

Other predators of elk including grizzly bears, black bears, and mountain lions have completed species management plans. If predation on elk by black bear or mountain lions is considered excessive, adjustments in harvest regulations for these species could be made if considered in an ecological context. Revisions of the black bear and mountain lion management plans are scheduled after current research studies on these species are completed between 2007 and 2009. Grizzly bears are currently a federally protected species managed under the Endangered Species Act. Like wolves, grizzly bears are being considered for delisting by the USFWS. Montana has completed a grizzly bear management plan for southwestern Montana and is working on a management plan for the rest of the state.

HB 262, passed by the 2003 Montana Legislature establishes policy for FWP regarding management of large predators. That policy is as follows:

**Policy for management of large predators – legislative intent.**

- (1) In managing large predators, the primary goals of the department must be to:
  - (a) preserve citizens' opportunities to hunt large game species;
  - (b) protect humans, livestock, and pets; and
  - (c) preserve and enhance the safety of the public during outdoor recreational and livelihood activities.
- (2) As used in this section:
  - (a) "large game species" means deer, elk, mountain sheep, moose, antelope, and mountain goats; and
  - (b) "large predators" means bears, mountain lions, and wolves.
- (3) With regard to large predators, it is the intent of the legislature that the specific provisions of this section concerning the management of large predators will control the general supervisory authority of the department regarding the management of all wildlife.

**Surveys of Hunter Attitude, Opinion, Preference, and Characteristics**

FWP has conducted a variety of statewide and more focused surveys of hunters for attitude, opinion, preference, and characteristics over the years through its Responsive Management Unit. Statewide samples of resident and non-resident hunters were surveyed in 1988 (Allen and FWP 1988), 1998 (King and Brooks 2001) and residents only in 2002 (Brooks, unpublished). We presented some results in earlier sections and will cover more general results here and within the following Economics and Commerce section.

Average age of all elk hunters increased from 38 years in 1988 to 46 years in 1998 and for residents only, remained stable at 42 years in 2002. In 1988, 5% of the sample was women, 6% in 1998, and 12% in 2002. Participation in archery hunting increased from 1% of the sample in 1988 to 15% in 1998. The percent of resident hunters that used an ATV increased from 4% in 1988, to 8% in 1998, and 9% in 2002. Non-resident hunter use of ATVs increased from 4% in 1988 to 11% in 1998. Resident hunter use of horses decreased from 22% in 1988, to 15% in 1998, and 14% in 2002. Non-resident hunter use of horses declined from 37% in 1988 to 26% in 1998.

Opinions of hunters on the use of roads for retrieval of elk did not change much in the 1988, 1998, and 2002 surveys. For 1988, 1998, and 2002, 53, 51%, and 47% respectively, of hunters said that only open roads should be used for vehicle retrieval of harvested elk. For the same years, 31%, 32%, and 37% said that closed roads should also be available for retrieval by vehicle. Similarly, 22%, 18%, and 17% said that hunters should be allowed to drive vehicles off-road for retrieval purposes.

In 1998, resident hunters were willing to pay about equal amounts more than current expenditures to double their chances of harvesting a 6-point or greater bull or see half as many hunters on their trip. Non-resident hunters were willing to pay about 50% more for the opportunity to harvest a 6-point or greater bull compared to the opportunity to see half as many hunters.

In 1998 and 2002, resident hunters were asked to choose among 3 bull elk regulation types: 1.) no permits required, hunt every year anywhere in the state, odds of harvesting a bull less than 1 in 10; 2.) unlimited permits, must choose hunting district, can hunt every year; and 3.) limited permits, may only receive permit 1 of 5 years, much better chance of harvesting a bull. Option 1 was favored by 39% of hunters in both 1988 and 2002, option 2 by 18% in 1988 and 17% in 2002, and option 3 by 10% in 1988 and 16% in 2002. Including the response of "do not favor, but would accept it", 63% of resident hunters in 1988 and 57% in 2002 chose option 1, 50% and 44% option 2, and 28% and 31% option 3. These results indicate that resident hunters prefer the opportunity to hunt every year to an improved chance to harvest a bull when they do hunt. It also indicated that they prefer the opportunity to hunt in multiple locations in the state within a year to an increased opportunity to harvest a bull. In 1988, non-residents favored option 2 (unlimited permits by hunting district).

Resident hunters were also asked in 2002 to rank order 5 options (1 to 5) for increasing antlerless elk harvest where population reductions were necessary. A combined ranking of 1<sup>st</sup> or 2<sup>nd</sup> choice was: lengthen season – 55.0%; increase A-7/antlerless permits – 50.9%; use a quota and season remains open until quota is met – 43.7%; use a "B-tag" for a second antlerless elk – 28.9% and; temporarily open closed roads for retrieval – 28.4%. The last 2 options had high (61.0% and 57.7%, respectively) negative rankings (4 or 5). Lengthen the season had the lowest negative ranking (12.4%).

Of resident hunters surveyed in 2002, 42% had attempted to gain permission to hunt elk on private lands. Of those, 59.6% were successful in obtaining permission (25% of all resident hunters). Of those residents actually hunting elk on private lands, 5.1% paid for the privilege (2.1% of all resident hunters). Block Management lands were hunted for elk by 25.3% of resident hunters.

Resident elk hunters were also asked in 2002 to rank priorities for FWP spending if additional funding became available. The following categories were targeted for more money spent by FWP by a majority of respondents: Hunting Access – 71.4%; Habitat Improvement – 59.6%; Habitat Acquisition – 51.8%; and Predator Management – 50.1%.

## Economics and Commerce

Elk are well known for their cultural and aesthetic importance to Montana, but they are economically very important as well. In 2001, hunters spent an estimated \$237,605,000 in Montana (USDI, FWS and Dept. of Commerce, U.S. Census Bureau 2003). Of this, non-residents spent \$63,771,000. Big game hunting accounted for about 80% of this total. Wildlife watching activities resulted in an estimated expenditure of \$350,335,000 and \$157,750,000 of this was spent by non-residents. Thus hunting and wildlife watching accounted for an estimated \$587,940,000 in expenditures in Montana, of which \$221,521,000 (37.7%) was by non-residents. This expenditure was equivalent to about 1.6% of total economic output in Montana during 1999 (Minnesota IMPLAN Group 2002). Inclusion of expenditures for fishing (\$292,050,000) raises the total to about 2.3% of all economic output in Montana. Based on the USFWS survey, hunting and wildlife watching generated about 23% of the economic output that farming, ranching, and agricultural services combined produced in Montana during 1999. Similar percentages were 62% of the combined economic output of all mining, 38% of the output of the petroleum industry, and 32% of the combined output of forestry products, wood products, and pulp and paper.

Studies of the Net Economic Value of elk hunting in Montana (Duffield 1988, King and Brooks 2001, and Brooks unpublished 2004) estimated expenditures per day by resident elk hunters of \$40.50 in 1988, \$47.20 in 1998, and \$53.82 in 2002. For non-residents, the comparable figures were \$186.56 in 1988 and \$207.42 in 1998. Estimates for non-residents were not made in 2002, but if expenditures increased at the same rate as for residents, the equivalent figure for non-residents in 2002 would have been \$236.00. These figures are expenditures for food, travel, and equipment (purchased for that trip only) and exclusive of license fees. An estimate of \$38,088,898 in resident and \$29,622,956 in non-resident expenditures, or \$67,711,854 total elk hunting expenditures are derived when expenditures per day are multiplied by number of days hunted for elk in Montana in 2002.

In 2002, elk license sales to Montana residents generated \$1,861,925 in income to FWP and non-resident elk license sales generated \$11,715,222 in income to FWP. This total of \$13,577,147 was about 53% of all license fees received by FWP and equal to the entire budget for the Wildlife Division. It also accounts for a high proportion of FWP's discretionary spending because much other FWP funding is earmarked for specific purposes. This total does not include elk permit drawing fees, archery license fees, or conservation licenses fees not included in license packages. It also does not include a share of \$5.6 million in Federal Pittman-Robertson funds that could be attributed to elk hunting/hunters. Thus, elk and elk hunting are of major importance to FWP funding and conservation and management programs for much more than elk.

Outfitting is a major industry in Montana and outfitted elk hunting is an important part of that industry. The majority of clients are non-residents; only about 1.5% of resident elk hunters utilize the services of outfitters (King and Brooks 2001). Although outfitter

sponsored licenses form a stable base of income for outfitters, some holders of the non-resident big game combination non-sponsored license also use the services of outfitters. Statistics compiled by Sime (2003) for a sample of elk hunting counties (Lincoln, Flathead, Gallatin, Beaverhead, Sweetgrass, and Madison) indicated that during 1999-2001 non-sponsored license holders averaging 44% of the number of sponsored license holders used the services of outfitters. Numbers of non-sponsored license holders using outfitters may be a slightly lower percentage than the above figure because of multiple reporting of the same client for multiple species. Thus in subsequent calculations, we use 35% of sponsored licenses as a multiplier.

Websites of Montana Outfitters and Guides Association (MOGA) listing elk hunting and prices for services were surveyed (<http://www.moga-montana.org/guide.html>). Seventy-two different businesses provided information relevant to elk hunting and fees on their websites. Notation was made if the site specifically mentioned availability of owned or exclusively leased private land or special private land hunts. If fees were different for different types of hunts, 2 hunters – one guide, one hunter – one guide, wilderness, lodge, etc., they were recorded separately and later averaged. Thus, for example, one business could provide 4 different fees for averaging costs of an outfitted elk hunt in Montana. For 86 hunting fee options that did not specifically mention the availability of owned or leased private land, the average price for an elk hunt was \$3,183.14 (range: \$1,695 - \$4,200). For 21 hunting fee options that mentioned the availability of owned or leased private land, the average price for an elk hunt was \$4,657.14 (range: \$2,950 - \$11,000). Thus the availability of owned or leased private land with a lightly hunted bull population added an average of about \$1,500 or 46% to the price of an outfitted elk hunt. The average for all 107 different price options recorded was \$3,472.43 for an outfitted elk hunt.

During 2002, 4,359 non-resident big game combination outfitter sponsored licenses and 652 non-resident elk combination outfitter sponsored licenses (5,011 total) were sold. Addition of 35% (1,754 non-sponsored hunters – see above) to that total indicates that 6,765 hunters may have used the services of outfitters to hunt elk in Montana during 2002. At an average price of \$3,472 per elk hunt, 6,765 elk hunters may have provided about \$23,488,080 in income to Montana outfitters. Thus outfitting elk hunters contributes substantially to bringing income to Montana from outside the state.

Much income to the state provided by elk is “hidden” in the retail and real estate sectors, among others. Many real estate ads in Montana trumpet the presence of elk in or near the subdivision or ranch as a prime attractant. Many products use the image of elk as an attractant or are designed to improve elk hunting and viewing. The Rocky Mountain Elk Foundation has its international headquarters in Missoula, Montana. Although most of its \$34,935,891 expenditures in 2002 was outside Montana, likely much of the \$4,724,704 management, general, and fundraising expenditures were spent in Montana along with at least some on the ground expenditures for habitat acquisition and improvement, etc.

## **Research**

FWP recently completed a 12-year study of: "Effects of hunting regulation changes on elk and hunters in the Gravelly-Snowcrest Mountains, Montana" (Hamlin and Ross 2002). This study examined the effects of changing bull elk regulations from AB to BAB to BTB over the period. It also examined the effects of changing antlerless permit levels. Effects on elk sex and age structure, reproduction, mortality, habitat use, distribution, movements and hunter numbers, success and attitudes were reported.

Currently, FWP is involved in 2 research projects related to elk. The first is a cooperative study with Montana State University – Ecology Department, USFWS, and NPS-Yellowstone National Park. This study is a long-term project to examine effects of wolf restoration on ungulates (especially elk) in the Greater Yellowstone Area of southwestern Montana. The study areas include the Northern Yellowstone range, the Madison-Firehole area of YNP, and the Gallatin, Madison and Gravelly-Snowcrest Mountains. Our study approach allows for comparisons among demographics of elk herds subject to wolf predation, but no hunting, herds affected by both wolf predation and hunting, and elk herds affected by hunting, but little or no wolf predation. As time progresses, expansion of the study outside the GYA may be necessary to find areas with no impact by wolf predation. By working in areas with differing ecological characteristics, including wolf abundance, we can make comparisons to identify factors that most impact wolf-elk dynamics. Because of the historical data on elk, we can make pre- and post-wolf comparisons among sites.

FWP and the University of Montana initiated a multi-year study in 2002 to document rates and causes of mortality of newborn elk calves in the east half of HD 292 in the Garnet EMU. Initiation of this study was in response to observed declining calf:100 cow ratios across much of FWP Region 2. This study also allows coordination with FWP's mountain lion research in the same area, following any changes in elk calf mortality coincident with known and manipulated changes in mountain lion densities. The study will also serve as an area without significant presence of grizzly bears or wolves for comparison with an elk calf mortality study on the Northern Yellowstone elk range where grizzly bears and wolves are a significant component of the elk predator complex.

## **The Elk Plan and Other Species**

Elk distribution and habitat requirements overlap those of a variety of other wildlife species and domestic livestock. Native predators may also influence elk population dynamics and management. Management objectives in this elk plan represent a balance with management objectives for other wildlife populations and landowner tolerance relative to domestic livestock operations and agricultural crops. To the extent possible, the needs of a variety of non-game and threatened and endangered species were also considered in formulation of management objectives for elk. FWP also considered the needs of plant species, habitat communities, soil, water and humans as individuals, groups and communities in this elk plan.

Management objectives for elk considered objectives in FWP species management plans for mule deer, black bear, mountain lion, grizzly bear in southwestern Montana and the Montana gray wolf conservation and management plan. A management plan for white-tailed deer is in preparation, a management plan for bighorn sheep is in the planning stage and updates of the black bear and mountain lion plans will be completed when current research projects are completed. As discussed earlier, HB 262 establishes FWP policy regarding managing large predators in relation to large game species.

### **Establishing Number Objectives for Elk**

The public questions how number objectives for elk populations and EMUs are established. For specific EMUs and populations, some believe the number objectives are too low and some believe they are too high. Without a firm biological basis for setting the objective, one opinion is as valid as another. In the 1950s, 1960s and early 1970s, specific number objectives were not set, but a biological based method was used to classify the elk population as too high, too low or "about right" based on forage use transects. After about 30 years, it became apparent that this method was not realistic. Subsequent elk population and forage changes have generally indicated that in many areas elk populations could be sustained at much higher numbers than our assumptions about forage indicated. We have not established alternative forage-based models.

An alternative model based on calf recruitment rates as a surrogate for the forage quantity/quality/nutrition model has also been followed, at least in some areas. The premise behind this model was that recruitment at levels below about 20 calves:100 cows west of the continental divide and 35 calves:100 cows east of the continental divide indicated nutritional deficiencies and overuse of the forage resource. Thus, at observed recruitment below these levels an elk population reduction was indicated to reduce competition for forage. Although in theory this model has potential, in practice, it has not been very predictive. Hindsight has shown that some early periods of low calf recruitment occurred at elk densities a quarter or half of later elk densities with much higher recruitment. With this model, low recruitment due to density-independent effects of weather and predation may often falsely indicate that long-term forage effects have occurred. Another problem with both models mentioned is that the substantial annual variation in forage production obscures potential elk number/forage relationships. Substantial reductions in elk numbers proposed for some areas in this elk plan revision would allow further testing of density effects on calf recruitment.

In practice, elk number objectives have been or will be established using the following considerations.

1. The history of long-term trend counts and discussions with landowners on many areas indicate to biologists at what count level and under what conditions agricultural damage complaints become more frequent or excessive. Objectives for number of elk counted will be established below levels of excessive damage problems. For other areas, especially on public lands in northwestern Montana, elk numbers are below levels sustained in the past. There, FWP objectives for elk numbers may be above current levels.

2. Input from sportspersons, public land managers, and the general public will also be considered.
3. Increasingly, in problem areas, Community Working Groups are formed to help all stakeholders come to consensus about objectives for elk numbers and potential solutions to elk management problems in the area.
4. FWP has come to recognize that in some areas and for some elk populations, demand for antlerless harvest with current regulations is less than is necessary to reduce the elk population from current levels to the objective. A substantially more liberal regulation package than traditionally used may be necessary to reduce the elk populations to objective levels. Once objective levels are met, regulations can be modified to maintain stable populations under average environmental conditions. These objective levels may be lower than ecological potential and driven more by sociological tolerance.
5. Elk populations in portions of some EMUs may be almost entirely inaccessible to hunters during the general hunting season or accessible to only a few hunters. To avoid over-harvest of accessible elk on public lands or private lands open to hunting, the inaccessible elk may not be included in objective numbers. Trend count number objectives may include only elk normally accessible to general hunting (if they are a distinct segment), though hunter access negotiations will continue. Elk occupying these "refuges" may be counted separately where practical (if they are a distinct segment) and sub-objectives established that could be operative if access negotiations are successful. If significant harvest of these "refuge" elk is possible with special management at some times and locations, they should be included in objective levels.

During winter and spring 2004, FWP biologists contacted many members of the public in various ways to discuss drafts of Elk Management (EMU) objective numbers for elk and proposed regulation packages. Comments received through these discussions were considered in writing the EMU Plans. EMU objectives and regulation packages were discussed at 54 meetings related to the 2004 season-setting process, with 18 Sportspersons Groups, with 7 Working Groups, with 45 individual sportspersons, with 23 outfitters, with 4 landowner/outfitters, and with 288 landowners in elk habitat.

It is apparent in many areas, especially with significant elk use of private land, that the ecological potential for elk numbers is substantially above the numbers sustainable based on landowner tolerance. For these areas, the expectations of private landowners will be an important component in establishing objectives for elk numbers.