

White River Elk Data Analysis Unit Plan  
Game Management Units: 11, 211, 12, 13, 131, 231,  
23, 24, 25, 26, 33, and 34

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DATA ANALYSIS UNIT PLAN  
Executive Summary

DAU: E-6 - White River Elk

GMUs: 11, 12, 13, 23, 24, 25, 26, 33, 34, 131, 211, 231

Current Population Estimate: 30,877 (with GMU 11)

Old Population Objective: 26,500 (without GMU 11)

New Population Objective: 28,500 (with GMU 11)

Current Sex Ratio: 18 bulls/100 cows (1993 post-season)

Old Sex Ratio Objective: 35 bulls/100 cows

New Sex Ratio Objective: 22 Bulls/100 cows

Changes from current objectives/management:

The Division of Wildlife (DOW) adopted the provisional objective of 26,500 elk for DAU E-6 in 1989, after the population model had been refined and GMU 211 was added to the DAU. At that time, the post season estimate was nearly 36,000 elk. Antlerless harvests have been high in recent years in an effort to reduce the population. The NW Region, DOW, recommends adding GMU 11 to the DAU and increasing the objective by the number of elk thought to reside in that unit. This represents no increase in the current population objective. The current sex-ratio objective was also adopted in 1989 but post-season classification counts have never exceeded 25 bulls per 100 cows. Current management practices which allow large antlerless harvests coupled with antler point restrictions (APR) for bulls will allow this elk herd to remain healthy, productive and able to co-exist with agricultural interests in the available habitat.

Significant issues raised during the public involvement sessions - how the plan addresses those issues:

The issues raised were more focused on distribution problems rather than a total number problem, although some landowners did recommend a herd reduction. Early movement of elk off summer ranges and onto private property was the most common complaint. Reducing the elk population to objective will do little to solve this problem. Increased cooperation between state and federal agencies and private landowners and possible regulation changes will be required to address the early movement problem. The Habitat Partnership Planning (HPP) committees should be able to address/resolve many local distribution problems. Sportsmen favored increasing the sex-ratio objective to produce larger bulls. This would require a totally limited license season structure or a significant reduction in the number of days of bull elk hunting to reduce pressure/harvest on bull elk. The Meeker HPP committee requested that GMU 11 be added to DAU E-6 because of an increasing number of elk from White River units wintering in unit 11. The Steamboat Springs and Glenwood Springs HPP committees voiced no opposition to this proposal.

## Introduction and Purpose

Historically, big game seasons were set either as a result of tradition or political whim. Often the seasons that resulted from this process had little to do with actual big game population size or habitat status. Tradition and politics still play a role in season-setting, but in Colorado the process is initially well-grounded in technical information. Various publics, such as the U.S. Forest Service, the Bureau of Land Management, sportspersons, guides and outfitters, ranchers and local chambers of commerce all have a vital interest in the size and composition of big game herds throughout the state. The Colorado Division of Wildlife (CDOW) is accountable to all these groups to maintain big game herds at population levels that have been determined through a public review process and approved by the Colorado Wildlife Commission.

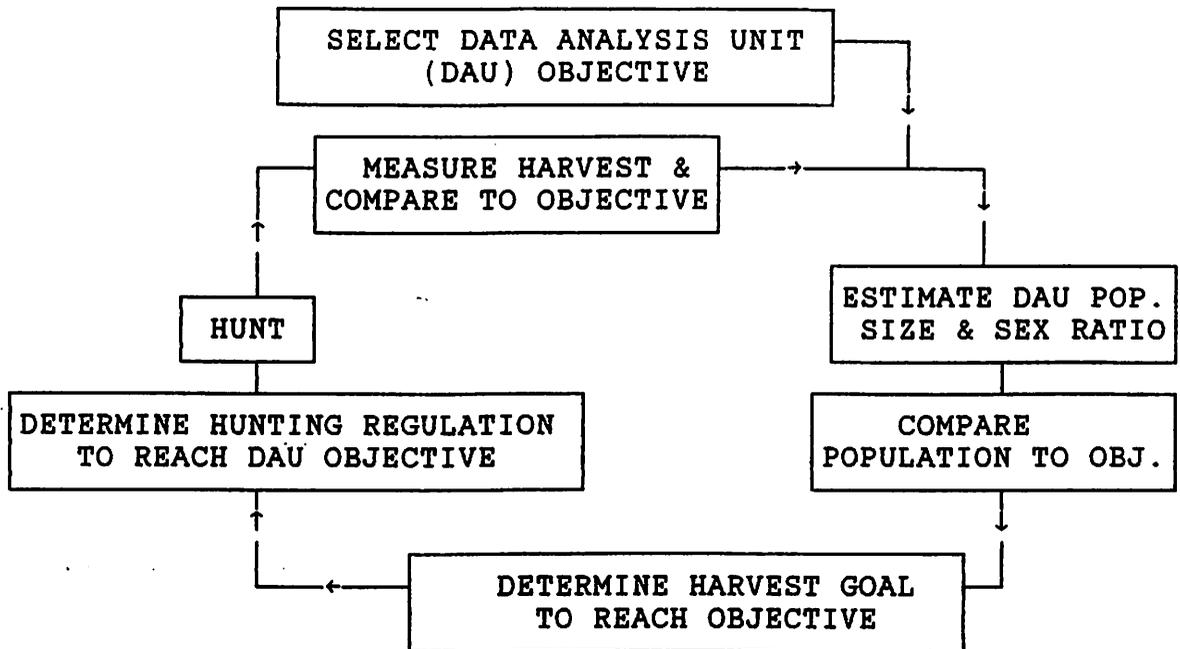
Each herd of deer, elk or pronghorn (antelope) lives in a geographic area called a Data Analysis Unit (DAU) or herd unit. Normally each DAU is composed of several game management units (GMUs) but in some cases only one GMU makes up a DAU. DAU boundaries follow established boundaries of GMUs in an effort to approximate the year-round range of that herd; the DAU includes the area where the majority of the animals in that herd are born and raised and where they die with as little mixing with from other herds as possible.

The DAU plan deals with two primary decisions - how many animals should the DAU contain, and what is the desired sex ratio (number of males per 100 females)? These numbers are referred to as the DAU population and composition objectives. Secondly, the DAU Plan collects and organizes most of the important management data for the herd into one utilitarian planning document, determines DAU issues through a public scoping process, identifies alternative solutions to the issues and problems identified in the scoping process and selects the preferred alternative. The process of preparing a DAU plan is designed to examine the public desires and biological herd capabilities and determine what is an appropriate balance. The public is involved in the determination of these goals by way of public meetings and comments to the Colorado Wildlife Commission. DAU objectives (population size and sex ratio) are usually set for a five year period.

These objectives drive the most important decision in the annual big game season setting process - how many animals need to be harvested to maintain or work toward the population objective. The objective management approach is a long term cycle of information collection, information analysis and decision making that culminates each year in a hunting season (see diagram below). The cyclic objective setting approach is designed to key the decision making process to the collection and analysis of information. It also focuses the decision makers, the Wildlife Commission, on "what it is we want".

This DAU plan analyzes data and supports decisions for population and composition objectives for the White River elk herd.

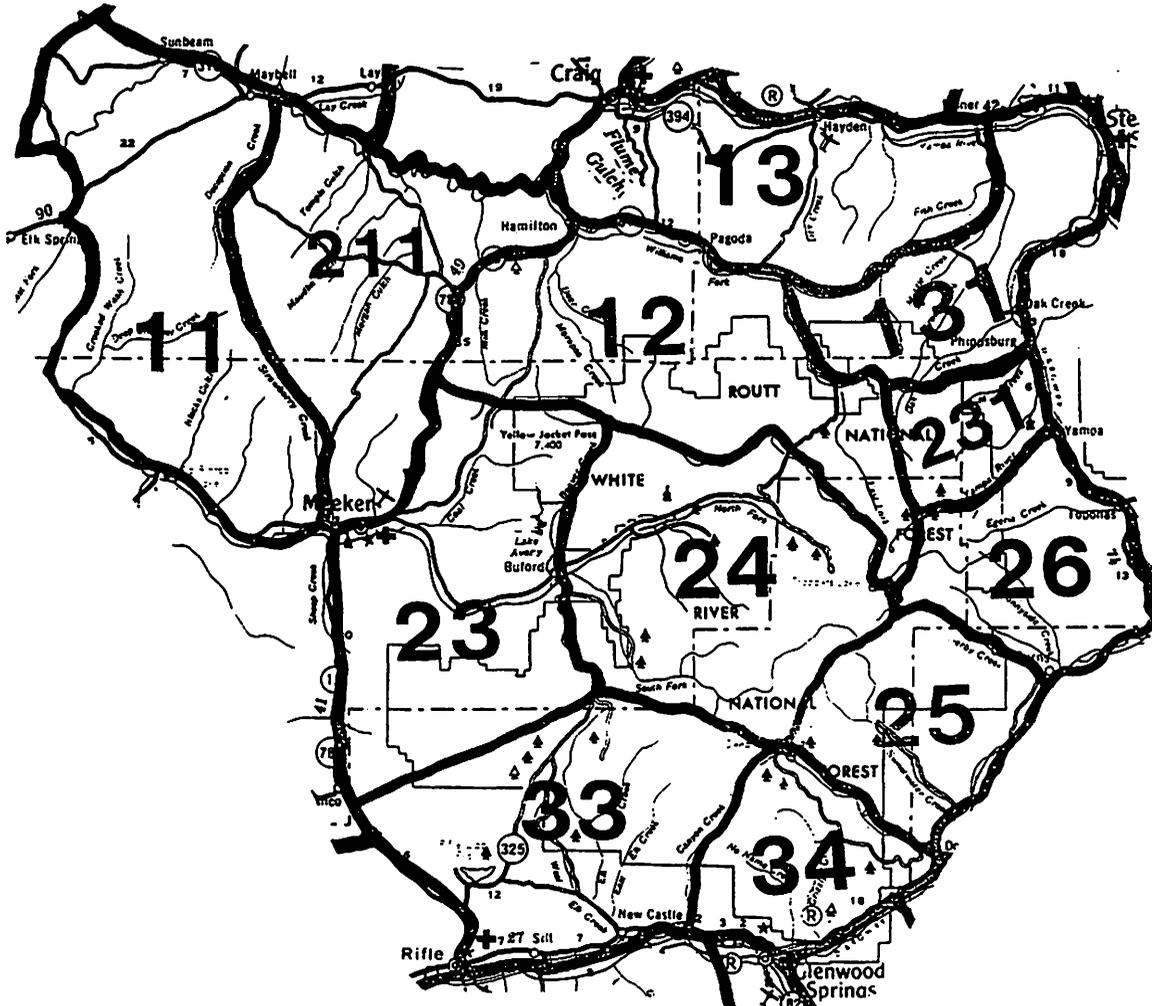
## CYCLE OF MANAGEMENT BY OBJECTIVE



## Description of the White River Data Analysis Unit

### Location

The White River elk DAU includes portions of Routt, Moffat, Rio Blanco, Garfield and Eagle counties in northwest Colorado and consists of 12 Game Management Units (GMUs): 11, 211, 12, 13, 131, 231, 23, 24, 25, 26, 33 and 34. The DAU is bounded on the north by the Colorado State Highway 318, U.S. Highway 40, the Yampa River, Colorado State Highway 13 and U.S. Highway 40; on the east by Colorado State Highway 131; on the south by the Colorado River; and on the west by Colorado State Highway 13, the White River, Wolf Creek, Coal Creek, U.S. Highway 40, Twelvemile Gulch, the Yampa River and the Little Snake River to Colorado State Highway 318. The towns of Craig, Steamboat Springs, Glenwood Springs, Rifle and Meeker can be found on the periphery of the DAU. DAU E-6 covers 4188 square miles (see map below).



WHITE RIVER ELK  
DATA ANALYSIS UNIT E-6

## Physiography

**Topography** - The major topographic features in the DAU include Cross Mountain and Axial Basin in the northwest, the Williams Fork Mountains in the north, the Flat Tops in the center and the Grand Hogback in the southwest. Four rivers are found in or on the border of the DAU: the Colorado, White, Williams Fork and Yampa rivers. Elevations range from Sheep Mountain (in the Flat Tops) at 12,241 feet to 5345 feet on the Colorado River at Rifle.

**Climate** - The climate varies greatly across the DAU. The northeastern and central portions have severe winters, heavy snowfall, and short cool summers. The southern portion of the DAU usually has comparatively mild winters and warmer summer temperatures. There have been exceptions, however, when winter temperatures have been as low as -60 degrees F in the northwest corner of the DAU. Mean annual precipitation at 10,000 feet in the Routt National Forest is about 40 inches, while approximately 12 inches falls at Rifle and Craig at elevations of 5345 and 6186 feet.

**Vegetation** - The varied topography and elevations in the DAU contribute to differences in habitat types across the area. Generally, vegetation types range from the montane/subalpine zone in the central, higher elevations to the transitional zone at middle elevations with the Great Basin zone at the lower elevations in the southern and northwest portions of the DAU.

The montane/subalpine zone is characterized by spruce-fir and aspen vegetation types. Depending on the degree of canopy closure and resultant understory of grasses and forbs, the spruce-fir areas represent moderate to good summer and fall forage for elk. Aspen groves and associated meadows provide high quality forage, spring through fall. The Flat Tops Wilderness Area is known for its expansive meadows interspersed with spruce/fir stands. Aspen habitat is also extremely important as calving areas for elk, especially when there is sufficient understory.

Mountain shrub zone vegetation consists of native grasses and Gambles oak interspersed with mountain big sage. Also common are serviceberry, mountain mahogany and chokecherry. This zone, roughly from 6500 to 8500 feet in elevation, is very important for both food and cover. The lower half of the zone serves as a large portion of the traditional elk winter range in all but the most extreme winters.

The Great Basin Zone, occurring generally below the 6500 foot elevation, is dominated by sagebrush steppes and grasslands. This zone is used primarily as winter range by elk although there are some smaller bands of elk using these areas year-round. Pinyon-juniper stands are most prevalent on north aspects of higher ridges throughout this zone. Pinyon-juniper serves as important winter cover and limited winter forage. In areas where sufficient irrigation water exists, sagebrush fields have been converted for

hay production of alfalfa or grasses such as timothy or smooth brome.

Wetland/riparian vegetation types are found along the river bottoms and associated irrigated meadows. Most notable is the Yampa River corridor running first north, then east to west across the northeastern and northern boundary of the DAU. Most riparian areas in the DAU are dominated by narrowleaf cottonwood and willow. This habitat is extremely valuable as wildlife habitat and supports the greatest abundance and diversity of wildlife species.

### Land Status

The White River elk DAU covers 4188 square miles. Of this, 38% (1570 sq. mi.) is private property, 25% (1056 sq. mi.) is Bureau of Land Management (BLM) land, 33% (1395 sq. mi.) is administered by the United State Forest Service (USFS), 3% (131 sq. mi.) is State Land Board land, and less than 1% (35 sq. mi.) is Colorado Division of Wildlife (CDOW) land. See Table 1 and Figure 1 for ownership patterns in each GMU and DAU totals.

The area within the DAU borders is classified by use and importance to various wildlife species using the CDOW Northwest Region's Wildlife Resource Information System (WRIS). For elk, the WRIS maps indicate the DAU contains approximately 2593 square miles of winter range, 851 square miles of severe winter range, 307 square miles of winter concentration areas, 136 square miles of known production areas, and 171 square miles of resident population areas. Severe winter range is defined as the area of winter range where 90% of the elk are located when the annual snowpack is at its maximum in the two worst winters out of ten. Definitions for the other WRIS classifications are contained in Appendix A. Ownership of the winter range is included in Table 1 and Figure 1.

### Land Use

From a wildlife perspective, it is fortunate that most of the land users in the White River DAU have left the majority of the area open and undeveloped. The main industries are ranching and outdoor recreation, including hunting, fishing hiking and sight-seeing. Open-pit coal mines are locally important in GMUs 13 and 131, while other mining and logging operations are scattered throughout the DAU.

Ranching is spread throughout the DAU, with private lands mostly in hay production and winter grazing and public lands used primarily for summer grazing. Large tracts in units 13 and 131 have been converted from native range to winter wheat production. Much of this land has recently been incorporated into the Conservation Reserve Program (CRP).

Hunting for both big and small game is a principal business in the DAU. It is estimated that hunting directly contributes over \$43 million annually to the economy of Moffat, Routt, Rio Blanco and Garfield counties with an additional \$ 37 million in secondary

TABLE 1

Land ownership data for the Game Management Units (GMUs) in Data Analysis Unit (DAU) E-6, presented in square miles and percentages. Winter range data for the total DAU only.

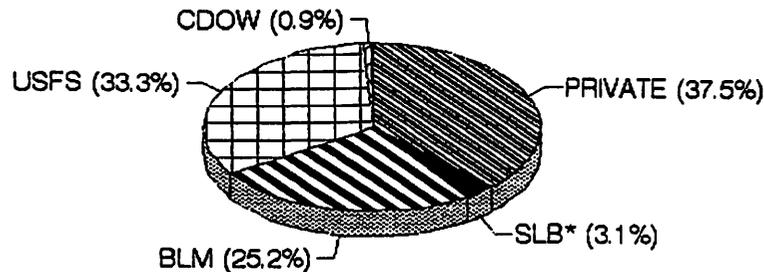
GMU	PRIVATE	SLB*	BLM	USFS	CDOW	TOTAL
11	101.8	23.6	453.9	0	0.6	579.9
12	223.4	7.2	35.4	208.9	10	484.9
13	287.4	56.8	27.4	0	1.3	372.9
23	233.2	0	35.2	120.9	19	408.3
24	35.8	0	4.4	420	1.3	461.5
25	39.4	0	57.7	137.4	0	234.5
26	125.5	5.2	38.3	71.3	0	240.3
33	105.3	0	121.8	188.2	2.7	418
34	16.3	0	35.9	142.3	0	194.5
131	150	19	15	2	0	186
211	184.2	17.5	226.2	0	0	427.9
231	68	2.1	5	104.4	0	179.5
<b>TOTAL</b>	<b>1570.3</b>	<b>131.4</b>	<b>1056.2</b>	<b>1395.4</b>	<b>34.9</b>	<b>4188.2</b>
<b>PERCENT</b>	<b>37.5</b>	<b>3.1</b>	<b>25.2</b>	<b>33.3</b>	<b>0.9</b>	<b>100</b>

Winter Range

DAU E-6	1558	132	662	197	44	2593
Percent	60.1	5.1	25.5	7.6	1.7	100

\* State Land Board

FIGURE 1. LAND OWNERSHIP DAU E-6.  
White River Elk herd



expenditures (1990 estimates). Hunters can pursue elk, deer, pronghorn, bear, mountain lion, rabbits, three species of grouse, waterfowl and other game animals in the DAU.

### **The Habitat Partnership Program and Its Role in the DAU plan**

Colorado's Habitat Partnership Program (HPP) was initiated in 1989 to better address the problems private landowners and federal land management agencies have with big game animals. The program is designed to solve forage and fence problems directly with local input. A committee of local landowners, sportsmen and federal agency personnel is established to ensure appropriate public involvement in identifying range management problems and recommending solutions to these problems. Five percent of the total deer, elk and pronghorn license revenue produced from the area is available to the committee for habitat work and other methods to alleviate conflicts.

The committee produces a 5-year Big Game Distribution Management Plan. This plan identifies locations and seasons of big game concentrations, which the landowner/land manager consider to be conflict areas. For each conflict area identified, the plan includes a strategy by which the CDOW and the landowner/land manager agree to eliminate or reduce the conflict.

Another significant portion of each committee's involvement in local big game management is participation in the DAU planning process. They insure that private land habitat issues are considered in setting the DAU objectives and that conflict areas are identified and solution strategies are appropriate.

Three HPP committees in Glenwood Springs, Steamboat Springs and Meeker are involved with DAU E-6. Two committees are in the formative stages and only the Lower Colorado River (Glenwood Springs) committee has produced a HPP plan approved by the Wildlife Commission.. Drafts of the DAU plan have been reviewed by the committees to insure adequate consideration is given to private and public land habitat issues.

### **Habitat Condition and Capability**

#### **Public Lands**

DAU E-6 covers portions of two National Forests (NF), the White River NF and the Routt NF, and two districts of the Bureau of Land Management (BLM). Table 2 summarizes grazing allotments contained within the boundaries of DAU E-6 administered by these two federal agencies. Domestic grazing is provided primarily for cattle and sheep; some allotments also allow horse use. The majority of the allotments, especially those on the forests, are used from June through September, some through mid-October. There are some allotments at lower elevations on BLM lands that are used during the winter months.

Table 2 shows that 365 grazing allotments covering over 1,229,000 acres are contained within E-6. Privately owned

**Table 2. Public Lands Grazing Allotment Summary**

<b>Agency/subunit</b>	<b>Number of allotments</b>	<b>No. Vacant Allotments</b>	<b>Total Acres</b>	<b>Suitable Acres</b>	<b>Permitted AUMs</b>	<b>Wildlife AUMs</b>
<b>USFS</b>						
White River NF	59	12	656511	433676	78286	-
Routt NF	31	1	163242	104048	17498	-
Subtotal - USFS	90	13	819753	537724	95784	**
<b>BLM</b>						
<b>Craig Dist.</b>						
Little Snake RA	131	19	219313	*	38328	11088
White River RA	51	0	47932	32555	10523	6442
<b>Grand Junction Dist.</b>						
Glenwood Springs R	92	18	142780	*	9361	14977
Subtotal - BLM	274	37	410025	-	58212	32507
<b>TOTAL</b>	<b>365</b>	<b>49</b>	<b>1229778</b>	<b>-</b>	<b>153996</b>	<b>-</b>

\* info not available

\*\* USFS makes no formal allotment for wildlife

(AUMs) of forage; additional forage is consumed by wildlife. Wildlife, primarily deer and elk, are allocated 32,507 AUMs of forage by the BLM. The USFS makes no formal allocation for big game species, but sets aside several allotments or pastures for wildlife. For example, on the Routt NF, the French Creek pasture adjacent to the Blacktail wildlife area and the Beaver Creek allotment on the Bears Ears district are set aside for wildlife.

#### Public Land Wildlife/Livestock Conflict Areas

In meetings prior to the development of this Plan, the federal land management agencies were asked to identify areas where livestock and elk were in conflict over forage. These agencies are mainly concerned with three issues:

1. year-round use by elk on cattle spring ranges,
2. degradation of riparian habitats, and
3. utilization of forage by elk before the livestock are allowed on the allotment.

The land management agencies were also asked to identify specific areas/allotments where conflicts occur between livestock and elk. Examples of conflicts were given as situations where elk had forced a change or delay in the period of use on an allotment, or where forage utilization by elk had caused a reduction in AUMs of forage available for livestock. The specific conflicts that were identified are listed in Appendix B. In most cases, the land managers agreed that distribution of elk, not total population size, is the main problem.

#### Private Lands

Habitat condition and capability on private lands will not be assessed in this Plan. However, during the public meetings, several landowners expressed concern about elk eating forage on their private land. Other ranchers, especially in the Williams Fork River valley, stated that elk are moving onto private land almost as soon as the archery season begins in the area along the south boundary of GMU 12 (Yellow Jacket Pass - Ripple Creek Pass). This is confirmed by the preliminary data from George Bear's telemetry study (DOW) where 11 radio-collared elk moved from the USFS lands along the White River-Williams Fork River divide to the refuge offered by private property. This movement occurred just before and during the first week of the archery season in 1992. In 1993, 10 of the 11 radio-collared elk had moved onto private property by September 2, the sixth day of the archery season.

#### Private Land Wildlife/Livestock Conflict Areas

The three HPP committees will identify elk/livestock conflict areas on private land as they develop their respective HPP plans.

## Management History

The White River elk population provides the longest uninterrupted data set for elk in Colorado. Data for DAU E-6 consist of annual estimates of harvests, numbers of hunters, and measurements of pre- and posthunting season age and sex ratios. However, there is no estimate of total population size or density based on reliable aerial or ground census methods. There is minimal information on natural mortality, pregnancy rates, and timing of calving. Research efforts have focused on elk inhabiting GMUs 23 and 24, the "heart" of the White River population (Freddy, 1987). Table 3 presents harvest and hunting pressure data, and estimates of post-hunt population size for DAU E-6 from 1953 through 1993. Figure 2 illustrates the growth in the elk population, hunting pressure and harvest for the same years.

### Post-Hunt Population Size

With a couple small deflections (dips) and a couple plateaus, the elk population in the DAU increased steadily from the 1940's until 1989. The 1953 post-season estimate was 7735 elk. By 1960, the population had grown to nearly 11,000 animals, and between 1960 and 1989, the herd increased over three-fold.

The CDOW uses a computer model, POP-II, to estimate the size of elk populations in Colorado. Estimates of mortality, initial population size, sex ratio at birth, wounding loss and winter severity along with actual harvest numbers are entered into the program. The model is then "run" several times until it reasonably "aligns" or agrees with the measured post-hunting season age and sex-ratio data. These data are collected annually by helicopter classification surveys usually flown in January, and along with the harvest data, represent the most accurate information available for herd modeling.

A small part of the increase in the population of elk in DAU E-6 can be explained because the DOW has added GMUs to the DAU. In 1988, GMU 11 was split north and south and the new unit created out of the east half of old GMU 11 was labeled GMU 211. In 1989, GMU 211 was added to DAU E-6 and GMU 11 was added to DAU E-21, Blue Mountain. GMU 11 has never fit very well with DAU E-21, and the concensus of DOW personnel, based on field observations the past 5 years, is that GMU 11 belongs with DAU E-6, so the decision to add it to E-6 was made during the winter 1993-94. The numbers in Table 3 include GMUs 11 and 211 from 1975 on. Table 3 includes data beginning in 1953, but only data from 1975 on are used in the POP-II model.

The POP-II model for E-6 shows a peak population in 1989 of 38,656 animals. Since 1989, the DOW has issued a large number of licenses for antlerless elk each year to reduce the herd size. We estimate the population after the 1993 hunting season was about 31,000 elk and we will attempt to issue enough licenses for antlerless elk in 1994 to further reduce the herd to 29,300 elk.

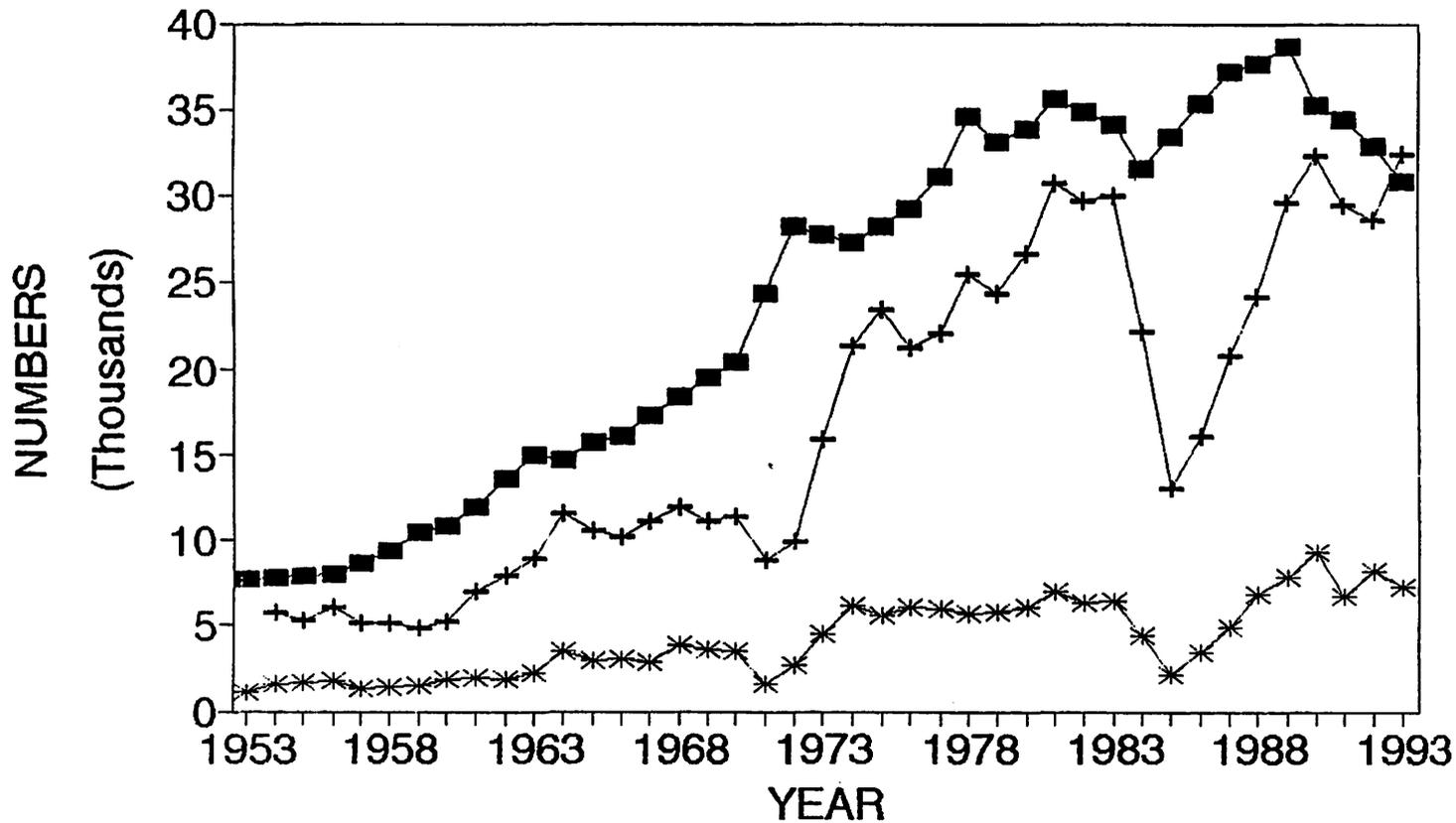
TABLE 3

White River elk herd (DAU E-6) game management units - 11, 12, 13, 23, 24, 25, 26, 33, 34, 131, 211, and 231 - showing post-hunting population size, total hunters, antlerless harvest, antlered harvest, total success. GMU 211 was included in E-6 in 1989; GMU 11 added in 1994. From 1975 on, this spreadsheet includes all the data for E-6 with GMUs 11 and 211. Prior to 1975, GMUs 11 & 211 are not included.

YEAR	POPULATION (POST-HUNT)	TOTAL HUNTERS	COW HARVEST	CALF HARVEST	ANTLERLES HARVEST	ANTLERED HARVEST	TOTAL HARVEST	% SUCCE
1953	7,735	NA	169	26	195	924	1,119	NA
1954	7,771	5,749	384	56	440	1,184	1,624	28%
1955	7,896	5,316	424	39	463	1,174	1,637	31%
1956	8,003	6,031	557	94	651	1,095	1,746	29%
1957	8,690	5,123	430	54	484	847	1,331	26%
1958	9,456	5,074	376	46	422	1,001	1,423	28%
1959	10,451	4,958	352	66	418	1,035	1,453	29%
1960	10,829	5,199	437	50	487	1,332	1,819	35%
1961	11,973	7,014	449	51	500	1,464	1,964	28%
1962	13,601	7,850	407	73	480	1,426	1,906	24%
1963	15,002	8,935	377	45	422	1,783	2,205	25%
1964	14,713	11,842	881	120	1,001	2,501	3,502	30%
1965	15,765	10,597	880	126	1,006	1,920	2,926	28%
1966	16,148	10,228	942	193	1,135	1,873	3,008	29%
1967	17,276	11,125	902	188	1,090	1,737	2,827	25%
1968	18,390	11,979	1,418	292	1,710	2,184	3,894	33%
1969	19,506	11,185	1,035	234	1,269	2,276	3,545	32%
1970	20,426	11,466	812	91	903	2,543	3,446	30%
1971	24,321	8,895	528	57	585	1,039	1,624	18%
1972	28,271	9,898	743	107	850	1,806	2,656	27%
1973	27,835	15,944	1,156	209	1,365	3,146	4,511	28%
1974	27,350	21,401	2,226	417	2,643	3,482	6,125	29%
1975	28,268	23,445	1,533	405	1,938	3,705	5,643	24%
1976	29,269	21,280	1,888	483	2,371	3,679	6,050	28%
1977	31,177	22,043	1,745	202	1,947	3,991	5,938	27%
1978	34,571	25,463	1,522	189	1,711	4,009	5,720	22%
1979	33,159	24,349	1,732	220	1,952	3,795	5,747	24%
1980	33,830	26,663	2,104	189	2,293	3,794	6,087	23%
1981	35,641	30,720	2,059	208	2,267	4,734	7,001	23%
1982	34,873	29,728	2,104	278	2,382	3,953	6,335	21%
1983	34,113	30,025	2,208	244	2,452	4,017	6,469	22%
1984	31,551	22,193	1,646	159	1,805	2,641	4,446	20%
1985	33,413	13,105	1,287	189	1,476	685	2,161	16%
1986	35,345	16,130	1,377	141	1,518	1,896	3,414	21%
1987	37,163	20,808	2,194	263	2,457	2,424	4,881	23%
1988	37,694	24,190	3,005	381	3,386	3,471	6,857	28%
1989	38,656	29,657	3,196	412	3,608	4,159	7,767	26%
1990	35,297	32,285	4,502	549	5,051	4,284	9,335	29%
1991	34,387	29,429	2,533	268	2,801	3,905	6,706	23%
1992	32,877	28,624	3,356	389	3,745	4,428	8,173	29%
1993	30,877	32,361	3,622	350	3,972	3,326	7,298	23%
AVERAG	23,989	16,953	1,451	199	1,650	2,553	4,203	25%
1950s	8,572	5,375	385	54	439	1,037	1,476	27%
1960s	15,320	9,575	773	137	910	1,850	2,760	29%
1970s	28,465	18,418	1,389	236	1,627	3,120	4,746	26%
1980s	35,228	24,322	2,118	246	3,892	3,177	5,542	23%
1990s	33,360	30,675	3,503	389	2,640	3,820	7,878	26%
MIN	7,735	4,958	169	26	195	584	1,119	18%
MAX	38,656	32,361	4,502	549	4,763	4,734	9,335	35%

# FIGURE 2. WHITE RIVER ELK (DAU E-6)

GMUs 11 and 211 included from 1975 on.



—■— POST-HUNT POP. —+— TOTAL HUNTERS —\*— TOTAL HARVEST

## Disclaimer

Estimating population numbers of wild animals over large geographic areas is an extremely difficult and inexact science. For example, numerous studies have attempted to accurately count all the animals in large fenced areas. Even when the number of animals held inside the fence was known, observers failed to consistently count all of the animals. In some cases less than 50% of the animals were observed and counted. High-tech methods using infra-red sensing devices have also met with very limited success. The DOW recognizes that reliable population estimates are vital to our management programs. DOW biologists attempt to minimize this problem by using the latest technology and inventory methods available. Elk population estimates are derived from computer model simulations that involve estimates of mortality rates, harvest from hunting, wounding loss and annual production. These simulations are then adjusted to align with measured post-hunting season age and sex ratio data. We recognize the limitations of the system. If better information (i.e., improved estimates of survival rates, wounding loss, sex ratio at birth, density estimates) or new modeling techniques and programs become available, the DOW will use these new tools and techniques. Making these changes may refine the population size estimate and management strategies. It is recommended that the population estimates presented in this document be used only as an index or as trend data and not as a completely accurate attempt to estimate all of the animals in the DAU.

To illustrate the risk of taking these model outputs too literally, the ONEPOP model used in the late 1970's and early 1980's put the 1983 postseason E-6 population estimate at just over 19,000 elk. A more sophisticated POP-II population model developed in 1987 by DOW researcher Dave Freddy changed that 1983 postseason estimate to almost 33,000 animals. The change in the estimate reflects improved modeling techniques, not a sudden, dramatic increase in the number of elk actually residing in DAU E-6.

## Post-hunt Age and Sex Ratios

Post-hunt age and sex ratios for this herd have been monitored annually since 1960 with helicopter classification flights. Counts are made in late December or early January each year. The counts are not a total census of the herd, but give statistically valid estimates of sex and age ratios. A summary of these counts is given in Table 4 and Figure 3. From 1960 through 1987, bulls were classified as yearlings or adults. Starting in 1988, DOW observers classified males into three age classes: yearlings, young bulls (2½ years old) and adults. Data from GMU 11 are included in Table 4 and Figure 3 beginning in 1981.

Since 1960, the bull-cow ratio has fluctuated from 5 to over 24. After the hunting season in 1971 when spikes were protected and the 1972 season when the northern White River units (GMUs 12, 13, 23 and 24) had a 4-point antler point regulation (APR), the

**TABLE 4**  
**POST-SEASON AGE and SEX RATIOS**  
**DAU E-6, 1960-1993**

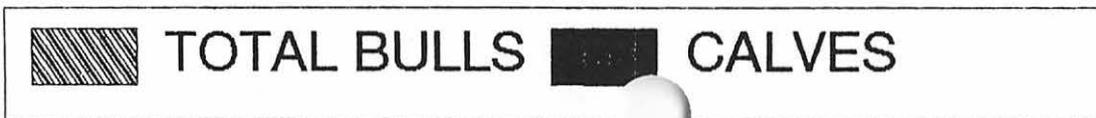
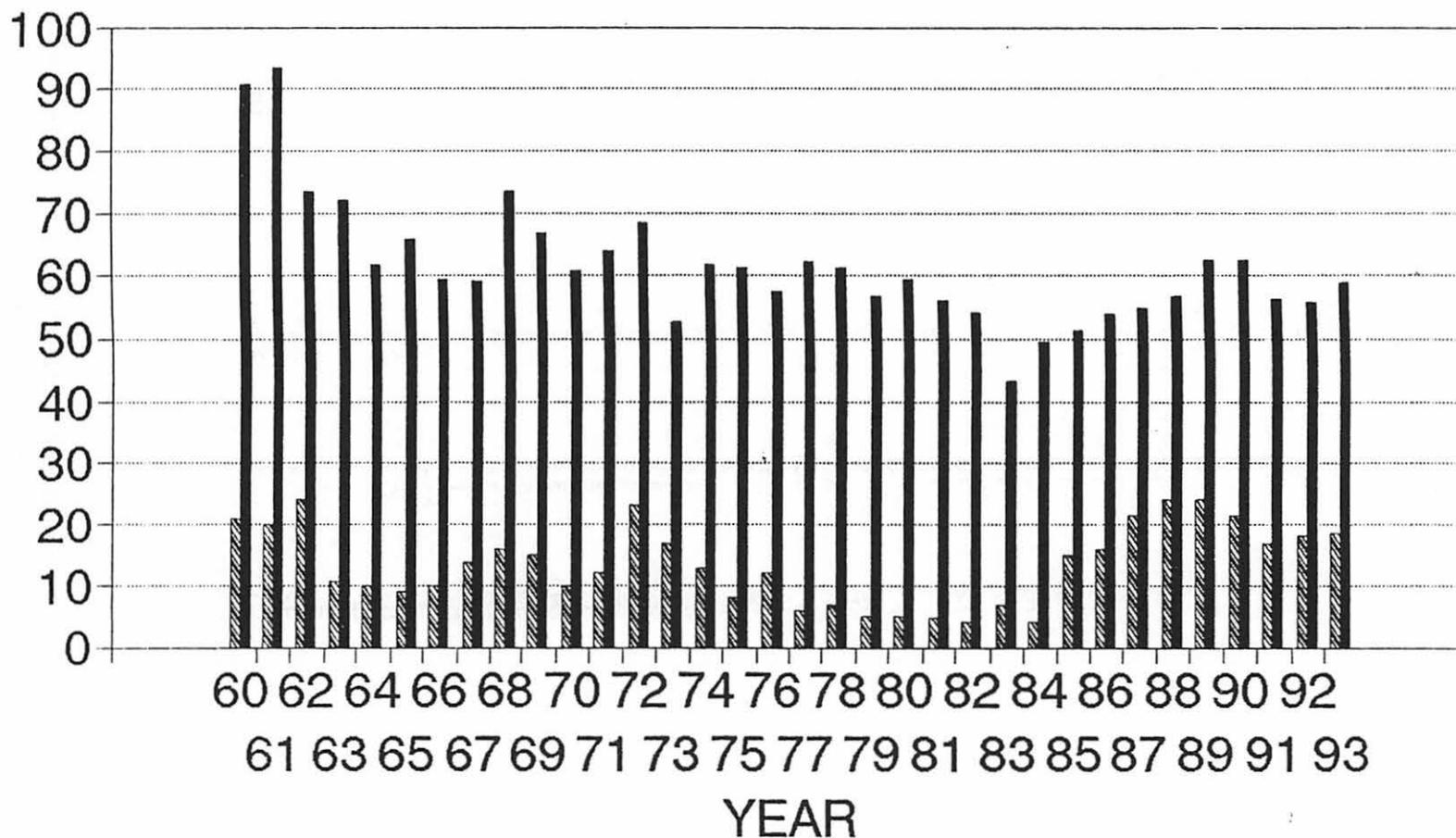
YEAR	YRLG MALE	2-YR MALE	ADULT MALE*	TOTAL MALE	YOUNG
60	14	0	7	21	90.7
61	14	0	6	20	93.5
62	17	0	7	24	73.4
63	7	0	4	11	71.9
64	8	0	2	10	61.9
65	6	0	3	9	65.9
66	9	0	1	10	59.4
67	11	0	3	14	59.2
68	13	0	3	16	73.5
69	13	0	2	15	66.9
70	6	0	4	10	60.9
71	10	0	2	12	64.2
72	19	0	4	23	68.7
73	11	0	6	17	52.8
74	8	0	5	13	61.8
75	5	0	3	8	61.3
76	10	0	2	12	57.5
77	5	0	1	6	62.2
78	5	0	2	7	61.2
79	4	0	1	5	56.8
80	4.4	0	0.5	4.9	59.5
81	4.1	0	0.5	4.6	56.1
82	3.8	0	0.4	4.2	54.3
83	5.8	0	1	6.8	43.3
84	3.4	0	0.8	4.2	49.5
85	13.3	0	1.7	15	51.3
86	13.1	0	2.9	16	54.1
87	17.8	0	3.7	21.5	55
88	20.1	3.2	0.6	23.9	56.7
89	20.3	3.3	0.5	24.1	62.6
90	19.3	1.8	0.4	21.5	62.5
91	14.3	1.9	0.7	16.9	56.3
92	15	2.3	1	18.3	55.8
93	14.6	3.3	0.5	18.4	58.8
Average	10.71	2.63	2.45	13.63	61.75
Ave. 1977 to 84				5.34	55.36
Ave. 1985 to 93 (under APR)				19.51	57.01

\* Adult male = bulls estimated 2 years or older, 1960 to 1987.  
Starting in 1988, NW observers classed bulls into 3 categories.  
GMU 11 included from 1981 on.

# FIGURE 3

## POST-HUNT AGE AND SEX RATIOS, DAU E-6

CALVES AND BULLS / 100 COWS



post-season ratio climbed to 23. But in the years 1977 through 1984, when all bulls with antlers at least 5 inches long were legal, the post-season ratio averaged just 5.4 bulls:100 cows. During these years, high hunting pressure resulted in the harvest of nearly all the legal bulls, yearling and older, every year.

The White River elk DAU has been under a 4 point APR since 1985, i.e., to be legal, a bull was required to have a minimum of 4 points on one antler. After the first year of APR, the post-season bull:cow ratio increased by almost 11 bulls, and the average post-season ratio for the years 1985-1992 is 19.5 bulls/100 cows. However, the DAU is not producing mature bulls with the APR. Most of the breeding is being accomplished by 2½-year-old bulls, then nearly all are taken during the hunting season. Table 4 shows the breakdown of bulls observed in the post season classification counts since 1988; less than 5% of the bulls observed were classified as mature (2½ years old or older). Currently, GMU 11 is not included in the list of units under the antler point regulation. As the new season structure for the years 1995-99 is developed, the DOW will probably recommend that APR apply to GMU 11 to make the regulation consistent for all units in the DAU.

New for the 1992 hunting season was a change in the antler point regulation; bulls either had to have 4 point on one antler or a brow tine at least 5 inches long. This resulted in the harvest of some 3-point bulls that would not have been legal under the 4 point APR. These were, in fact, 2½ year old bulls, and they were being shot and left in the field prior to the 1992 season.

Concern was expressed in the mid-80's by the public and DOW personnel that low bull/cow ratios could be causing the decline in calf:cow ratios. Figure 3 illustrates the decline in the ratios from 1974 when the post-season calf:cow ratio was about 62 to a low of just over 43 in 1983. The general feeling was that depending on yearling bulls to accomplish the majority of the breeding was resulting in low reproductive success. In theory, the adult cows were reluctant to accept the younger bulls, causing unbred cows or resulting in cows bred in their second or third estrous cycle. This in turn, may have caused calving to occur later the following spring, resulting in lower survival rates for calves the following winter.

Freddy (1987) offers an alternate hypothesis to explain the low calf:cow ratios. He states that inadequate breeding in elk because bulls were too young or few in number has rarely, if ever, been demonstrated. Rather, reduced nutritional status in wild ungulate populations has caused delays in conception and calving, reduced conception rates, delays in puberty and decreased calf birth weights.

There is evidence that the nutritional status of the White River elk herd was lower in the 1980's than in the 1960's. The overall population was at least twice as large in the 1980's. In the 1980's, elk were on the winter range for longer periods of time and the elk population was expanding into new winter ranges. Antlers of yearling bulls were less developed in the 1980's compared to the 1960's (Freddy, 1987).

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The increased number of yearling males carried one extra year in the population because of APR does not significantly affect our ability to practice Maximum Sustained Yield (MSY) management. Yearling males associated with cow/calf groups may negatively affect the nutritional status of that group because of increased competition for food during the winter months. At 2 years of age, bulls begin to segregate themselves during winter and thus do not compete with antlerless animals for food (Freddy 1993, pers. comm.). As a result of carrying a higher number of bulls in the population, the MSY value is potentially lowered.

Appendix C contains a more detailed discussion of the concepts of carrying capacity and MSY management.

### Harvest History

Annually, the DOW estimates the harvest of elk, both statewide and by GMU. Harvest estimates are generated by statistical sampling techniques. In large DAUs like E-6 where many animals are harvested, the estimate is  $\pm 10\%$  at the 90% confidence interval.

Table 3 and Figure 2 present harvest figures for DAU E-6 back to 1953. In 1953, a total of 1119 elk was taken while 9335 elk were killed in E-6 in 1990, the year Colorado experienced a record elk harvest. E-6 accounted for approximately 18% of the total harvest that year; from 1990-93, an average of 16% of the elk harvest in Colorado has come from E-6.

Since 1960, Colorado has used four different season structures to provide hunting opportunity for rifle hunters. From 1960 through 1970, there was one rifle season for both deer and elk. In 1970, the season lasted three weeks. During the years 1971-76, there was a separate elk season and a separate deer season. From 1977 through 1985, Colorado used the separate/combined season structure, that is, a separate deer, separate elk, and a combined deer and elk season. Since 1986, there have been three combined seasons each year with each hunter allowed to participate in one of the seasons. Appendix D chronicles the changes in season structure, dates, and special regulations in effect from 1970 through 1993.

In the early 70's, elk "areas" were designated alphabetically, primarily to distribute cow hunters. For example, Area E was comprised of GMUs 23 and 24. Area E was specified (both antlered and antlerless licenses totally limited in number) from 1966-80. Other highlights include:

- 1967 - archery season allowed in E-6
- 1971 - spike bulls protected
- 1972 - 4 point Antler Point Restriction (APR) in GMUs 12, 13, 23 and 24
- 1973-84 - no APR in effect
- 1974 - first Muzzleloading in an E-6 unit, the eastern part of GMU 13
- 1985 - 4 point APR instituted in DAU E-6 (one year in advance of the rest of the state)

### Hunting Pressure and Harvest Success

Table 3 shows hunter numbers for DAU E-6 from 1954 through 1993. The average of 30,675 hunters per year from 1990-93 is almost a six-fold increase over the average of 5375 hunters per year in the 1950's. The sudden declines in hunter participation in 1971 and 1972 correspond to the antler point restrictions (APR) in effect those years. In 1985, hunter numbers dropped by nearly 9000 from the previous year; we believe this was caused by a license fee increase and the imposition of the 4 point APR in DAU E-6. Hunting pressure rebounded quickly; in three years the total number of hunters had nearly doubled (24,190 hunters in 1988 compared to 13,105 in 1985).

Comparing the averages for each decade, harvest success rates have remained nearly constant, with values ranging from a low in 1985 of 16% to a high in 1960 of 35%. For the period 1990-93, the average is 26%, one percent higher than the long term average. Table 3 shows annual success rates and averages for each decade.

## **DAU E-6 MANAGEMENT OBJECTIVES**

### **Issues and Strategies**

#### **Issues and Concerns**

Meetings to identify issues and concerns for DAU E-6 were held in Glenwood Springs and Craig with personnel from the US Forest Service (USFS) and Bureau of Land Management (BLM). Three deer DAU Plans were also discussed: DAU D-7, DAU D-42 and DAU D-43. In general, agency personnel expressed concern over degradation of riparian habitats on public lands. The consensus was that distribution of animals, not the total population size, is the main problem with elk in DAU E-6. They also expressed concern with premature movement of elk from summer ranges, off the Forest and onto private lands at lower elevations. This movement is occurring primarily during the archery and muzzleloading seasons. Specific comments received from the agencies are summarized in Appendix B.

Following the scoping meetings with the federal agencies, a series of five public "open houses" was conducted in communities around the perimeter of DAU E-6. The open houses were offered in Rifle, Glenwood Springs, Meeker, Craig and Steamboat Springs at times convenient (4 to 8 p.m.) for citizens to attend. Citizens were presented data and information on both DAU E-6 and the deer DAUs listed above. After describing the DAU planning process and answering any questions, each individual was invited to complete a questionnaire, asking each individual to indicate what population size and sex ratio should be managed for in each of the DAUs. We also asked for specific comments and recommendations. 46 members of the public attended the open houses: one in Rifle, 8 in Glenwood Springs, 6 in Meeker, 22 in Craig and 9 in Steamboat Springs. A copy of the questionnaire and a listing of the specific comments received about DAU E-6 are included as Appendix E.

#### **Issue Resolution**

Several issues raised at the meetings discussed above related directly to the primary purpose of this Plan: to determine the population and sex-ratio objectives. Those will be addressed later in the alternative development and alternative selection portions of this document. However, there are a number of separate issues/concerns that warrant discussion here.

#### **Distribution and Movement**

Field personnel from the DOW, federal agency biologists and members of the public have expressed concern about distribution of elk in the DAU. Some have concerns about localized sub-populations of elk. In these cases where the DOW agrees that the local

population of elk is too large, special hunts or other means can be used to reduce animal numbers. The harvest of cows in the first combined season (first allowed in 1992) and the proliferation of Private Land Only (PLO) hunts during the regular and extended seasons have helped achieve the harvest objective and helped resolve some local problems. The overriding concern for many individuals is the apparent premature movement of elk off the summer range down onto private property. The popular perception held by most landowners and DOW field people is that early season hunters (archers and muzzleloaders) are pushing the elk down.

The perception of early movement of elk in late August/early September has been substantiated by the preliminary data from a research project conducted by DOW researcher George Bear. George trapped and radio-collared 20 cow elk during the winter 1991-92 and has followed their subsequent movements. Eleven of the cows spent the summer 1992 on the Williams Fork River-White River divide (Group A) while the other 9 spent the summer on the Flattops (Group B). Both groups of elk moved with the onset of the archery season; Group A moved earlier and further than Group B. Group A moved an average of 8 miles north to the private lands along the Williams Fork River. Group B moved a short distance off the top into the dark timber and rough terrain under the rim of the Flattops. One major difference in these two areas is the absence of vehicle access on the Flattops compared to the widespread use of 4WDs and ATVs along the Williams Fork River-White River divide.

A previous study in which a large number of adult cows were radio collared did not show the same patterns of movements. Elk had been captured and collared by employees of Camp, Dresser & McKee Inc. to determine movements and habitat use on lands proposed for coal mining by Consolidation Coal Company. In that 1985 study, 87% of the radio collared elk (20 out of 23 animals) were still on National Forest lands mid-way through the archery and muzzleloading seasons (Graham, 1993). However, early season hunter numbers in 1985 were much lower than now; in 1985 there were only 37% as many hunters afield as there were in 1992.

Statewide, the popularity of early seasons has resulted in nearly a doubling of hunter numbers in the eight years, going from 16,411 hunters in 1985 to 30,651 in 1992. For E-6, the increases are even more dramatic; 1923 early season hunters in 1985 and 5263 in 1992, an increase of 274%. In 1992, 19.5% of the total hunting pressure in DAU E-6 came during the archery and muzzleloading seasons compared to 15% of the total pressure statewide. Ever-increasing numbers of early season hunters are choosing E-6 over other areas of the state; in 1985, 11.7% of the hunters chose E-6, but in 1992, the share of the state's total choosing E-6 amounted to 17.2%, an increase of 147%. Some of this increase resulted in GMUs 23 and 24 opening to muzzleloaders in 1987, but if you look at archery figures alone, the same trends are apparent. Since muzzleloading season dates are included within the archery season framework, it is appropriate to consider both seasons together.

In addition to sheer numbers of hunters flocking to DAU E-6, the increasing popularity of four-wheel drive (4WD) and all-terrain

vehicles (ATV's) has exacerbated the problem of elk distribution. A high percentage of early season hunters use one or both of these vehicles to get to their favorite hunting spot. The disturbance caused by an increasing number of hunters using an increasing number of 4WDs and ATVs may be forcing animals off summer range and, in many cases, down to the refuge offered by privately-owned land. This problem seems to be especially bad along the divide from Yellow Jacket Pass to Ripple Creek Pass (the south boundary of GMU 12), and Bar HL Park and Coulter Mesa in GMUs 23 and 33.

What possible remedies exist to allow elk to stay on public lands, on summer ranges? In the late 1960's, Boyd (1970) concluded that the main migration from summer to winter ranges did not occur until late November or even as late as January, depending on snow conditions. It's doubtful that we'll ever see those conditions again, but it's in the best interest of most of us to allow elk to remain longer on summer range.

One strategy available to the DOW is to limit hunter participation during the early seasons. The DOW could specify the number of archers and muzzleloaders allowed in each GMU of the DAU. We could raise this issue during discussions in 1994 for the development of the statewide big game season structure 1995-1999. A total limit on early season hunter numbers will be very contentious; if adopted, it would represent a major change in philosophy for the Wildlife Commission.

A second option to reduce disturbance on the summer ranges is to limit vehicle use in portions of the DAU. The USFS could restrict use along the south boundary of GMU 12, most of GMU 23, GMU 24 north of the North Fork of the White River and the north boundary of GMU 33, the areas discussed above. This would require a change in the Travel Plans for the White River and Routt National Forests. If hunters were required to travel on foot or horseback, would the elk remain on the summer range? It may take several years to change the habits the elk have developed over the past 7-8 years as the early season hunter numbers and vehicle use increased.

Restricting vehicle use in these portions of the DAU may reduce hunting pressure and disturbance enough to postpone the requirement that the DOW totally limit early season hunter numbers. It may be necessary to restrict both hunter numbers and vehicle use in order for the elk to remain on summer range.

It's unfortunate that solutions to these two problems cannot be resolved prior to establishing the DAU population objective. Much of the frustration voiced during the public input phase of this process is a result of these early movements of elk. We heard over and over "It's not so much a problem of elk numbers, it's a problem of distribution". The DOW could recommend a higher population objective if we knew of a way to keep the elk on the National Forests until weather forced them to lower elevations. However, further consideration and considerable discussion will be required to determine a course of action.

Forage Condition/Utilization

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Many of the issues raised, especially at the meetings with federal agency personnel, relate to the condition of the forage base, both on winter ranges and on specific allotments. Damage to the forage base, especially on winter ranges, relates to overall herd size, which is discussed in the alternatives section later in this Plan. In many cases, concerns were voiced over specific cattle/sheep allotments, where utilization of forage by elk occurs in late spring/early summer. It has traditionally been considered inappropriate to use hunting seasons/special kill permits during this time period. Hopefully, as the three HPP committees develop their plans, they will consider these problem areas and focus some of their resources to alleviate these conflicts. Copies of notes and correspondence relating to the problem allotments and conflict areas will be provided to the HPP committees.

### Damage to Riparian Habitat

Personnel from the BLM and USFS expressed concern about damage to riparian habitat in several areas of the DAU. As they point out, it is very difficult to determine whether elk or domestic livestock are causing the damage.

Reducing livestock numbers and fencing severely damaged areas is one alternative to allow the riparian areas to "heal". Fencing is impractical over large areas due to high costs, both for initial construction and maintenance. Timing of grazing and changes in grazing systems may be more effective ways of restoring riparian areas than simply reducing numbers of animals. Elk and domestic livestock may be attracted away from damaged riparian areas through the use of water developments and habitat manipulations to improve both cover and forage. Whatever means are selected will require close cooperation between state and federal agencies to be effective.

### Expansion of the DAU

The boundaries of a DAU are defined in an effort to include the year-round range of the majority of animals that make up the "herd". Entire game management units (GMUs) are included in a DAU; we do not assign a portion of a GMU to a DAU. The DOW recognizes the fact that there is interchange across the boundaries of DAU E-6, especially across Colorado State Highway 13 from GMU 23 into GMU 22 and across Strawberry Creek from GMU 211 into GMU 11.

Elk that move from GMU 23 into GMU 22 seem to use only that portion of GMU 22 east and north of Piceance Creek. The majority of GMU 22 is used by elk living in DAU E-10. Because the number of elk that move into GMU 22 is relatively small, we don't feel it merits dividing GMU 22 into two units and expanding DAU E-6 with the new unit created.

The DOW does recommend that GMU 11 be added to DAU E-6. The Meeker Preference Right Lease Application (PRLA) Elk Mitigation Study for Consolidation Coal Company was initiated in 1983 by consultants Camp, Dresser and McKee, Inc. That study showed

limited movement of radio-collared elk into the eastern portion of GMU 11, but after the winter of 1983-84, an increasing number of elk seem to be moving into GMU 11. The most extensive movement may be on the north end of DAU E-6 out of GMUs 12 and 23 through GMU 211 to areas in the north end of GMU 11, specifically to Wapiti Peak, Cedar Springs Draw and the south side of Cross Mountain.

Residents (human, not elk) of GMUs 211 and 11 living along Strawberry Creek report increasing numbers of elk moving into GMU 11 to winter and then moving back to the east in the spring. The Yampa-White River (Meeker) HPP committee formally recommended adding GMU 11 to DAU E-6 after reviewing the first draft of this Plan. Their letter is included in Appendix E.

## **Alternative Development**

### **1. Population Level**

Since the decision was made to add GMU 11 to DAU E-6, the current long term post-hunt objective for DAU E-6 has been revised upward to 28,500 elk. This is an addition of 2000 animals, which DOW biologists believe is the number of elk that reside in GMU 11. The alternative management strategies that were presented in the draft version of this Plan have been adjusted to include the elk from GMU 11.

The 1993 post-hunt estimate is 30,877 elk, but with a projected harvest of 3668 bulls and nearly 3500 cows and calves during the 1994 seasons, the DOW expects to reduce the herd to 29,300 elk. See Appendix F for further analysis of these numbers and a breakdown of the 1994 licenses (1994 objective sheet).

### **Alternative Management Strategies**

#### **1.1 Maintain current population objective of 28,500 elk.**

History of alternative - Prior to 1987, the DAU population objective was 18,000 elk. At that time, NW DOW biologists thought there were about 16,000 elk in the DAU. In 1986 and 1987, the POP II model was updated/refined and the population estimate was doubled. During the 1987 regulation development process in which the number of limited licenses was determined, the population objective was set at 26,500. This objective was considered "provisional" until this DAU plan could be written. The addition of GMU 11 to the DAU in the spring of 1994 required that the DOW add 2000 elk to that provisional objective.

In recent years, the DOW has issued large numbers of licenses for antlerless elk during regular and late seasons to bring the population down. Steady progress toward the objective in the years 1990-93 has been shown. The objective

of 28,500 elk should be reached after the 1995 hunting seasons.

Game damage - Damage by elk would be expected to be relatively light at this population level, coming mostly from competition for forage during hard winters.

Season Framework - The present season framework could be maintained. The number of licenses for antlerless elk offered in 1995 and beyond would be tapered back to a level to hold the population, rather than aggressively reducing it as we have in the past several years. Emphasis on late and special season licenses would still be required to address distribution problems, that is, to reduce local elk populations in relatively small areas.

Survival Rates, Quantity and Quality of Harvest - Survival rates and general herd condition should improve. While harvest will not reach the records seen the last few years, it should remain high and stable. With the population held at this level, survival rates for calves should gradually increase, and it is possible that nearly the same annual harvest rate can be maintained with fewer animals being carried over-winter. The number of branch-antlered bulls should remain high as well.

Fiscal Impacts - Income to the DOW and the local economies should remain high because this population size allows large numbers of bulls and cows to be harvested. Economic return should stabilize.

1.2 Decrease the herd objective to 23,100 elk.

History of the Alternative - This would require a reduction of 25% from the 1993 post-hunt estimate and a reduction of 19% from the current objective. The herd size has not been at this level since 1970. This management strategy would be most appropriate to meet carrying capacity during a severe winter rather than managing for average winters.

Game Damage - Few conflicts or game damage problems, except during the most severe winters, would be expected at this level. Maximum forage availability for livestock and other wildlife would be achieved with this alternative.

Season Framework - The population decrease would be achieved by maintaining a large number of licenses for antlerless elk for several years, which is allowable under the present season structure.

Survival Rates, Quantity and Quality of Harvest - Survival rates would be the highest of any of the alternatives.

However, even with lower winter mortality on calves and virtually no mortality as yearlings, fewer legal (2½ year-olds) bulls would be recruited into the population. At this objective, we estimate about 10% fewer bulls would be available for harvest (about 3300 bulls compared to the nearly 3700 projected to be taken in 1994). Overall, antlerless harvest rates would remain high until the objective was reached, then harvest would be reduced to allow the population to stabilize at the lower level. In 1970, when the population was about 20,500 elk, the harvest was 3446 animals, less than half the harvest projected for 1994.

Fiscal Impacts - A modest increase in income because of the large number of cow elk hunters would be expected while the herd was being reduced. However, long term DOW and local economic returns would be somewhat depressed by maintaining this population level, because the number of legal bulls available in the population would be lower and fewer bull hunters would be attracted to DAU E-6 as the population declined.

1.3 Increase the herd objective to 34,200 elk.

History of Alternative - This level represents an increase of 17% from the 1994 post-season estimate and a 20% increase from the current objective. The elk herd in DAU E-6 has been at this level several times in recent years (see Table 3); in fact, it was probably over 13% higher than this post-hunt 1989. The elk population would have no difficulty in attaining this size; the DOW could merely reduce the antlerless harvest rates.

Game Damage - Game damage problems would increase in number and severity with this population alternative because of increased competition for forage. The conflicts and distribution problems reported by private landowners and the federal agencies (Appendix B and the Issues Resolution section above) are a result of an elk population at this level. Significant damage problems would occur during a severe winter with the elk population at this level.

Season Structure - No changes from the current season structure would be required. Greater dependence on late and special seasons would be necessary to respond to continuing distribution problems.

Survival Rates, Quantity and Quality of the Harvest - With a larger population, intraspecific competition for forage would increase, and survival rates, especially for calves during winter, would decline. The poorer nutritional state of breeding-age cows would also negatively affect calf survival. Total harvest could vary considerably. Several years of mild

winters would allow large harvests from the DAU, but a severe winter would result in a die-off that could lower the harvest potential for several years.

Fiscal Impacts - Income to the DOW and local businesses, including landowners, would fluctuate widely with the boom and bust cycle of the herd at this objective. The cost of game damage and necessary habitat manipulations would be highest at this objective.

## 2. Herd Composition - Sex Ratios

Since the inception of the 4 point APR in the White River units in 1985, the post-season bull:cow ratio has averaged just over 21:100. When GMU 11 data is included, the average ratio for all units drops to 19.5 bulls:100 cows for the same years.

### Alternative Management Strategies

#### 2.1 Maintain the current sex ratio objective of 35 bulls:100 cows.

History of the Alternative - Since 1960, when the DOW began conducting classification counts from a helicopter, the post-season sex ratio has never exceeded 25 bulls per 100 cows. The DOW has been able to achieve bull:cow ratios above 35 in GMUs/DAUs where hunting pressure on bulls is totally limited, for example, DAU E-1, Cold Springs. In order to reach this level in DAU E-6, it would be necessary to limit bull hunting pressure, either by limiting the number of licenses issued for antlered elk, or by severely limiting the number of days of bull hunting allowed.

Season Framework - Going to a totally specified number of licenses can be accommodated within the present season framework. Other options that fit the current framework and could be tried to increase bull:cow ratios include shorter seasons, more restrictive antler point restrictions (APR = 6 points or better), or possibly totally limited either sex licenses rather than the combination of unlimited antlered and limited antlerless licenses the DOW now offers.

Survival Rates, Quantity and Quality of Harvest - Fewer bulls would be harvested under this option because of the natural mortality occurring to bulls remaining longer in the population. Also, because of the increased number of bulls being carried in the population, the total number of antlerless elk would have to be reduced to keep total numbers of elk at the population objective. This reduces the production potential of the herd and leads to fewer overall licenses. The quality of bulls in terms of size and antler development would be increased. Initially, a reduction in

bull licenses by a third to one half of present levels could be expected.

Fiscal Impacts - If totally limited licenses were imposed, total hunter numbers would decrease. As many as 7000 fewer hunters would be afield during the regular rifle seasons. If shorter seasons were implemented, some hunters would probably choose to hunt another DAU with longer seasons, so there would be a reduction in the total number of recreation days, and therefore a total reduction in the amount of time (dollars) hunters spent in local communities. Limited licenses would reduce income to both the DOW and local economies, while shortened seasons would not affect overall DOW income but would reduce local income.

2.2 Decrease the bull:cow objective to 22:100.

History of Alternative - Since the 4-point APR was established in DAU E-6 in 1985, bull:cow ratios have averaged 21.3 (without GMU 11). With some fluctuations year to year, and if GMU 11 is added to the list of units with APR, the post-season ratio can be held at nearly 22 bulls with the current regulation requiring 4 points or a brow tine on one antler. As shown in Table 4, the majority of the bulls seen during the post-season classification counts are yearling bulls.

Season Framework - The current season structure would not have to be changed.

Survival Rates, Quantity and Quality of Harvest - These factors would remain unchanged from what has been experienced the past several years.

Fiscal Impacts - Lowering the sex ratio objective to what is achievable under current management practices/regulations should provide the best possible economic benefit to local communities and to the DOW. The establishment of the 4-point APR was an economic boost to this area. When the quality and number of bulls increased, hunter numbers rose to record levels and the dollar amount hunters were willing to pay for leases and outfitter services increased substantially. In an area already dependent on hunter dollars, this was an economic shot in the arm. Keeping the 4-point APR should maintain the economic value of this herd to the DOW and local communities.

2.3 Allow the bull:cow ratio to decline to 5 bulls:100 cows.

History of Alternative - In the years 1977-84 before the 4-point APR was initiated, the post-season bull:cow ratio averaged 5.3 (with GMU 11 included). The post-season population estimate exceeded 31,000 each year and averaged

33,614 elk. An average of 26,398 hunters prowled E-6 each year. After the 1984 hunting season, the observed sex-ratio was at a 23-year low at 4.2 bulls. Hunting regulations those years allowed unlimited pressure on all age classes of bulls, except bull calves. Virtually all bulls 2½ years and older were killed, and a majority of the yearling bulls were harvested as well.

Season Framework - No change in season framework would be necessary to implement this alternative. The 4-point APR could be eliminated, at least for a portion of the season(s).

Survival Rates, Quality and Quantity of Harvest - This alternative would allow the highest number of bulls to be harvested. The majority of the bull harvest would be yearlings, since few large bulls would be present in the population. Branch-antlered bulls would seldom be seen. The number of antlerless animals (cows and calves) could be increased somewhat to fill the void left by the absence of bulls in the population. Calf:cow ratios might decline if it proved true that breeding by yearling bulls results in late calving and lower calf survival.

Fiscal Impact - Income to the DOW would not change substantially, but local income could be reduced significantly because of the reluctance of hunters to pay outfitters or purchase leases for hunting lower quality bulls.

## **Alternative Selection**

### **Preferred Alternatives:**

Population Objective: 28,500 elk (Alternative 1.1)

Sex-Ratio Objective: 22 Bulls:100 cows (Alternative 2.2)

### **Justification:**

The DOW concurs with the input received from the BLM, the USFS and the public that we should maintain this herd at a population level somewhat lower than the past few years. The consensus at the agency and public meetings was that the current objective is "about right" - the correct number of animals. This level seems to present the best balance between hunters' satisfaction and for protection of the forage base on which so many depend.

Freddy (1987) noted that several pieces of evidence pointed to a decreased nutritional state, as a result of high population size, for the White River herd in the early to mid-1980's. There were three main clues: the perception of two different sized calves during mid-summer, the apparent change in age structure of

## E-6 DAU PLAN - FINAL - MAY, 1994

harvested cows (the percentage of cows over 9 years old had increased from 3 to 13%), and the perception that yearling bull antlers were less developed in the mid-80's than in the early 1960's. While Freddy was completing his report, the White River elk population was still growing to a record size in 1989 of nearly 39,000 animals. Only with the addition of special hunts and greatly increased number of licenses for antlerless elk has the DOW managed to reduce the White River elk herd. By reducing the numbers of elk, we hope to create a herd that is healthier and more productive, resulting in a continuing harvest near the present level.

Alternative 2.1, reducing the population 5400 animals below the provisional objective, seems unnecessary. After increased numbers of licenses for antlerless elk were issued for several years to gradually decrease the herd, the harvest would be reduced by 40-50% to hold the population at that level. The lowered bull harvest and total harvest potential for DAU E-6 is not acceptable to most sportspersons.

Although the majority of people (82%) completing the DAU questionnaire favored increasing the bull:cow ratio in the DAU, it is not possible without a major change in management philosophy. To increase the bull:cow ratio significantly, for example, up to 35 bulls:100 cows post-hunt, would require that the annual bull harvest be reduced by approximately 50%. The most effective way to achieve a reduced bull harvest is to totally limit the number of hunters allowed to hunt the DAU. The 6 point APR and/or shorter seasons for bulls listed above would help raise the ratios, but would also result in illegal kill of bulls that would dampen the effect of the regulations.

Most successful bull hunters contacted in the field in DAU E-6 are happy with their 2½ year old "trophies". The refinement of the 4 point APR to allow bulls with brow tines to be harvested helped reduce the illegal kill, so overall, the DOW and the public are happy with the status quo in the DAU. A post-season ratio of 22 bulls per 100 cows is achievable under current management and regulations and should be adopted as the long-term objective. It will be necessary to include GMU 11 in the list of units with the 4-point APR.

### Management Implementation

The reduction of this herd to the recommended objective of 28,500 animals has been ongoing through the effects of large numbers of licenses for antlerless elk. This will be continued in 1994; the objective should be reached post-season 1995.

No change in management is necessary to reach the sex-ratio objective of 22 bulls:100 cows.

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**APPENDIX A**  
**WRIS**  
**ELK SEASONAL ACTIVITY AREAS**  
**February, 1993**

<b>Overall Range</b>	The area which encompasses all known seasonal activity areas within the observed range of an elk population.
<b>Winter Range</b>	That part of the overall range of a species where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site specific period of winter as defined for each DAU.
<b>Winter Concentration Areas</b>	That part of the winter range of a species where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten.
<b>Severe Winter Range</b>	That part of the range of a species where 90 percent of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten. The winter of 1983-84 is a good example of a severe winter.
<b>Highway Crossings</b>	Those areas where elk movements traditionally cross roads, presenting potential conflicts between elk and motorists.
<b>Migration Corridors</b>	A specific mappable site through which large numbers of animals migrate and loss of which would change migration routes.
<b>Migration Patterns</b>	A subjective indication of the general direction of the movements of migratory ungulate herds.
<b>Production Areas</b>	That part of the overall range of elk occupied by the females from May 15 to June 15 for calving. (Only known areas are mapped and this does not include all production areas for the DAU).

**Resident Population Area**

An area used year-round by a population of elk. Individuals could be found in any part of the area at any time of the year; the area cannot be subdivided into seasonal ranges. It is most likely included within the overall range of the larger population.

**Summer Range**

That part of the range of a species where 90% of the individuals are located between spring green-up and the first heavy snowfall. Summer range is not necessarily exclusive of winter range; in some areas winter range and summer range may overlap.

**Summer Concentration Areas**

Those areas where elk concentrate from mid-June through mid-August. High quality forage, security, and lack of disturbance are characteristics of these areas to meet the high energy demands of lactation, calf rearing, antler growth, and general preparation for the rigors of fall and winter.

**Limited Use Area**

An area within the overall range which is occasionally inhabited by elk and/or contains a small scattered population of elk.

**Disclaimer**

Care should be taken in interpreting these maps. The activity areas portrayed here are graphic representations of phenomena that are difficult to reduce to two dimensions. Animal distribution is fluid, animal populations are dynamic, and either may vary considerably from what is shown here. narrative information accompanies these maps and should be considered.

APPENDIX B AGENCY INPUT

ISSUES AND CONCERNS - comments from federal agency personnel.

The comments listed here were received at the two agency meetings. No importance is given to the order in which they are listed. This section is to be viewed as a summary of inputs with no judgements made of the statements. The agency responsible for the statement is given at the end of each comment:

WRNF - White River National Forest; RNF - Routt National Forest; BLM - Bureau of Land Management; GSRA - Glenwood Springs Resource Area; LSRA - Little Snake Resource Area; WRRRA - White River Resource Area; USFS - United States Forest Service.

We're seeing elk distribution problems due to summer recreationists. WRNF

We're having year-round use by elk on cattle spring ranges. WRNF

The shrub component is in poor condition on the winter range, especially in units 25, 26 and 34. BLM-GSRA

The Red Dirt area in GMU 25 is in poor range condition. WRNF

The winter distribution of elk seems to be changing on an annual basis. The herding habits of elk during the winter makes distribution a larger problem than numbers. BLM-LSRA

Concern that the quality and availability of forage on the winter range has declined in the past decade. BLM-WRRRA

The population of elk is about 10% higher than desired; the bull:cow ratio is somewhat low. WRNF

We're seeing a degradation of riparian habitats in the Rifle and Blanco districts. This is not attributable to elk, specifically, because many of the problem areas are found in cattle allotments. However, control of cattle is the only solution because you can't fence out elk economically. WRNF

In GMU 211 there are too many elk, also distribution problems - the aspen and riparian habitats are suffering. BLM-WRRRA

Total numbers of elk are not a problem in relation to habitat condition and livestock management. There are some concerns with damage to fences and with distribution on some allotments. RNF

General spring-summer conflicts between livestock and elk on allotments. WRNF

Spring-summer ranges are in a deteriorating condition in GMUs 231 and 26. For example, the Moody Creek allotment has 40-50 % utilization (measured) by elk before the cows go on. The areas measured were relatively small, eg. 10 acre meadows. RNF

Most concerned with riparian conditions; it's very difficult to determine whether livestock or elk are causing the problems unless the grazing allotment is vacant or there are no elk using the area in question. WRNF

A 10% decrease in elk numbers across the (Blanco) district would help to alleviate some of the elk concentration problems, eg. the area north of Milk Creek east to Sleepy Cat Peak, where the elk find a high degree of solitude during the late spring and summer months and heavily graze the allotments prior to the start of use by domestic sheep. However, we understand that 10% is probably well within the Confidence Interval for the population estimate in the DAU. WRNF

We are concerned with the effects of early hunting seasons on the movements of elk from public onto adjacent private lands, contributing to the difficulty in harvesting animals. WRNF

#### Comments on specific allotments/problem areas - USFS

##### Routt National Forest

Egeria Creek - much of the allotment in poor condition, particularly in the Aspen/Forb type.

Bear Creek/Watson Creek allotments - Utilization by elk within these allotments ranged from 2½% to 47% before the cows went on.

South Hunt allotment - allotment in poor/very poor condition. Elk utilization ranged from 4-23 %.

Middle Hunt allotment - Poor/very poor range conditions over most of this allotment. "Suspected" that only a few elk use this area, probably because of the poor range condition, and what few use the area are out by mid-July when the cattle go on. Permittees attribute much of the use on the allotment to the number of elk there.

North Hunt allotment - historical grazing patterns have over-used the riparian areas; high amount of larkspur. Large numbers of elk use North Hunt Creek.

Sheep allotments - little analysis/utilization work has been conducted on sheep allotments. Most permittees report high elk use on both their allotments and their private land adjacent to the Forest, but these reports have not been verified.

## White River National Forest

### Rifle District

1. The area including Cherry Creek and the stock driveway in T4S, R91W is in generally fair to poor habitat condition, based on ocular estimates. The area is classified as critical elk winter range and winter concentration area for elk, but there is also some year-round use by elk in this area.
2. Main Elk drainage along the Clintop Road and the area south of the Mansfield trail is winter range for elk that has become overgrown and dense brush in some areas.
3. The Boiler Creek to Third Set spring is a very important elk security and production area. Protecting elk security in the area may help to hold them up on the Forest longer during the hunting seasons, as the Bear Wallow Ranch lies just below the Forest, intermingled with BLM.
4. The Coulter Mesa and Bar HL Park area lacks security cover (dark timber) and has a high density of roads. It is also managed as an "open" area for travel, which means ATV's can go off roads and trails. Without adequate hiding cover, some elk tend to migrate to lower private lands during the archery season.

### Eagle District

1. Sweetwater drainage - some habitat improvements have already been done on elk winter range in this area; more habitat improvements can be done to hold the elk off private land.
2. Burns area - habitat improvements on USFS and BLM to hold elk off Nottingham's Ranch.

### Blanco District

Most of the concerns in this district deal with riparian conditions in specific areas, influenced by both livestock and big game (primarily elk) use. To restore damaged riparian areas and protect those areas currently in good condition, the USFS employs various methods of management. Some of these include: 1) altering livestock grazing systems including stocking rates and timing, 2) building exclosures (in extreme cases), 3) planting stream banks with willows and native grass and forb seed mixes, 4) placing structures in identified streams to aid in sediment trapping and bank restoration, and 5) combinations of the above methods. Comments on specific riparian/identified impact areas follow.

1. Lost Creek/Lost Park - On-going project following recommendations listed in Coordinated Resource Management Plan (CRMP); permanent transects in riparian areas and throughout

the park show improvement in conditions since the CRMP was adopted and the grazing system was changed in 1987. Portions of the stream were fenced and banks seeded, and structures placed in the stream to improve bank conditions and fish habitat (Colorado River cutthroat trout, R-2 Sensitive and Candidate Category 2 species - Lost Creek). Permanent transects in the Lost Park C&H allotment will be used to continue monitoring.

2. East Beaver/Big Lick/Cattle Creek - This area falls between Oak Ridge and Lost Park and is heavily used as transition range by elk as well as being a cattle allotment (Cattle Creek C&H). On-going work to improve and monitor riparian conditions include prescribed burning of upland sites and slopes to alleviate concentrations in the riparian area, permanent transects in the burn (treatment) and control areas to monitor use by livestock and big game and a change in the livestock grazing system which included more rest of pastures and added private land to the allotment.
3. Miller Creek/West Marvine/North Elk Creek - These drainages are impacted riparian areas and restoration and/or monitoring projects are either on-going or planned. The affected allotments are Middle Miller C&H, West Marvine C&H, and North Elk C&H.
4. Morapos S&G and Milk Creek S&G allotments - north of Milk Creek and east to Sleepy Cat Peak. This area offers a high degree of solitude during the summer months and appears to be a major concentration area for elk during that time. Elk grazing/impacts are substantial here and can be detected prior to the start each year of domestic sheep grazing (on-date of June 25 or later in the Morapos, Deer Creek and Three Points allotments). A similar situation occurs around the Pagoda/Sand Peaks area west of Ripple Creek Pass in the early part of the summer. USFS personnel are constantly faced with concern expressed by livestock owners that early season impacts to the range caused by elk negatively impacts the range resource.

## APPENDIX C

### THE CONCEPTS OF CARRYING CAPACITY AND MAXIMUM SUSTAINED YIELD

#### The Concept of Carrying Capacity

During the formulation of this Plan the subject of carrying capacity in DAU E-6 has been a item of prominent concern and discussion. In order to address those concerns, a brief discussion of carrying capacity is necessary.

In wildlife management terms, carrying capacity is the animal population and habitat in equilibrium. In the animal population, the number of births each year equals the number of deaths, therefore, maintaining the population at this level does not allow for a harvestable surplus. Also, the animals in such a population and the vegetation that population depends on are in relatively poor condition; when a severe winter or other catastrophic event occurs, a large die-off is inevitable.

This is a fairly simple concept that, when applied to deer and elk on open range combined with livestock use of the same range, becomes much more complex. How many Animal Unit Months (AUMs) can a parcel of range support and not seriously damage the forage base? Part of the problem is the tremendous amount of variability in vegetative production and availability. The amount and timing of precipitation, the mean and extremes of temperature, the number of sunny days, the snow crusting conditions and similar factors all contribute to differences in annual production of forage.

Because of the limitations and vulnerabilities of a herd managed at carrying capacity, the DOW's standard for management is more accurately described as Maximum Sustained Yield (MSY). At MSY, population size is held considerably below carrying capacity to allow maximum production and survival, resulting in a harvestable surplus. Better range conditions, better herd health and a buffer against losses in a severe winter are other advantages of managing for MSY.

#### Managing Populations for Maximum Sustained Yield (MSY)

Numerous studies of biological populations of such species as bacteria, mice, rabbits and white-tailed deer have shown that animal populations grow in a mathematical relationship that biologists refer to as the "sigmoid growth curve" or "S" curve (Fig. 3). There are three distinct phases to this cycle. The first phase occurs while the population level is still very low and is characterized by a slow growth rate and a high mortality or death rate. This occurs because the populations may have too few animals and the loss of even a few of them to predation or accidents can significantly affect the population. In other words, there appears to be some truth in the old saying, "there's strength in numbers."

The second phase occurs when the population number or density is at a moderate level. This phase is characterized by high rates

of reproduction and survival. During this phase, food, cover, water and space (habitat) are abundant and not limiting factors. Also, during this phase, animals such as white-tailed deer have been known to successfully breed at six months of age and produce a live fawn on their first birthday, older does have been known to produce 3-4 fawns that are very robust and healthy. Survival rates of all the deer (bucks, does and fawns) are at maximum rates during this phase.

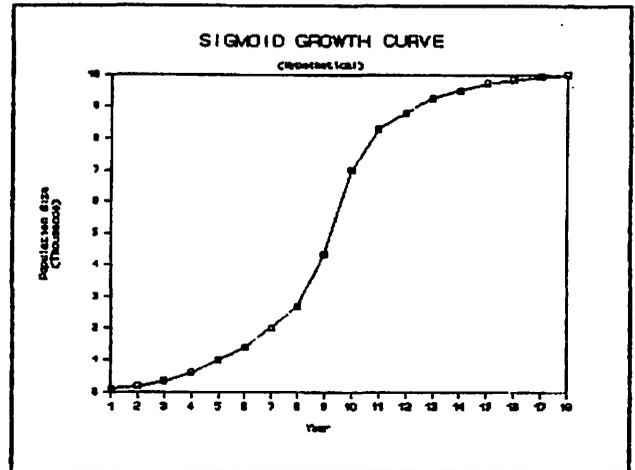


Figure 1. Hypothetical sigmoid growth or "S" curve.

The final or third phase occurs when the habitat becomes too crowded. During this phase the quantity and quality of food, water, cover and space become scarce due to the competition with other members of the population. This phase is characterized by a decrease in reproduction and survival. Also, during this phase white-tailed deer fawns can no longer find enough food to grow to achieve a critical minimum weight so that they can reproduce; adult does will usually only produce 1-3 fawns; and survival of all deer (bucks, does and fawns) will decrease. During severe winters, large die offs can occur due to the crowding and lack of food. The first to die during these situations are fawns, then bucks followed by the adult does. Severe winters thus affect future buck to doe ratios by selecting for more does and fewer bucks in the population. Also, since the quality of a buck's antlers is dependant upon the quantity and quality of his diet, the antlers are stunted during this phase. If the population continues to grow it will eventually reach a point called "K" or the maximum carrying capacity. At this point, the population reaches an "equilibrium" with the habitat. The number of births each year equal the number of deaths, therefore, to maintain the population at this level would not allow for any "harvestable surplus." The animals in the population would be in relatively poor condition and when a severe winter or other catastrophic event occurs, a large die-off could be inevitable. Thus, another old expression, "the bigger they are the harder they fall" may be appropriate here. A recent example of such a population die-off occurred in the relatively unharmed Northern Yellowstone elk herd during the severe winter of 1988-89. This winter followed the forest fires of 1988 that raged in the National Park.

What does all this mean to the management of Colorado's big game herds such as deer and elk? It means that if we attempt to manage for healthy big game herds, we should attempt to hold the populations at about the middle of the "sigmoid growth curve." Biologists call this "MSY" or "maximum sustained yield." At this level, which may be half the maximum population size (K), the population will display the maximum production, survival and

available surplus animals for hunter harvest. Also, at this level, range condition and trend should be good to excellent and stable, respectively. Game damage problems should not be significant and economic return to the local and state economy should be at the maximum. This population level should produce a "win - win" situation to balance sportsmen and private landowner concerns.

A graph of a hypothetical deer population showing sustained yield (harvest) potential vs. population size is shown below (Fig. 4). Notice that as the population increases from 0 to 5,000 deer, the harvest also increases. However, when the population reaches 5,000 or "MSY", food, water and cover becomes scarce and the harvest potential decreases. Finally, when the population reaches the maximum carrying capacity or "K" (10,000 deer in this example), the harvest potential will be reduced to zero. Also, notice that it is possible to harvest exactly the same number of deer each year with 3,000 or 7,000 deer. This phenomenon occurs since the population of 3,000 deer has a much higher survival and reproductive rate compared to the population of 7,000 deer.

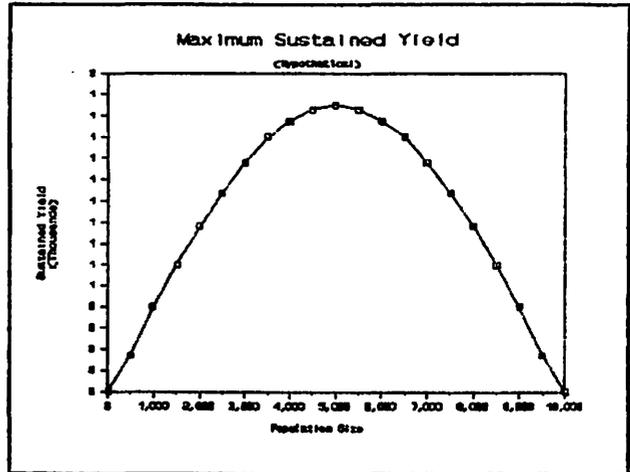


Figure 2. Hypothetical maximum sustained yield curve (MSY).

APPENDIX D

DAU E-6 Regulatory History, 1970-93

<u>Year</u>	<u>Method</u>	<u>Dates</u>	<u>Restrictions</u>
1970	Archery Regular	Aug. 15-Sept. 20 Oct. 17- Nov. 6	AO in Aug., ES in Sept. Unl. AO, limited Antlerless
Area E (units 23 and 24) specified for both archery and regular seasons. Last year of a single, combined deer and elk season lasting 21 days.			
1971	Archery Regular	Aug 21-Sept. 12 Oct. 16-25	Unlimited AO Unl. Branch-antlered, limited antlerless
First year of separate elk and deer seasons, spike bulls protected.			
1972	Archery Regular	Aug 19-Sept. 10 Oct. 28-Nov. 12	AO in Aug., ES in Sept. Unl. AO (4 point APR), limited antlerless
4 point APR in units 12, 13, 23 and 24.			
1973	Archery Rifle, Early Regular	Aug. 18-Sept. 23 Oct. 10-23 (during deer season) Oct. 27-Nov. 11	AO in Aug., ES in Sept. Antlerless, except Unit 11 Unl. AO, limited antlerless
APR eliminated statewide. GMU 13, split E-W for allocation of antlerless licenses.			
1974	Archery Muzzle Regular	Aug. 17-Sept. 22 Sept. 14-22 Oct. 12-22	AO in Aug., ES in Sept. GMU 13E, Limited AO Unl. AO, limited Antlerless
Last year to use the alpha "area" designations. Archery hunters placed under the "one and only hunt" concept. Last year units 23 and 24 specified for archery. First time an E-6 unit included for ML (ML hunters were placed under "one and only hunt" concept in 1972).			
1975	Archery Muzzle Regular Late	Aug. 16-Sept. 21 Nov. 15-30 Sept. 13-21 Oct. 11-21 Dec. 6-14	AO in Aug., ES in Sept. ES, GMU 12W Limited AO in GMU 131 Unl. AO, limited Antlerless Lim. antlerless, GMU 12W
GMU 131 created from the southeast half of unit 13.			
1976	Archery	Aug. 21-31 Sept. 1-24 Nov. 13-30	Unlimited AO ES, all units except 12, 13, 131, 26 ES in units 12, 13, 131, 26

	Muzzle	Sept. 11-19	Limited AO in all units except 23, 24, 25 and 26
		Dec. 4-12	Lim. AO in units 25N, 26S
	Regular	Oct. 16-26	Unl. AO, limited antlerless
1977	Archery	Aug. 27-Sept. 25	ES in units 25, 26S and 34
		Sept. 3-25	ES in rest of units in DAU
	Muzzle	Sept. 10-18	Lim. AO in all units except 23 and 24.
	Separate	Oct. 22-Nov. 1	Unl. AO, Limited antlerless
	Combined	Nov. 5-15	Unl. AO, Lim. antlerless

First year of separate-combined season structure (deer first 77-79)

1978	Archery	Aug. 26-Sept. 24	ES in units 25, 26S, 34
		Sept. 2-24	ES in rest of units
	Muzzle	Sept. 9-17	Lim. AO all units exc. 23 & 24
	Separate	Oct. 21-31	Unl. AO, limited antlerless
	Combined	Nov. 4-14	Unl. AO, limited antlerless
	Late	Dec. 2-17	Cows, Unit 25N and 26S
		Dec. 2-4 & 9-11	GMU 12, unfilled cow lic.

GMU 131 split on Dunkley Pass Road for allocation of cow licenses.

1979	Archery	Aug. 25-Sept. 23	ES in units 25, 26S and 34
		Sept. 1-23	ES - all other units
	Muzzle	Sept 8-16	Lim. AO, all units but 23 & 24
	Separate	Oct. 20-30	Unl. AO, limited antlerless
	Combined	Nov. 3-13	Unl. AO, limited antlerless
1980	Archery	Aug. 30-Sept. 28	ES in units 11, 25 and 34
		Aug. 30-Sept. 21	ES, all other units
	Muzzle	Sept. 13-21	Lim. AO, all units but 23 & 24
	Separate	Oct 11-21	Unl. AO, limited antlerless
	Combined	Nov. 1-11	Unl. AO, limited antlerless
	Late	Dec. 1-21	Lim. antlerless, units 25 & 26

Last year units 23 and 24 were specified. Separate elk first, 1980-82

1981	Archery	Aug. 29-Sept. 27	ES, units 11, 25 and 34
		Aug. 29-Sept. 20	ES, all other units
	Muzzle	Aug. 12-20	Lim. AO, all units exc. 23 & 24
	Separate	Oct. 10-20	Unl. AO, limited antlerless
	Combined	Oct. 31-Nov. 10	Unl. AO, limited antlerless
	Late	Dec. 1-20	Cows, units 25 and 26
1982	Archery	Aug. 28-Sept. 26	ES, units 11, 25 and 34
		Aug. 28-Sept. 19	ES, all other units
	Muzzle	Sept. 11-19	Lim. AO, except 23 and 24
	Separate	Oct. 16-26	Unl. AO, limited antlerless
	Combined	Nov. 6-16	Unl. AO, limited antlerless

GMU 11 split east and west for allocation of licenses. Unit 11W managed with GMU 10.

1983	Archery	Sept. 10-Oct. 9	ES, units 11E, 25 and 34
		Sept. 10-Oct. 2	ES, all other units in DAU
	Muzzle	Sept. 24-Oct. 2	Lim. AO and antlerless, all units except 23 and 24.
	Separate	Oct. 15-25	Unl. AO, lim. antlerless
	Combined	Nov. 5-15	Unl. AO, lim. antlerless

First year for limited antlerless licenses for muzzle-loaders (1000 lic. statewide). Separate/combined season structure 1983-85, elk first.

1984	Archery	Sept. 8-Oct. 7	ES, units 11, 25 and 34
		Sept. 8-30	ES, all other units
	Muzzle	Sept. 22-30	Lim. AO, Lim. antlerless, all units except 23 & 24
	Separate	Oct. 13-23	Unl. AO, limited antlerless
	Combined	Nov. 3-13	Unl. AO, limited antlerless
	Late	Dec. 8-18	Lim. Antlerless, GMUs 12W, 13 and 23
1985	Archery	Sept. 7-Oct. 6	ES, units 11, 25 and 34
		Sept. 7-29	ES, all other units
	Muzzle	Sept. 21-29	Lim. AO, Lim antlerless, all units except 23 and 24
	Separate	Oct. 12-22	Unl. AO, limited antlerless
	Combined	Nov. 2-12	Unl. AO, limited antlerless

4 point APR imposed on all E-6 units.

1986	Archery	Aug. 16-Sept. 20	AO in Aug., ES in Sept.
	Muzzle	Sept. 7-20	Lim. ES, except units 23 & 24
	First	Oct. 11-15	Unl. AO
	Second	Oct. 18-29	Unl. AO, limited antlerless
	Third	Nov. 1-9	Unl. AO, limited antlerless
	Late	Dec. 1-31	Lim. antlerless, unit 13

First year of three combined seasons. 4 point APR adopted statewide; APR in effect for all seasons in DAU E-6.

1987	Archery	Aug. 15-Sept. 20	AO in Aug., ES in Sept.
	Muzzle	Sept. 7-20	Lim. ES
	First	Oct. 10-14	Unl. AO
	Second	Oct. 17-28	Unl. AO, Lim. Antleless
	Third	Oct. 31-Nov. 8	Unl. AO, Lim. Antlerless
	Late	mid-Nov - Dec 31	Lim. Cows, units 13 and 25

First year units 23 & 24 open to muzzle-loaders; late seasons expanded.

1988	Archery	Aug. 13-Sept 20	AO in Aug., ES in Sept.
	Muzzle	Sept. 7-20	Limited ES
	First	Oct. 15-19	Unlimited AO
	Second	Oct. 22-Nov. 2	Unl. AO, limited antlerless
	Third	Nov. 5-13	Unl. AO, limited antlerless
	Late	Dec. 1-Jan. 15	Lim. antlerless, GMUs 12W,13,23 & 211

GMU 231 split off from 131, GMU 211 split from Unit 11.

1989	Archery	Aug. 23-Sept. 25	AO in Aug., ES in Sept.
	Muzzle	Sept. 15-25	4000 bulls, 2000 cows statewide
	First	Oct. 14-18	Unl. AO
	Second	Oct. 21-Nov. 1	Unl. AO, Limited antlerless
	Third	Nov. 4-12	Unl. AO, Limited antlerless
	Late	Dec. 1-31	Lim. antlerless, units 12W, 13, 23, 131 (PLO), 211

First Private Land Only (PLO) hunt used in E-6.

1990	Archery	Aug. 23-Sept. 25	AO in Aug., ES in Sept.
	Muzzle	Sept. 15-25	Lim. Bulls, Lim. cows
	First	Oct. 13-17	Unl. AO
	Second	Oct. 20-31	Unl. AO, limited antlerless
	Third	Nov. 3-11	Unl. AO, limited antlerless
	Late	Dec. 1-31	Lim. antlerless, units 12W, 13, 23, 131 (PLO), 211

First year for Wildlife Ranching hunt in DAU E-6: RFW hunt in GMU 13 on Colowyo Coal property during regular season.

1991	Archery	Aug 23- Sept 25	AO in Aug., ES in Sept.
	Muzzle	Sept. 15-25	Lim. Bulls, Lim. cows
	First	Oct. 12-16	Unl. AO
	Second	Oct. 19-30	Unl. AO, limited antlerless
	Third	Nov. 2-10	Unl. AO, limited antlerless
	Late	Nov. 30-Dec. 31	Limited antlerless, units 12W, 13, 23, 131 (PLO), 211

1992	Archery	Aug. 29-Sept. 27	ES for entire season
	Muzzle	Sept. 12-20	Limited bulls, cows
	First	Oct. 10-14	Unl. AO, limited antlerless
	Second	Oct. 17-28	Unl. AO, limited antlerless
	Third	Oct. 31-Nov. 8	Unl. AO, limited antlerless
	Late	Nov. 28-Dec. 31	Limited antlerless, units 12W, 13, 23 (PLO), 33 (PLO), 211

APR changed to allow take of bulls with 4 points or brow tine on one antler; first year for cow licenses in first combined season; PLO hunts used in all three combined seasons in unit 23; wildlife ranching hunt added in unit 211 on Morgan Creek (Colowyo Coal Co.)

1993	Archery	Aug. 28-Sept. 26	Unl. ES
	Muzzle	Sept. 11-19	Limited Bulls, cows
	First	Oct. 16-20	Unl. AO, Limited antlerless
	Second	Oct. 23-Nov. 3	Unl. AO, Limited antlerless
	Third	Nov. 6-14	Unl. AO, Limited antlerless
	Late	Nov. 27-Jan. 15	Lim. antlerless in units 12W, 13, and 211; PLO in 23, 25, 26, 33

Limited PLO antlerless in unit 23 all three combined seasons; Wildlife Ranching hunts in units 13 and 211.

Explanation of terms:

AO = Antlered Only	ES = Either Sex
APR = Antler Point Restriction	Unl. = Unlimited
Lim. = Limited	RFW = Wildlife Ranching
GMU = Game Management Unit	ML = Muzzleloading

Elk areas: In the early 1970's, GMUs were lumped together to form "areas" for the allocation of limited cow licenses:

Elk area	Game Management Units
B	12, 13
B-1	11
E	23, 24
X	25 S of Sweetwater Creek, 33, 34
W	25 N of Sweetwater Creek, 26 (before 1972)
B-2	13 E of Milner (created in 1972)
W	25 (1972 and later)
W-1	26 (1972 and later)

Elk area "E" got special treatment; it was "specified", i.e. licenses were totally limited, for archery until 1973 and for regular rifle seasons until 1981. Muzzleloaders were not allowed into units 23 and 24 until 1987.

## APPENDIX E PUBLIC INPUT

Listed below are the recommendations received from the public relating to population size and sex-ratio objectives. Numbers indicate the "votes" for each option:

	Population size	Sex-Ratio
Hold	13	2
Increase	5	18
Decrease	6	2

### ISSUES AND CONCERNS

The following comments were received at the five open-house sessions. Issues and concerns are summarized here in the general headings of biological, political, and social with no importance given to order. The source of the issue or comment is given at the end of each. This section is to be viewed as a summary of inputs with no judgements made of the statements.

#### Biological

DAU E-6 should be expanded to include GMU 11, the Piceance triangle, and the east portion of GMU 10. HPP

Bowhunting season may cause movement of elk prior to rifle season. Public

Elk are moving lower. Public

Put less pressure on elk during the rut; specifically, limit bow season. Public

Improve the quality (i.e. numbers and bull:cow ratio) in one of the primary destination elk hunting areas in the nation. Public

Too many elk in GMU 13. Female population of elk is 25-50% too high. Public

Want to see more mature males. Public

Early season pressure is moving elk off summer ranges prematurely. This is a real, not a perceived, problem. DOW

Muzzleloader and archery season pressure is at all time high in GMU 33; these hunters are forcing both elk and deer off the USFS lands and onto winter ranges. Some elk in GMU 33 are staying year-round on the winter range. DOW

### Political

There are entirely too many elk; they eat forage needed for cattle. Public

Shorten all seasons, have more quality areas and more public access to private land where there is game damage. Public

Need more licenses in the late hunt for us meat hunters. Public

Landowners should get some permits to sell for whatever they could get to reimburse them for the feed the game is eating. Public

Concerned about archery season moving elk from public to private land. Public

Restore elk herd to 1989 pre-hunt level. There was no good reason to reduce the herd in the first place. Habitat is everywhere. Public

Game management would be more precise if you (DOW) went to a limited draw system. Public

Research should be done to establish population levels for elk and deer prior to white settlement of the area; population levels should be maintained at or below those historic levels. Public

### Social

All licenses should be obtained through drawings, then private landowners could only obtain bull licenses for their hunters by agreeing to take equal number of cow hunters. Public

Limit bowhunters to one area, change area as necessary to keep elk on forest lands. Public

Would like to see the herding of elk by private landowners stopped. Public

NORTHWEST REGION  
Data Analysis Unit (DAU) Planning Process  
August 1993

**What is a DAU:** It is a single herd unit of deer, elk, or antelope that has little ingress or egress from adjacent herds. It is usually a collection of game management units (GMU's) but in some cases can be a single GMU.

**What is A DAU Plan:** It is a document and planning process the Colorado Division of Wildlife (DOW) uses to determine the following questions based upon a public input process:

1. How many animals to manage for in the DAU?
2. What should be the sex ratio or herd composition?
3. What are the major concerns and issues in the DAU?

<u>NAME</u>	<u>DAU NUMBER</u>	<u>GMU(s) INVOLVED</u>
White River Deer	D-7	11, 211, 12, 13, 131, 231, 22, 23, 24
Rifle Creek Deer	D-42	33
Sweetwater Ck. Deer	D-43	25, 26, 34
White River Elk	E-6	211, 12, 12, 131, 231, 23, 24, 25, 26, 33, 34

**How do I comment on these DAU's?**

1. Fill out the attached questionnaire - name, address, telephone number and the special interest group you represent i.e., landowner, sportsmen, businessman, etc.
2. The DOW personnel will explain the past management history; the different aspects of population dynamics; and outline some of the pros and cons of different population and sex ratio alternatives.
3. Fill out the attached questionnaire and indicate the way that you feel the DOW should try to manage each herd (DAU) for the next 5 years. A "HOLD" recommendation would mean to keep the populations and sex ratio (bucks or bulls ratio to does and cows) about the same as it is now. A "DECREASE" or "INCREASE" recommendation should indicate how many or by what PERCENTAGE we should increase or decrease the present herd size.
4. Add any comments, issues or concerns you have to offer about these populations of animals. Please write on the back of the questionnaire if you need additional space. If your comments are specific to a geographic area or GMU, please indicate which DAU and species are affected.
5. Return the questionnaire with your issues and concerns to the Division of Wildlife. You can leave it with us today or mail it to:

Colorado Division of Wildlife  
Attention: John Gray  
711 Independent Ave.  
Grand Junction, CO 81505

Your comments will be taken into consideration for the final DAU plans that the Colorado Wildlife Commission will adopt at its March 1994 meeting. Thank you for your interest in the management of Colorado's big game animals.

**QUESTIONNAIRE**  
**Northwest Colorado**  
**1993 DAU Planning Process**

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY, STATE, ZIP CODE: \_\_\_\_\_

WHAT GROUP DO YOU FEEL YOU MOST REPRESENT? (OPTIONAL)

- LANDOWNER
- GUIDE AND OUTFITTER
- BUSINESSMEN
- SPORTSMEN
- ENVIRONMENTAL
- GENERAL PUBLIC
- OTHER

YOUR RECOMMENDATION (PLEASE CHECK)

White River Deer (D-7):

	<u>HOLD</u>	<u>INCREASE</u>	<u>DECREASE</u>	<u>RECOMMENDED CHANGE %</u>
Population size	_____	_____	_____	_____
Buck to doe ratio	_____	_____	_____	_____

Rifle Creek Deer (D-42):

	<u>HOLD</u>	<u>INCREASE</u>	<u>DECREASE</u>	<u>RECOMMENDED CHANGE %</u>
Population size	_____	_____	_____	_____
Buck to doe ratio	_____	_____	_____	_____

Sweetwater Ck. Deer (D-43):

	<u>HOLD</u>	<u>INCREASE</u>	<u>DECREASE</u>	<u>RECOMMENDED CHANGE %</u>
Population size	_____	_____	_____	_____
Buck to doe ratio	_____	_____	_____	_____

White River Elk (E-6):

	<u>HOLD</u>	<u>INCREASE</u>	<u>DECREASE</u>	<u>RECOMMENDED CHANGE %</u>
Population size	_____	_____	_____	_____
Bull to cow ratio	_____	_____	_____	_____

COMMENTS/ISSUES/CONCERNS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Return this questionnaire to the Colorado Division of Wildlife. You can leave it with us today or mail it to:

Colorado Division of Wildlife  
 Attention: John Gray  
 711 Independent Ave.  
 Grand Junction, CO 81505

# HABITAT PARTNERSHIP PROGRAM [HPP]

YAMPA — WHITE RIVER COMMITTEE  
Merv Johnson, Committee Chairman

Post Office Box 1181  
Meeker, Colorado 81641

February 14, 1994

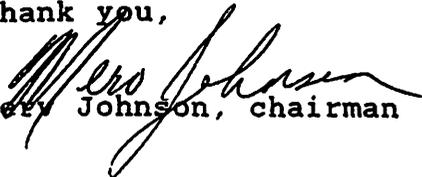
John Gray  
Division of Wildlife

John,

The Yampa/White River HPP committee would like to request that DAU E-6 be expanded to include GMU 11. We believe this would simplify the understanding of populations in that area and help us in meeting our goals in resolving conflicts.

As best we can tell, there are well over 2000 elk migrating into GMU 11 from GMU's 211, 12, and 13. Because these are elk that we are working with in these other areas, we feel we can do a better job if they are included in the data provided by you in DAU E-6.

Thank you,

  
Merv Johnson, chairman

Mr. Merv Johnson                      Chairman

Mr. Stephen Strang                      Co-Cha

## COMMITTEE MEMBERS

Mr. Angelo Theos, Woolgrower Association; Mr. Barry Dupire, Colorado Division of Wildlife; Mr. Stephen (Bart) Strang, Cattlemen Association; Mr. Gregory A. Glasgow, USDA Forest Service; Mr. Michael Grady, Farm Bureau; Mr. Rusty Roberts, USDI Bureau of Land Management; Mr. Merv Johnson, Sportsmen.

# APPENDIX F.

## DAU MANAGEMENT OBJECTIVES FOR 1994

E6-1994.GM  
03-28-1994  
15:54:18

1. SPECIES: ELK	DAU NAME: WHITE RIVER	REGION: NW
		DAU NUMBER: E-6
2. Long Term Post-Hunt Objectives	Males Females Young Total	Males/100 F/Young
3. 1993 Post-Hunt Estimates	3059 16102 9339 28500	19 / 100 / 58
4. 1994 Pre-hunt Projection	3267 17381 10230 30877	19 / 100 / 59
5. 1994 Harvest Objective	7170 20114 9870 37154	36 / 100 / 49
6. 1994 Post-Hunt Objective	3668 3026 446 7140	
	3135 16785 9380 29300	19 / 100 / 56

GMU	LICENSE TYPE	1994 RECOMMENDATIONS		1994 HARVEST OBJECTIVES			
		TOTAL LICENSES	RIFLE		ARCHERY & MUZZLELOADER		TOTAL
			MALE	FEMALE & YOUNG	MALE	FEMALE & YOUNG	
11	LIMITED ANTLERLESS	355		185			18
12	"	480		251			25
13	"	470		272			27
23	"	735		294			29
24	"	400	3150	180	450	450	45
25	"	285		114			11
26	"	305		110			11
33	"	445		192			19
34	"	200		52			5
131	"	205		124			12