FOSSIL RIDGE DATA ANALYSIS UNIT E-43

ELK MANAGEMENT PLAN

GAME MANAGEMENT UNITS 55 AND 551

DIVISION OF WILDLIFE

300 W. NEW YORK AVE.

GUNNISON CO 81230

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DAU E-43

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DATA ANALYSIS UNIT PLAN

EXECUTIVE SUMMARY

DAU: E-43 Fossil Ridge Elk

Game Management Units: 55 and 551

Current Population Estimate: 4580 **Current Sex Ratio:** 20 Bulls:100 Cows

Current Population Objective: 3000 **Current S/R Objective:** 20:100

New Population Objective: **3**000 - 3500 **New Sex Ratio Objective:** 25:100

Percent Change From Current Population Objective: No Change to 17% Increase

SUMMARY OF MANAGEMENT DECISIONS

The primary process used by the CDOW to gather public input to help select preferred alternatives for this DAU Plan was the Gunnison Citizen Task Force Committee (CTF). The CTF consisted of 18 members representing local businesses, sportspersons, environmental groups, livestock operators, outfitters, general public, federal land-use agencies and local government entities. The CTF had 9 meeting from January, 1998 through March, 1999 and 2 additional meetings in March and April, 2000. Additional information on the CTF process is included in Appendix C. Recommendations from the Gunnison Habitat Partnership Committee and CDOW personnel were also considered to select preferred alternatives.

The preferred alternative for population size is to manage the elk population in the DAU within a range of 3000 to 3500 animals. This range would allow some fluctuation in elk numbers depending on habitat and climatic conditions.

The preferred alternative for the herd composition objective (bull:cow ratio) is increase to 25 bulls:100 cows. The average ratio over the past 5 years (1995-99) is 21 bulls:100 cows. There are a few less restrictive management options that could be implemented over the next 3-5 years to achieve the objective. If these options don't increase bull:cow ratios, limited bull licenses may become necessary to reduce the bull harvest in the DAU. The Division of Wildlife will not make recommendations within the current season structure (2000-2004) to limit bull licenses in the

DAU.

A public meeting was held in Gunnison on November 20, 2000 to present the draft DAU Plans and to received input on the preferred alternatives. Fifty six (56) people signed the sign-in sheet at the meeting. Also in attendance, were Wildlife Commissioners Mark LeValley and Bob **E-25 E-43 Executive Summary (continued)**

Shoemaker plus staff and area CDOW personnel. A comment form was handed out at the meeting. The deadline for returning comment forms was December 20, 2000.

A total of 73 comment forms and letters were returned. Of the respondents that addressed the preferred alternatives for E-43, 82% (47 of 57) supported the preferred alternative for population size and 96% (55 of 57) supported the preferred alternative for bull:cow ratio. Included in the respondents which supported both of the preferred alternatives, were letters from the Gunnison County Stockgrowers Association, Inc. and the Gunnison BLM.

Comments by opponents for the population size alternative included "population should be higher" and "current elk population estimate is too high".

SIGNIFICANT ISSUES

The Fossil Ridge elk DAU has historically been a popular DAU among elk hunters. This is mainly due to a large elk population, easier access and 88% public land. Managing elk and domestic livestock numbers to improve and maintain healthy range conditions was a significant issue discussed by all stakeholders during the planning stages of this DAU Plan. All parties agree that habitat monitoring and evaluation should be an important component to this DAU plan and the elk population level should be tied to the carrying capacity of the habitat.

All stakeholders agree the elk population in the DAU has been steadily reduced over the past 10 years and most agree that some further reduction is necessary. Public land managers believe the habitat, especially winter range, has been degraded by big game over-use. They recommend reductions in population size from present levels to allow the vegetation to recover. A Colorado State University range scientist says "the wildlife winter range is unable to support the current numbers of wildlife without substantial risk to the populations." It will likely take two or three years to reach the population objective and habitat should be monitored for two or three years at that level. The population objective will be reviewed following the 2004 hunting season.

INTRODUCTION AND PURPOSE

DOW's Management by Objective Process

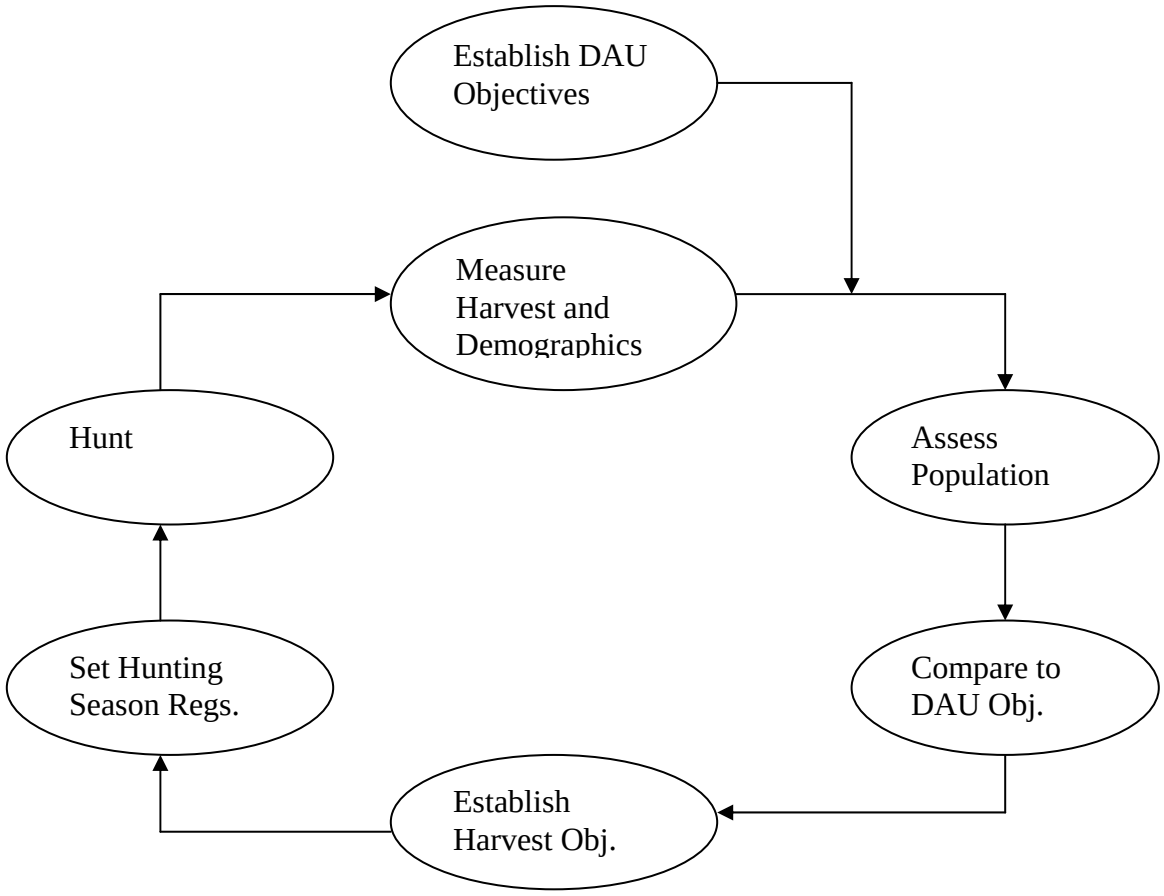
Big game seasons were historically set on the basis of tradition or by the vagaries of politics. Often, the seasons that resulted were not related to herd levels, status of the habitat or even balanced by the interests of affected publics. Hunters, the USDA Forest Service, the Bureau of Land Management, agricultural producers, guides and outfitters, and other business people all share a stake in the management of Colorado's big game herds. By statute, the Colorado Division of Wildlife (DOW) is accountable to manage every species of wildlife for the benefit of all Colorado residents and visitors to the State. To insure that public needs are met, it is imperative that DOW maintain big game herds at population levels agreed upon in a public review process and approved by the Wildlife Commission.

For convenience, populations of big game ungulates are typically described on the basis of a herd unit occupying a specific geographic area. DOW refers to such an area as a Data Analysis Unit (DAU). Normally each DAU is composed of several game management units (GMUs) that divide the DAU into subunits designed to manage hunter distribution. The boundaries of a given DAU should encompass the area where most of the herd carries out breeding activities, spends the winter, gives birth and raises their young, with minimal ingress of animals from surrounding GMUs, or egress of resident animals.

In recent years, DOW has adopted a five-year objective setting process based on the preparation of a DAU Plan. The public is involved in determining population goals through public meetings sponsored by DOW, along with the opportunity to submit comments directly to the Colorado Wildlife Commission. Interested parties are invited to give their ideas on how many animals to have in the population, and help decide the most desirable composition (*i.e.*, ratio of males, females and young) for a particular herd. These numbers are referred to respectively as the DAU population and composition objectives. DOW consults federal land management agencies to help determine the amount of habitat suitable for supporting the big game species covered by the plan, and to identify any problem areas within the habitat. Local committees of the Habitat Partnership Program (HPP) also play a significant role in the DAU Planning process. This program brings together representatives from the Bureau of Land Management, the USDA Forest Service, DOW, stock growers and hunting interests into working groups. HPP participation in DAU planning insures that private land habitat issues are considered when setting DAU objectives, that conflict areas are identified and solution strategies are appropriate.

The DAU plan summarizes all the important management data and issues in one utilitarian planning document. Once all the issues regarding the management of a given species have been identified, and the biological capabilities determined, alternative solutions are developed. An appropriate balance between public desires, issues and capabilities is sought, leading to the selection of a preferred alternative.

After the Wildlife Commission reviews and approves a DAU plan, the population and composition objectives become management targets that drive the annual permit setting process. Management by objective is a process based on an annual cycle of information collection, analysis, and decision-making that culminates each year in a hunting season (see diagram below). The population objective drives the most important decision in the annual big game season setting process how many animals need to be harvested to meet the population



objective. If, for example, the herd is under objective, this will call for relatively few, if any, antlerless licenses. On the other hand, if the herd is over objective, the number of licenses will need to be liberalized. The cyclic objective setting approach focuses on the collection and analysis of information, and serves to keep decision makers working toward a specific goal.

In instances where significant conflicts occur with agricultural interests in the management of a particular species, local HPP committees attempt to address these problems. Individual HPP Committees are responsible for developing a Distribution Management Plan (DMP), which

establishes a framework for alleviating big game conflicts on public and private lands through habitat enhancements and direct distribution techniques, such as specialized hunts. Whereas the DAU plan addresses the overriding management strategy, the DMP focuses on management actions that may reach down to the level of individual ranches. To accomplish objectives outlined in the DMP, committees are allocated money at a rate of 5% of the annual three-year average license revenues for deer, elk and antelope licenses in their locality. HPP is also authorized to compensate landowners for actual damage to fence and forage caused by big game.

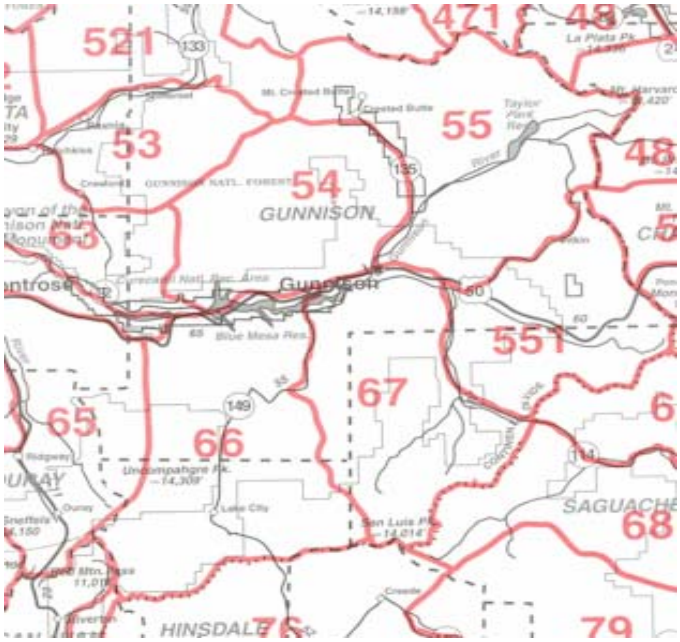
Tradition and politics still play a role in the season setting process. But hopefully this new approach does a much better job of analyzing the desires of various publics and then setting objectives, helping to ensure that big game species are managed properly.

DESCRIPTION OF DATA ANALYSIS UNIT

Location

Data Analysis Unit (DAU) E-43 is located in the west central portion of Southwestern Colorado in Saguache and Gunnison counties. The DAU contains Game Management Units 55 and 551 and is commonly referred to as the Fossil Ridge DAU. The DAU contains 1428 square miles. It is bounded on the north by the Elk Mountains and the Sawatch Range and on the east and south by the Sawatch Range and the Continental Divide to Highway 114. It is bounded on the south and west by Highways 114, 50 and 135 north to Crested Butte and north along the Ruby Range divide to the Elk Mountains.

FIGURE 1. DAU E-43 Map



Topography & Climate

Topography - The dominant geographical features of this DAU are the mountains of the continental divide along the east and south side and the Sawatch Mountains on the north and the Ruby Range on the west. Taylor Park and Taylor Reservoir lie in the heart of the DAU. Tomichi Creek, Taylor River, East River, Cochetopa Creek, and the Slate river are main drainages of the DAU and all are tributaries to the Gunnison River. Elevation ranges from over 14,000 feet along the continental divide to 7,700 feet in the city of Gunnison.

Climate - The climate of this area is characteristic of mountainous areas of Colorado. Summers are short in the upper reaches and milder temperatures prevail for 4-5 months a year. The lower elevations have 5-6 months of summer and slightly warmer seasonal temperature. High elevations receive substantial amounts of precipitation, roughly 40 to 50 inches per year, at 14,000 feet while the lower elevations receive only 8 to 10 inches.

Vegetation

Vegetation in the Fossil Ridge DAU can be categorized into five broad types cropland, wetland/riparian, rangeland, forested lands and alpine. The variety of vegetation creates a highly desirable mosaic that is very beneficial to wildlife such as mule deer and elk. However, plant communities at lower elevations have been extensively modified by agriculture and are increasingly being disturbed by intensive human use.

Croplands consist of irrigated hay meadows and terraces that have been re-seeded to more desirable forage plants. Most hay ground is "native hay", consisting of Timothy and Smooth Brome, with some sedges and rushes.

Wetlands and Transition Riparian occur along the river bottoms and irrigated meadows. The riparian habitat is one of the least represented vegetative types in the area, but it is extremely valuable as wildlife habitat. It supports the greatest abundance and diversity of wildlife.

Rangelands consist of sagebrush steppe, mountain shrub and grassland communities. The sagebrush community is by far the most common rangeland in the Fossil Ridge area at elevations up to 9,000 feet. It is found on drier non-agricultural areas on the valley floors and the lower hills. Mountain shrub, consisting of big sagebrush mixed with serviceberry and chokecherry is found on better soils at lower elevations. Both sagebrush steppe and mountain shrub have grass and forb understories, making them suitable for rangeland. Bluebunch wheatgrass is prominent in these vegetative types under good range conditions. Native grasslands are found in two different sites. Mountain meadows, consisting of grasses, forbs and some shrubs, occur at higher elevations in association with aspen and spruce-fir forest types. Low elevation grasslands occur on windswept sites with poorly developed soils incapable of supporting sagebrush.

Forested lands in the Fossil Ridge area can be subdivided into three major types, lodgepole pine,

aspen and spruce-fir. Lodgepole pine occurs in even-aged stands at elevations between 7,500 feet and 10,500. Due to the dense overstory, this habitat type typically provides little forage for big game, but it is important from the standpoint of cover. At higher elevations, Engelmann spruce and subalpine fir regularly occur in uneven-aged stands. This habitat provides excellent summer cover for deer and elk. Aspen stands usually are found in areas with better soil moisture, or in areas of less severe exposure at elevations up to 10,500 feet. The understory in aspen typically consists of vigorous herbaceous growth, shrubbery and emerging conifers. This forest type is attractive to a variety of wildlife and provides important cover and forage for big game animals. On some sites aspen is the climax species; on other sites it is a transitional species that occurs for only a relatively short period of time after a disturbance such as fire. As temperature and winds become more extreme with increasing altitude, Engelmann spruce and subalpine fir become stunted, eventually giving way to forbs, grasses and sedges. Low growing plants are typically nestled among lichen-covered rocks. This is the alpine community, or tundra, which usually occurs above 11,000 feet in elevation. In those protected areas blanketed by snow during the winter, and kept moist by melting snow banks during the summer, thickets of willows can exist. Alpine sites can provide high quality elk forage from July through early September.

Land Status

About 88% of the DAU is public land which has management emphasis for big game winter range. The BLM controls portions of the lower elevations amounting to about 12% of the unit. Nearly 75% is under control of the USFS out of the Gunnison office and 1% of the DAU is under state control by the CDOW and the State Land Board. The remaining 12% is under private ownership and is used for livestock grazing and hay production. The private land is mostly located throughout the lower elevations and along drainages. Elk move onto their summer range as the snow melts in mid to late May. They graze the entire unit until after hunting seasons or until the snow conditions cover the available forage. Elk generally move down onto the winter range between mid-October and mid-December. During harsh winters the animals concentrate on severe winter ranges. Land ownership is categorized in Table 1.

TABLE 1. DAU E-43 Elk Winter Use Areas - Public vs. Private Ownership.

	WINTER RANGE	WINTER CONCENTRATION	SEVERE WINTER RANGE
% PUBLIC OWNERSHIP	79%	88%	74%
% PRIVATE OWNERSHIP	21%	12%	26%

Land Use

The main industries in this part of the state are recreation, tourism and ranching. Some commercial logging also takes place. The Taylor Ranger District of the Gunnison National Forest, Gunnison Basin Resource Area of the BLM administer federal lands within the DAU. Portions, of the Collegiate Peaks, Fossil Ridge and Maroon Bells-Snowmass Wilderness Areas are located within the DAU. Recreation, livestock grazing and wildlife production are the predominant uses of USFS and BLM lands, with timber harvest occurring in areas where there are suitable forest products; other activities such as right-of-way administration, mineral production, watershed protection and cultural resource protection are common to the two agencies.

Hunters can take deer, elk, bear, bighorn sheep, mountain goat, mountain lion and blue grouse in this portion of the Gunnison Basin. Good fishing is provided in several Gold Medal streams large reservoirs and numerous high lakes. Hunters and anglers make substantial contributions to local economies. DAU E-43 occupies a portion of Gunnison County. DOW figures show that for the year 1995, the total expenditures for elk hunting in this county were $5,347,000.00. People who take trips to observe and photograph wildlife also buy gas, groceries and other supplies, substantially impacting both destination areas and retailers along travel routes.

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

HABITAT RESOURCES

DAU E-43 contains 360 square miles of winter range and 150 square miles of severe winter

range. Elk move from the winter ranges about April 15 to intermediate ranges and onto summer range in early June. They generally stay on the summer ranges until early October when deep snow and hunting pressure force migration back through intermediate range to the winter range. Elk densities on winter range are 8 to 10 times greater then densities found on summer range. The migratory behavior of this elk herd is primarily a change in elevation in response to changes in weather conditions.

Increasing development and recreational uses within the DAU are of concern to the DOW and have lead to conflicts with wildlife. Alpine areas within the DAU are extremely important since all are utilized by elk.

A total of 48,017 acres (21%) of elk winter range, and 24,863 acres (26%) of severe winter range occur on private lands within the DAU (Table 2). Wildlife/livestock conflict areas are discussed in the Gunnison Basin DMP.

The concern about condition of wildlife seasonal ranges, especially winter ranges is significant and has been mentioned by several individuals. Dr. Roy Roth with the range science department at Colorado State University offers the following general comments. The wildlife winter range is unable to support the current numbers of wildlife without substantial risk to the populations. The shrub component clearly indicates that transitional and winter ranges are being over-browsed. Damage to resources can result in long-term loss of the habitat's ability to support grazing animals.

Bureau of Land Management personnel offered the following comments. Numbers of big game in excess of herd objectives from 1987 to 1996 have contributed to the degraded vegetation conditions on critical winter range. The intensity and frequency of big game use has resulted in plant communities that cannot support current populations without continued degradation. Because of this, the carrying capacity has been greatly reduced. The capacity of the winter range to support the current herd objective no longer exists. Both elk and deer need to be reduced to improve the winter range and transition range.

The Gunnison Basin Habitat Assessment Project reported on habitat conditions in portions of DAUs E-43 and E-43. A report released in January 1999 concluded: "Winter range in the study area is not in good shape. The vegetation is dominated by over-used and decadent big sage plants that have stunted growth and low production. This condition has resulted from a long time of over use from grazing herbivores. The key long-term risk, as we see it, is continued and/or accelerated damage to range resources." The GHAT report further states that they do not believe it is wise to plan for supplemental feeding programs to circumvent difficult winters.

TABLE 2. DAU E-43 Elk Winter Use Areas By Land Ownership.

	WINTER RANGE 230,516 Acres	WINTER CONCENTRATION 42,648 Acres	SEVERE WINTER RANGE 95,679 Acres
BLM **ACRES** **% OF TOTAL**	102,449 44%	22,558 53%	57,912 61%
FOREST **ACRES** **% OF TOTAL**	75,692 33%	13,750 32%	11,899 12%
PRIVATE **ACRES** **% OF TOTAL**	48,017 21%	4,937 12%	24,363 26%
DOW **ACRES** **% OF TOTAL**	200 >1%	126 >1%	200 >1%
LAND BOARD **ACRES** **% OF TOTAL**	4,158 2%	1,2277 3%	1,305 1%

Herd Management History

Post-hunt Population Size

The 1999 elk age and sex composition survey for DAU E-43 resulted in a count of 4,580 animals. This is about 1580 elk above the current long term objective of 3,000. For the same time period, the model (POPII) that was being used to predict population size for the DAU estimated a total population of 2,760 elk. There are several reasons for this discrepancy, but the truncation of age classes at 14, high winter severity indices and lower than projected wounding loss artificially depressed the estimate of population size. Dave Freddy, research biologist for the Division of Wildlife, was recruited to conduct a detailed analysis of existing inventory data and POPII models. Dave produced new spread sheet models, correcting the problems with number of age classes, winter severity indices and wounding loss that indicates there are currently about 4,500 elk in the DAU. Elk numbers in the Fossil Ridge DAU increased from around 4,500 animals in 1980 to a high of 7,200 in 1989. With increasing numbers of antlerless licenses being issued each year, the population has been on a steady decline ever since. The

1999 post-hunt population estimate is 4580 elk. The mean population size during the past 5 years (1995-1999) is about 4840 elk.

Disclaimer

Estimating population numbers of wild animals over large geographic areas is an inexact science. Whenever attempts have been made to account for a known number of animals in large fenced enclosures, investigators have consistently failed to see every animal. In some cases, less than 50% of the animals can be observed and counted. High-tech methods using remote sensing have also met with very limited success. Most population estimates derived using computer model simulations involve estimations of sex ratio at birth, survival rates, wounding loss and annual production. These simulations are then adjusted to align on measured posthunt age and sex ratio classification counts, and in some cases density estimates derived from line-transect or quadrat surveys. DOW recognizes population estimation as a serious limitation in our management efforts and attempts to minimize this problem by using the latest technology and inventory methodology available. As better information has been obtained on survival rates, wounding loss, fetal sex ratios and density estimates, and whenever new modeling techniques and programs have emerged, these have been assimilated into the process for population estimates. These changes may result in significant differences in the population size estimate and make new management strategies more appropriate. It is recommended that the population estimates presented in this document not be viewed as an exact representation of the number of animals in the DAU; instead, their utility is in helping to evaluate population trends over time.

Carrying Capacity

Decision makers must take carrying capacity into account when determining optimum size at which to maintain a herd. As any population of animals expands in a finite habitat, it eventually reaches a maximum sustainable level. That level for ungulates is usually governed by availability of food resources. Typically, survival and reproductive rates decline as the population approaches carrying capacity, until no further population growth is possible (see Appendix B for more discussion). Fewer resources are available to individuals in the population at this point due to the demands of increased numbers of animals. In most situations carrying capacity is not static, however, but fluctuates from year to year based on factors such as forage production, forage availability, and competition with other species. Herbivore populations respond to these fluctuations in carrying capacity, which in turn affects predator populations.

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

Post-hunt Herd Composition

Observed post-hunt calf:cow ratios in the Fossil Ridge DAU have fluctuated over the past 20 years from a low of 36 calves per 100 cows in 1981 to a high of 64 calves per 100 cows in 1996 (1980-1999) (Table 3). The average bull:cow ratio from 1980 to 1985 was about 11 bulls per 100 cows (Table 3). Antler point restrictions (APR) were implemented in the first two regular rifle seasons in 1986 but, spike bulls could still be legally harvested in the third rifle season. From 1992 to the present seasons, APR have been in effect in all elk seasons in the DAU. Post-hunt bull:cow ratios have averaged about 21 bulls per 100 cows over the past five years (1995-1999).

TABLE 3. DAU E-43 Age and Sex Ratios, 1980-1999.

Year	Count Type	Yrlg. M /100 F	2-Yr. M /100 F	Adult M /100 F	Total M /100 F	Young /100 F
1980	POST	6.8	1.7	0.7	9.3	47.8
1981	POST	8.7	1.6	1.3	11.6	36.4
1982	POST	7.1	1.6	0.9	9.6	46.1
1983	POST	10.2	0.7	2.4	13.3	66.0
1984	POST	5.9	1.1	1.5	8.6	42.2
1985	POST	12.3	0.5	1.4	14.2	46.2
1986	POST	7.6	1.3	0.9	9.7	43.9
1987	POST	12.4	2.0	1.9	16.3	50.2
1988	POST	12.8	1.9	2.8	17.5	51.8
1989	POST	13.0	1.7	3.0	17.7	55.9
1989	POST	13.0	1.7	3.0	17.7	55.9
1990	POST	9.6	2.4	1.4	13.4	51.2
1991	POST	11.3	2.7	2.1	16.1	44.5
1992	POST	13.2	1.0	1.5	15.7	53.1
1993	POST	21.1	2.4	1.4	24.9	46.8
1994	POST	17.7	3.3	3.5	24.4	51.2
1995	POST	15.7	3.2	2.6	21.5	44.2
1996	POST	15.6	4.0	2.5	22.0	64.3
1997	POST	16.3	2.7	1.0	20.0	52.3
1998	POST	13.2	3.1	1.6	17.9	48.7
1999	POST	13.7	1.8	0.9	16.4	50.2

Harvest History

From 1969 to 1999 the total elk harvest in the DAU fluctuated from a low of 199 animals in 1971 to highs of 1983 and 1744 in 1990 and 1996, respectively. The mean harvest for the last 5 years (1995-99) was 1149. The overall hunter success rate has continued to decline over the past

years. The mean success rate from 1988-92 was 21%, whereas, the mean success rate over the past 5 years dropped to 14% (Table 4).

From 1969 to 1999 the antlered harvest ranged from 134 bulls in 1971 to highs of 988 and 751 in 1990 and 1996, respectively. During this same time period, the antlerless harvest fluctuated drastically from a low of 65 in 1971 to 994 and 993 in 1990 and 1996, respectively.

Hunting Pressure

The number of hunters using the Fossil Ridge DAU steadily increased from 1844 in 1971 to over 6000 during the early 1980's (Table 4). The hunter numbers dropped to around 4400 in 1986, when antler point restrictions were implemented in the first 2 regular rifle seasons. As more and more hunters learned that they could take spike bulls in the other seasons, the number of hunters sharply increased to 8100 in 1991. Beginning in the 1992 seasons, antler point restrictions were implemented in all elk seasons. During the past 5 years (1995-99) the average annual number of hunters was about 8000.

Current Herd Status

The 1999 post-hunt elk population estimate in the Fossil Ridge DAU was 4470 animals (Appendix A). This is 1470 elk above the current long-term population objective of 3000. The difference between the 1999 post-hunt estimate and the current long-term objective is primarily the result of a new population model that was created in April, 2000. The newer model uses more recent elk survival and longevity data whereas, the older may have been underestimating the elk population. The current long-term post-hunt sex ratio objective is 20 bulls per 100 cows. The 1999 observed post-hunt sex ratio was 18 bulls per 100 cows. The average bull:cow ratio for the past 5 years (1995-1999) was 21.

TABLE 4. DAU E-43 Elk Harvest, Hunters and Percent Success, 1969-99.

Year	Total Males	Total Females	Total Young	Total Harvest	Total Hunters	Percent Success	Total Rec. Days
1969	505	317	65	887	2225	39.9	0

1970	548	73	22	643	5775	11.1	0
1971	134	52	13	199	1844	10.8	0
1972	447	133	34	614	3180	19.3	0
1973	427	112	27	566	4009	14.1	0
1974	637	239	48	924	5716	16.2	0
1975	587	221	71	879	6004	14.6	0
1976	536	319	115	970	5451	17.8	0
1977	687	310	58	1055	5284	20.0	0
1978	603	538	126	1267	6011	21.1	0
1979	487	283	50	820	5818	14.1	0
1980	454	453	103	1010	6475	15.6	0
1981	505	182	34	721	6291	11.5	0
1982	474	197	36	707	6024	11.7	0
1983	488	166	39	693	6080	11.4	0
1984	614	402	82	1098	5178	21.2	23859
1985	423	162	17	602	5807	10.4	30625
1986	427	233	43	703	4401	16.0	22172
1987	417	159	23	599	5022	11.9	26970
1988	533	395	79	1006	5456	18.4	29390
1989	801	593	92	1489	6603	22.6	34266
1990	988	831	163	1983	7146	27.7	35766
1991	797	448	106	1349	8100	16.7	44521
1992	655	578	77	1310	7516	17.4	38973
1993	456	631	110	1197	7841	16.0	43378
1994	515	480	67	1062	7508	13.5	39369
1995	384	310	42	736	7403	9.5	39464
1996	751	870	123	1744	8048	21.0	39587
1997	514	547	66	1127	8104	14.0	42864
1998	583	595	95	1273	8792	14.0	46859
1999	494	331	40	865	7638	11.0	40310
Tot.	16871	11172	2066	30109	186750	16.0	534995

MANAGEMENT ISSUES

Division of Wildlife Issues and Concerns

- **Limited Winter Range** - Only a limited amount of habitat is available to support deer, elk and pronghorn during the winter. More and more winter habitat is converted to housing and associated development every year. In severe winters elk become concentrated in the floor of the valley on a few south facing or wind swept slopes. Competition for food is intense and this results in higher than normal winter mortality. However, adult cow mortality during severe winters is usually less than 20%.

- **Habitat Condition** - In addition to the loss of habitat to human development, overall habitat condition in E-43may have declined over the last several decades. Sagebrush stands are tending to become more decadent and forbs are being lost in the understory. Long-term soil erosion has caused fertility to decline, and some riparian systems may be deteriorating. The combined effects of these are bound to be having some effect on big game.

- **Winter Feeding of Big Game –** Severe winter weather conditions occasionally require that big game animals, including elk be supplied supplemental feed in order to prevent game dame, control distribution of animals and reduce winter mortality. However, winter feeding has drawbacks in the form of concentration of animals, habituation of animals to humans, localized damage to winter ranges and the increased potential for disease outbreaks. Also, winter feeding is expensive both in the cost of supplemental feed and the increased demands for manpower and equipment. The DOW has a feeding policy that establishes criteria that determine where and when feeding will occur, but it is incumbent on the DOW to try and keep big game populations below the carrying capacity of the habitat to minimize the frequency of winter feeding events. The winter feeding policy will be used to determine when and if supplemental feeding will occur in DAU E-43.

Public Issues and Concerns

The public has expressed an interest in increasing the level of local participation in the process of making decisions influencing wildlife population objectives as well as regulations controlling types of hunting seasons and hunter participation. During the rewrite of the DAU plans for the Gunnison Basin, a new process for soliciting public input was tested by CDOW. Citizen Task Force (CTF), a process developed in New York State was selected as a result of the successful track record that had been developed in using this process to develop recommendations on specific management strategies. Public meetings were held in Lake City and Gunnison in December of 1997 to identify issues and allow people to define their “stake” or interest in the process. Following in January, representatives of the Division of Wildlife, Gunnison Basin Habitat Partnership Program committee, Forest Service and Bureau of Land Management met to nominate persons to serve on the CTF. Eighteen people were selected to represent a variety of

interests including business interests, sportspersons, the environmental community, ranchers, outfitters, the general public and government entities.

A list of issues concerning big game management that was developed by the Gunnison Basin Habitat Partnership Program committee IN THE Distribution Management Plan (November, 1992) is presented here. The issues are grouped in two major categories: short term and long term.

Short Term Problems/Issues

- Conflicts caused by distribution of big game.
- Consumption and/or damage to forage in stackyards, feedlots and corrals by big game.
- Fence damage by big game.

Long Term Problems/Issues

- Distribution of game.
- Elk on private property
- Spring use of private land and grazing allotments by big game that is detrimental to range or grazing readiness.
- Lack of information regarding carrying capacity of local habitat for grazing animals.
- Effect of uses of public land and timing of use of such lands that shifts distribution of big game into areas of potential conflict.
- Degradation of the shrub component of habitats due to winter concentrations of deer in specific locations.
- Degradation of aspen habitats due to winter concentration of elk in specific locations.
- Access to public lands denied by private landowners.
- Over-use of deferred pastures by big game may result in reduced available livestock forage.
- Habitat degradation due to continual use by concentrations of big game.
- There are areas in the basin where historical and improper resource management has resulted in degraded resource conditions thus decreasing carrying capacity.

Short Term and Long Term Problems/Issues

- Hunter problems: Lack of respect for property rights, trespassing without permission, gates not left in the condition they were found resulting in unacceptable distribution of livestock, fences cut/damaged, etc.
- Access to public land denied by private landowners
- Concerns and problems of the local CDOW office not fully understood or appreciated by state CDOW office.
- Big game damage to irrigated and other land types.
- Effect of development or change of land use in regard to all aspects of game management.

Land Management Agencies Issues and Concerns

- Land management agency personnel have expressed concerns that present population levels of elk are too large for the available habitat.
- Shrub communities have been over utilized and are in poor condition in some areas.
- Riparian vegetation has also been damaged in some areas.
- High elk populations may be a negative influence on deer and Gunnison sage grouse populations.

Issue Resolution

Obviously, no simple solution can possibly address all the concerns of our constituents. Issues, such as predation and bad hunter behavior, are beyond the scope of this plan. Each individual alternative under consideration may have some positive impact on each issue, or it may make matters worse. These impacts are summarized in the following section under each individual option.

ALTERNATIVE DEVELOPMENT

Alternative Management Strategies

Five alternatives are presented in this document representing a percentage of the potential alternatives. All of the alternatives for population size are lower than the estimated size of the current population. This reflects the concern expressed by CDOW, representatives of land management agencies, livestock interests and portions of the general public that habitat in this DAU can not sustain the current level of utilization for a long period of time without damaging the vegetative resource. The alternatives for sex ratio represent ratios that are below, the same and above the current sex ratio, but even the high ratio is lower then the bull:cow ratios needed for trophy or premier unit management

#1 Decrease population objective for elk currently in the Fossil Ridge herd and maintain the sex ratio at the present objective: 2,400 elk with 20 bulls per 100 cows

Discussion:

Basis for Alternative - This is lower then the current population objective, with a bull ratio the same as the current goal. The 1999 post-hunt population estimate of 4,470 elk is well above this alternative for population size. This alternative would require the largest number of antlerless licenses over the longest period of time to reach objective. This alternative would probably require innovative seasons such as all cow licenses being additional or two carcass tags per cow license in order to achieve the objective. The option would not require a restriction on the number of bull licenses. Bull to cow ratios may be high initially due to the large harvest of antlerless elk. Antler point restriction would be maintained.

Advantages of Alternative – The lower population objective would allow habitat resources to recover faster versus other population alternatives. Hunter success rates for antlerless animals would increase due to the need for late seasons to reach population objectives.

Disadvantages of Alternative - Hunter success for bull hunters will decrease after the population objective is obtained. The opportunity for hunters to harvest a mature bull will be lower or under this scenario.

#2 Retain current objective - *i.e.*, hold population at the current objective and hold sex ratio at current level:

3000 elk with 20 bulls per 100 cows

Discussion:

Basis for Alternative - This is the current DAU objective originally adopted in 1992. However, the population is substantially above the objective at this time. Achieving the stated bull ratio would be feasible with the current season structure.

Advantages of Alternative – Habitat would probably recover at this population level.

Disadvantages of Alternative – This population objective would be difficult to achieve in a reasonable time frame. The number of older age class bulls available for harvest would not increase.

#3 Increase population objective and hold sex ratio at current level:

3,500 elk with 20 bulls per 100 cows

Discussion:

Basis for Alternative – The target population objective would be much easier to reach.

Advantages of Alternative - This alternative yields the largest total annual harvest, which in turn would result in a positive fiscal impact.

Disadvantages of Alternative - This alternative probably carries the highest risk in terms of herd health and habitat condition. Large number of antlerless or either-sex licenses will be needed during times when the herd goes over objective. Past history has shown there is limited demand for these licenses, resulting in a large volume of licenses left over after the drawing.

#4 Increase population objective and maintain the bull:cow ratio at the current objective: 3000 to 3,500 elk with 20 bulls per 100 cows

Discussion:

Basis for Alternative – The population objective would be easier to obtain.

Advantages of Alternative – The range of population sizes would be easier to manage for. The sex ratio objective can be reached without limited antlered licenses and hunter opportunity would be maximized. Negative economic impacts would be minimized with this alternative.

Disadvantages of Alternative – The population size would possibly be too high to allow for recovery of degraded habitats.

#5 Manage the elk herd for a population ranging between a low of 3,000 animals to a high of 3,500 animals and increase the bull to cow ratio: 3,000 to 3,500 elk with 25 bulls per 100 cows

Discussion:

Basis for Alternative – This alternative was recommended by the Habitat Partnership Program committee (HPP). The Citizen's Task Force Group (CTF) recommended a

population objective of 3,500 elk.

Advantages of Alternative – Combines the sex ratio recommended by CTF and HPP with the ability to make timely and easy adjustments to population size. The number of older age class bulls would increase a slight amount.

Disadvantages of Alternative – May have a negative fiscal impact license agents and local communities due to reduced annual harvests, once the population has been lowered to this level. Hunter participation may need to be reduced to achieve the higher sex ratio objective.

Alternative Selection

The preferred population alternative is #5: 3,000 to 3,500 elk with 25 bulls per 100 cows.

Maintaining higher bull ratios comes with a price tag, however. There are a few less restrictive management options that could be implemented over the next 3-5 years to achieve the objective. If these options don't increase bull:cow ratios, hunter participation for bulls may need to be reduced by 50% or more. If antlered elk licenses become limited and available by drawing only, local license agents would loose revenue and there will be fiscal impacts to other merchants as well as CDOW. It has the broadest support of any option among the members of the CTF. It is also the option preferred by the Habitat Partnership Program committee.

Implementation

1. Hunting pressure on bulls may need to be reduced under alternative #5. It is possible that sex ratios will increase in the short term, as a result of lower hunter pressure associated with non-resident license fee increases. However, no recommendation for limited antlered licenses will be considered until the next five year season structure process following the 2004 hunting season.

2. Reducing elk numbers will probably result in healthier range resources that can be maintained for an extended period of time.

3. Habitat quality and quantity need to be maintained, otherwise it may be necessary to reduce the size of the E-43 population.

APPENDIX A

E-43 Population Model

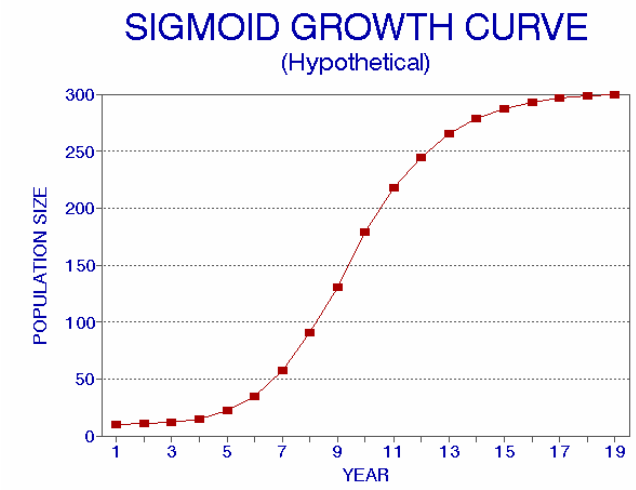
Population Size During Biological Year

Bio- Year	Start	Pre-Harvest	Post-Harvest	End	%- Growth
1980	5720	5720	4514	4163	-7.5
1981	5290	5290	4440	4111	5.2
1982	5568	5568	4732	4362	17.9
1983	6563	6563	5746	4786	-4.7
1984	6254	6254	4949	4571	-0.5
1985	6222	6222	5510	5083	8.4
1986	6746	6746	5912	5466	10.4
1987	7446	7446	6738	6222	13.3
1988	8437	8437	7236	6681	7.3
1989	9050	9050	7275	6708	-2.5
1990	8820	8820	6456	5959	-11.7
1991	7785	7785	6184	5720	-0.8
1992	7727	7727	6103	5545	-5.5
1993	7303	7303	5803	5367	-1.8
1994	7169	7169	5837	5392	-2.5
1995	6991	6991	6071	5628	8.9
1996	7615	7615	5466	4956	-13.4
1997	6597	6597	5182	4786	-6.0
1998	6201	6201	4621	4275	-8.7
1999	5659	5659	4583	4237	-3.7
2000	5452	5452	3963	3665	-13.2
2001	4729	4729	3368	3115	-14.7

APPENDIX B

Population Dynamics

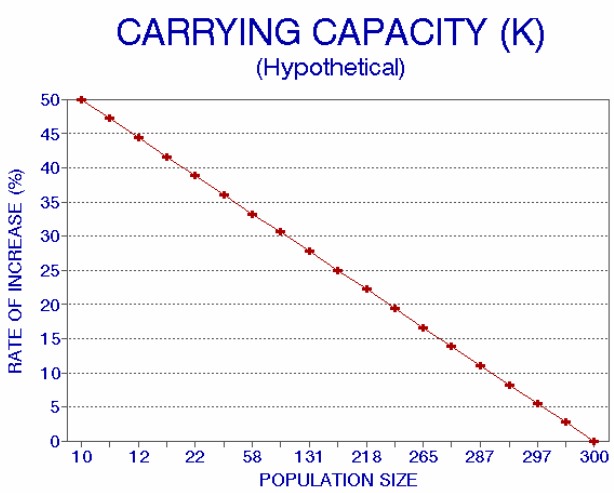
The sigmoid curve can be used to describe various phenomena in nature, including the typical growth pattern for animal populations. Three phases of this population growth curve are readily apparent:



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

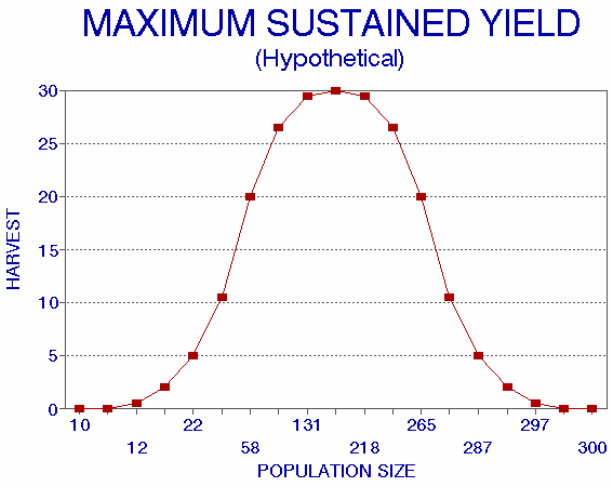
Prosperity Phase (years 6-15 on the graph): food, cover, water and living space are still abundant. Survival rates are at their highest. Although rate of increase is declining, the population begins to build "momentum" because of the increasing size of the core population; this results in larger increases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

Equilibrium Phase (Years 16-19 on the graph): the population continues to grow until it reaches the maximum carrying capacity of the habitat (the K value). Animals become crowded into available habitat, bringing them into direct competition with each other. Environmental resistance develops due to the scarcity of some resources. Game damage problems tend to be the worst under these circumstances. Momentum developed in the prosperity phase begins to dissipate as the rate of increase approaches zero. Overall condition of animals declines and mortality is high, especially among young and those under stress. Only the fittest animals breed successfully. Animals recruited into the population will equal those dying. If condition of the habitat deteriorates further, then deaths begin to exceed recruitment.



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

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



or-bust management scenario. On the other hand, managing at a point to the right of MSY tends to be very forgiving, since population dynamics naturally compensate for any management "mistakes”.

APPENDIX C

Public Involvement in Herd Unit Planning for Gunnison Basin, Colorado

Data Analysis Unit (DAU) or herd unit plans are the cornerstone of big game management in Colorado. They are viewed by the Colorado Division of Wildlife (DOW) as the equivalent of a "contract" with the local community and local representatives of statewide user groups for the approximate size of big game populations for the area defined in the plan. The Gunnison Basin DAU plans were written in 1993 and covered the years 1994-98. The plans were due to be updated in 1998 for the years 1999-2003. Big game DAU Plans are now written to cover a 10-year period.

One of the major outcomes of the Big Game License Allocation Project, a statewide project sponsored by the Division of Wildlife in 1997 and 1998, has been a declaration that the public wants to increase/improve the level of local participation in the process of making wildlife recommendations to the Wildlife Commission.

The Human Dimensions (HD) section was formed as part of the DOW reorganization in mid 1996. One task of this section was to improve the public involvement portion of DAU planning. Accordingly, the HD section recommended that a process proven successful as a means to develop recommendations on specific management strategies in New York State, known as Citizen's Task Force (CTF) planning, be tried in the Gunnison Basin.

Public meetings were held in Lake City and Gunnison on December 16 and 17, 1997 where the CTF process was described, and issues were identified, ranked and recorded using a nominal group technique. People identified their "stake" or interest in the process, and several people volunteered to serve as CTF members.

In January 1998, representatives of the Colorado Division of Wildlife (DOW), Gunnison Basin Habitat Partnership Program committee (HPP), United States Forest Service (USFS) and Bureau of Land Management (BLM) met to nominate persons to serve on the CTF. Twenty-five people were contacted to determine if they would serve on the committee; 17 accepted the invitation. There were 3 members to represent business interests, 2 to represent sportspersons, 2 to represent the environmental community, 2 to represent ranchers, 2 to represent outfitters, 3 to represent the general public and 3 to represent other agencies/entities of government. A third sportsman was added at the request of a sportsman's group, bringing the total to 18.

The CTF had their first meeting January 13, 1998 in Gunnison. John Gray, public involvement coordinator for the DOW, facilitated the first 9 CTF meetings and John Smeltzer, Human Deminsons Supervisor, facilitated the last 2 meetings. At the first meeting, John Gray explained the task for the CTF was to develop recommendations to the Colorado Wildlife Commission on post-season herd size and post-season sex ratio (bulls per 100 cows or bucks per 100 does) for

APPENDIX C (continued)

each of the 7 DAUs in the Gunnison Basin: three elk, three deer and one pronghorn. The CTF was charged with obtaining input from the variety of interest groups, trying to balance those interests and arriving at a recommendation on herd size and composition that "everyone can live with". Gray also explained that the process was open to the public and that consensus would be sought for each recommendation. During each meeting, the public in the audience (which varied from 4 to over 100 persons) was allowed to ask questions of speakers or make statements of fact or opinion. However, only those CTF members present were allowed to vote on the issues to be decided.

The initial plan was to have just 3 meetings with CTF members to develop the ecommendations. The first meeting was to present data/information, the second meeting to discuss and suggest alternatives, and the third meeting to select the alternatives that would become the DAU recommendations. The whole process was scheduled to be complete by April 1998. However, a few things occurred independently of the CTF process that had a major impact on the schedule: two lawsuits and a habitat study.

In January 1998 the Wildlife Commission (WC) passed regulations that totally limited all elk hunting in Game Management Units (GMUs) 66 and 67 on the south side of the Gunnison Basin. At the same meeting, the WC opened 48 GMU's in western Colorado to over-the-counter either sex elk hunting for 1998, including GMU's 54, 55 and 551, the north and east sides of the Gunnison Basin. These two decisions precipitated lawsuits that affected the local political climate in which the CTF operated.

During the spring of 1998, the Gunnison Basin HPP committee commissioned a study team, headed by Dr. Roy Roath, extension Range Specialist from Colorado State University, to conduct a habitat assessment in the Gunnison Basin. At the April 13, 1998 CTF meeting, Dr. Roath briefed the CTF on the study proposal and several HPP members urged the CTF to put their process on hold until the habitat report was finished. The CTF agreed to suspend further meetings until December 1998 at which time they would consider the condition/capacity information from the habitat study team.

During spring and summer 1998, the DOW lost two court cases. The group opposing the over-the-counter either-sex elk licenses in GMUs 54, 55 and 551 won their case. The DOW asked the Wildlife Commission to approve antler-less licenses for the fall hunt. The group opposed to the limitations in GMUs 66 and 67 won their case and the two units were once again open to unlimited, over-the-counter bull licenses.

The CTF remained focused on their task of developing recommendations for population size and sex ratios. They met once during the summer of 1998 and then started meeting regularly again in December 1998. In total, the CTF met 11 times with the last meeting in April, 2000. All recommendations except the population size for the three deer DAUs were reached by consensus. Decisions on deer numbers were reached by 9-4 majority vote.

The initial recommendations of the Gunnison Basin CTF were presented to the Wildlife Commission at their May 1999 meeting in Gunnison. CTF members understood that their recommendations will be considered along with the recommendations from the Gunnison Basin HPP committee, DOW staff, the federal agencies and local government.