

**FINAL**

**E - 13 (Williams Fork Elk)  
DATA ANALYSIS UNIT PLAN**

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**E - 13**

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## DAU PLAN SUMMARY

### Williams Fork Elk

**GMUs:** 28, 37 and 371

**Current Population Estimate:** 5,000 (posthunt 1997)

**Proposed New Population Objective:** 3,000                      No change recommended

Percent Change: 40% reduction from the estimated 1997 posthunt population.

**Current Sex Ratio Objective:** 24 bulls:100 cows

**Proposed Sex Ratio Objective:** 24/100                      No change recommended.

Percent Change: no change from the 1997 posthunt estimate.

#### **Changes from current objective/management:**

If the proposed alternative is approved there will be no change from the current objectives. However, the herd will likely need to be reduced by 40% from the estimated 1997 posthunt population. This will be done by offering antlerless licenses that are additional, private land only licenses, and possibly by resuming the experimental either-sex season of 1998. Restrictions on harvesting spikes will likely be needed to maintain the sex ratio at 24 bulls:100 cows, especially once the population is lowered to this level.

#### **Description of significant issues raised during public involvement sessions and how the plan addresses those issues:**

The current objectives for this DAU were set in 1990, and it now appears that the population size was underestimated by at least 30% at that time. Large numbers of antlerless permits have been issued this decade – more than 2,100 in 1993, '96, & '97. This DAU contains steep terrain and heavy cover, along with numerous refuge areas. It is a hard area to hunt; consequently, hunter success tends to be low, at times below 20%. The population objective has not been met, and the herd has not been significantly reduced from the 1990 level. Unlimited either-sex licenses and antlerless permits considered additional, heretofore unavailable, were implemented for the 1998 season. Hopefully, these tools will improve harvest to the point where the population can be brought under control over time; at the same time, more cow harvest will need to take place on privately owned lands if conflicts are to be reduced. During hunting season, probably one quarter of this population resides in refuge areas, where little or no hunting takes place. DOW and the local HPP committee need to continue working on finding ways to make reductions in this “protected” portion of the herd.

Issues regarding elk management are diverse. Fifty-nine DAU surveys were returned by members of the public. Sixty-seven percent of those surveyed are very concerned that refuge areas, along with changing land use patterns, are making it nearly impossible to manage elk. Refuge areas include YMCA's Snow Mountain Ranch, the Cyprus-Amax mill property, ranches and other private property in the vicinity of Granby and Tabernash, and private ranch land leased out just for hunting trophy bulls. Subdivision of the land brings multiple ownership and a diversity of viewpoints that makes it difficult to gain consensus for any management. Additionally, hunters, guides and outfitters tend to feel that some of the landowners complaining about too many elk are the same ones who restrict access for cow hunting during the season (an issue picked by 33% of survey respondents).

Hunters, non-consumptive users, and guides and outfitters are concerned that elk habitat is shrinking due to human activities. Another big concern is that summer recreational pressure at higher elevations may keep elk from using traditional habitats on national forest, shifting additional use onto privately-owned transition range. Major concerns in the agricultural community include: (1) not enough cows are killed during the regular season; (2) private landowners are forced to support a public resource without being given any choice, or compensation; and (3) DOW has failed to reduce the two major elk herds in Middle Park enough to bring them anywhere close to the objective agreed upon in 1990. Landowners, guides and outfitters, and hunters also feel that there may be too many elk for optimal herd health, and that high numbers adversely affect other wildlife species such as deer. Hunters also feel that more hunting pressure is needed on private property early in the season, to keep elk from moving off the national forest too soon.

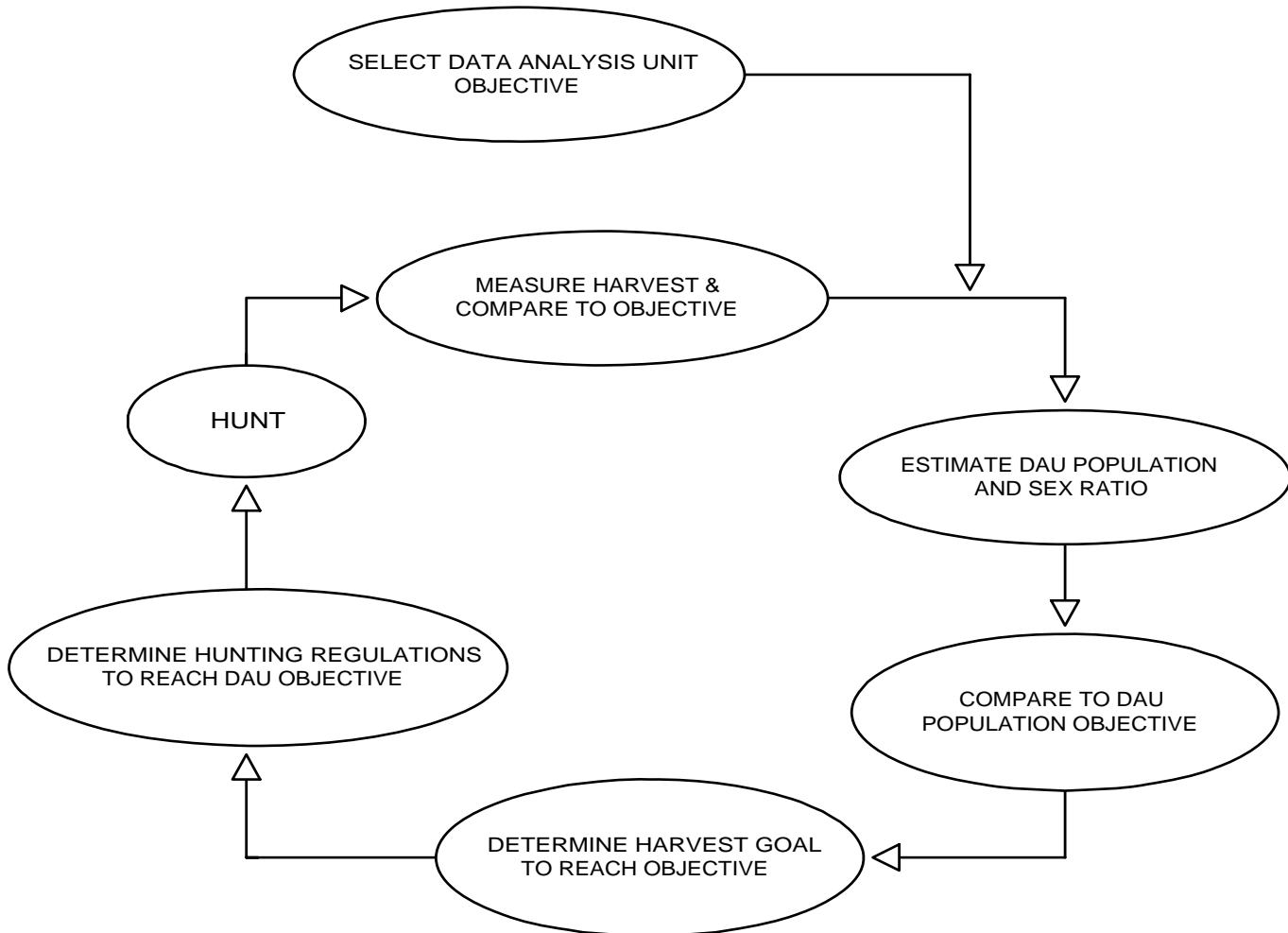
Major concerns of the DOW include problems with refuge areas, inadequate census information, the difficulties in managing elk due to land use changes, lack of adequate harvests, and distribution problems with elk. This latter category includes a possible shift of elk use from public lands to private lands, along with the problem of elk wintering in the valley bottoms where they create conflicts and damage private property, and where they also may be competing with deer on winter ranges.

Sixty-one percent of people submitting surveys preferred a posthunt population of 3,000 elk with a sex ratio of 24 bulls:100 cows. This was by far the most popular alternative, with the next most popular option only gaining 21% of the vote. The preferred alternative was favored by sportsmen, landowners, guides and outfitters, the Kremmling Resource Area of the Bureau of Land Management and the Sulphur Ranger District of the USDA Forest Service. It is also the option supported by the Middle Park HPP Committee and is the recommendation of the local DOW personnel. This option addresses many of the issues that concern landowners, and will result in a better balance between herbivores and their habitat. A smaller elk herd should prove beneficial to the deer herd. However, this population objective has been difficult to achieve in the past and may continue to prove elusive, especially given the refuge problems. DOW credibility stands to be hurt further if we fail to lower this herd to objective. Landowners with the ability to provide opportunity for cow harvest also risk the loss of public sympathy for their damage problems if they fail to actively participate in the herd reduction.

## INTRODUCTION AND PURPOSE

### DOW's Management by Objective Process

Big game seasons were historically set on the basis of tradition or by the vagaries of politics. Often, the seasons that resulted were not related to herd levels, status of the habitat or even balanced by the interests of affected publics. Hunters, the USDA Forest Service, the



growers and hunting interests into working groups. Full participation in DAU planning insures that private land habitat issues are considered in setting the DAU objectives, that conflict areas are identified and solution strategies are appropriate. The whole DAU planning process is designed to examine the public desires and biological herd capabilities, and determine an appropriate balance. Once set, the herd objectives typically remain in effect over a five-year period.

herd into one utilitarian planning document, compiles DAU issues identified through a public scoping process, examines alternative solutions to the issues and problems that have come to light during scoping, and finally recommends an alternative. After the Colorado Wildlife Commission reviews and approves a DAU plan, the population and composition objectives become management targets that drive the annual permit setting process.

Management by objective is a process based on an annual cycle of information collection, analysis, and decision-making culminating each year in the hunting season (see diagram below). The population objective drives the most important decision in the annual big game season setting process—how many animals need to be harvested to meet the population objective. If, for example, the herd is under objective, this will call for relatively few, if any, antlerless licenses. On the other hand, if the herd is over objective, number of licenses will need to be liberalized. The cyclic objective setting approach focuses on the collection and analysis of information, keeping decision makers working toward a specific goal.

In instances where significant conflicts occur with agricultural interests in the management of a particular species, local HPP committees attempt to address these problems. Individual HPP Committees are responsible for developing a Distribution Management Plan (DMP), which sets a framework for alleviating big game conflicts on public and private lands through habitat enhancements and direct distribution techniques, such as specialized hunts. Whereas the DAU plan addresses the overriding management strategy, the DMP focuses on management actions that may reach down to the level of individual ranches. To accomplish objectives outlined in the DMP, committees are allocated money at a rate of 5% of the annual three-year average license revenues for deer, elk and antelope licenses in their locality. HPP is also authorized to compensate landowners for actual damage to fence and forage caused by big game.

Tradition and politics still play a role in the season setting process. But hopefully this new approach does a much better job of analyzing the desires of various publics and then setting objectives, helping to insure that big game species are managed properly.

## **Description of The Data Analysis Unit**

### **Location**

The Williams Fork Elk DAU (E-13) is located in north-central Colorado and consists of GMUs 28, 37 and 371. It is bounded on the north by the Colorado River, Lake Granby and Arapaho Creek, on the east and south by the Continental Divide, and on the west by the Gore

#### **1. DOW's Annual Management Cycle**

Range and Eagles Nest Wilderness Divide. This DAU takes in the southern half of Middle Park, and includes all of Summit County and about half of Grand County.

Major towns include Hot Sulphur Springs, Granby, Fraser, Grand Lake, Silverthorne, Frisco, Dillon and Breckenridge. Kremmling lies just outside the DAU boundary. Interstate 70 transverses the southern part of the DAU from the Eisenhower Tunnel to Vail Pass. The DAU includes all of the Blue River, Fraser River and Williams Fork drainages. Refer to the next page for a map of the Troublesome Creek Elk DAU E-8.



## DAU Map

**Fig. 2.** Data Analysis Unit E13

## Physiography & Climate

**Topography** - Middle Park is a large basin surrounded by high mountain ranges. As an inter-mountain park it is unique in two respects. It does not have the level interior characteristic of other large mountain parks in Colorado, such as North Park and South Park, and it lies west of the Continental Divide. All natural surface drainage for this area funnels through Gore Canyon, downstream from Kremmling. The elevation reaches 14,270 feet above sea level on Grays Peak near Loveland Pass. The Gore Range and Tenmile Range both have peaks that rise above 13,000 feet in elevation, as does the Continental Divide.

Once snow accumulation forces big game animals down to the valley floor in the winter, they become trapped in the park by Gore Canyon and they are unable to migrate out of the valley. The valley floor at Kremmling is 7,300 feet in elevation, making it one of the higher elk winter ranges in Colorado. Interior mountains, such as Wolford and Junction Butte, provide excellent southern exposure for critical big game winter range, however.

**Climate** - Weather in Middle Park varies greatly depending on location and altitude. In general, the climate is cold and the majority of annual precipitation falls as snow. Drought years occur with some regularity. During winter when there is no wind, cold air becomes trapped by the surrounding mountains, causing extreme temperature inversions. The town of Fraser is consistently one of the coldest spots in the lower 48 United States and once was promoted as the "Ice Box of the Nation." During the middle of winter, nighttime low temperatures in the minus 20-degree Fahrenheit range are to be expected, and can drop much further. Temperatures below minus 50-degrees F. have been recorded.

The summer growing season is extremely short and variable. Snow showers may even strike in the summer at higher elevations. Lower elevations may have daytime temperatures reaching into the 90-degree F. range; however, valleys become significantly cooler than uplands during the night as colder air settles. Fraser has an annual average of only six frost-free days.

Local topography also affects the amount and type of moisture. Kremmling lies in the "rain shadow" of the Gore Range and only averages about 11 inches of moisture per year; whereas at Fraser, where prevailing winds push clouds up against the Continental Divide, average precipitation is approximately 20 inches. Thunderstorms occur almost daily during the summer along the Continental Divide.

Most of the moisture that falls in the area comes during the period of October to late April. Snow blankets the area during the winter and accumulations of 30" are typical at the 9,000-10,000 foot level. Deer and elk move to lower elevations as snow accumulates, seeking out south facing or wind-blown slopes. At high elevations upwards of 20 feet of snow can fall over the course of winter. In the valleys, sunny winter days and/or windy conditions cause snow to disappear on some slopes.

## Vegetation

Vegetation in Middle Park can be categorized into five broad types – cropland, wetland/riparian, rangeland, forestland and alpine. The variety of vegetation types scattered throughout Middle Park creates a highly desirable mosaic very beneficial to wildlife. However, plant communities at lower elevations are increasingly being disturbed by intensive human use.

Croplands consist of irrigated hay meadows and terraces that have been re-seeded to more desirable forage plants. Most hay ground is "native hay," consisting of Timothy and Smooth Broome, with some sedges and rushes. Some hay meadows have been seeded to alfalfa. Truck crops such as broccoli, spinach, lettuce, asparagus and peas are grown just north of Granby.

Wetlands and Transition Riparian occur along the river bottoms and irrigated meadows. The most extensive riparian habitat lies along the Colorado River between the towns of Granby and Kremmling. This area is dominated by narrowleaf cottonwood and willow. The riparian habitat is one of the least represented vegetative types in Middle Park but is extremely valuable as wildlife habitat. It supports the greatest abundance and diversity of wildlife.

Rangelands consist of Sagebrush Steppe, Mountain Shrub and grassland communities. The sagebrush community is by far the most common rangeland in Middle Park at elevations up to 9,000 feet. It is found on drier non-agricultural areas on the valley floors and the lower hills. Mountain Shrub consisting of big sagebrush mixed with serviceberry, chokecherry and antelope bitterbrush, is found on better soils at lower elevation. This plant community is not widely represented in Middle Park but provides important wildlife food and cover. Both Sagebrush Steppe and Mountain Shrub have grass and forb understories, making them suitable for grazing. Bluebunch wheatgrass is prominent in these vegetative types under good range conditions. Native grasslands are found in two different sites. Mountain meadows, consisting of grasses, forbs and some shrubs, occur at higher elevations in association with lodgepole, aspen and spruce-fir forest types. Low elevation grasslands occur on windswept sites with poorly developed soils that cannot support sagebrush.

Forestlands in Middle Park can be subdivided into four major types: piñon-juniper, lodgepole pine, aspen, and spruce-fir. Piñon-juniper woodlands are found on the dry, lower elevation slopes such as Cedar Ridge, west of Williams Fork Reservoir. "P-J" can provide cover during the winter, along with low quality forage. Lodgepole pine is the most widely distributed forest type. This species typically occurs in even-aged stands at elevations between 7,500 feet and 10,500 feet. Due to the dense overstory, this habitat type typically provides little forage for elk but is important from the standpoint of cover. At higher elevations, Engelmann spruce and subalpine fir regularly occur in uneven-aged stands. This habitat provides excellent summer cover for deer and elk. Aspen stands usually are found in areas with better soil moisture or in areas of less severe exposure at elevations up to 10,500 feet. The understory in aspen typically consists of vigorous herbaceous growth, shrubbery and emerging conifers. This forest type is attractive to a variety of wildlife and provides important cover and forage for big game animals. On some sites aspen is the climax species; on other sites it is a transitional species that occurs for only a relatively short period of time after a disturbance, such as fire. Douglas-fir, ponderosa pine and limber pine forest types also occur in Middle Park, but to a lesser extent.

As temperature and winds become more extreme with increasing altitude, Engelmann spruce and subalpine fir become stunted, eventually giving way to forbs, grasses and sedges. Low growing plants are typically nestled among lichen-covered rocks. This is the Alpine

community, or tundra, which usually occurs above 11,000 feet in elevation. In those protected areas blanketed by snow during the winter, and kept moist by melting snow banks during the summer, thickets of bog birch and willows can exist. Alpine sites can provide high quality elk forage from July through early September.

### Land Status

The DAU covers a total of 1,358 square miles. Sixty-four percent of this landscape is administered by the USDA Forest Service (USFS), 29% is privately owned, and 5% is under the jurisdiction of the Bureau of Land Management (BLM). The State of Colorado (State Land Board and DOW) administers slightly over 1% of the land area in the DAU (see figure 3). The Junction Butte and Hot Sulphur Springs State Wildlife Areas, along with portions of the Kemp-Breeze SWA, are managed to provide winter habitat for deer and elk. Land ownership is categorized in Table 1.

**TABLE 1**

Land ownership in DAU E-13 by GMU shown in square miles.

<b>GMU</b>	<b>PRIVATE</b>	<b>BLM</b>	<b>USFS</b>	<b>SLB*</b>	<b>DNR*</b>	<b>TOTAL</b>
28	214.4	44.3	392.0	8.5	1.4	669.1
37	162.0	26.1	333.1	2.3	2.6	528.4
371	25.6	0.0	146.0	0.0	0.1	171.7
<b>TOTAL</b>	402	70.4	871.1	10.8	4.1	1369.2
<b>PERCENT</b>	29.4%	5.1%	63.6%	0.8%	0.3%	100.0%

SLB = State Land Board DNR = Dept. Nat. Resources (State Wildlife Areas)

DAU E-13 contains approximately 315 square miles of elk winter range, 106 square miles of severe winter range and 72 square miles of elk winter concentration areas. Severe winter range is defined as the area of winter range where 90% of the elk will be confined during the worst two winters out of ten. Winter concentration areas are defined as areas on the winter range that have a density of at least 200% more elk than surrounding areas. The majority of the winter range occurs on private land (approximately 40%), followed by USFS lands (approximately 35%) and then BLM land (approximately 20%). State Land Board lands and DOW lands make up the balance of approximately 5%.

Insert Land\_E-13 Bitmap Image Here

FIGURE 3

### Land Use

The main industries in this part of the state are recreation, mining and ranching (in descending economic importance). Some commercial logging also takes place. Highly-developed mountain communities occur in the areas surrounding Winter Park, Granby and Dillon/Silverthorne. The Sulphur Ranger District of the Arapaho/Roosevelt National Forest, the Dillon Ranger District of the White River N.F., and the Kremmling Resource Area of the BLM administer federal lands within the DAU. Recreation, livestock grazing and wildlife production are the predominant uses of USFS and BLM lands, with timber harvest occurring in areas where there are suitable forest products; other activities such as right-of-way administration, mineral production, watershed protection and cultural resource protection are common to the two agencies.

The area of the DAU provides extensive opportunities for winter recreation – skiing and snowmobiling in particular. There are four major downhill ski areas, along with two smaller resorts. In addition, Devil’s Thumb Ranch Resort and Snow Mountain Ranch (YMCA of the Rockies) cater to cross-country skiers. Major ski areas have large base developments associated with offsite condominiums, homes and commercial facilities. Summit County ski areas are destination resorts which furnish year-round recreation opportunities including golfing, horseback riding, fishing, boating and hiking. Because of their proximity to Denver, Winter Park and Dillon areas have been developed with numerous recreational homes and cabins.

Grand and Summit counties are also popular destinations for summer recreationists, with numerous campgrounds, dude ranches and other resorts. Reservoirs built for water storage, including Lake Dillon, Green Mountain Reservoir and Williams Fork Reservoir, provide good fishing, along with opportunities for recreational boating. Rafting companies offer trips down the Colorado River, and local rivers also provide opportunities for kayaking. All, or portions, of Byers Peak, Eagle Nest, Ptarmigan Peak, and Vasquez Peak Wilderness Areas are located within the DAU.

Hunters can take deer, elk, bear, pronghorn antelope, bighorn sheep, mountain goat, mountain lion, blue grouse and sage grouse in Middle Park. Good fishing is provided by several Gold Medal streams, three large reservoirs and numerous high lakes. Hunters and anglers make substantial contributions to local economies. DOW figures show that for the year 1996, the total annual impact of all hunting and fishing in Grand and Summit Counties would have been close to \$83 million (factoring in both direct expenditures and the multiplier effect of dollars recirculating in the economy). People who take trips to observe and photograph wildlife also buy gas, groceries and other supplies, substantially impacting both destination areas and retailers along travel routes.

Most of the molybdenum used in North America is produced in this part of Colorado. Climax Mine operates north of Leadville. Ore mined in Clear Creek County is transported via an underground conveyer belt to be processed at the Henderson Mill on the Williams Fork drainage.

Besides providing recreational opportunity, undeveloped lands in the DAU are also utilized to raise livestock. Most livestock operations are cow-calf enterprises. Most livestock are pastured on USFS or BLM allotments during summer months. Private lands are used for hay production and winter pasture.

Commercial logging has been curtailed somewhat by recent closures of processing plants at Kremmling and Walden, but with wood prices rising the industry remains economically viable. In the past, lodgepole, spruce and fir accounted for nearly all the saw and pole timber produced in the area, with aspen being harvested for pulpwood.

## **Habitat Condition and Capability**

### **Public Lands**

#### **USFS -**

The USFS manages 37 grazing allotments occurring totally or partially in DAU E-13. Fifteen of these are vacant – not being used by domestic livestock at this time. The remaining 22 allotments provide 10,491 AUMs of forage for livestock on an annual basis. The period of utilization is variable, but primarily occurs from late June through September. Classes of livestock using these allotments include cattle, horses and sheep.

Standing forage, security cover, road access and the mix of these largely determine the quality of elk habitat. Habitat conditions on USFS lands are believed adequate to meet the needs of the current population in the DAU. Habitat diversity is high throughout the area, providing a good forage:cover ratio. Additional logging is not generally needed for elk or other wildlife species in the DAU in the near future, except where aspen stands are being invaded and

crowded out by conifers. Forage condition is fair to good overall. Livestock graze most of the northern portion of this DAU. Competition between cattle and elk does not appear to be a problem, based on the fact that adjustments in allotment management plans have not occurred because of wildlife impacts. Roads are sometimes closed to travel, at least seasonally, on both winter and summer ranges.

Approximately 35% of winter range in this DAU is on USFS lands. There is apprehension that elk and cattle may be heavily impacting grazing allotments along the Blue Ridge due to year-round use (livestock during the growing season and wildlife during the winter). Small scale burning projects on some allotments are currently under consideration to mimic natural processes and increase the amount of forage.

Recreation receives emphasis on both the Dillon and Sulphur Ranger Districts. Extensive trail systems provide access for mountain bikes and hiking. Road systems developed for logging, or remaining from the hard rock mining days on the Dillon District, are heavily used by motorized off road enthusiasts.

#### **BLM -**

The Bureau of Land Management has 42 allotments in the DAU. These provide 5,438 AUMs of forage for livestock, with use occurring primarily in the spring and fall, although some use occurs in summer and winter. The class of livestock using these allotments is almost exclusively cattle and horses.

The Kremmling Resource Management Plan emphasizes the management, production and use of renewable resources on the public lands in the Williams Fork DAU. Sustained yield and multiple use of renewable resources are primary tenets of this management philosophy.

Livestock production, recreation and sustaining wildlife resources are emphasized on BLM lands in the DAU. A few areas are suitable for timber harvest. Range forage has been allocated to optimize both livestock production and big game populations where feasible. In grazing allotments where optimizing for both was not possible, livestock production was favored while providing sufficient forage to support 1980 big game levels.

#### **Wildlife/livestock Conflict Areas - Public Lands**

Federal land management agencies were asked to provide information on areas where conflicts may occur between livestock and wildlife – for example where wildlife had forced a change or delay in period of use on an allotment, or where forage utilization by wildlife had caused a reduction in AUMs of forage available for livestock. Sulphur Ranger District and the Kremmling Resource Area of the BLM have not identified any allotments with forage conflicts between elk and livestock. Dillon Ranger District felt that the year-round use by livestock and wildlife on allotments along Blue Ridge (GMU 37) could be having detrimental impacts on the vegetation. These allotments include Acorn, Big Hole, Blue Ridge, Green Mountain and Pioneer.

Over the past seven years, the Middle Park HPP Committee has contributed to the salary of a temporary range technician over the summer season. This person has concentrated on determining the degree of use, and timing of use, by large herbivores on critical rangelands.

Range utilization cages constructed of wire mesh were put out in key areas on private meadows, state lands, BLM, USFS and NPS, and were monitored throughout the growing season. A primary focus of this work in the initial years was to determine the degree to which elk might be damaging spring pastures. Damage does not appear to be a problem, but elk use can force a delay in livestock being put out to pasture, increasing the time they must be fed. The summary report for the 1997 summer season identified several problem areas, in spite of the fact that rangeland vegetation had an excellent opportunity for growth due to above average rainfall in early and late summer. Of biggest concern were several areas in GMU 28 where there is no permitted livestock grazing – North Battle Creek and South Battle Creek below Williams Mountain (USFS) and isolated areas east and north of Silver Creek Resort (BLM) – where there were significant impacts to the vegetation from elk. Most other areas that were observed to be hit hard were at lower elevations on BLM where elk gathered in the winter and early spring, with cattle coming in right behind in late spring and early summer. Not much has changed during the 1998 season, although the early part of July was very dry. Competition for summer forage between elk and livestock does not appear to be of any concern, other than the effect it may be having on elk distribution.

#### Wildlife/livestock Conflict Areas - Private Lands

Elk damage crops and fences, raid and destroy haystacks, compete with livestock for spring forage, damage aspen trees, and have other impacts on privately-owned habitat in parts of DAU E-13. Wintertime concentrations lead to conflicts with some regularity, particularly in regard to cattle feeding operations. Most hay storage areas have had to be permanently fenced to keep elk out. DOW provides materials for these stackyards and ranchers erect them.

Whenever damage to livestock fencing or forage occurs, or that potential exists, the Middle Park HPP Committee has typically become involved in the resolution of these conflicts. Aerial fertilization of elk habitat on public lands has been used with some success to attract animals away from private rangelands. In addition, HPP funds have been used to provide materials for “Middle Park Gates.” Landowners are encouraged to install these metal gates in existing travel corridors of elk. These can then be left open during times when cattle are not being pastured, and elk seem willing to go out of their way to use these gates when they aren’t hurried. HPP has also paid for several miles of high-tensile division fence to improve grazing management on a BLM allotment and adjacent private land. Distribution management hunts, where landowners are allowed to bring in hunters of their own choosing when elk are causing conflicts during the period from Aug. 15-Jan 30 (excluding regular hunting seasons), have also proven useful in reducing damage. An average of 100 licenses for distribution management hunts have been issued annually since 1990 for ranches in E-13.

### **Herd Management History**

Elk were plentiful in Middle Park in pre-settlement times, but were soon exploited when Europeans began arriving on the scene. Market hunters supplied mining camps near Leadville



and in Clear Creek and Summit Counties with wild game meat. Later, thousands of elk were shot throughout Colorado for just their teeth. The disappearance of elk brought about closed seasons from 1902-1928. In 1913, it is estimated that only 50 head remained in the entire upper Colorado River Basin (500-1000 in all of Colorado). Between 1912 & 1928 there were fourteen reintroductions in Colorado totaling 350 animals. (The Elks Lodge was instrumental in getting these done). One such transplant occurred at Estes Park in 1913, with 36 elk from Yellowstone; another release occurred near Steamboat Springs. During the late teens and twenties the entire Williams Fork drainage was maintained as an elk refuge. Williams Fork drainage reopened in 1929 when damage occurred on local ranches (300 animals were killed that year). In 1932, feeders were hired to try and lure elk from the vicinity of Windy Gap, over Cottonwood Divide to the Beaver Creek valley, where they planned to hold them for the winter. This was unsuccessful. Due to the protection afforded elk, numbers in E-13 have been gradually increasing since the turn of the century, and elk are now a prominent feature of the local fauna.

### Posthunt Population Size

No practical census technique has ever been developed for elk in Colorado. Consequently, DOW uses computer population models as their primary method for estimating population size and for setting permit numbers. Prior to 1998, a software program called POP-II was used on personal computers to help determine what is occurring in big game populations. A new spreadsheet model is currently being evaluated as a replacement for the POP-II program. Both programs are similar in that harvest figures are entered into the computer along with estimates of mortality, initial population size, sex ratio at birth and wounding loss. Numerous simulations are run with the model until the outputs reasonably align with age and sex ratio data collected at least every other year following the hunting season in the Williams Fork DAU. Accuracy of the new spreadsheet model is estimated to be within 20%, but there is no way to verifying this. Results of the computer generated population estimates are summarized in Appendix A.

Except for a few minor setbacks, the Williams Fork elk herd has been steadily increasing for most of this century. Computer modeling indicates the herd may have leveled off since the late 1980s (see Figure 4). The highest posthunt population estimate for the DAU was 6,000 elk (1988 & 1995). The lowest population estimate, based on recent records, was 709 elk in 1954. During this decade, the computer model indicates elk numbers in the DAU have averaged 5400 animals.

The closest thing to an elk census in recent years occurred during the winter of 1995-96 when the Middle Park HPP Committee contributed money for additional helicopter flights. Near ideal counting conditions were present during February of that year after a heavy snowfall with very little wind and no drifting. Elk began to move to lower elevations and into habitat with

Insert Graph of Williams Fork Elk Herd Here  
FIGURE 4

less tree cover, and congregated in groups that averaged slightly more than 21 elk in size. The solid snow cover greatly increased the visibility of animals and made tracking from the air possible. A total of 31 hours of flight time were spent counting and classifying elk in Middle Park. Photographs were taken of some of the larger groups to ascertain the degree to which undercounting was occurring. The total number of elk accounted for in E-13, after adjusting for sightability and counting error in large groups, was 4,102. However this figure does not reflect elk that had migrated out of the DAU for the winter, such as to South Park or Radium, or those elk that may have been in areas that were not surveyed.

### Disclaimer

**Estimating population numbers of wild animals over large geographic areas is an inexact science.** Whenever attempts have been made to account for a known number of animals in large fenced enclosures, investigators have consistently failed to see every animal. In some cases, less than 50% of the animals can be observed and counted. “High-tech” methods using remote sensing have also met with very limited success. Most population estimates derived from computer model simulations involve estimations of sex ratio at birth, survival rates, wounding loss and annual production. Such simulations are aligned on measured posthunt age and sex ratio classification counts, taking into account any information available on minimum population size or population trend. DOW recognizes population estimation as a serious limitation in our management efforts and attempts to minimize this problem by using the latest technology and inventory methodology available. Major revisions of POP-II elk models were made in 1992 (15 age classes), 1996 (20 age classes) and 1998 (higher survival rates), and all these changes resulted in higher population estimates. As better information has been obtained on survival rates, wounding loss, fetal sex ratios and density estimates, and whenever new modeling techniques and programs have emerged, these have been assimilated into the process for population estimates. These changes may result in significant differences in population estimates which call for new management strategies. It is recommended that the population estimates presented in this document not be viewed as an exact representation of the number of animals in the DAU; rather, their utility is an **index** to evaluate population trends over time.

In 1990, when the last population objective was set, DOW significantly underestimated the size of the elk population in Middle Park. At the time, it was felt that reducing the population by 21% should bring the population in DAU E-13 down to the objective of 3,000 animals. We now know that this assumption was incorrect, and that a much larger reduction (46%?) in the population was needed to achieve the objective. This example only points out the folly of trying to deal in terms of exact numbers of wildlife, especially with a species as elusive as elk.

### The Concept of Carrying Capacity

Decision makers must take carrying capacity into account when determining optimum size at which to maintain a herd. As any population of animals expands in a finite habitat, it eventually reaches a maximum sustainable level. That level for ungulates is usually governed by

availability of food resources. Typically, survival and reproductive rates decline as the population approaches carrying capacity, until no further population growth is possible. Fewer resources are available to individuals in the population because of the demands of increased numbers of animals (see Appendix B for more discussion). In most situations carrying capacity is not static, however, but fluctuates from year to year based on factors such as forage production, forage availability and competition with other species.

Wildlife managers recognize that it is often possible to increase harvest over the long term and reduce the possibility of large die-offs due to severe winters by managing a population at some level well below carrying capacity of the habitat. The increased production that results from individuals being on a higher plane of nutrition more than compensates for the reduced population size. Individual animals are usually more healthy and robust. Other species may also benefit from increased availability of forage and cover.

The question often asked in relation to the DAU plan is, "How can you set a population objective without knowing a number that the area can support?" However, arriving at a definitive estimate of biological carrying capacity is not any easier than estimating population size. One must first know animal requirements and how they use their environment, then resources must be inventoried across a wide geographic area, and yearly variability must be taken into account. The cost of conducting such investigations is usually prohibitively expensive.

The posthunt population in DAU E-13 has probably been between 5,000 and 6,000 animals for over 10 years. Based on the large harvests consistently occurring in this DAU (averaging 1150), it is safe to assume that this level is well within carrying capacity of the habitat. Does this indicate that between 5,000 and 6,000 elk is the right number to have in the posthunt population? Lacking definitive data on the vegetation, we cannot say. Ultimately, the decision on biological carrying capacity must come down to a consensus of interested parties as to what demands wildlife and livestock are presently making on the forage, and what that "feels" like in terms of general range condition. This is the utility of a DAU Planning process.

### Posthunt Herd Composition

The first documented age and sex ratio surveys in the Williams Fork elk herd were conducted in 1972. Since then, DOW has conducted 17 posthunt age (calf to cow ratio) and sex (bull to cow ratio) classifications. Sex ratios have averaged 24 bulls:100 cows with a range of 11 to 42. During this decade DOW has conducted five age and sex ratio classifications which averaged 24 bulls:100 cows, with a range of 19 to 35. Sex ratios are

Insert Graph of Troublesome Sex Ratios Here  
FIGURE 5

shown in Figure 5.

Sex ratios in this herd have consistently been in the lower 20s, even without any restriction on hunter numbers or season-long antler point restrictions. The numerous refuge areas in the DAU where there is no hunting help retain more bulls in the population. The ratio did dip in the early 1980s, probably as a result of very heavy elk hunting pressure on bulls while antlerless harvest was being kept in check. From 1986 to present, DOW has been using the four-point antler restriction to protect a portion of the bulls during the 1<sup>st</sup> and 2<sup>nd</sup> combined rifle seasons. There have also been a large number of cow permits issued for this DAU this decade. The combination of these factors has allowed the bull ratio to recover.

Posthunt age ratios are measured at the same time as sex ratios – early in the winter. These give some indication of reproductive success but, depending on severity of the winter, may not

accurately reflect recruitment into the population (*i.e.*, those animals surviving to one year of age). Significant mortality of young can occur between the time of the counts and May.

Posthunt age ratios have been more variable than sex ratios. Over the last 25 years the average age ratio has been 56 calves:100 cows (range: 42 in 1993 to 65 in 1977). This decade DOW has conducted five surveys; two of these age ratios were well above average, while the other was an all-time low. The late winter and spring in 1993 was hard on deer and elk, which is likely the reason for low production. Figure 6 graphs the age ratios in E-13.

Insert Graph of Troublesome Age Ratios Here  
FIGURE 6

### Other Management Activities in DAU E-13

Hunters in the 1989 game damage season and subsequent distribution management hunts have been required to submit the lower jaw and uterus from harvested cows. DOW has maintained records of pregnancy rates, fetal sex ratios and age structure of the harvest from these biological samples, and has also estimated dates of conception and parturition from measurements of the fetuses. Through the years 941 jaws have been aged and 815 uteri have been examined. Pregnancy rates in Middle Park elk have averaged 90% for animals 2½ years of age and older and 31% for yearlings. Two to 3 percent of the cows harvested appeared to have been 15 years of age or older and one of these animals had twin fetuses (the only incidence of twinning detected).

There is currently a telemetry study to determine the amount of interchange between the southern part of the Williams Fork DAU and Kenosha DAU. Thirty-two adult cows were radio-collared in June 1997 along the Continental Divide and the Ten Mile Range. Six collars were

replaced in December 1998. It is estimated that 400 or more elk from E-13 may be wintering in South Park.

### Harvest History

Bull harvest steadily increased in the Williams Fork DAU from the 1950s until the late 1980s. Antlerless (cow and calf) harvest has increased dramatically from a low of 21 in 1957 to 889 in 1996. In the 1950s, total harvest averaged 125 elk per year; this rose to 260 in the 1960s, 409 in the 1970s, 830 in the 1980s and 1,219 in the 1990s. The maximum number of elk harvested in any one year was 1,552 in 1996, and the lowest number was 90 in 1957 (see Figure 7 for a graph of the harvest data). Note: harvest figures are estimated from random surveys of hunters and may be subject to error.

Antlerless harvest is a function of antlerless licenses issued, but there does seem to be a point of diminishing returns over a certain level. Since 1983, DOW has authorized anywhere from 520 to 2,330 antlerless licenses in the DAU (see Table 2). Anywhere from 1,538 to 1,930 antlerless licenses were issued through the application process from 1994-97. Permit numbers over and above this level end up being sold at DOW offices to walk-in customers.

**TABLE 2**

## Limited Licenses in DAU E-13

YEAR	Posthunt OBJECTIVE	TOTAL LICENSES	LICENSE TYPE	HARVEST	PERCENT SUCCESS
1983	2,400 elk	900	Antlerless	258	29%
1984	2,400 elk	910	Antlerless	327	36%
1985	2,400 elk	520	Antlerless	147	28%
1986	2,400 elk	700	Antlerless	182	26%
1987	2,400 elk	1,375	Antlerless	411	30%
1988	4,200 elk	1,580	Antlerless	475	30%
1989	3,800 elk	1,710	Antlerless	528	31%
1990	3,000 elk	1,480	Antlerless	570	39%
1991	3,000 elk	1,230	Antlerless	461	37%
1992	3,000 elk	1,455	Antlerless	434	30%
1993	3,000 elk	2,185	Antlerless	591	27%
1994	3,000 elk	2,330	Antlerless	470	20%
1995	3,000 elk	1,575	Antlerless	439	28%
1996	3,000 elk	2,330	Antlerless	715	31%
1997	3,000 elk	2,330	Antlerless	434	19%
1998	3,000 elk	2,330	Antlerless	NA	NA

Hunting Pressure

Hunting pressure in the Williams Fork DAU has increased along with the elk population. The lowest number of elk hunters was 404 in 1956 and the highest was 7,483 in 1997. During the period 1993-97 hunter numbers have averaged 6,833.

As would be expected, overall hunter success has declined somewhat over the years.

Insert Graph of E-13 Harvest History Here  
FIGURE 7

Insert Graph of E-13 Hunter Success Here  
FIGURE 8

## Season Structure

Hunters have been able to buy a general license to hunt bulls in DAU E-13 since 1947 or before (unlimited either sex seasons were held from 1948-51). Starting in 1953, limited antlerless licenses have been available by drawing in the DAU, except for 1961, 1971 and 1972.

An elk season separate from that of deer was initiated in 1971, and Colorado went to two separate and one combined seasons in 1976. Another major overhaul of the season structure occurred in 1986 when the three combined season structure made its appearance.

Antler point restrictions have been used at times to improve the number of bulls 2½ years and older in the population. Branch-antlered only hunting was first tried throughout the state in 1972. The “4-point” antler restriction has been in effect for the 1<sup>st</sup> and 2<sup>nd</sup> Combined Seasons in E-13 since 1986.

DOW has experimented with various methods of increasing cow harvest in Middle Park. In 1985, the first late cow hunt was tried in GMU 371. In 1990 and 1991, late private land only (PLO) seasons were held. These proved unpopular with landowners and there were problems with hunters pushing elk off public lands, so these hunts were discontinued. DOW started issuing limited antlerless licenses in 1<sup>st</sup> Combined Season beginning in 1992. A nine-day late season was held three weeks after the close of 3<sup>rd</sup> Combined in 1997, with 1,000 antlerless licenses for all of Middle Park south of I-70. Licenses for this late season were sold first come first served and demand for these far outstripped availability; hunters succeeded in harvesting about 350 cows in Middle Park, but the season was not without its problems (agents and offices were swamped, and there were safety concerns, poor sportsmanship and illegal bull harvest). PLO antlerless licenses were instituted on a trial basis for the 1996 regular season and are being retained – these are considered additional. During the 1998 season, unlimited either-sex licenses were sold for the 2<sup>nd</sup> and 3<sup>rd</sup> Combined Seasons; additional antlerless licenses were also made available.

Damage hunts and distribution management hunts have been used to alleviate elk conflicts. Hunters are restricted to harvesting an antlerless animal during these hunts. Damage seasons were held during the winter of 1989-90. With the formation of the prototype HPP Committee in Middle Park in 1990, distribution management hunts were instituted. These have been somewhat successful in easing conflicts.

## Current Objective

Prior to 1979, DOW’s intent was to increase elk in DAU E-13. Following the severe winter of 1978-79 the objective was to stabilize the population. In 1988 and ‘89, the objective was to have more elk in the population (4,200 elk and 3,800 elk respectively).

The first DAU planning process was completed in 1990, which resulted in the lower objective of 3,000 elk in the post-season population, along with a sex ratio objective of 24 bulls:100 cows. The objective of 3,000 elk was intended to give landowners some relief from game damage problems, as well as to bring about a better balance between elk and their winter range. The plan was to lower the population incrementally over four years until the objective

was reached. By 1993, the population may have been reduced some, but remained well above objective. Consequently, our constituent groups have not had the benefit of seeing what this herd level looks like on the ground. The sex ratio objective of 24 bulls:100 cows has been achieved in the last two years when heavy cow harvests have occurred.

## **DAU E-13 MANAGEMENT ISSUES**

### **Current Management Problems/Constraints**

Major Problems in DAU E-13 (in no particular order).

1. **Limited Winter Range** - Only a limited amount of habitat is available in Middle Park to support deer, elk and pronghorn antelope during the winter. Habitat continues to be converted to housing and associated development every year. Wintering herds also have to coexist with an increasing number of recreational users. When recreation occurs on winter range, animals often seek refuge on private lands, aggravating existing conflicts. The larger elk herds of the last two decades have also encroached on winter range used by deer.
2. **Inadequate Census Information** - As noted in the Disclaimer Section, the size of the elk population in DAU E-13 was significantly underestimated when the existing DAU plan was written. The last DAU planning process was contentious and the various constituencies were likely misled by this inaccurate information. Inadequate census information has made accurate computer modeling much more difficult because there is no benchmark on which to align the model. Underestimates of population size result in too few antlerless licenses being issued, allowing the population to grow.
3. **Problems with the Model** - Because of inadequate census information, models tended to be conservative. Early models used unrealistic survival rates – no one realized natural mortality of elk was so low and that significant numbers of cow elk were living (and breeding) past 12 years of age. We now know from survival studies that elk herds have the potential to increase 18% annually discounting any hunting, and this was not reflected in models until just recently. There also has been a general reluctance among DOW field personnel to believe higher population estimates from the model, another reason models tend to be conservative. When harvest figures were inputted in these conservative models every March, and modeled sex ratios fell short of sex ratios observed the previous January, the model was adjusted to reflect more animals. Through the latter part of the 1980's this annual adjustment amounted to 300-400 animals and grew even larger in the early 1990's. This retroactive adjustment left managers one step behind the population increase, and when the problem could no longer be ignored the “damage” had already occurred, leaving DOW with a population that has proven difficult to control. Despite its



improvements, the 1994 version of the model seemed to indicate that the population was nearing objective, so antlerless permits were reduced in 1995. The mistake became apparent in 1996 and the model was revamped; however, the reduction in permits had allowed the population to climb again.

4. **Inability to Harvest Animals** - Even if DOW could precisely measure the size of elk populations and knew exactly how many animals needed to be harvested to stabilize the herd, there could be difficulties in achieving this harvest. A statewide season structure does not always present the ideal situation to facilitate harvest in certain localities. Many factors, such as hunting conditions (*i.e.*, weather), access (particularly to private property), the commitment of hunters to success and their hunting ability are beyond the control of DOW. In 1997, 2,330 regular antlerless elk licenses were issued for this DAU, compared to a total of 1,575 licenses in 1995. Although there were 48% more licenses issued in 1997 than 1995, there was actually 1% less antlerless harvest during the 1997 regular season. Too often people looking for simplistic solutions believe the overpopulation problem could be solved with more licenses.
5. **Competition with Deer** - While deer numbers were in general decline over the past 15-20 years in Middle Park, elk numbers were building. During this period of increase elk have expanded their historic winter ranges into lower elevations, setting up the possibility of competition with deer. Elk are stronger and more aggressive than deer, and have more diverse food habits. Questions linger as to whether elk displacement of deer on winter feeding grounds may have contributed to the decrease in deer numbers and made them more susceptible to die-offs. Deer may also be impacted at other times of the year on transition ranges.
6. **Refuge Areas and Changes in Land Use** - Many of the traditional ranches around Fraser and Silverthorne have been subdivided. As patchwork ownership develops it becomes virtually impossible to reach consensus on wildlife management decisions due to the diversity of viewpoints. Safety issues also come into play with regard to hunting with high-powered rifles. In those situations where a family continues to control a large area, owners are tending to become very conservative in the amount of hunting they allow. Ranches around Granby and Tabernash protect about 400 elk in addition to limiting hunter access to National Forest; YMCA's Snow Mountain Ranch protects another hundred animals; another 200 elk stay on Silver Creek Ski Area property where they are largely protected. The molybdenum mill of Cyprus Amax falls under the Mine Safety Act and firearms are not allowed on its industrial area (tailings ponds and mill site); this helps several hundred animals make it through the hunting season. Some ranches on the lower Blue River are charging large sums of money for bull hunting and are not interested in letting cow hunters in during the regular season. Hunters sometimes become upset about the lack of animals on public lands and complain that landowners holding elk on private lands for their own paying hunters. On the other hand, large numbers of hunters on public land often create a formidable barrier, unwittingly pushing

elk back onto private lands as soon as animals try to cross over onto public ground.

7. **Game Damage** - High elk numbers in this area over the past 25 years have periodically resulted in damage problems – a major concern of DOW and landowners in the Williams Fork DAU. Growing crops (primarily hay meadows), livestock forage and fences have been affected. Damage was especially bad during the severe winters of 1978-79 and 1983-84. DOW has attempted to mitigate these problems by providing temporary and permanent fencing, hazing elk and paying game damage claims. Payments for game damage in E-13 have averaged \$4,161 annually over the past five years. Game damage hunts and distribution management hunts designed to selectively harvest animals causing damage on private land have been implemented. HPP becomes involved where there is damage to fence or forage. In situations where elk take spring forage intended for cattle use, HPP can make lease payments for pasture when there is no where else for elk to go until melting snow allows them to move to calving areas. By allowing the animals to remain on these sites, damage to other private lands is averted. The Middle Park HPP Committee has made lease payments for spring grazing by elk to two ranches on several occasions. Total HPP payments for fence and forage in E-13 are approaching \$15,000 over the last five years. Despite all efforts, game damage seems to be continually taking on new dimensions.
8. **Changes in Recreational Use** - Mountain bikes, all-terrain vehicles, snowmobiles and sport utility vehicles have all come into existence within the last 20-30 years. Recent technological advances have made these more efficient, with increased comfort and reliability. Bikes and ATVs allow humans to visit areas that were once the domain of the dedicated hiker or those on horseback. Extensive road and trail networks have been developed since these inventions came onto the scene. During winter flights conducted by DOW in helicopter and fixed-wing plane in Middle Park, snowmobile tracks are observed throughout most parts of the winter range. Changes in demographics and culture have increased the portion of the city-dwelling population that “heads for the hills” during time off. The population residing in Grand and Summit Counties has also greatly increased, and these newcomers often go biking, driving, hiking or jogging before or after work. Ownership of large dogs has increased over the years and people frequently bring their pets with them to the mountains. All of this adds up to a tremendous increase in the presence of humans and dogs in important parts of elk habitat. It would not be surprising if this has caused elk to spend more time on large tracts of privately owned lands, where there is less disturbance. Such displacement could be having a negative effect on transitional ranges which deer and elk typically occupy during the spring and early winter. These areas are important to animals needing to build fat reserves for the winter, and rebounding from the rigors of winter in preparation for lactation.
9. **Habitat Changes due to Logging** - The ratio of hiding cover to foraging areas on USFS lands has changed due to harvest of aspen and lodgepole pine over the last several

decades. Construction of logging roads coupled with the loss of escape cover may be forcing elk to leave public lands and seek refuge on less accessible private land. Such movement could be accentuating distribution problems, increasing game damage, as well as lowering hunter success rates.

10. **Elk Ingress from Adjacent Areas** - DAUs are delineated on the assumption that there is very limited interchange with adjoining areas. Elk numbers may be fluctuating in this DAU due to migrations of elk back and forth to adjacent areas such as South Park, the Radium area and the Vail Valley. A major influx or departure of animals greatly increases the difficulty of maintaining the elk population at the predetermined number. DOW may consider creating a new GMU south of I-70 and transferring this to the Kenosha Pass DAU. Results of the South Park Elk Study, where the movements of cow elk are being monitored with radiocollars, will provide background information to assess the need for such a change.
11. **Herd Vigor and Habitat Concerns** - As herd size increases, particularly where it begins to tax available forage in critical areas, vigor of the herd and ability to grow large bulls diminishes. Age ratios may also decline. Particularly on limited range (*e.g.*, winter range or spring pastures) elk can create localized problems and impact the productivity of such areas for a period of time. Deteriorating range condition impacts other wildlife species and livestock operations dependent on the same resource.
12. **Distribution Problems** - Frequently it is not the total number of elk in a DAU that creates problems, but rather animals that congregate in critical areas, such a winter range or security areas, particularly at times when resources are most limited. Elk also create conflicts in agricultural areas. Distribution problems are at times compounded by recreational use on public lands, excessive hunting pressure, and by inappropriate hazing of animals from one piece of deeded land to another. Studies in the White River National Forest suggest that animals are quite attuned to the hunting seasons, and do indeed seek out refuges away from hunting pressure. Often these are the privately owned lands.

#### Other Problems or Potential Problems in DAU E-13

1. **Extended Hunting Seasons** - Distribution management hunts can begin in mid-August and extend until the end of January (except during the regular hunting season). Game damage hunts can occur as late as February. Applying hunting pressure for up to a half year increases stress on animals. Sometimes the harassment that accompanies late seasons increases energy consumption of the animals, in turn raising forage demands, and further intensifying conflicts with livestock operations.
2. **Leftover Licenses** - More than 2,000 limited antlerless licenses were offered in 1994, '96

and '97. A sizable portion of this license allotment is not claimed during the drawing. During these three years, an average of 18% of the antlerless allotment has had to be issued as leftovers. Flooding the market with licenses often means the people picking up the remaining licenses are not familiar with the area they are hunting or are not that serious about harvesting an elk. Consequently, the more licenses left over after the drawing, the harder it becomes to meet harvest objectives.

3. **Hunter Overcrowding** - There are several areas in the DAU where hunters tend to over-concentrate. These tend to be in areas with extensive road networks or backcountry accessible to ATVs. This problem is also affected to some extent by the number of antlerless permits issued. These situations are counterproductive to achieving harvest goals and heighten chances of an accident occurring. The quality of the hunt is obviously affected and hunters of better ability typically avoid such areas.

## Issues and Concerns of Our Constituents

Three meetings were held in Granby, Kremmling and Silverthorne on different evenings to involve the public in the DAU planning process. Notices for these meetings were placed in local newspapers, and about 450 personal invitations were mailed to potentially affected parties. People attending the meetings received 15-20 minutes of background information on local elk herds, then were given a survey form on which to identify elk issues important to them, and to select a preferred management strategy. Deer and antelope DAUs were also discussed at the same meetings. Thirty issue statements relating to elk were presented at the first public meeting: these were issues and concerns that had surfaced at previous public meetings and/or had been identified through mail surveys in past years, or that DOW felt were important. These issues had been discussed with the Middle Park Habitat Partnership Committee meeting prior to the public meetings, and committee members felt all the main issues were covered. People attending the DAU meetings were invited to contribute additional issues, and as new ones came up they were written on a flip chart at the front of the room. Participants added seven more issues during the three meetings. Thirty-one of the issues were picked among the top four concerns of the participants, with votes ranging from a high of 16 down to one vote.

Seventy people attended these meetings and fifty people voted on the issues in DAU E-13. An additional nine surveys were hand-delivered by local District Wildlife Managers to landowners and sportsmen who were not at the DAU meetings. When surveys were analyzed, an attempt was made to place respondents into one of six constituent groups. Landowners and hunters were about equally represented and made up approximately 78% of the audience. Guides/outfitters, other business persons and non-consumptive users were also in attendance.

### Significant Issues

Those filling out a survey were asked to identify their top four issues for elk. Sixty-seven percent of those surveyed are very concerned that refuge areas, where there is little or no hunting, along with changing land use patterns are making it nearly impossible to manage

elk. People also had major concerns about habitat loss, elk distribution and various aspects of the hunting seasons. Issues are described below in descending order of importance.

Percentages of respondents selecting the particular issue are listed in parentheses, along with the group(s) most closely identified with the issue. Issues are categorized as Biological (B), Social (S), Economic (E), Recreation (R), or a Combination (C) of several issues, and then ranked in importance within that category.

*People are very concerned that . . .*

- C1 “subdivision of the land, diversification of uses and conflicting interests are making it nearly impossible to manage elk.” . . . or . . . “land use problems are starting to interfere with our ability to hunt elk.” (35%: non-consumptive users, hunters and landowners)
- B1 “large areas are closed to hunting, or have limited access; these areas of protection are making it extremely difficult to reduce the size of the herd.” (33%: mainly hunters)
- S1 “landowners are quick to complain about too many elk, but are reluctant to grant permission to hunt their property unless you are willing to pay high dollars.” (33%: hunters and one guide/outfitter)

Other important issues included, *a concern that . . .*

- B2 “elk habitat is shrinking due to human activities.” (24%: hunters, non-consumptive users, one merchant and one landowner)
- C2 “elk don’t move to the high country during the summer; they now spend most of the year on private property because there is too much human activity on the national forest.” . . . or . . . “summer recreational pressure at higher elevations may keep elk from using traditional habitats on national forest, shifting additional use onto transitional range.” (24%: landowners, hunters, non-consumptive users and one guide/outfitter)
- B3 “not enough cows are killed during the regular season.” (17%: landowners, hunters and one merchant)
- R1 “more hunting pressure is needed on private property early in the season, to keep elk from moving off the national forest too soon.” (17%: hunters and one landowner)

## Secondary Issues

*People are also concerned that . . .*

- B4 “there may be too many elk for optimal herd health, and that high numbers adversely affect other wildlife species such as deer.” (17%: landowners, hunters, guides and outfitters, and one merchant)
- S2 “private landowners are forced to support a public resource without being given any choice, or compensation.” (15%: landowners)
- B5 “hunting seasons extend over 5 months, which is too long a period to be stressing animals.” (15%: guides and outfitters, non-consumptive users, one landowner and a hunter)
- R2 “hunting pressure on public lands pushes animals onto private property during the seasons.” (15%: hunters and merchants)
- R3 “hunter overcrowding is a serious problem in some areas.” (13%: hunters, guides and outfitters, and some non-consumptive users)
- E1 “elk use seems to get priority over livestock on federal grazing allotments.” (12%: landowners and hunters)
- B6 “large herds could be causing damage to forage resources on public and/or private lands.” (11%: landowners and hunters)
- S3 “DOW has failed to reduce the two major elk herds in Middle Park enough to bring them anywhere close to the objective agreed upon in 1990.” (9%: landowners)
- E2 “elk cause conflicts by using forage that could go to livestock, they damage fences and interfere with winter feeding operations.” (9%: landowners and hunters)
- R4 “there aren’t enough big bulls in the population.” (9%: hunters and landowners)
- B7 “there aren’t enough serious hunters in the field to achieve an adequate harvest.” (9%: non-consumptive users, hunters and landowners)
- C3 “elk should not be wintering in the valley bottoms.” (9%: landowners)
- B8 “census information is inadequate for effective management to take place.” (9%: guides and outfitters, and non-consumptive users)

- R5 “high fees charged for hunting private property keep the average hunter from having access to good elk hunting.” (9%: hunters and a landowner)
- R6 “too many landowners are trying to hold elk on their land during hunting season for their clients.” (7%: hunters and one landowner)
- E3 “landowners who support elk during the winter may not be the ones to benefit from the hunting season.” (7%: landowners and a guide/outfitter)
- S4 “trophy hunting should be discouraged because it sends the wrong message to hunters and non-hunters alike, and encourages exploitation.” (7%: landowner, hunter and a non-consumptive user)

### Minor Issues

*Respondents apparently are less concerned that . . .*

- S5 “hunters, landowners, and other members of the public do not have enough opportunity to affect elk management decisions.” (4%: guides and outfitters)
- S6 “wherever livestock overuse occurs on federal grazing allotments, elk move elsewhere.” (4%: landowner and a hunter)
- B9 “high elk populations are damaging aspen stands or other resources.” (4%: landowner and non-consumptive user)
- S7 “hunters cause damage to public and private lands and do not respect property rights.” (2%: hunter)
- R7 “we should have more elk than we have now.” (2%: hunter)
- S8 “National Forests could be better managed for elk.” (2%: hunter)
- R8 “archers keep getting restricted more and more.” (2%: hunter)

The following issues were not selected among anyone’s top four issues.

“hunting seasons should be designed to harvest animals causing conflicts.”

“unrealistic management objectives produce undesirable and unexpected effects (e.g., hunter over-crowding, unacceptably low hunter success, and a need for late seasons).”

“HPP should enhance habitat (fertilize) in more areas on federal lands and then make an effort to move elk to those areas.”

“there are too many road closures now and these keep hunters from accessing areas.”

“increased pressure to harvest more elk may ultimately result in the elimination of individual sub-herds.”

“too many bulls are accidentally killed during late seasons.”

## **Issues and Concerns of Land Management Agencies**

A summary of the results from public surveys was mailed to Sulphur Ranger District and Dillon Ranger District of the USDA Forest Service, and the Kremmling Resource Area of the Bureau of Land Management. Additional input on elk management issues was solicited from these agencies.

Kremmling Resource Area of the BLM echoed concerns expressed by members of the public and the Middle Park HPP Committee regarding the potential conflict between deer and elk, particularly for winter habitat. Expanding elk herds are occupying winter ranges which have historically been important deer winter ranges. They recommended that DOW consider some type of evaluation of this potential problem in Middle Park.

Dillon Ranger District raised DOW's inability to meet harvest objectives as an issue.

## **Issue Resolution**

Obviously, no simple solution can possibly address all the concerns of our constituents. Herd management objectives will have no effect on more than half of the twenty-one significant and secondary public issues. Issues such as changing land use patterns and bad hunter behaviors are two of those beyond the scope of this plan. Of the remaining ten issues that can be impacted, each individual alternative under consideration may have some positive impact on the issue, or it may make matters worse. These impacts are summarized in the following section under each individual option.

## **ALTERNATIVE DEVELOPMENT**

### **Alternative Management Strategies**



DOW presented seven alternatives to the public at DAU meetings held in Grand and Summit Counties. During the DAU meetings, and on the written surveys handed out to those in attendance, people were given the opportunity to suggest other alternatives. People presumably felt comfortable with this range of alternatives, since no other suggestions have been submitted.

Written comments were also solicited from the USFS and BLM regarding these seven alternatives. Land management agencies did not indicate that any of these alternatives were not feasible.

#1 Hold the E-13 elk population at the December 1997 level and sex ratio using the current season structure:

5,000 elk with 18 bulls per 100 cows

### **Discussion:**

**Basis for Alternative** - This was the situation as it existed in the 1997 posthunt population. The sex ratio might drop to this level whenever cow permits are reduced from current levels. These goals have been achieved without problems under the current season structure.

**Relationship to Public Issues** (stronger impacts are designated by underlining) -

This option helps address the following issues: none

This option has no impact on the following issues: C1, B1, S1, C2, B3, R1, B4, S2, B5, R2, R3, E1, B6, E2, B7, C3, B8, R5, R6, E3, S4, S5, S6, B9, S7, S8 and R8

This option exacerbates the following issues: B2, S3, R4 and R7

**Advantages of Alternative** - Produces the largest total annual harvest of any option and provides the most hunting opportunity. Unlimited antlered licenses can be offered. Has a positive economic impact on businesses and license income for the DOW.

**Disadvantages of Alternative** - There may be habitat impacts associated with such a large elk population, and the deer population may be negatively affected. This alternative requires the most antlerless permits and carries a risk of the herd getting out of control following several years of poor hunting. Experience has shown that

large numbers of leftover antlerless licenses typically occur with the herd at this level.

**Public Support** - Only one person out of 56 people submitting a survey supported this alternative.

#2 Hold the E-13 elk population at the December 1997 level, but take the necessary steps to increase the bull ratio slightly from what it was at that time:

5,000 elk with 24 bulls per 100 cows

### **Discussion:**

**Basis for Alternative** - This is the current estimated posthunt herd size; at times the bull ratio has approached this level.

### **Relationship to Public Issues -**

Beneficial Impact: none

No Impact: C1, B1, S1, C2, B3, R1, B4, S2, B5, R2, R3, E1, B6, E2, R4, B7, C3, B8, R5, R6, E3, S4, S5, S6, B9, S7 and S8

Harmful Impact: B2, S3, R7 and R8

**Advantages of Alternative** - Produces the second largest total annual harvest of any option, along with the largest preseason bull population. Hunters would have the best opportunity of harvesting a mature bull under either this scenario or Option #7.

**Disadvantages of Alternative** - There may be habitat impacts associated with this high an elk population, and the deer population may be negatively affected. Under this alternative the herd has a lower growth potential than with Option #1, so it should be easier to keep under control. Large numbers of leftover licenses are also likely under this scenario.

**Constraints** - Spike bulls would likely need total protection during all hunting seasons to maintain this high of a sex ratio, or else bull licenses would need to be limited by drawing.

**Public Support** - This alternative was supported by only 6% of the survey

respondents.

#3 Reduce the elk population in DAU E-13 by approximately 20% from the December 1997 posthunt size, while allowing the sex ratio to drop somewhat:

4,000 elk with 18 bulls per 100 cows

### **Discussion:**

**Basis for Alternative** - The population was probably last near this level prior to, and following, the bad winter of 1983-84. The bull ratio has been somewhat above this level over the past 10 years.

### **Relationship to Public Issues -**

Beneficial Impact: B2, B4, B6, E2 and B9

No Impact: C1, B1, S1, C2, B3, R1, S2, B5, R2, R3, E1, S3, B7, C3, B8, E3, S4, S5, S6, S7, S8 and R8

Harmful Impact: R4, R5, R6, and R7

**Advantages of Alternative** - This option probably benefits the deer herd, and the potential for habitat damage is less. A reduction in game damage problems could be expected. Unlimited antlered licenses can be offered under this alternative.

**Disadvantages of Alternative** - There will be some loss of income to local merchants and DOW once the herd is reduced to this level. At this level and sex ratio the herd still has considerable growth potential and several poor hunting seasons could create difficulties.

**Constraints** - Reducing the herd to this level will likely require the continuation of unlimited either-sex licenses or additional antlerless licenses.

**Public Support** - This alternative was not favored by anyone that completed a DAU survey.

#4 Reduce the elk population in DAU E-13 by approximately 20% from the December 1997 posthunt size while raising the postseason bull ratio slightly:

4,000 elk with 24 bulls per 100 cows

**Discussion:**

**Basis for Alternative** - The population was probably last near this level prior to, and following, the bad winter of 1983-84. At times the bull ratio has approached this level and it is not an unrealistic goal with antler point restrictions in all seasons.

**Relationship to Public Issues -**

Beneficial Impact: B2, B4, B6, E2 and B9

No Impact: C1, B1, S1, C2, B3, R1, S2, B5, R2, R3, E1, S3, R4, B7, C3, B8, R5, E3, S4, S5, S6, S7 and S8

Harmful Impact: R6, R7 and R8

**Advantages of Alternative** - This alternative is probably better for the habitat and deer herd than the current situation. Fewer game damage problems and other conflicts would be expected. Once the herd has been reduced to this level, it should be easier to maintain due to the smaller female component. Fewer leftover antlerless licenses will likely remain after the initial drawing than with any of the previous three alternatives.

**Disadvantages of Alternative** - There will be some loss of income to local merchants and DOW once the herd is reduced to this level.

**Constraints** - Reducing the herd to this level will likely require the continuation of unlimited either-sex licenses or additional antlerless licenses. Spike bulls would likely need total protection during the hunting season to achieve this higher sex ratio, or else bull licenses would need to be limited by drawing.

**Public Support** - Twenty-one percent of the people responding to the survey favored this alternative, making it the second most popular alternative.

#5 Current Objective - Reduce the size of the E-13 elk population by approximately 40% from the December 1997 level, while allowing the sex ratio to drop from what it was then:

3,000 elk with 18 bulls per 100 cows

**Discussion:**

**Basis for Alternative** - This alternative is the current objective for population size with a lower sex ratio. The population was probably last at this level in the 1970s.

**Relationship to Public Issues -**

Beneficial Impact: B2, B4, R3, E1, B6, S3, E2 and B9

No Impact: C1, B1, S1, C2, B3, S2, B5, R2, B7, C3, B8, E3, S4, S5, S6, S7, S8 and R8

Harmful Impact: R1, R4, R5, R6, and R7

**Advantages of Alternative** - This population level would be easier on the habitat and deer herd than the current situation. It should also reduce game damage problems.

**Disadvantages of Alternative** - To reach this population level, cow harvest on private land would need to increase substantially (improvement in Issues S1, R1, B1, R5 and R6). Once the population has been lowered to this level there could be a negative fiscal impact on the DOW and local merchants, due to reduced annual harvests.

**Constraints** - It will take several years, at minimum, to reach this population level.

**Support for the Alternative** - Only one person out of 56 people submitting a survey supported this alternative.

#6 Reduce the size of the E-13 elk population by approximately 40% from the December 1997 level, while raising the sex ratio slightly above what it was then:

3,000 elk with 24 bulls per 100 cows

### **Discussion:**

**Basis for Alternative** - This alternative calls for no change from the current population objective and sex ratio objective.

### **Relationship to Public Issues -**

Beneficial Impact: B2, B4, R3, E1, B6, S3, E2, B7, C3 and B9

No Impact: C1, B1, S1, C2, B3, S2, B5, R2, R4, B8, E3, S4, S5, S6, S7 and S8

Harmful Impact: R1, R5, R6, R7 and R8

**Advantages of Alternative** - This population level would be easier on the habitat and deer herd than any of the first four options. It should also minimize game damage problems. Once the population objective is achieved, the smaller female component would lessen the potential for growth, making it easier to keep the herd under control.

**Disadvantages of Alternative** - Once the herd is at objective, there would be a negative fiscal impact on DOW and license agents due to limited licenses and reduced annual harvests. The smaller cow component would produce a slower recovery from a severe winter or over-harvest.

**Constraints** - To reach this population level, cow harvest on private land would need to increase substantially (improvement in Issues S1, R1, B1, R5 and R6). Spike bulls would likely need total protection during hunting seasons to achieve this higher sex ratio, or else bull licenses would need to be limited by drawing. It will take several years, at minimum, to reach this population level.

**Public Support** - Sixty-one percent of people submitting surveys preferred this option, making it by far the most popular; there also seems to be a broad basis of support across all interest groups. Sulphur Ranger District and the Kremmling Resource Area of the BLM also prefer this option.

#7 Reduce the size of the E-13 elk population by approximately 40% from its December 1997 level, while raising the sex ratio at least 25% from what it was then:

3,000 elk with 30 bulls per 100 cows

**Discussion:**

**Basis for Alternative** - This alternative is the current population objective with a much higher sex ratio. There hasn't been this many bulls in DAU E-13 since 1977, but the goal should be feasible under the proper season framework.

**Relationship to Public Issues -**

Beneficial Impact: B2, B4, R3, E1, B6, S3, E2, R4, B7, C3 and B9

No Impact: C1, B1, S1, C2, B3, S2, B5, R2, B8, R5, E3, S4, S5, S6, S7, and S8

Harmful Impact: R1, R6, R7 and R8

**Advantages of Alternative** - This population level would be easier on the habitat and deer herd than any of the first four options. It also minimizes game damage problems. The small female component would lessen the herd's potential for growth, making it easier to keep the herd under control, once the population objective is achieved. The smallest percentage of bulls would be harvested under this alternative, and when coupled with gains in habitat condition affords the best chance of producing quality bulls.

**Disadvantages of Alternative** - There could be a negative fiscal impact on the DOW and license agents due to reduced annual harvests, once the population has been lowered to this level. With this herd composition, the population would be slow to recover from a severe winter.

**Constraints** - To reach this population level, cow harvest on private land would need to increase substantially (improvement in Issues B1, S1, R1, R5 and R6). To achieve this objective, licenses for all seasons and both sexes would likely need to be limited. Whenever licenses are totally limited, DOW is required to reserve 15% of the licenses for private landowners. It will also take several years, at minimum, to reach this population level.

**Public Support** - Roughly 9% of the people submitting surveys preferred this option.

## **Alternative Selection**

Option #6, with 3,000 elk and 24 bulls per 100 cows, is the recommended alternative. This option has support from local hunters (more than 50% of survey respondents), landowners (57% of survey respondents), guides and outfitters (more than 43% of survey respondents), BLM and Sulphur Ranger District, Middle Park HPP Committee and the local DOW. However, this reduction of approximately 40% in herd size must occur fairly uniformly across the DAU. If herds on public land incur most of the thinning, the broad base of support for this alternative will likely evaporate. Animals that are inaccessible for harvest are already a major problem (Issues S1, B1, R1, R5, and R6).

This option addresses habitat concerns (Issues B2, B4 and B6) and should give landowners with damage problems some relief. If DOW can achieve this reduction, it should help their credibility (Issue S3). Reducing the herd to 3,000 animals in the posthunt population should take some of the pressure off the winter range and transition range – improving habitat condition and herd vigor. The deer population will also probably benefit from a reduction in the elk population.

However, this is not a population objective that can be attained immediately; rather, it is likely to take at least 2-3 hunting seasons to achieve this reduction. If significant winter mortality occurs in the next year or two, this will shorten the timetable. If poor hunting conditions occur one or more years, it could take longer to reach objective.

## **Implementation**

This population goal has proven elusive over the past eight years. Additional tools, such as antlerless licenses that are additional and the experimental unlimited either-sex licenses, are now available to enhance harvest. However, for this alternative to be successful antlerless harvest on private land will need to increase substantially, or else elk in refuge areas will need to be pressured to move onto public land when hunting seasons are underway. Preferably, this additional harvest needs to come at some point during the regular season. Hunters and the non-hunting public are unlikely to support a major herd reduction during January and February, and conditions conducive to achieving a good harvest in late November and December are too undependable.

Possibilities for improving harvest on private land include:

1. **Hunter Referral System or Hunter Registry** - Landowners willing to accept cow hunters on their land, and hunters looking for a place to hunt could be brought into contact with each other under this system. Some screening would be necessary to insure



hunters were responsible. Hunters receiving any type of complaint could be permanently dropped from the system. A nominal trespass fee could be incorporated into the system.

2. **Hunt Coordinators** - These persons would be employed by the Middle Park HPP Committee and supervised by the local District Wildlife Manager to oversee public hunting on participating ranches. Coordinators schedule hunts and act as intermediaries between landowners and hunters, directing people to specific hunting areas and advising them of ranch boundaries and rules. This relieves the landowner of the day-to-day chore of dealing with hunters. Landowners' friends and relatives who hunt can still receive priority; however, in order for the hunt coordinator program to be workable, these people need to plan ahead and give the hunt coordinator ample notice of their intentions, to prevent breakdowns in scheduling.
3. **Early Private Land Only Seasons** - Landowners who do not sell hunting rights may be willing to allow cow hunters on their property between primitive weapons season and 1<sup>st</sup> Combined Season. Hunting pressure applied at this time of year may succeed in pushing animals onto public lands, making them available to the general public.
4. **Landowner Incentives** - Landowners selling bull hunts may need encouragement to allow cow harvest to take place toward the end of the regular season. There are several possibilities that can be considered here, most of which would require legislation or the approval by the Wildlife Commission. These could be considered under the new 5-year season structure for 2000-05.
5. **Private Land Either-Sex Licenses** - These are being used in other parts of the state to encourage cow harvest on private land. It would be easy to implement these in Middle Park at such time as the unlimited either-sex license experiment is ended. These would create additional incentive to hunt private property.
6. **Late Hunts, Damage hunts and Distribution Hunts** - These special hunts make it possible to thin down groups of elk that otherwise may be unavailable for harvest, or that may be causing perennial problems. However, they should not be viewed as the answer to major herd reduction. Distribution hunts are widely viewed as "the rancher season," allowing landowners' friends and relatives to get an elk; the general public perceives this as special treatment and feels excluded. Attempts to expand this program could result in loss of this tool altogether. On the other hand, damage hunts require hunter selection by lottery, so participating landowners have no say over who hunts their property. Late hunts run the risk of developing into situations that appear as wholesale slaughter to many. They can also increase the energy requirements of animals by shuttling elk between neighboring ranches.

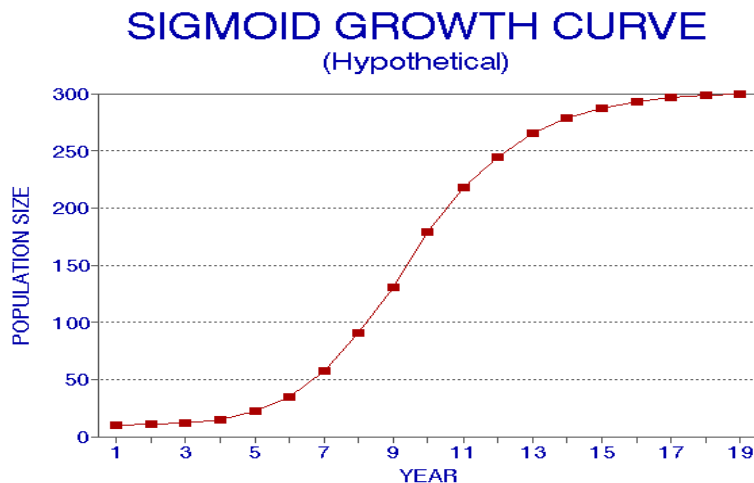
APPENDIX A  
E-13 Population Model

## APPENDIX B

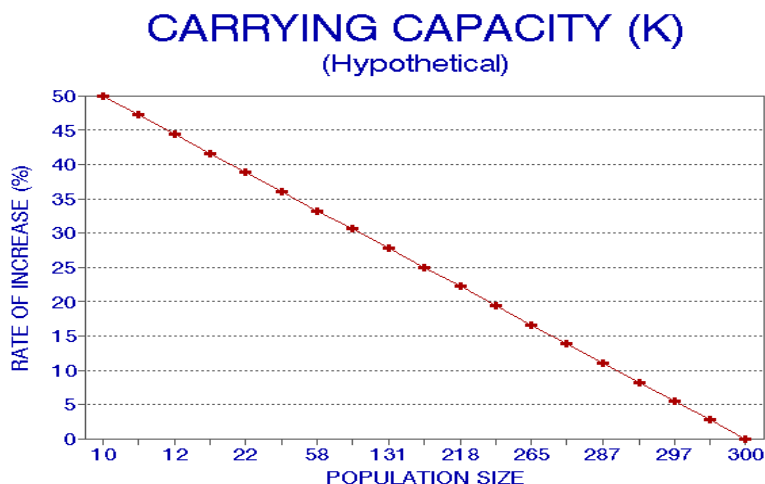
### Population Dynamics

The sigmoid curve can be used to describe various phenomena in nature, including the typical growth pattern for animal populations. Three phases of this population growth curve are readily apparent:

Establishment phase (years 1-5 on the graph): here the population is gaining a foothold; numbers are low, and the population will be significantly affected by mortality and recruitment (recruitment being animals added to the breeding component of the population). In this situation the rate of increase may be high, but due to the small core population, the increase in actual numbers is small (*e.g.*, a 50% increase in ten animals is only five individuals).



Prosperity Phase (years 6-15 on the graph): food, cover, water and living space are still abundant. Survival rates are at their highest. Although the rate of increase is declining, the population begins to build "momentum" because of the increasing size of the core population; this results in larger increases in actual numbers (*e.g.*, a 30% increase in a population of 100 animals results in 30 additional animals). Since the population is experiencing its greatest recruitment in this range, the largest surplus would be available for hunting (see the concept of MSY on the following page). The situation at this point tends to be ideal from several management aspects – range condition and trend are optimal, economic return to state wildlife agencies is the greatest, while game damage problems are still minimal. These circumstances represent a win-win situation for both sportsmen and landowners.

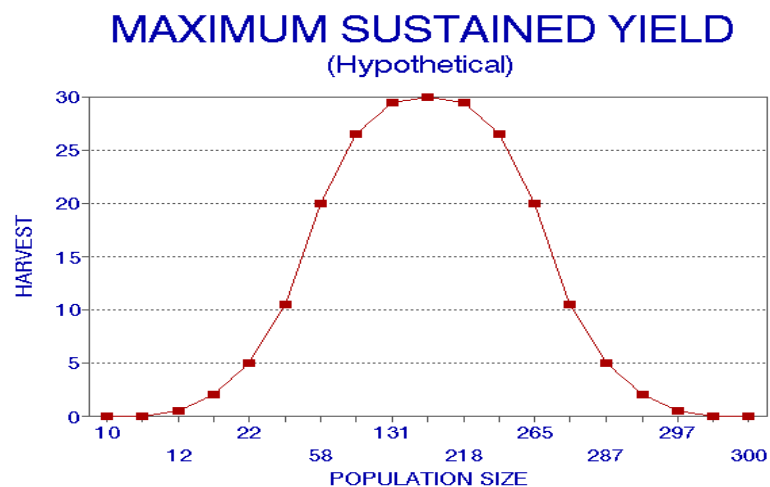


continues to grow until it reaches animals become crowded into each other. Environmental game damage problems tend to be the most severe when the prosperity phase begins to decline and the rate of increase of animals declines and eventually reaches zero. Only the fittest animals breed.

successfully. Animals recruited into the population will equal those dying. If condition of the habitat deteriorates further, then deaths begin to exceed recruitment.

The straight-line regression graph shown above illustrates how growth rate varies at different population levels.

Maximum sustained yield (MSY) theoretically occurs at half the population that would be present at maximum carrying capacity. At this point, the greatest harvest of animals can be sustained over the long term, providing animals are removed randomly (without regard to age or sex). Hunting doesn't normally occur in this manner; however, the concept can still be viewed as a general guideline for purposes of discussion. In the MSY curve shown at the right, it is noteworthy that at points equidistant above and below MSY the same surplus of animals will likely be available in any given population. Maintaining a population at a point to the left of MSY is an exacting business, however. Population size must be accurately measured, along with recruitment and mortality. Any over-harvest or under-harvest will require dramatic adjustments in future harvests, creating a boom-or-bust management scenario. On the other hand, managing at a point to the right of MSY tends to be very forgiving, since population dynamics naturally compensate for any management "mistakes."



APPENDIX C  
Management Options for the Williams Fork Elk Herd (E-13)

## APPENDIX D

### Written Comments Regarding Management of the Williams Fork Elk Herd (E-13)

Comments received from the Middle Park HPP Committee, the Kremmling Resource Area of the BLM and the Sulphur Ranger District follow on the next four pages.