and promoting late succession forest conditions. In Eastern Oregon, the “Regional Forester’s Plan Amendment” has a similar effect in protecting and promoting ‘Late and Old Structure’. These plans have resulted in a virtual elimination of clear-cut logging practices and a significant reduction in the harvest of large trees even in selective logging projects. This also is coupled with long-term fire protection to result in densely stocked to overstocked tree stands in some areas. The result is federal forestlands in Western Oregon are increasingly lacking in adequate forage conditions. In Eastern Oregon, a large emphasis has been placed on thinning forest stands to reduce the threat of fire and disease, resulting in reduced hiding cover. Inadequate hiding cover in conjunction with a high level of motorized travel can preclude elk from optimum utilization of habitat and can contribute to the redistribution of elk to private lands. The ‘Desired Future Condition’ of forestlands from a federal land manager’s point

of view may be quite different from what elk managers would desire for elk habitat. The differences between these two management concepts must be recognized to prevent major losses in the quality of elk habitats in Oregon. On private and state forestlands, harvest practices have changed to a lesser extent and generally provide adequate forage for elk.

Some federal, state, and most private corporate forests are involved in travel access management by gating roads and limiting motorized access. The use of gates has reduced harassment of elk in some areas.

Range Management: Range management practices are similar to timber management in that they can be either beneficial or detrimental. Most rangelands are in Eastern Oregon and livestock grazing is prevalent. Timing, intensity, and duration of livestock grazing can greatly affect elk habitat. Grazing that considers the needs of elk can be beneficial by removing old, unpalatable vegetation and stimulating new, succulent growth elk prefer. However, grazing that ignores elk can remove needed forage and damage important riparian habitat areas. Research also has demonstrated elk prefer areas without cattle and may move away from them if suitable habitat is available elsewhere.

Grazing on public lands is generally governed by plans for each grazing allotment. These plans define when grazing occurs, stocking rates, planned range improvements, and how livestock are moved throughout the allotment. There are two primary aspects governing the value of livestock grazing to elk. The most important issue is plant health, which is affected by timing and duration of grazing in relation to plant development. Providing a diversity of forage elk need to meet nutritional requirements is also an important consideration. Forage diversity can be manipulated by varying livestock stocking rates, grazing duration, and timing.

Range improvements such as prescribed burns, juniper thinning, forage seedings, water improvements, and fencing can significantly affect elk distribution, movements, and habitat. Fences, while desirable for controlling livestock, can injure and impede elk. Livestock water improvements in arid areas have had clear benefits for elk. Pipelines, wells, reservoirs, spring improvements, and other water improvements have greatly improved water distribution, contributing to increased populations and expanded herd ranges.

Prescribed burning, juniper thinnings, and seedings can enhance or adversely effect elk habitat. Timing, intensity, size, weather, and the kind of habitat being treated all affect the results. Burns and thinning remove or thin overstory vegetation and create openings and improve forage quality and quantity. They also can remove important winter range browse shrubs such as bitterbrush and mountain mahogany, or if timed too late in the spring or fall, adversely impact important calving and foraging areas. Excessive removal of overstory cover may reduce or eliminate needed thermal and hiding cover values. Consideration of elk forage and cover needs should be incorporated into treatment objectives.

Seeding can be used in conjunction with wildfires, thinning, and other habitat practices. The specific seed mix used varies depending on locality, livestock grazing practices, type of range, precipitation, project objectives, and treatment method. Productive seedings can include non-

native and native species and offers an opportunity to reduce weed infestation and improve forage conditions if plant species preferred by elk are included in the seed mix.

Recreation Practices: Since inception of Oregon's Elk Plan in 1992, public lands have been under growing pressure to provide recreational opportunities. From 1990 to 2000 Oregon's population increased from 2.8 million to 3.4 million, and is projected to increase to 3.8-4 million by 2010. If present trends continue, more, not less, recreational pressure on public lands can be expected. Both the kinds of users, as well as overall numbers of users are increasing, which has caused conflicts with elk management. Like many western states, Oregon has seen a significant increase in motorized recreational uses involving all terrain vehicles [ATVs (i.e., motorcycle, quads, snowmobiles)] and mountain bikes. This is in addition to users having more traditional methods of access (i.e., horseback, by foot, skis, or snowshoes). Antler hunting and upland bird hunting are causing increased harassment, expenditure of needed energy by elk, and displacement of elk from winter ranges. Likewise, increased ATV activity and mushroom hunting is causing harassment and displacement on calving and summering areas. The challenge for elk and land managers will be not only to provide elk habitat but also ensure disturbance from recreationalists does not render it unusable by elk. Future elk management will likely be more about people management and the need to consider impacts from the myriad of recreational users.

MANAGEMENT CONCEPTS

Elk management requires the involvement of all interested groups and utilizes a variety of techniques, which include: 1) setting/defining planning goals, 2) establishing management objectives, 3) regulating hunting seasons, 4) maintaining and improving habitat, 5) monitoring harvest and elk populations, and 6) outreach with landowners, agencies and tribes. Successful elk management requires consideration of both biological and social issues during the decision making process.

Mixing biological and social considerations becomes very difficult. High hunter demand, decreasing cover, high levels of roading, and loss of back-country areas has increased elk vulnerability and resulted in reduced hunter opportunity in order to maintain bull ratios at MO levels. This is especially critical when considering results of the early 1980s elk workshops, which indicated Oregon elk hunters desired more mature bulls, less crowded hunting conditions, and less motorized-vehicle access in elk hunting areas.

Inventories and Harvest Surveys

Annual inventories are conducted to monitor the status of Oregon's elk herds. Elk population inventories are conducted during winter and early spring each year at a time elk are concentrated on more open areas. Inventories have been of two basic types: herd trend and herd composition counts. Trend data are collected from fixed wing aircraft and/or helicopter. Herd composition data can be collected from the ground, fixed wing aircraft, or helicopter.

Trend information is collected during February, March, and April each year and is recorded as the number of elk seen per linear mile of inventory route. The aerial survey method allows flexibility for searching a standard portion of winter range each year and documenting elk

observed, regardless of location on that range. In this way, variability caused by differences in annual snow conditions or plant phenology is reduced. Historic inventory routes often failed to enumerate many of the elk on a range during abnormal years because they were rigid as to flight path. To be comparable to historic data, a standard number of flight miles must be attributed to each winter range portion inventoried. Data are reported as elk observed per mile and are most meaningful when used to detect trends in the elk population over several years.

Inventories are designed to determine elk population size at the end of winter. Winter is the major natural mortality period for elk after the first few weeks of life. Calves are considered to have been successfully recruited into the population at the end of winter and become part of the adult population. Biologist term this population number as 'the number of adults alive at the end of the biological year.' This reference point is important in understanding the population MOs. The annual cycle starts over when calves are born in June, thus beginning the next biological year.

Population trend data can be expanded and used in calculating a population estimate on a unit basis. The number of elk observed per mile of route annually can be compared to a standard elk per mile figure indexed to the MO for the WMU. A high degree of variability was associated with population estimates derived in this manner. With the advent of personal computers, population simulation modeling was developed. Elk trend data is most useful as a tool to validate the population model. There is still no more useful tool for a biologist than the confidence gained when animals are actually observed.

While trend data have been useful in estimating elk populations for decades, efforts continued to develop techniques that would provide better population estimates. Research in the state of Idaho developed an intensive monitoring technique called 'Sightability Modeling.' This method involves detailed helicopter transects over a sampling area that has been mapped with zones of differing expected population densities and cover types. It has been an expensive method to utilize, but has been successfully used in Oregon to validate simulation models (POP2) in several WMUs.

Elk herd composition data are collected from December through early April, with the majority collected in February and March. The guidelines for collecting this data ensure that all bulls in the sample still have their antlers (or can be readily seen as bulls), and that the major calf mortality period has passed. Herd composition data are recorded as the number of bulls, calves, and cows observed in each group of elk successfully classified. The resulting data are reported as ratios: the number of bulls and calves per 100 cows in the population. Herd composition data provide an index to bull and calf survival within each WMU. Low bull/cow ratios usually indicate excessive bull harvest, and low calf/cow ratios suggest poor calf survival.

The 1992 Elk Management Plan proposed Mos for post-season bull ratios in each WMU of Oregon. A public involvement process, completed in 1994, finalized these MOs for most units of the state along with population MOs. Each year the bull ratio for a WMU is compared to the MO, and hunting season proposals are based on these comparisons.

Annual harvest is monitored by a statistically tested telephone survey conducted after each hunting season. Controlled hunting has provided an excellent basis for determining sample size and more reliable harvest estimates. These data are accurate for controlled hunts and for general seasons that cover a large area with sample sizes that are adequate for expansion. Accuracy is much lower for general season hunts with a smaller sample size, particularly archery seasons. ODFW has greatly improved the annual harvest survey so that results are accurate and useful in the POP2 simulation modeling process that has been adopted. Budgetary constraints and reduced sample sizes can greatly influence the usefulness of these surveys.

Legal challenges to roadblocks led to the banning of mandatory big-game check stations as a tool in wildlife law enforcement and reduced its use for biological data collection. Check stations for elk seasons are rarely utilized except in key research situations such as the Starkey Elk Study in Northeast Oregon. When used, they are a valuable tool for collecting biological samples and for the benefit of public relations gained by the direct contact between hunter and biologist. The related activity of conducting field checks of hunters by biologists or Oregon State Police game officers still remains beneficial in many districts. Biological data from harvested animals is recorded and the direct hunter contact is valuable. These checks are utilized primarily for recreation reports to the media. Individual districts find them useful in monitoring the trend in hunter success and the age-class structure of harvested elk.

Biological samples taken from harvested elk provide valuable information for management. Hunters have responded by cooperating in collections of elk reproductive tracts, udders, jaws (teeth), and kidneys of harvested cow elk throughout Oregon. Pregnancy rates, age, lactation, and physical condition are all monitored through these collections. This baseline data is invaluable when trying to interpret low calf ratios, low bull ratios, or high predation rates on an elk herd.

Point Regulations

The purpose of antler point regulations is to increase bull/cow ratios and the average age of bulls in the populations. This improves the biological characteristics of the herd for production of young and herd social characteristics. Currently, there are two basic types of antler point regulations in use: 1) minimum antler point regulations; e.g., three-point or greater regulations, and 2) maximum antler point regulations in which a maximum number of points define a legal bull; e.g., spike-only regulations.

The theory behind minimum point regulations is by protecting young bulls, they will survive to become older bulls in the population. The goal is to increase the number and age of branch-antlered bulls in the population. However, with uncontrolled hunter numbers and a minimum antler point regulation, all hunting pressure is placed directly on the segment of the populations targeted for increase. Under minimum point rules with unrestricted tag numbers, the average age of bulls in the populations generally increases approximately one year, but the number of older-aged bulls does not increase. The overall bull ratio generally increases because of higher survival of yearling bulls. All legal hunting pressure is placed on older-aged bulls, and most of them are harvested one year later in life than under an any-bull regulation. Total harvest is generally reduced and illegal kill (primarily spikes) increases under minimum point regulations. In addition, as animals survive more years prior to harvest, nonhunting mortality is likely to

increase. Hunter numbers often decline markedly as many hunters see their chances of harvesting an elk being reduced and choosing to hunt elsewhere.

Hunter success may increase under minimum antler point regulations if hunter numbers are limited or decline. A study of radio-collared yearling bulls in the Snake River WMU in Oregon showed many yearling bulls from the former minimum point regulation area moved to adjacent units and were legally harvested as spikes. This indicated that the effectiveness of minimum point regulations might be limited unless they apply to entire herd ranges.

Minimum antler point regulations are generally viewed as counterproductive by wildlife managers. Recent studies in the Tioga, Snake River, and Saddle Mountain WMUs (all had minimum point bull hunting regulations) indicated that protected animals were yearlings, which typically increased the number of yearling bulls that survived the hunting season. The number of two-year-old bulls in the herd increased during the next breeding season, which may have been beneficial. Even though two-year-old bulls probably breed earlier than yearlings, they do not equate to a herd structure that includes mature bulls (three years and older), which many biologists consider important for adequate reproduction and calf survival. Few older-aged bulls are produced because most bulls are legally harvested as two-year-olds.

The objectives of maximum point (spike-only) seasons are similar to minimum antler point regulations: to increase post-season bull/cow ratios and the number of mature bulls in the population. A high percentage of yearlings often are harvested (much like during any-antlered bull seasons). Spike bulls escaping hunters have a better chance to survive into older age classes. Some controlled entry or general season harvest of older bulls may be allowed, provided bull ratio objectives are met.

Spike-only seasons (with permit harvest on older bulls) have increased both the overall bull ratio and the number of older bulls in populations of Rocky Mountain elk. In the Elkhorn Mountains of Montana, bull ratios improved from 2-3 bulls/100 cows under an any-bull regulation to 10+ bulls/100 cows under a spike-only regulation with permit harvest of branched bulls. Total bull harvest was very similar between the two regulations, yet the overall bull ratio and the number of older bulls was greatly increased under the spike-only regulations. Hunter success during branch-antlered permit seasons was typically around 50 percent, and the number of 2 to 5-year-old bulls killed was higher. Illegal harvest under a spike-only regulation was less than under a minimum antler point regulation.

In Northeastern Oregon, most WMUs adopted spike-only, general season regulations for the second bull season in 1996. An evaluation was conducted in eight WMUs to examine the effectiveness of the spike-only regulation compared to the previous any bull regulation. The average bull ratio increased from 4 bulls/100 cows in 1995 to 9 bulls/100 cows in 2000. The average number of rifle bull hunters declined by 17 percent from 24,596 in 1991-95, to 20,421 in 1996-2000. The decline in rifle bull hunters was caused by tag reductions in limited-entry seasons and hunters choosing not to hunt during the spike only, general season. Many displaced rifle bull hunters apparently transferred to rifle cow and archery seasons. Antlerless hunters increased from 4,738 for 1991-95 to 5,632 for 1996-2000 as elk populations were reduced in some WMUs to population MOs. The average number of archery hunters increased by 68

percent from 3,206 for 1991-95 to 5,376 for 1996-2000. Average bull harvest for rifle hunters declined 32 percent from 3,888 to 2,634, while archery harvest of bulls increased 45 percent from 190 to 276. For branched-antlered bulls, rifle harvest declined 58 percent from 1,114 for 1991-95 to 464 for1996-2000, while archery harvest increased 76 percent from 87 for 1991-95 to 153 for 1996-2000.

In Western Oregon, three WMUs adopted some spike-only regulations following adoption of the 1992 Elk Plan. The Powers WMU went to a controlled entry spike-only bag limit in 1994. Bull ratios increased from an average of 5 bulls/100 cows for 1985-94 to 11 bulls/100 cows for 1995-2001. In 2001, 56 percent of bulls detected in post-season surveys were branched bulls. Calf ratios increased slightly over time as well, especially when compared to adjacent WMUs. However, bull rifle hunter numbers and corresponding bull harvest both dropped up to 60 percent.

In the Wilson and Trask WMUs, a spike-only general season was implemented in 1999 for one of the two general seasons in those WMUs. Although an evaluation has not been completed, preliminary data indicates bull escapement has increased significantly over previous years in which both seasons had an any-bull bag limit. Hunter numbers and rifle bull harvest have dropped over previous levels as well.

Controlled Bull Hunting

Controlled bull hunting has as its objective an increase in total bull numbers, particularly the older age class bulls in the population. An additional social benefit is an improved hunting experience when fewer hunters are allowed in a hunt area. Increases in bull/cow ratios and bull age structure result directly from lowering hunter numbers in units with vulnerable elk populations.

With more than a decade of experience in Oregon with controlled bull elk hunting, the results are encouraging. Bull ratios can be maintained at or above the MO minimum level. As the bull ratio maintained itself, or was improved by limiting hunters, hunter satisfaction has improved in response to a better quality hunt for a chance at an older bull. Less crowded conditions with a chance to hunt the elk in a one-on-one situation leave most hunters with a much better feeling about their opportunity. Many feel that overall hunter ethics improve with less competition. If recreational ‘opportunity’ is measured solely as the total number of hunters who have a chance to participate, then controlled hunting reduces that opportunity. As the value of the opportunity improves, however, hunter satisfaction with this opportunity must be part of the equation for evaluating recreation.

Controlled hunting is not currently a consistent method across all WMUs in Oregon. As conditions improve over time in a hunt area, there is a gradual increase in interest for the qualities that are improving. These qualities include larger bulls available, fewer hunters in the woods, and a better ratio of bulls to pursue.

Hunters utilizing a less desirable type of hunt such as a general bull season (Western or Eastern Oregon) or a point restriction of some type (three-point restriction in Southwestern Oregon or

spike-only in Northeastern Oregon) often use their controlled hunt application for more desirable hunts. They have the opportunity to hunt general seasons when they are unsuccessful in the controlled hunt drawing. Displacement of hunters from their traditional hunting area occurs in this way. Controlled hunting works best in larger geographical areas when most of the WMUs are similar in the opportunity they provide.

It was once said that controlled bull hunting would reduce recreational opportunity in Oregon. Fewer tags allocated in comparison to general seasons would mean a loss of revenue for the wildlife agency. This may even trickle down to the small communities dependent on a hunting season increase in business. Many hunters have provided public comments at meetings around the state during the last 20 years indicating they would like more mature bulls and fewer hunters. They were willing to give up hunting every year to obtain this kind of opportunity. The addition of the preference point system for elk in 1994 made this decision even more palatable to many elk hunters. They could anticipate and plan for the years in which draw success was probable. For an increasing number of hunters, the availability of general archery hunting for those not drawing a controlled hunt rifle bull elk tag is used as an option.

Antlerless Harvest

Antlerless elk generally are harvested in Oregon for three reasons: population control, to solve damage problems on private lands, and to collect reproductive and age information on specific elk herds. Antlerless hunting also provides a valuable source of recreation. Harvest of antlerless elk may increase calf survival by reducing competition for resources, particularly when elk densities are high compared to available cover and forage resources. When an elk herd is at or above MO (if MO is set at environmental carrying capacity), it can withstand a reasonable amount of antlerless harvest without reducing productivity. Such hunts provide increased opportunity for hunters to hunt and harvest elk, especially where bull ratios and bull hunter successes are low.

Antlerless harvest as a form of population control is important for several reasons. Elk populations are bound by their habitat's capacity to support a certain number of elk. This level is called the environmental carrying capacity. When predation rates are low to moderate, an elk population below carrying capacity will grow toward that level based on its reproductive rate. As carrying capacity is approached, reproductive rate slows, or the mortality rate increases. If the objective is to maintain maximum production from a herd, numbers need to be maintained at a level below carrying capacity.

As the density of adult animals increases in an elk population constrained by habitat, the survival of calves typically declines. A reduction of the adult component may increase calf survival. Antlerless hunting has been a valuable tool for regulating the size, composition, and density of an elk population. When calf ratios are high, bull-only regulations simply cannot remove enough animals to reduce the population.

Generally, elk populations reach a social carrying capacity (the willingness of landowners and local residents to accept elk) well before they reach their environmental carrying capacity. Elk damage to private land typically reaches an unacceptable level under such circumstances.

Antlerless hunting serves several purposes in damage situations. The overall number of damage causing elk is reduced, the animals that are left become more wary, their typical use patterns change, and damage is reduced. Addressing elk damage to private property with antlerless hunting is sometimes difficult because some landowners will not allow public access to their land. When adequate harvest is prevented, elk damage often continues to be a problem for adjacent landowners.

An emergency hunt procedure has been in place in Oregon for many years. Elk damage problems can be addressed using this method separately from planned antlerless hunts. Smaller areas with acute damage problems can be handled with a smaller number of hunters pinpointed at solving that problem immediately. Emergency hunt lists are established on an annual basis for each county of the state.

Recent changes in the Landowner Preference (LOP) Program have led to the development of what is termed 'LOP Damage Tag Exchanges.' Unused landowner preference tags can be exchanged on a two-for-one basis for antlerless elk tags when damage occurs on the registered private land. The local biologist and landowner must agree a damage situation is occurring, and tags are issued specifically for that LOP land. This procedure has quickly increased in usage and is often preferable to emergency hunts by both the landowner and the local biologist.

Antlerless hunting to collect reproductive tracts is generally done in conjunction with research and management studies in a specific herd range, WMU, or region. Collection of female reproductive tracts and udders during late November allows biologists to determine pregnancy rates. Lower incisors are also collected for elk age determination using the cementum annuli technique, providing information on the age structure of the antlerless component of the herd. Kidneys and associated fat deposits are also collected to determine relative physical condition of harvested cows.

Either-Sex Hunting

Either-sex or 'any-elk' hunting has become a more widespread harvest management tool in Eastern Oregon in recent years. When there is a concern about too many hunters in an area, such as an area of predominantly private land, an either-sex bag limit allows effective control of elk populations without excessive numbers of hunters. Harvest under an either-sex bag limit can vary from as low as 20 percent cows to near 65 percent cows (but usually averages near 50 percent) depending on the habitat and landownership patterns. In some areas this strategy often allows control of the elk population with a minimum of hunters while maintaining a high bull ratio. These hunts are very popular with hunters and can be difficult to draw. When there is no concern for having too many hunters in an area, the either-sex strategy will generally not allow as much hunting opportunity as separate bull and cow seasons due to harvest success rates tending to be higher than bull-only and some cow-only seasons.

Travel Management

An increasing human population in Oregon and its subsequent demands for year-round outdoor recreational opportunities will continue to be a major concern for elk managers. Over the years, large areas of Oregon's elk habitat have been converted from a nearly roadless to a heavily

roaded condition on both private industrial forest lands and public lands. Elk populations once occupying secure and undisturbed habitats now must contend with habitat that provides little security and escape opportunity.

It is documented in numerous studies that human access to elk habitat due to increased road density can negatively affect elk habitat utilization and increase elk vulnerability (Perry and Overly, 1977; Lyon and Ward, 1982; Lyon, 1983; Witmer and deCalesta, 1985; Wisdom, 1998; Rowland, et al., 2000). Habitat Effectiveness models developed from these studies all concluded that the effectiveness of habitat for elk declines as road density increases.

Road density and human access can effect elk populations in several ways:

- Roads physically remove land from the habitat base.
- Road access increases elk vulnerability during hunting seasons and to poaching year-round.
- Road access enhances other types of disturbances (snowmobiles, ATVs, hikers, mushroom pickers, skiers, etc.) during critical calving and wintering periods of the year.
- Elk utilization of habitat adjacent to roads is reduced due to disturbances.
- Increased human harassment can contribute to the redistribution of elk populations from areas of high disturbance (public lands) to areas with little or no disturbance (primarily private lands).

Traditional travel management programs consist of regulating the amount, type, or timing of motorized vehicle access on either a seasonal or permanent basis through road closures. Each program can have a variety of strategies and are administered based upon the land ownership and current or future management needs. Travel management implemented on a seasonal basis can be used to achieve a desired hunting season objective (i.e., distribute harvest over the season, increase bull ratios) or can protect elk from harassment during critical calving or wintering periods. In addition to achieving all of the objectives of a seasonal closure, travel management used on a permanent basis can protect special habitats, reduce elk harassment year-round, and provide for a more diversified and quality hunting experience.

Road closure methods utilized in traditional travel management programs are variable and site specific. Administrative closures using signs identifying motorized vehicle restricted roads, or a round green reflector ‘Green Dot’ system marking roads open to motorized travel can be utilized on both permanent and seasonal closures where it is not possible to physically block roads. They are less expensive to establish but cost more to enforce in order to achieve an acceptable compliance level. Gates and guardrail barricades are more effective and easily utilized in both permanent and seasonal closures where vegetation or terrain restricts access around the barrier. They are more easily enforced but are expensive and difficult to maintain due to vandalism problems. Ditches, logs, boulders, or other types of barriers used to physically close roads are cost effective and are easily maintained in permanent road closure situations. Road obliteration is cost effective to enforce, easy to maintain, and the most effective method used to ensure that a road is closed to motor vehicle access.

While each road closure method needs to be carefully evaluated to produce the desired results, none of these methods has been proven completely effective in controlling the use of ATVs on

'closed' roads or preventing cross-country ATV travel. ATV use has increased significantly in Oregon between the late 1990s and 2001. Oregon State Parks and Recreation Department records indicate that ATV permit sales have risen each year, from 21,447 in 1997 to 51,242 in the year 2001. State and federal land managers have found difficulty in implementing effective travel management programs using 'traditional' methods to control ATV activities. An increasing number of land managers are implementing restrictions to eliminate or reduce cross-country ATV access by restricting ATV use to established roads.

Nontraditional travel management programs consisting of complete closures to all access on a seasonal or permanent basis to protect wildlife and their habitats are more difficult to implement. While these programs are easier to establish, the enforcement costs necessary to achieve compliance can be high. Limiting access by public land-management agencies and to lesser extent private land managers is proving to be a high profile and controversial subject with some user groups.

Regardless of the type or techniques used on any travel management program, careful planning and cooperation will continue to be an important tool to develop and implement effective motorized or non-motorized travel management systems. Partnerships between land managers, wildlife managers, big game hunters, and diverse recreational users will be essential for travel management programs to be successful and remain an important tool in elk management.

Supplemental Feeding

Harsh winter weather (i.e., deep snow and low temperatures) occurs periodically, primarily in Southeastern and Northeastern Oregon and for elk wintering at high elevations in the Cascades. Under severe weather conditions elk calves may suffer relatively high levels of mortality. Supplemental feeding to reduce mortality due to severe winter conditions is not desirable on a long-term basis and has a number of associated problems that include:

1. Supplemental feeding may develop concentrations of animals that could increase the possibility of disease outbreaks and transmission and may cause damage to habitat resulting in long-term damage to the site.
2. Dependency on feed grounds may delay or diminish migration to traditional winter or summer ranges. Elk are then encouraged to return in large numbers each year to areas that do not have adequate winter habitat.
3. Supplemental feeding may maintain an artificially high elk population that will ultimately need to be reduced if the feeding program is interrupted.
4. Feeding may habituate elk to hay, causing them to seek out haystacks rather than natural winter forage. Some elk learn to remain near the feeding area during summer, causing damage to crops during the growing season.
5. Supplemental feeding is expensive. Funding is generally not available and may be better spent maintaining or enhancing natural habitat for long-term benefits to elk and other wildlife.
6. Supplemental feeding, to be effective, must be initiated prior to elk undergoing nutritional stress in order to allow rumen digestive organisms to adapt to a new diet. Once started, the program must be continued through the winter.

7. Funding mechanisms are not in place to buy feed and begin feeding in a short time frame when needed.

Supplemental feeding may be effective in preventing winter elk damage to private property or in maintaining elk in areas where there is abundant summer range, but adequate natural winter range no longer exists. This may be the only means to maintain elk in such areas. Costly programs to save elk from starvation during severe weather generally are not effective in producing desirable results. Such programs are inefficient, divert public attention and funding from real problems, and can quickly cripple an agency's budget.

Predation

Predators have been the focus of debate since European settlement of the west. Most early settlers made their living off the land, and there was little tolerance for losses to predators. Concerted efforts were made to eliminate grizzly bears, wolves, coyotes, and cougars with most of these species either near or actually extinct by the 1960s.

Black bears, cougars, and humans remain the three primary predators influencing elk herds in Oregon. The last 50 years have brought significant changes to bear and cougar populations and their management. Elimination of bounties in 1961 and poisons in 1972 has allowed cougar populations to increase. A vote by the public in 1994 eliminated the use of dogs for the hunting of bears and cougars, which has contributed to a general increase in both populations (see Keister and Van Dyke, 2002, for cougar population status). As a result of the 1994 vote, hunter harvest declined, as hunters were no longer able to use traditional methods for harvesting cougars and bears. However, through time harvest of cougars has increased as more hunters purchased cougar tags and were able to take advantage of the increasing cougar population.

The increase in cougar and bear populations has resulted in documented increases in complaints as well as cougars taken as a result of livestock damage and safety concerns, with increasing evidence of impacts to some elk populations. Significant declines in calf survival and recruitment for some areas of Eastern Oregon have been documented. Of particular concern is Northeastern Oregon. Calf recruitment in eight WMUs in Northeastern Oregon has declined significantly since the mid-1990s and resulted in population declines. This has led to decreases in both antlerless and bull hunting opportunity in those WMUs.

Preliminary data suggest that nutrition is not the major factor influencing calf survival in Northeastern Oregon. In most years, elk body condition in Northeastern Oregon has been consistently good, and better than any other area in the state (see Fig. 9). In addition, pregnancy rates have consistently been above 90 percent, and usually higher than other areas (see Fig. 10). Predation appears to be a growing factor in the decline in calf recruitment in these areas. Studies have been conducted in Oregon and in areas of similar habitat in nearby Idaho and Washington to determine reasons for poor calf ratios. Two studies in Idaho showed that bears and cougars played a large role in the poor survival of calves experienced in the study areas. Ongoing research in two study areas (Lochsa River and South Fork of the Clearwater River), where calf ratios have been poor (1999 calf ratio was 17 calves/100 cows on the Lochsa) and medium (25-35 calves/100 cows on the Clearwater) found survival of radio-collared calves to be 15 percent

on the Lochsa and 51 percent on the Clearwater (Pete Zager, Idaho Fish and Game, personal communication). On the Lochsa River, bears were responsible for 52 percent and cougars 38 percent of calf mortality. On the Clearwater River cougars were responsible for 36 percent and bears 27 percent of calf mortality. Likewise, in the Blue Mountains of Washington calf ratios have been low (18-19 calves/100 cows for 1992-93). A recent study (1992-98) found poor survival of radio-collared calves with predation responsible for 78 percent of observed deaths; cougars responsible for 49 percent and bears 16 percent of the mortalities (Myers, et al., 1999). In addition, a cougar study done in the Catherine Creek Unit of Northeastern Oregon found the mean predation interval for female cougars (1996-98) was 7.7 days (Nowak, 1999). Thirty-one percent of the kills were elk and 69 percent were deer, which did not differ from population proportions of elk and deer in the area. Of the elk in the kill sample, 81 percent were calves and for deer, 63 percent were fawns. Most elk and deer killed by cougars were in good (73 percent) or fair (21 percent) condition.

In addition to those eight WMUs in Northeastern Oregon, which have shown significant declines in calf ratios, there are at least five others in Eastern Oregon that have had declines in the last two to three years. However, it is not known if these declines are part of the normal year-to-year fluctuations or represent the beginning of a significant trend. Other WMUs in Eastern Oregon have shown no significant decline in calf ratios yet, although, the trend in declining calf ratios seems to be moving from WMUs in the northeast corner of the state to the south and west.

Calf recruitment has not been of concern so far in Western Oregon. Nutritional limitations have long been recognized as being responsible for lower pregnancy rates in Roosevelt elk. Even with nutritional limitations, Roosevelt elk calf ratios have remained steady and now are above averages for Rocky Mountain elk (Fig. 8). ODFW will continue to monitor calf ratios throughout the state as funds are available.

The significant decline in calf ratios in parts of Oregon has led to increased public pressure to define the causes of the low recruitment and take action to recover elk herds. As a result, in 2002 ODFW initiated the elk predation/nutrition studies in Northeastern and Southwestern Oregon. This five-year study will examine the role of nutrition and predation relative to calf survival.

Technology and Hunter Methods

Technological advances in recent years have changed the way many people hunt, resulting in increased hunter efficiency and success. Advances in clothing, Global Positioning Systems (GPS), radios, and cell phones add to hunter safety while in the field. However, most of the technology improvements are used to gain an advantage over other hunters or increase the chance of locating a trophy animal.

GPS units allow hunters to venture into unknown areas. Two-way radios and cellular phones allow hunting partners to stay in better contact. Improved optics, rangefinders, night-vision scopes, and infrared detection equipment allow hunters to scout, locate, and harvest animals more efficiently. Improved clothing, boots, and insulation allow hunters to withstand the elements longer. An increasing number of hunters use ATVs to access remote or less accessible areas and to transport equipment or game animals. Paragliders and ultra-light aircraft are sometimes used to locate herds or to scout for trophy animals during the off-season. Many

advances in weapons technology have extended the range of weapons. Nearly every aspect of hunting has been made easier or more efficient by technological advances.

ATV riders and other off-highway vehicle users are coming under increasing criticism from land managers and biologists for damaging the land resource and harassing wildlife, which contributes to elk population redistribution. Night vision, ATVs, and ultra-light aircraft are aids to illegal hunting methods such as night hunting and hunting with the aid of motor vehicles or aircraft. Issues of fair chase are developing that threaten to erode public support for hunting.

Concerns are developing about the impacts of technology on hunting opportunity. In the past, the Oregon Fish and Wildlife Commission has expanded primitive weapon hunt opportunities to ease crowding and reduce hunter efficiency. Restrictions have been imposed in recent years on equipment allowed for archery and muzzleloader hunting. Hunting season opportunities have been reduced to lessen the impacts of increased hunter efficiency on game populations. It is likely that in future years more focus will be needed in regulating the use of technological advances. Staff and the Commission will continue to evaluate the effects of technology advances on all types of hunting opportunity.

Special Interest Hunting

Since elk hunting opportunity has existed as a sport with regulations on the manner in which an animal could be taken, there have been groups and individuals seeking to establish seasons to harvest elk in a specific manner. Early examples of these types of hunts were the Canyon Creek Archery Season and agricultural archery hunts in Southwest Oregon. The number of seasons dedicated to specific groups of hunters was small. At that time, the availability and technology of alternative equipment was limited and interest by the sporting public was similarly limited. In addition, center fire rifle hunting seasons were long and contained no limit on tags. As a result, there was little interest by hunters in trying other avenues to hunt.

During the 1970s, elk hunting was attracting more hunters and rifle elk hunting seasons became crowded. At the same time interest was building in archery hunting. After the first statewide bow season was initiated in 1979, archery hunters began to increase in number. For a number of years, archery hunting was primarily the only special interest hunting season available to hunters in Oregon.

During the 1980s and early 1990s, elk rifle seasons got progressively more crowded and restrictions on rifle hunters increased. As a result, hunters started looking for alternative approaches to hunting. At the same time, muzzleloading rifles became widely available and a new group of hunting enthusiasts came into being. In the last decade several muzzleloader hunts have been established to accommodate this sporting group (Fig. 11). During the same time archery hunting has increased from a small special interest hunt to the second most participated hunting pursuit in the state (Fig. 12).

Figure 11. Muzzleloader hunter numbers in Oregon, 1991 vs 2000.

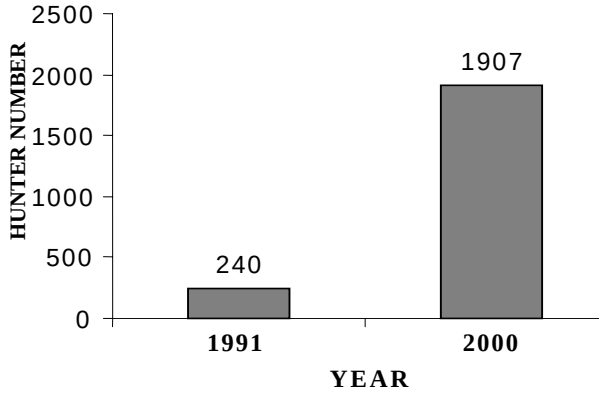
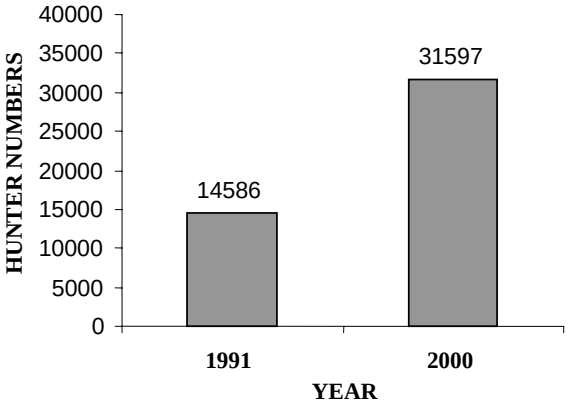
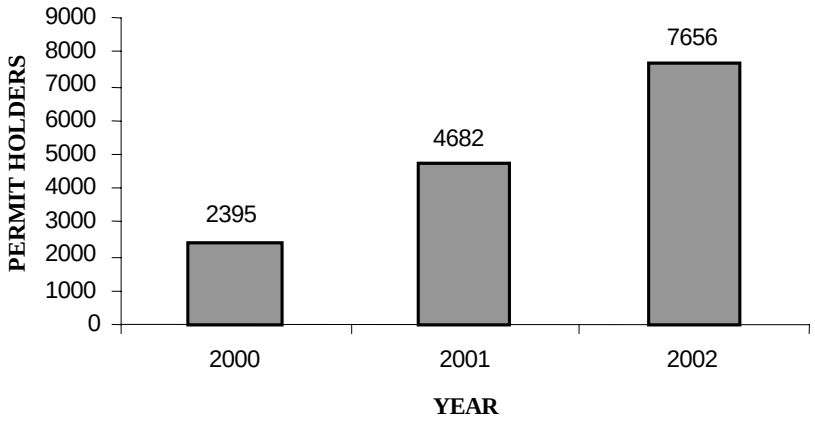


Figure 12. Archery hunter numbers in Oregon, 1991 vs 2000.



The 1990s have seen an explosion of hunting opportunities oriented to specific groups. In addition to archery and muzzleloading, these include youth hunts, creation and subsequent expansion of the Landowner Preference Program, tags set aside from open competition for guides and outfitters, and special bag limits for hunters with permanent disabilities. In 1999, the requirements for qualifying as a 'permanent disabled hunter' were relaxed. Since that time, a large number of hunters have registered to obtain the more liberal bag limits afforded hunters with disabilities (Fig. 13).

Figure 13. Permanent Disabilities Hunter permit holders in Oregon, Years 2000 to 2002.



Each expansion of special opportunities for specific weapons or groups of individuals has ultimately taken opportunity away from the largest hunter group: rifle elk hunters. In an environment where elk numbers are limited and harvest has to be apportioned between groups, any expansion of opportunity to one group ultimately has to come out of the opportunity of another.

ECONOMIC ASPECTS OF OREGON'S ELK RESOURCE

Economic Concepts

There are two approaches generally used to describe the economic importance or value of wildlife-based activities: economic impact and economic value.

The **economic impact** approach measures the economic impact of purchases made by people who buy goods and services during their recreational trips and the indirect effects of that money on the local or state economy. This approach is used to estimate the personal income impact of fish- and wildlife-related activities on the financial economy of a local community, county, state, or region.

The **economic value** approach is based on the value of an activity to resource users and reflects the 'willingness to pay' by people to participate in an activity. The difference between the willingness to pay and what is actually spent is the net economic value or user value. This approach typically is used to compare the net benefits of one resource management option to other resource options, or to compare benefits from the resource to the cost of producing it.

Economic Impact of Elk Hunting in Oregon

Estimates of the economic impact of hunting on statewide personal income have been developed using expenditure data and economic 'input-output' models. Total expenditures for all types of hunting by Oregonians were estimated at about $625 million in 1996 (U.S. Fish and Wildlife Service, 1998a). This estimate includes expenditures on special equipment such as vehicles used primarily for hunting. These estimated expenditures for all hunting produced roughly $315 million in statewide personal income (Southwick Associates, 1998).

The amount that a hunter spends in order to take part in a hunting trip has an impact on state or regional economies as well as the local economy. For example, the expenditures related to big-game hunting in Eastern Oregon also generate income outside Eastern Oregon. A portion of hunting trip expenditures are made near hunters' homes and enroute to the hunting destination; income also is generated because of 'leakages,' or purchases, of the local area economy from the larger state and regional economies.

Among the data collected in a study on hunting in the Starkey Experimental Forest (during 1989-91) were deer and elk hunter trip expenditures. These expenditures did not include spending on hunting equipment and special equipment. The associated impact on personal income from the expenditures has been estimated for the state level and for Eastern Oregon. The estimates for elk hunting are shown in the following table:

Starkey Experimental Forest Elk Hunter Average Hunter Day Expenditures and Associated Impacts on Total Personal Income

Hunt Period	Usable Responses	Average Total Trip Expenditures (per hunter day)	State Level Personal Income Impact (per hunter day)	Average Eastern Oregon Expenditures (per hunter day)	Eastern Oregon Personal Income Impact (per hunter day)
ELK HUNTS					
1989	37	$ 48.95	$ 36.55	$ 18.49	$ 8.58
August 1990	129	$ 46.40	$ 35.23	$ 26.32	$ 12.95
December 1990	37	$ 71.13	$ 54.31	$ 42.81	$ 21.56
August 1991	138	$ 51.18	$ 38.44	$ 27.17	$ 12.38
December 1991	95	$ 60.46	$ 45.68	$ 31.22	$ 14.25
WEIGHTED AVERAGE	436 total	$ 53.29	$ 40.25	$ 28.39	$ 13.41
WEIGHTED AVERAGE (2001 $)		$ 65.00	$ 49.10	$ 34.63	$ 16.36

No comparable estimates of expenditures and personal income impacts have been made for Western Oregon elk hunting.

Economic Value of Elk Hunting

The first in-depth study of the net economic value of big-game hunting in Oregon was based on a 1968 survey (Brown, et al., 1973), which estimated the net economic value for big-game hunting in Northeast Oregon using a travel cost model. The average net economic value in 1968 was an estimated $9.20 per hunter day. Translated to 2001 dollars using the Gross Domestic Product (GDP) implicit price deflator, this amounts to about $38 per hunter day.

Analysis of Oregon data collected during the 1985 national survey (U.S. Fish and Wildlife Service, 1988) provided another estimate of the net economic value of deer hunting. Using the contingent value method, Hay (1988) estimated an average net economic value per day of elk hunting at $27 for Oregon. Translated to 2001 dollars using the GDP implicit price deflator, this amounts to about $40 per hunter day.

Boyle, et al., (1998) used western regional data from the 1996 national survey (U.S. Fish and Wildlife Service, 1998a) to develop estimates of the net economic value of elk hunting. They estimated a mean net economic value for elk hunting of $410 per year for an aggregate region including the states of Oregon, Idaho, Montana, Colorado, and Wyoming. The corresponding estimated value per elk hunter day was $59. Translated to 2001 dollars using the GDP implicit price deflator, this amounts to about $64 per hunter day.

The U.S. Forest Service and ODFW collected economic data from elk and deer hunters at the Starkey Experimental Forest in Northeast Oregon during the 1989-91 hunting seasons. Fried (1993) estimated values for elk hunting from some of this data. Fried's analysis differed from the

national survey estimates in that he estimated the median (instead of the mean or average) value per trip for elk hunting. The estimated median value for Starkey elk hunters was $113 per hunter per trip. The estimated mean value per trip for a hypothetical increase in the elk herd that would ensure an opportunity to shoot at an elk was $287. The estimated median value for such an increase in hunt quality was $90 per trip. Based on these last two estimates of the value of improved quality, Fried concluded that the value of a harvested elk was between $375 (based on the median value) and $1,195 (based on the mean value).

Based on the studies cited above, a net economic value of roughly $40 to $60 per hunter day for elk hunting in Oregon can be applied to the total 774,000 days of elk hunting in Oregon (2000) to yield an estimate of between $31 million and $46 million in annual net economic benefits. This estimate represents the aggregate user value of elk hunting to those who hunted in Oregon, above their actual expenditures (costs) for this recreation.

PUBLIC INPUT DURING DEVELOPMENT OF OREGON'S ELK MANAGEMENT PLANS

A major effort was made to solicit public input for the development of Oregon's original Elk Management Plan in 1992. A 'Public Working Group' (PWG) consisting of 26 individuals, representing a wide variety of different interests was formed to work with 16 ODFW biologists in drafting the plan. The PWG developed a preliminary list of topics and issues for potential inclusion in the management plan.

These topics and issues were presented to the public for comments, suggestions, and additions at 22 statewide public meetings. More than 600 people attended the 22 statewide public meetings. In addition, a hunter survey was mailed to 1,133 elk hunters, stratified across the various hunter groups. A total of 749 completed surveys were returned.

The PWG reviewed comments from the public meetings and results of the questionnaire, then developed recommendations for ODFW on contents to include in development of the Draft 1992 Elk Management Plan. Additional comments were solicited in the form of written letters and testimony to the Commission. Detailed summaries of comments received through the public meetings and results of the hunter survey are presented in the 1992 Elk Management Plan.

The purpose of Oregon's 2003 Elk Management Plan is to review and update the 1992 Elk Plan to reflect current conditions. In January 2002, an Internal Committee of ODFW field staff was appointed, consisting of nine members, one from each of the ODFW watershed districts. The Internal Committee prepared an evaluation report of accomplishments on the 1992 Elk Management Plan titled, "Assessment and Review of Topics, Issues, and Strategies Identified in Oregon's Elk Management Plan, 1992."

Public input to the plan revisions began in March 2002, when a new PWG was established. The PWG members represented a variety of interests including several sportsmen's groups, private landowners, guides and packers, Native Americans, the Oregon Farm Bureau, U.S. Forest Service, and Bureau of Land Management (Appendix, Table A). The Internal Committee of ODFW field staff also served as part of the PWG. Three meetings of the PWG were held in April

and May of 2002. The PWG identified current issues of importance and developed strategies to address those issues. These issues and strategies were combined with background information from the original elk plan to create a draft revised plan.

The Oregon Fish and Wildlife Commission reviewed the draft revised plan in August 2002 and made the draft available to the public on the ODFW Web site, in paper copies available at all ODFW offices, and at 12 public meetings conducted around the state during the month of August (Appendix, Table B). The 12 public meetings attracted approximately 260 public participants.

The elk plan update was conducted concurrently with a similar plan update for mule deer and a planning effort for black-tailed deer management strategies. The 12 public meetings were conducted as concurrent reviews of both the deer and elk plan drafts. More than 700 public comments were received from this public involvement effort including many comments that pertained to both deer and elk planning. The elk PWG reviewed more than 300 comments applicable to the elk plan revision.

Comments taken at the meetings as well as comments received in written form were reviewed by the Internal Committee and used to make changes to the draft plan in September 2002. This public input resulted in three additional issues and several additional strategies or word changes that expanded the coverage of issues or strategies to include the public recommendations. A final review was then made by the PWG and ODFW staff, and a final Fish and Wildlife Commission hearing was held on February 7, 2003, to review the plan and take public testimony prior to adopting, changing, or rejecting the plan.

Summary of Public Input Received

The majority of the comments concerned issues or strategies that were already covered in the draft elk plan. Major categories that emerged as top public concerns based on the number of comments received included habitat, predation, ATV use, cervid ranching/disease, inadequate enforcement, and LOP program.

In addition, two issues were anticipated to be of special interest and were identified as issues that would be addressed separately at a later time. One of these issues was Mos for elk populations, including population levels, bull ratios, and calf ratios. The other issue was archery hunting and how opportunity is allocated between bow hunters and rifle hunters. As expected, both of these issues generated numerous comments that will be used in future reviews.

Public input relating to habitat issues included a diversity of interests with the main topics being more protection and enhancement of habitat including better range management, forest management, winter range protection, and forage production. There also was a fair amount of interest in road closures, highway impacts, better coordination with land managers, and competition between elk and deer. Most of the comments were already addressed in the draft plan and other than a new issue and strategies developed to address competition between deer and elk, only a few minor changes and additions were needed to cover the additional public input.

Concerns about cougar and bear predation generated many public comments. Most comments recommended reducing cougar and bear populations. Some suggestions were beyond ODFW's authority (such are reinstating hunting with dogs). A few of the predator-related comments included the need for more studies and concern about additional predation if wolves become established. This issue was already addressed in the draft plan and no changes in the draft were required to address these comments.

ATV use was the most contentious issue where public attitudes were nearly equally divided between those who do and those who do not want more restrictions on ATV use. ATVs were already addressed in the draft plan and the need for at least some restriction is recognized to protect elk habitat, hunting opportunity, and promote hunter ethics.

Cervid ranching and disease were linked as major issues of concern. Public comments overwhelmingly supported the Fish and Wildlife Commission's recent importation ban and also recommended the outright banning of existing permitted facilities in Oregon. The draft plan already reflected the concerns about cervid ranching, but an additional issue and strategies were added to address public comments about disease, which is a broader issue than just cervid ranching.

Significant concern was expressed about inadequate enforcement of regulations. There is growing recognition that enforcement is critical to maintaining healthy elk populations and for the equitable distribution of the harvest, but because of funding shortfalls, enforcement is being reduced instead of increased. A few minor changes were made in the draft plan to better reflect these concerns and to incorporate the funding recommendation.

The Landowner Preference (LOP) Program generated considerable comment. Many of the comments were in reference to concerns about abuse of the program and a perception by some hunters that the LOP program unfairly favors landowners at the expense of general hunting opportunity. LOP issues had been included in the draft plan but were primarily oriented toward solving landowner damage problems. A new issue was added to the draft to address this additional hunter perspective. Comments about the LOP program will be forwarded to the Wildlife Damage Task Force for additional consideration in that separate planning process that focuses on damage.

Other topics where several comments were received included interest in mandatory harvest reporting to improve available data on harvest and populations; the need for more hunter education; excessive harassment of elk from extended hunting season time frames, shed antler hunting, and increasing nonhunting recreational activities; interest in restricting out-of-state and out-of-area hunters; and opportunities for disabled hunters, senior hunters, youth hunters, landowners, Native Americans, master hunters, and trophy hunters. Many of these issues were already included or were added to the draft plan.

Numerous other topics were addressed in a few comments. Many of these comments were not within the authority of ODFW, were too specific to go into a statewide management plan, or were a question rather than a suggestion and therefore not addressed in the elk plan.

TOPICS, ISSUES AND STRATEGIES

The PWG and public identified 17 issues facing elk management in Oregon. These issues were grouped into four categories or topics. Strategies were developed to address each issue. **Completion of the potential strategies outlined in this plan is dependent on adequate staff and funding in the future.**

Habitat

ODFW recognizes that wildlife populations are dependent on habitat, which affects the potential productivity of each population. Habitat management is the legal responsibility of public land management agencies and private landowners. ODFW serves only in an advisory role in the great majority of land management decisions, which are usually outside ODFW's jurisdiction. ODFW is committed to working with land managers, tribal entities, and private landowners to maintain and enhance habitat for all wildlife including elk under the direction of this plan.

1. ISSUE: There is a degradation and loss of elk habitat, which will cause a decline in elk populations and may increase conflict with private property.

There is concern that habitat conditions favoring elk are declining. In Western Oregon, a decline in forage availability has been a result of drastic reductions in timber harvest in some areas. In Eastern Oregon, increases in road densities in the 1970s - 90s and the current direction to thin forests has caused increased harassment and displacement of elk to private properties in some areas.

Objectives

- Identify habitat factors limiting elk throughout Oregon.
- Work with landowners and managers to maintain or improve habitat conditions.
- Seek to improve ODFW programs and funding that maintain and enhance elk habitat.

Proposed Strategies

A. Remain involved with county and federal agency planning processes to maintain big-game winter ranges.

B. Strengthen the Memorandum of Understanding with land management agencies, specifically the USFS and BLM to allow more productive input to land-management decisions that affect elk.

C. Seek continued funding for the A&H Program to ensure long-term viability of the program. Utilize A&H funds to enhance private lands and develop expedited application processes for small enhancement projects

D. Develop alternative funding sources (such as funds from the Rural Schools and Community Act of 2000) for habitat improvement projects.

E. Fully fund the Green Forage (GF), Dear Enhancement and Restoration Program (DEAR), and federally funded Pittman-Robertson (PR) habitat maintenance and improvement programs. Restore GF and DEAR funds that are now going into the A&H program.

F. Promote noxious weed and undesirable plant management.

G. Work with land-management agencies to reduce open road densities.

H. Promote the federal Conservation Reserve Program (CRP) to enhance elk habitat on private lands, where appropriate.

I. Encourage Oregon Department of Transportation and the Federal Highway Administration to design highways that allow for safe elk passage where needed.

J. Identify and prioritize limiting factors for elk by WMU and seek to resolve these limiting factors.

K. Habitat improvement activities should incorporate benefits for multiple species.

L. Cooperate with groups or land-management agencies to purchase or protect (i.e., easements, cooperative agreements, etc.) winter range or other important habitats.

M. Support projects in Western Oregon that encourage more forage production where forage is limiting.

2. ISSUE: There is a perceived need to improve cooperation between ODFW and landowners, land managers, tribes and recreational users to minimize conflicts in elk management.

Federal and state resource managers, landowners, tribes, and other resource users often have different goals resulting in different views on elk and elk management. These differences often result in a lack of cooperation or even conflict between the different landowners, managers, and resource users.

Objective

- Seek to achieve the best cooperation with all parties involved in elk and elk habitat management.

Proposed Strategies

A. Maintain a high level of cooperation between landowners, hunters, and ODFW through communication programs (e.g., Wildlife Damage Council).

B. Make sure appropriate parties are included in planning.

C. Develop volunteer resources to assist where appropriate.

3. ISSUE: Conflict still exists between elk and private lands in some areas.

While progress has been made at solving or improving many elk damage conflicts, some still exist and new problems have developed as elk have expanded their range.

Objective

- Continue to seek innovative alternatives to reduce elk damage to private properties.

Proposed Strategies

A. Continue recognition of the valuable contributions made by private landowners to Oregon's wildlife.

B. Maintain a high level of cooperation between landowners, hunters, and ODFW through communication programs (e.g., Wildlife Damage Task Force, LOP, etc.).

C. Streamline the LOP Process. Separate the damage abatement portion from the sport hunting tag allocation portion.

For the damage portion:

1. Simplify and improve current emergency hunt and damage hunt procedures in order to address damage in a timely manner.
2. Consider determining the number of LOP tags based on damage, not strictly on acreage.
3. Allow landowners, as well as other emergency hunters, to hunt the entire, specified hunt area to alleviate damage.

For the tag allocation portion:

1. Reduce paperwork for landowners who don't change their tag distributions list each year. Only require landowners to submit new tag distribution lists if they want to change individuals on that list.
2. Streamline obtaining tags, outside of the controlled hunt process, for landowners who only want to hunt on their own land.

D. Use alternative funding sources to reduce the adverse effects of damage (e.g., Access and Habitat, Green Forage, damage budget).

4. ISSUE: In some localities there is an inability to manage elk populations and damage because of poor access to individual private lands.

In several areas, particularly in Eastern Oregon, there have been major changes in distribution of elk from public to private lands. These changes have occurred primarily due to increases in disturbance on public lands contrasting with very little disturbance and more nutritious forage, particularly alfalfa, on private lands. Some landowners welcome the elk, while those who are hardest hit are often their neighbors who are in agricultural production. Elk have learned to stay

where they are welcome during the day and 'raid' the neighbor's alfalfa fields during the night. ODFW's ability to control elk numbers and reduce damage has been limited in these situations. However, progress has been made in several areas due to long, liberal hunting seasons.

Objective

- Continue to seek ways to increase public access to key properties to improve elk population management and decrease damage.

Proposed Strategies

A. Continue to work with the A&H program to develop meaningful public access to private lands where possible to help solve damage situations.

B. Identify this issue to the Damage Task Force.

C. Consider reimbursement to landowners for access (e.g., provide a coupon on each tag that the hunter can give to a landowner for access. The landowner would turn in the coupon to ODFW for reimbursement).

POPULATION STRUCTURE

ODFW has primary responsibility for managing population structure, which includes population levels, bull/cow ratios, and calf ratios. In areas of primarily public lands, hunting season structure is an important tool used to achieve Mos for population and bull ratios. In areas of primarily private lands, hunting season structure alone has not always been enough to reach those MOs. The level of calf recruitment into the population is also important in achieving MOs, as well as the desired levels of hunting opportunity.

1. ISSUE: Low bull ratios and poor age distribution of bulls still exist in some areas.

One of the most important issues in the first Elk Planning Process (1992) was low bull ratio. Since that time, hunting season structure has been changed in many parts of the state to increase bull ratios. As a result, bull ratios have improved dramatically; however, there are some areas where bull ratio MOs have not been reached.

Objectives

- Improve bull ratios where needed.
- Re-evaluate bull ratio management objectives.

Proposed Strategies

A. Meet current bull-ratio MOs until a separate process can be undertaken by ODFW to review all population Mos.

B. Monitor age-class distribution for bulls and develop guidelines for management of age class distribution.

C. Within two years undertake a public review process for bull ratio management objectives for all WMUs.

2. ISSUE: ODFW is having difficulty achieving and maintaining population management objectives.

Populations are below MO in several units in Northeastern Oregon due to low calf survival. At the same time, populations are above MO in other areas and have been difficult to control, often due to inaccessibility to elk on large areas of private property. Population Mos were not set during the last elk planning process for the Alsea and Snake River WMUs.

Objectives

- Manage populations to achieve adopted MOs.
- Reevaluate all population MOs.

Proposed Strategies

A. Maintain current population MOs until a separate process can be undertaken by ODFW to review all population management objectives.

B. Within two years undertake a public review process of population Mos for all WMUs.

C. In addition to annual elk inventories, utilize additional criteria to supplement progress toward meeting MOs (e.g., damage complaints, habitat indicators, hunter-days of recreation, improved harvest statistics - consider requiring mandatory reporting by hunters).

3. ISSUE: Levels of predation on elk calves may be depressing calf survival in some areas to levels too low to sustain elk populations at management objective and maintain historic hunting opportunity.

In recent years, extremely low calf survival in parts of Northeastern Oregon and a declining trend in calf ratios in other parts of Eastern Oregon have been noted. Lower calf ratios have contributed to reductions in tag numbers in several Eastern Oregon WMUs. Preliminary data indicate an increasing role of predation on calf recruitment, primarily in Northeastern Oregon. Calf ratios have remained unchanged in Western Oregon, indicating that predation rates have not increased significantly there. Several WMUs in other parts of Eastern Oregon have had lower calf ratios the last two or three years, but there is not yet enough data to determine if there is a significant trend and not enough information to determine cause. ODFW will continue to monitor calf recruitment in all WMUs.

Objectives

- Identify factors causing low calf recruitment.
- Manage all game species to achieve the desired balance between species.

Proposed Strategies

A. Continue the ongoing elk/cougar studies to determine the relationship between predation, nutrition, and calf survival.

B. Develop minimum calf recruitment ratio guidelines for each WMU designed to reflect recruitment levels needed to maintain populations at MO and meet hunting opportunity goals.

C. Population Mos should be established for cougars and bears and should be adopted into those species plans. Manage predators to achieve all MOs.

D. To the extent allowed by the federal and Oregon Endangered Species Acts, manage wolves immigrating to Oregon minimize impacts of already depleted elk populations.

HUNTER MANAGEMENT

The ability to achieve Mos depends on hunter numbers and ethics, levels of harassment to elk on public lands, seasons and bag limits, and habitat conditions. The 1984 elk workshops identified the need for enforcement as their second highest priority issue. In 1992, enforcement problems and hunter ethics were major concerns throughout the public input process and continue to be in the current review process.

1. ISSUE: There is a perception that opportunity to pursue elk is not equitable between hunting methods.

To achieve MOs for bull ratios in both Eastern and Western Oregon, significant restrictions have been placed on rifle hunters. At the same time the liberal archery seasons were left intact to attract hunters away from rifle hunting.

Objective

- Evaluate the distribution of elk hunting opportunity and bag limits between rifle and archery hunters to identify inconsistencies with ODFW objectives.

Proposed Strategies

A. When restrictions in hunter opportunity are required to meet population and/or bull MOs, all hunting methods should share in responsibility.

B. Archery-related issues will be addressed in a separate public review process within two years.

2. ISSUE: There is a perception by many hunters that special interest hunting groups (i.e., Landowner Preference Program, persons with permanent disabilities, archery, muzzleloader, youth, out-of-state, et al., are increasing their opportunities at the expense of general hunting opportunities. (See discussion in Special Interest Hunting section, Page 34.)

As the population of hunters and ability to harvest elk increased beyond the ability to produce elk for harvest, hunting regulations became more restrictive and 'limited entry' hunting replaced 'general season' hunting so that hunters are no longer able to hunt when and where they want each year. In the 1990s, large increases in hunting opportunity for specific weapons and groups have occurred, which seeks to guarantee hunting opportunity each year for members of those groups.

Objective

- Evaluate the distribution of elk hunting opportunity and bag limits between the various groups to identify inconsistencies with ODFW objectives.

Proposed Strategies

A. Make sure the Wildlife Damage Task Force considers public concerns about the LOP Program. A list of the concerns will be sent to the task force.

B. Separate the damage abatement portion from the sport hunting tag allocation portion of the LOP Program.

C. Evaluate the effects of increasing numbers of permanent disabilities hunter permits and total harvest to determine overall impacts by WMU.

D. Evaluate the impacts of all special seasons on elk populations, Mos, and hunter distribution.

3. ISSUE: Level of law enforcement is perceived to be inadequate and declining.

Numbers of wildlife enforcement officers have declined in recent years. In contrast, the complexity of game laws has increased in an effort to provide optimum hunting opportunity while meeting more restrictive MOs with declining calf ratios and populations in some areas.

Objective

- Decrease illegal activity associated with elk hunting.
- Secure stable funding for game enforcement program

Proposed Strategies

A. Improve hunter ethics.

B. Increase penalties for game violations.

C. Increase the number of wildlife enforcement officers. Consider deputizing ODFW personnel.

D. Increase the value of wildlife for civil penalties.

E. Streamline the restitution process to ensure funds are collected in a timely manner.

F. Strengthen laws restricting aerial hunting and hunting from a motor vehicle.

G. Increase funding for enforcement. (See Management Considerations, Issue 1 below.)

MANAGEMENT CONSIDERATIONS

1. ISSUE: Decreasing budgets are negatively impacting ODFW's ability to conduct data collection, law enforcement, information and education activities, and to effectively coordinate and cooperate with landowners and land managers.

Objective

- Seek to fully fund biological data collection, law enforcement, information and education, and outreach activities.

Potential Strategies

A. Develop a budget that provides funding for data collection and law enforcement to implement Elk Management Plan objectives.

B. Consider a surcharge added to hunting license/tag fee dedicated to inventory and law enforcement.

C. Fund 'occupational licensing' programs (i.e., hide and antler dealer, taxidermy, etc.) through other sources such as increased license and permit fees and general fund, so wildlife funds can be applied to key wildlife programs such as census, law enforcement and damage control.

D. Consider charging more for 'trophy' hunt opportunities.

2. ISSUE: Large increases in off-road vehicle use and other recreational activities are causing harassment to and displacement of elk, degradation of habitat, and loss of hunt quality.

Land management agencies (USFS, BLM) have primary responsibility to manage roads and motorized travel on public lands. ODFW acts only in an advisory role. In addition, ODFW currently doesn't have authority to manage antler (trophy) hunting.

Objective

- Reduce harassment of elk on public lands.

Proposed Strategies

A. Coordinate with public land management agencies (USFS, BLM) to keep ATV trails out of important wildlife habitat and enforce existing regulations on public land.

B. Recommend to land management agencies to restrict ATVs to designated areas and existing roads and trails.

C. Explore ways to minimize effects of antler hunting on elk and deer.

D. Strictly enforce loaded firearm laws for ATVs.

E. Consider ways to shorten the overall length of big game hunting activity (archery season through the last cow season) on public lands.

3. ISSUE: There is a concern that wild elk and other ungulates are placed at risk by the current elk ranching regulations.

Increased incidence of diseases, primarily chronic wasting disease (CWD), throughout the western United States associated with captive elk has caused increased concern for wild populations. As the situation in North America has been changing rapidly, so has the legal status of cervid ranching in the United States. As of October 2002, 17 states, including Oregon, have some form of prohibition on importation of live cervids into the state. In addition, Washington and Wyoming do not allow cervid ranching and Montana recently banned cervid ranching through the initiative petition process. During the 12 public meetings and 3 Public Working Group meetings held to discuss this Elk Management Plan, cervid ranching generated much of the concerns and comments. The public attending those meetings overwhelmingly supported a ban on cervid ranching in Oregon.

Objective

- Provide controls on elk ranching in Oregon necessary to protect wild elk populations.

Proposed Strategies

A. Formalize coordination between ODFW and ODA, with regulatory responsibilities developed to effectively address administration of cervid ranching.

B. Require cervid ranches to notify ODFW and ODA immediately of all cervid mortalities and of importation and relocation activities.

C. Require immediate disease testing of elk mortalities on cervid ranches.

D. Revise OARs and ORSs to increase protection of wild and domestic animal health, including:

1. Require double fencing at cervid facilities.
2. Require all elk imported into the state be from herds are certified free of CWD for 60 months.
3. Require a liability bond for cervid ranchers.
4. Increase permit fee to cervid ranches to cover field costs for administration and enforcement of regulations.

4. ISSUE: There is a growing concern among the public and ODFW regarding diseases in wild elk.

In addition to the incidence of disease, primarily CWD, found in captive cervids, disease has also been found in wild deer primarily, and elk in Nebraska; Wyoming; South Dakota; New Mexico; Colorado; Wisconsin; and Saskatchewan.

Objective

- Insure the health of wild elk populations in Oregon through developing effective monitoring, testing, evaluation, and response programs

Proposed Strategies

A. Continue to investigate techniques to test for CWD in live elk.

B. Acquire federal funding for disease testing.

C. Develop a feasible disease monitoring strategy for wild elk.

D. Develop a response plan for wildlife diseases of concern.

5. ISSUE: There is a perception that much of the public is not sufficiently knowledgeable about wildlife and wildlife management. There is therefore a desire to increase educational outreach opportunities to the public about wildlife and wildlife management.

Because of the wide variety of interests, backgrounds, and education of the individual citizens of Oregon, it has been difficult to inform the public of the status and circumstances involved with each of the many wildlife species in the state and management options available for each.

Objective

- Increase educational outreach opportunities to the pubic about wildlife and wildlife management.

Proposed Strategies

A. ODFW should distribute this Elk Management Plan to the public.

B. Promote voluntary hunter education for adults.

C. Develop and promote a wildlife education program for grade school and high school teachers to present to students.

D. Provide the annual population and harvest statistics report to the public.

E. Improve information to the general public describing research and wildlife management activities.

6. ISSUE: There may be competition between deer and elk causing a decline in deer populations.

By the early 1900s, both deer and elk populations were severely depleted in the state. With protection from hunting and predator control, both species recovered. Deer were the first to respond, possibly due to their greater reproductive potential (does generally have twins while elk only have singles), and became quite numerous by the 1950s. Since the 1970s, deer populations have fluctuated with weather trends but have generally declined from the peaks experienced in the 1950s and 60s. On the other hand, elk have continued to expand their range and increase in numbers. This has led to speculation among biologists and members of the public that deer have declined as a result of competition from elk. At this time, no definitive studies have been done in Oregon to determine if deer population responses are due to changes in conditions that favor elk and not deer or if there is competition between the species that favors elk at the expense of deer.

Objective

- Minimize competition between deer and elk.

Potential Strategies

A. Consider competition in establishment of population MOs.

B. Assess the feasibility of developing a research project to determine if competition exists, its nature, significance, and extent.

7. ISSUE: Wildlife management plans are not sufficiently coordinated.

At this time, there are management plans written for several species and groups of species, including elk, deer, cougar, black bear, bighorn sheep, and a nongame plan for the hundreds of species in Oregon that are not hunted. In addition, management plans will be written for mountain goats and turkeys in the near future and others are likely. As the number of species management plans grows, the potential for conflict between management strategies and plans will increase. It will be necessary to coordinate plans and objectives so that the plans are compatible with each other and the desired balance between species is achieved.

Objective

- Make sure all species plans are coordinated between each other.

Proposed Strategies

A. Review all other species plans to ensure that the Elk Plan is compatible with other species plans and wildlife damage policies.

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APPENDIX

Table A. Membership and affiliation of the 'Public Working Group' for Oregon's Elk Management Plan, II.

Name	Affiliation
Bruce Carne	Oregon State Police
Rich Thompson	Traditional Archers of Oregon
Daryl Hawes	Oregon Farm Bureau
Terry Luther	Confederated Tribes of Warm Springs
Dave Zalunardo	USFS Ochoco National Forest
William McCormack	Landowner
Sandy Sanderson	Oregon Hunters Association
Fred Taylor	Bureau of Land Management
Brian Ferry	ODFW High Desert Region
Jim Lemos	ODFW High Desert Region
Brian Thompson	Landowner
George Keister	ODFW Northeast Region
Mark Kirsch	ODFW Northeast Region
Herman Biederbeck	ODFW Northwest Region
Bill Castillo	ODFW Northwest Region
Don VandeBergh	ODFW Northwest Region
Larry Cooper	ODFW Wildlife Division
John Toman	ODFW Southwest Region
George Johnson	Oregon Bow Hunters
Ryan Branstetter	Confederated Tribes of the Umatilla Indian Reservation
Merv Wolfer	ODFW Southwest Region
Tom Kerns	Landowner
Don Gentry	Klamath Tribes
Dave Wiley	Rocky Mountain Elk Foundation
Eldon Deardorff	Oregon Guides and Packers

Table B. 2002 Elk Plan Meeting Schedule

City	Date	Time	Meeting Location
Burns	August 5	7-9 p.m.	Senior Citizen Center 17 South Alder
Tillamook	August 6	3-7 p.m. Open house	Dept. Human Resources Wilson River Building 4670 Third St.
Medford	August 6	7-9 p.m.	Jackson County Courthouse Auditorium Oakdale St. between 8th and Main St.
Redmond	August 7	7-9 p.m.	Redmond High School Large Auditorium 675 S.W. Rimrock Dr.
La Grande	August 8	7-9 p.m.	ODOT Office Large Conference Room 3012 Island Ave.
Roseburg	August 8	7-9 p.m.	SW Regional Office 4192 N. Umpqua Hwy
North Bend	August 13	7-9 p.m.	North Bend Community Center 2222 Broadway
Newport	August 14	7-9 p.m.	Hatfield Marine Science Center Auditorium 2030 S.E. Maine Science Dr.
Pendleton	August 15	7-9 p.m.	Pendleton Convention Center 1601 Westgate
Klamath Falls	August 20	7-9 p.m.	OSU Extension Office 3328 Vandenberg Rd.
Corvallis	August 21	7-9 p.m.	ODFW Corvallis Office 7118 NE Vandenberg Ave. (Adair Village)
Portland	August 22	7-9 p.m.	ODFW Commission Room 2501 S.W. First St.

Table C. Adopted Elk Hunting Season Framework as of 2002.

SEASON	TIME FRAME
Archery	Season to open on the Saturday five (5) weeks prior to the opening of rifle deer season, and to run for 30 days.
Cascade	Season will open on the third Saturday in October and run for seven (7) days.
Rocky Mountain Bull, 1st	Season will open on the Wednesday on or prior to Oct. 29 and run for five (5) days. Hunter numbers may be regulated through controlled hunting as mandated by Commission action.
Rocky Mountain Bull, 2nd	Season will open on the second Saturday in November and run for nine (9) days. Hunter numbers may be regulated through controlled hunting as mandated by Commission action.
Wilson Trask	Season will open on the third Saturday in October and run for five (5) days.
Mid-Coast Valley	Season will open on the second Saturday in November and run for four (4) days. Hunter numbers may be regulated through controlled hunting, as mandated by Commission action.
Coast Valley	Season will open on the Saturday following the close of the Mid-Coast Valley season and run for seven (7) days. Hunter numbers may be regulated through controlled hunting as mandated by Commission action.
Antlerless	Hunts designed to control damage may occur at any time between Aug. 1 - March 31, as determined by local situations and Commission action. Hunts designed to achieve unit MOs: *Eastern Oregon* - will generally occur in the period starting on the third Saturday in November, running nine (9) consecutive days (exceptions may occur when migration, vulnerability, or road closures mandate). *Western Oregon* - will generally occur in late November and December.
Late Archery	Season varied. Opportunity may be provided only where additional opportunity does not interfere with MOs.