LAKE FORK DATA ANALYSIS UNIT E-25

ELK MANAGEMENT PLAN

GAME MANAGEMENT UNITS 66 and 67

DIVISION OF WILDLIFE

300 W. NEW YORK AVE.

GUNNISON, CO 81230

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DAU E-25

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Executive Summary

DAU: E-25 Lake Fork Elk

Game Management Units: 66 and 67

Current Population Estimate: 7830 **Current Sex Ratio:** 20 Bulls:100 Cows

Old Population Objective: 3000 **Old Sex Ratio Objective:** 20:100

New Population Objective: 3500 - 4500 **New Sex Ratio Objective:** 25:100

Percent Change From Old Population Objective: 17% to 50% 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 meetings 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, CDOW personnel and the Habitat Study (Roth et al. 1998) 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 3500 to 4500 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. This objective is achievable under the current regulations of limited bull and/or either-sex licenses in all seasons and it is recommended to continue these regulations in the DAU. When regulations were passed to limit bull licenses in the DAU in 1998, the Wildlife Commission received strong written support for the proposal; 925 in favor, 182 opposed. The average ratio over the past 5 years (1995-99) is 18 bulls:100 cows.

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 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-25, 81% (51 of 63) supported the preferred alternative for population size and 93% (57 0f 61) supported the preferred alternative for bull:cow ratio. Included in the respondents which supported both 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", "current elk population estimate is too high" and "to many elk". Comments from opponent for the herd composition alternative included "trying to make a trophy unit".

Twenty eight (28) respondents specifically addressed the issue of limited bull licenses in E-25 and 96% supported maintaining totally limited elk licenses in the DAU.

SIGNIFICANT ISSUES

The Lake Fork elk DAU has historically been popular among elk hunters. This is mainly due to a large elk population, reasonable public access and 80% 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 relatively stable and significant reductions have not occurred over the past 10 years. New population models indicate that the population has continued to increase in recent years. Public land management personnel are concerned about the health of range resources. Most agree that some reduction is necessary, but there is some disagreement on how much reduction should occur. This disagreement is mostly focused around the current population estimate, which some stakeholders believe is too high.

INTRODUCTION AND PURPOSE

DOW's Management by Objective Process

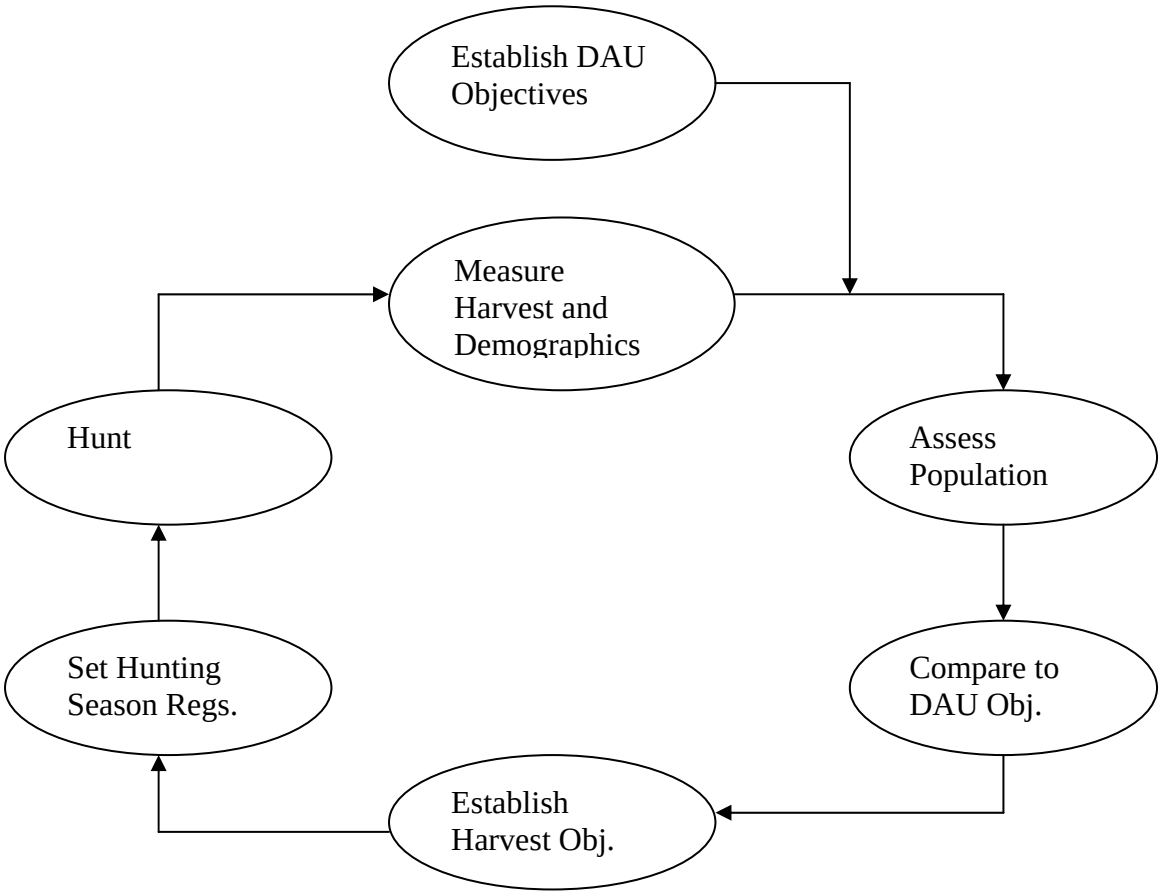
Big game seasons were historically set on the basis of tradition or by the vagaries of politics. Often, the seasons that resulted were not related to herd levels, status of the habitat or even balanced by the interests of affected publics. Hunters, the USDA Forest Service, the Bureau of Land Management, 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 per 100 females) 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

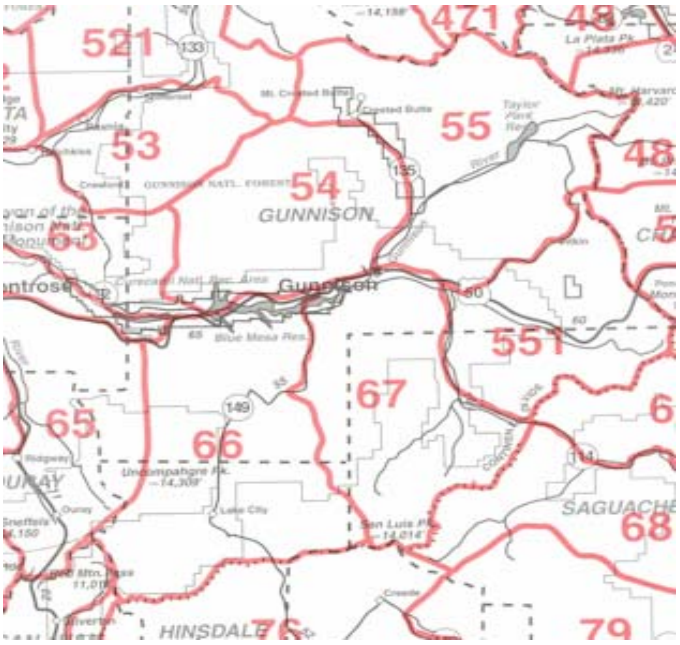
hopefully this new approach does a much better job of analyzing the desires of various publics and then setting objectives, helping to ensure that big game species are managed properly.

DESCRIPTION OF THE DATA ANALYSIS UNIT

Location

Data Analysis Unit (DAU) E-25 is located in the south central portion of southwestern Colorado in Gunnison, Saguache, and Hinsdale counties (Figure 1). This DAU contains Game Management Units 66 and 67 and is commonly referred to as the Lake Fork DAU. It is bounded on the north by Highway 50 and the Gunnison River, on the east by Colorado Highway 114 to the Continental Divide, on the east and south by the Continental Divide, on the west by the Hinsdale/San Juan county line and the Ouray/Hinsdale county line to Wetterhorn Peak and on the west by the divide between the Cimarron River and Big Blue Creek to the Gunnison River.

FIGURE 1. DAU E-25 Map



Topography & Climate

Topography **-** The Dominant Geological features of this unit are several peaks over 14,000 feet on the San Juan and La Garita mountain ranges. Morrow Point, Blue Mesa and Lake San Cristobal are major lakes that form part of a boundary or are found within this unit. There are numerous miles of streams and small lakes throughout

this unit. Cochetopa Creek, Lake Fork of the Gunnison River and the Cebolla Creek are the major drainages in the DAU. Cannibal Plateau-Mesa Seco is one of the larger flat alpine tundra areas in the state. The only town within this DAU is Lake City, although Gunnison sits on the north border of the DAU. DAU E-25 lies entirely above 7,000 feet in elevation.

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 Lake Fork 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. Some hay meadows have been seeded to alfalfa.

Wetlands and Transition Riparian occur along the river bottoms and irrigated meadows. Some of the best riparian habitat is along the Lake Fork of the Gunnison River between Lake San Cristobal and Blue Mesa Reservoir and Cebolla Creek. This area is dominated by narrowleaf cottonwood and willow. 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 Lake Fork 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 ponderosa pine, 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 Lake Fork area can be subdivided into three major types: ponderosa pine, aspen and spruce-fir. Ponderosa pine is the most widely distributed forest type. This species typically occurs in even-aged stands at elevations between 7,500 feet and 10,500 feet. This habitat type typically provides substantial amounts of forage for elk. 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. The Douglas-fir, forest type occurs in the Lake Fork area.

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

DAU E-25 contains a total of 1571 square miles. The USFS manages about 37% of this area while the BLM administers 43%. The management emphasis on the public lands is for big game winter range. The remaining 20% is in private ownership. Private land within the DAU is utilized mainly for livestock and hay production. DAU E-25 contains 663 square miles of winter range, 242 square miles of severe winter range, and 25 square miles of known calf production areas. 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-25 Elk Winter Use Areas - Public vs. Private Ownership.

	WINTER RANGE	WINTER CONCENTRATION	SEVERE WINTER RANGE
% PUBLIC OWNERSHIP	67%	52%	70%
% PRIVATE OWNERSHIP	33%	48%	30%

Land Use

The main industries in this part of the state are recreation, tourism and ranching. Some commercial logging also takes place. The Cebolla Ranger District of the Gunnison National Forest, Gunnison Basin Resource Area of the BLM, and Curecanti National Recreation Area administer federal lands within the DAU. All, or portions, of the Big Blue, La Garita and Powderhorn 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, pronghorn antelope, bighorn sheep, 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-25 occupies portions of three different counties, Gunnison, Hinsdale and Saguache. DOW figures show that for the year 1995, the total expenditures for elk hunting in these three counties was $6,094,950.00. 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

The DAU contains 424,267 acres of winter range and 155,076 acres of severe winter range (Table 2). Sixty seven percent (67%) of the winter range and 70% of the severe winter range occur on public lands (Table 2). Within the DAU, 139,221 acres (33%) of elk winter range and 46,052 acres (30%) of severe winter range occur on private lands. Wildlife/livestock conflict areas are discussed in the Gunnison Basin Big Game Distribution Management Plan (DMP) (November, 1992). Public land managers have expressed concerns about the condition of big game winter ranges.

TABLE 2. DAU E-25 Elk Winter Use Areas By Land Ownership.

	WINTER RANGE 424,267 TOTAL	WINTER CONCENTRATION 25,173 TOTAL	SEVERE WINTER RANGE 155,076 TOTAL
BLM ACRES **% OF TOTAL**	251,850 59%	12,959 51%	108,450 70%
FOREST ACRES **% OF TOTAL**	31,055 7%	161 1%	574 <1%
PRIVATE ACRES **% OF TOTAL**	139,221 33%	12,053 48%	46,052 30%
DOW ACRES **% OF TOTAL**	1,835 <1%	0 0%	0 0%
LAND BOARD ACRES **% OF TOTAL**	306 <1%	0 0%	0 0%

HERD MANAGEMENT HISTORY

Post-Hunt Population Size

The 1998 elk age and sex composition survey for DAU E-25 resulted in an actual count of 5,258 animals. For the same time period, the model (POPII) that was being used to predict population size for the DAU estimated a total population of 3,841 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 almost 8,000 elk in the DAU. The new models show that elk numbers in the Lake Fork DAU have steadily increased from around 4750 in 1980 to 7800 in 1999. Number of limited antler-less licenses has been sharply increased over the past several years, but harvest rates haven't been sufficient to start decreasing the population.

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 post-hunt 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

From 1981 to 1989, post-hunt calf:cow ratios in the DAU averaged 45.0:100. Calf:cow ratios averaged 44.8:100 from 1990-99 (Table 3). Bull:cow ratios from 1980-1985 averaged 8.3:100. Beginning in 1986, antler point restrictions (APR) were implemented in all elk seasons in the DAU. The average bull:cow ratio from 1986-97 was 17.6:100. In 1998 the Wildlife Commission passed regulation to reduce the number of bull elk hunters in the DAU by 50%. Even though a lawsuit overturned this regulation for the regular rifle seasons in 1998, the number of bull hunters was still less than in previous years. Bull hunters were reduced by 50% for all seasons in 1999. The average bull:cow ratio for 1998 and 1999 was 20.0:100.

TABLE 3. DAU E-25 Age and Sex Ratios, 1981-1999.

Year	Count Type	Yrlg. M /100 F	2-Yr. M /100 F	Adult M /100 F	Total M /100 F	Young /100 F
1981	POST	8.4	0.7	1.1	10.2	41.8
1983	POST	5.9	2.0	0.9	8.7	56.4
1984	POST	7.7	0.0	0.0	7.7	21.2
1985	POST	5.6	0.6	0.6	6.7	37.9
1986	POST	10.7	1.3	1.8	13.8	48.0
1987	POST	15.1	2.1	1.8	19.1	50.8
1988	POST	18.7	2.1	4.4	25.1	53.2
1989	POST	14.8	2.0	1.3	18.1	50.3
1990	POST	17.9	2.7	0.7	21.3	49.8
1991	POST	12.5	1.8	1.5	15.8	43.2
1992	POST	10.3	0.9	1.4	12.7	36.9
1993	POST	14.8	2.1	1.4	18.3	45.7
1994	POST	12.6	1.2	0.6	14.4	42.2
1995	POST	13.8	3.0	1.6	18.4	36.4
1996	POST	14.2	1.5	1.0	16.7	48.3
1997	POST	14.8	1.6	0.6	17.0	48.5
1998	POST	12.4	4.1	2.3	18.8	51.6
1999	POST	16.1	2.7	2.5	21.3	45.3

Harvest History

Over the past 31 years (1969-99), the total elk harvest in the DAU fluctuated from lows of 428 and 464 elk in 1971 and 1987, respectively to highs of 1361 and 1348 in 1978 and 1996, respectively (Table 4). During this time, bull harvest ranged from a low of 286 in 1987 to highs of 916 and 810 in 1978 and 1996, respectively. The low bull harvest in 1987 corresponds with the change in hunting regulations in 1986 that initiated antler point restrictions requiring all bull elk harvested by hunters have four points on one antler or a brow tine of at least five inches. The high bull harvest in 1996 also reinforces the idea that elk populations have continued to grow in the DAU since bull harvest for this year didn't include yearlings that were included in 1978. The average bull harvest over the past 5 years (1995-99) was 559. The antler-less elk (cows and calves) harvest fluctuated from a low of 71 in 1971 to highs of 527 in 1989 and 538 in 1996. The average hunter success rate over the past five years (1995-99) was 20 percent.

Hunting Pressure

From 1969 to 1985, the number of elk hunters using the DAU ranged from 1901 in 1969 to 4985 in 1981. In 1986, when APR were first implemented, the number of hunters dropped to 2998 (Table 4). Since that time, however, the number of hunters steadily climbed and reached a high of 5971 in 1997 (Table 4). Hunter numbers again declined in 1998 and 1999 to 4091 and 3753, respectively, due to Wildlife Commission regulation to reduce bull hunters in the DAU by 50%. The decision to reduce numbers of bull hunters was initiated by citizens from Lake City and Hinsdale County (the proposal was not unanimously supported by all public interests). The proponents requested the reduction in hunters to improve the quality of the hunting experience in the DAU. A 50% reduction in numbers of bull hunters to achieve an improvement in quality of hunting experience is different from the 75% or 80% reduction in bull hunter numbers that is required to achieve high bull cow ratios necessary for premier or trophy management areas.

Current Herd Status

The 1999 post-hunt elk population estimate in the Lake Fork DAU is about 7830 animals. This is 4830 elk above the current long term objective of 3000. The current long term post-hunt sex ratio objective is 20 bulls per 100 cows. The 1999 observed post-hunt sex ratio is 21:100. The mean bull:cow ratio for the past 5 years (1995-99) is 18:100. The large difference between the 1999 post-hunt estimate and the current long-term objective is the result of a new population model that was created April 2000. The newer model uses more recent elk survival and longevity data, whereas, the older model may have been under estimating the elk population.

Table 4. DAU E-25 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	401	142	18	561	1901	29.5	0
1970	721	74	8	803	4812	16.7	0
1971	357	60	11	428	3105	13.8	0
1972	465	119	28	612	2554	24.0	0
1973	435	102	9	546	3625	15.1	0
1974	521	191	23	735	4366	16.8	0
1975	495	208	29	732	4151	17.6	0
1976	484	335	79	898	4233	21.2	0
1977	580	327	43	950	3750	25.3	0
1978	916	397	48	1361	4962	27.4	0
1979	411	477	65	953	4635	20.6	0
1980	444	238	31	713	4850	14.7	0
1981	447	321	50	818	4985	16.4	0
1982	471	255	32	758	4663	16.3	0
1983	526	226	59	811	4609	17.6	0
1984	426	326	57	809	3819	21.2	18180
1985	476	198	48	722	4202	17.2	22816
1986	294	240	22	556	2998	18.5	15690
1987	286	162	16	464	3567	13.0	19614
1988	443	255	22	721	3724	19.4	20347
1989	490	468	59	1018	4590	22.2	24287
1990	730	475	46	1253	4957	25.3	25756
1991	550	329	32	911	4757	19.2	25978
1992	655	417	56	1128	5368	21.0	27156
1993	539	360	41	940	5713	16.4	31064
1994	550	414	53	1017	5228	19.5	27198
1995	419	332	56	807	5559	14.5	29872
1996	810	492	46	1348	5572	24.2	27442
1997	613	349	28	990	5971	16.6	31211
1998	439	420	79	938	4091	22.9	20762
1999	514	335	27	876	3753	23.0	19736
Tot.	15908	9044	1221	26173	135070	19.6	387109

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-25 may 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.

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 herd level 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 the current population objective for elk in the Lake Fork herd and decrease sex ratio: 2,400 elk with 15 bulls per 100 cows

Discussion:

Basis for Alternative - This is lower then the current population objective, with a bull ratio lower than the current goal. The 1999 post-hunt population estimate of 7830 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 still require a restriction on the number of bull licenses to control hunter density. Bull to cow ratios would be quite high initially due to the large harvest of antlerless elk. Antler point restrictions on bulls might not be needed initially during the period of extensive cow harvest, but would eventually be needed to keep bull to cow ratios from dropping below 15 bull per 100 cows.

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 - Due to the low bull ratio, 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 almost non-existent 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 smaller proportion of cows in the population inherent in this alternative probably would produce fewer calves and provide fewer animals for harvest. The number of older age class bulls available for harvest would not increase.

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

4,500 elk with 20 bulls per 100 cows

Discussion:

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

Advantages of Alternative - Along with Option #1, 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 increase the bull:cow ratio:

4,500 elk with 25 bulls per 100 cows

Discussion:

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

Advantages of Alternative - This alternative has the potential to produce the most high-quality bulls for trophy hunters. However, because bull licenses would need to be limited, license agents would not fully share in the positive fiscal impact.

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 3,500 animals to a high of 4,500 animals and increase the bull to cow ratio: 3,500 to 4,500 elk with 25 bulls per 100 cows

Discussion:

Basis for Alternative – This alternative was recommended by the Citizens Task Force (CTF) and the Habitat Partnership Program committee (HPP).

Advantages of Alternative – Combines the sex ratio recommended by CTF and HPP with the ability to make timely and easy adjustments to population size.

Disadvantages of Alternative – Would have a negative fiscal impact on license agents and local communities due to reduced annual harvests, once the population has been lowered to this level.

Alternative Selection

The preferred population alternative is #5: 3500 to 4500 elk with 25 bulls per 100 cows.

Maintaining higher bull ratios will come with a price tag, however. Hunter participation for bulls has already been reduced by 50%. This alternative will continue with that policy or perhaps result in greater reductions in order to reach the sex ratio objective of 25 bulls per 100 cows. Local license agents will continue to loose revenue from elk license sales. It has the broadest support of any option among those who submitted surveys from DAU meetings. It is also the option preferred by the Habitat Partnership Program committee.

Implementation

Hunting pressure on bulls will probably need to remain about the same under alternative #5. Further reductions in pressure on bulls may be accomplished by issuing either-sex licenses in place of antlered only licenses.

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

Habitat quality and quantity need to be maintained in good or better condition, otherwise it may be necessary to reduce the size of the E-25 population.

APPENDIX A

E-25 Population Model

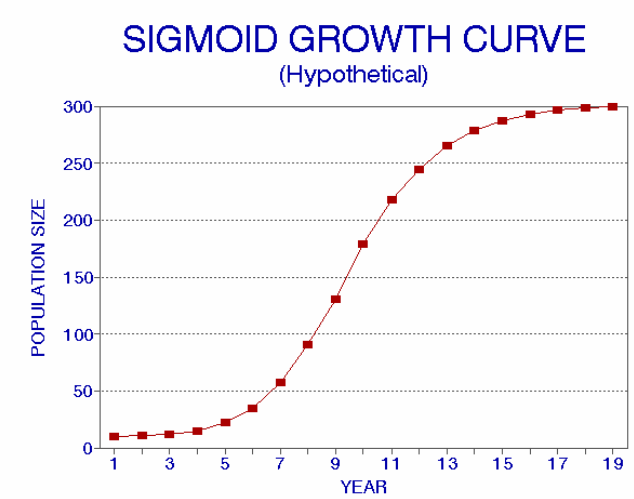
Population Size During Biological Year

Bio-Year	Start	Pre - Harvest	Post Harvest	End	% Growth
1980	5600	5600	4753	4388	2.0
1981	5711	5711	4736	4378	1.5
1982	5795	5795	4894	4519	9.8
1983	6365	6365	5407	4493	-9.0
1984	5792	5792	4827	4467	-0.7
1985	5750	5750	4897	4534	6.8
1986	6141	6141	5401	4984	11.3
1987	6834	6834	6206	5727	14.3
1988	7812	7812	6862	6331	7.2
1989	8372	8372	7050	6517	2.0
1990	8537	8537	6922	6396	-3.4
1991	8249	8249	7057	6536	-1.1
1992	8161	8161	6704	6146	-0.7
1993	8101	8101	6891	6372	1.2
1994	8197	8197	6859	6353	-2.5
1995	7992	7992	6942	6446	6.8
1996	8533	8533	6796	6064	-4.4
1997	8158	8158	6895	6364	7.3
1998	8757	8757	7481	6900	3.2
1999	9040	9040	7831	7253	2.4
2000	9256	9256	7351	6813	-6.8
2001	8624	8624	6586	6104	-7.3

APPENDIX B

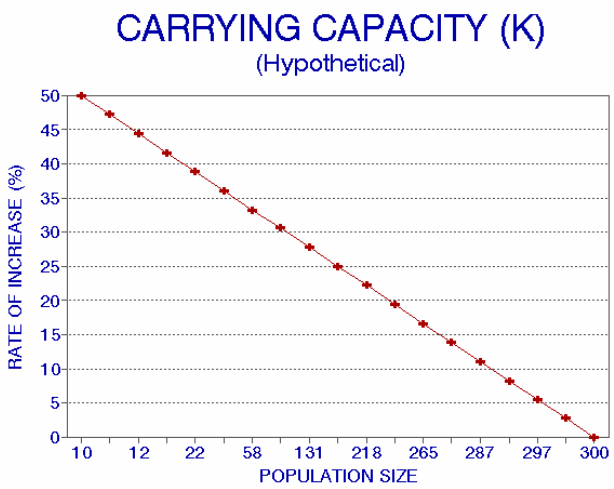
Population Dynamics

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:



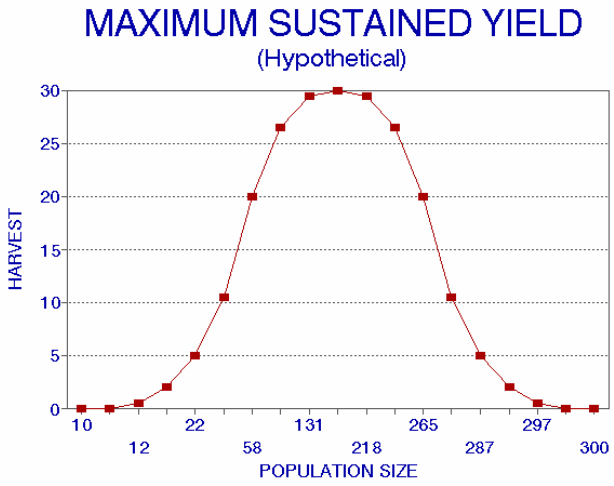
Establishment phase (years 1-5 on the graph): here the population is gaining a foothold; numbers are low, and the population will be significantly affected by mortality and recruitment (recruitment being animals added to the breeding component of the population). In this situation the rate of increase 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 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.

APPENDIX C (continued)

The initial plan was to have just 3 meetings with CTF members to develop the recommendations. 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 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.