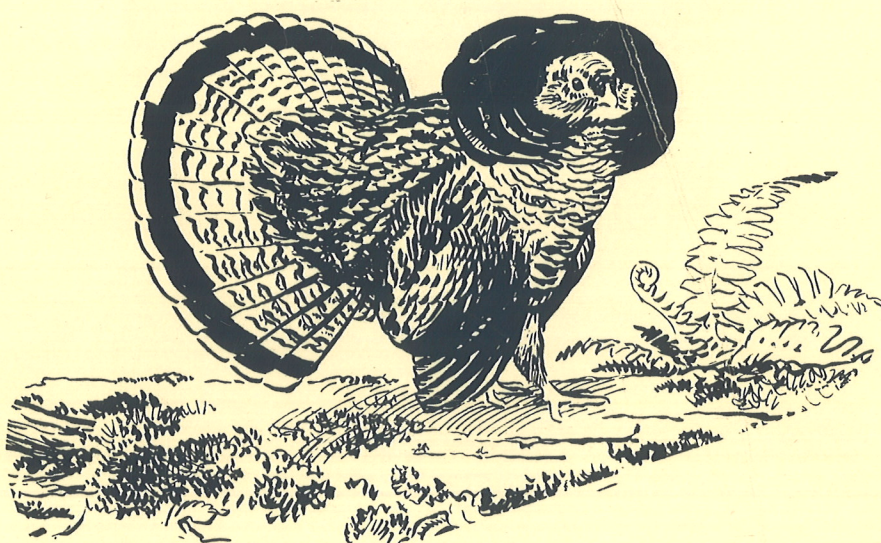


THE WILDLIFE SOCIETY
MONTANA CHAPTER



26TH ANNUAL MEETING

Lewistown, Montana

10 & 11 February 1988

The Wildlife Society
1988 Montana State Chapter Meeting
Yogo Inn, Lewistown

Tuesday, 9 February

0800-on	Non-game Symposium
1800-2100	Registration, TWS, Montana Chapter

Wednesday, 10 February

0700-0850	Registration
0900-1000	<u>Keynote Address</u> --Wildlife Population Regulation: Predation, Habitat, or Management Screwups? Ray Demarchi, Ministry of Environment, Cranbrook, B.C.
1000-1030	Winter Food Habits of Wolves in the North Fork of the Flathead, Montana and British Columbia. R. Ream, D. Pletscher, M. Fairchild, and D. Boyd. University of Montana, Missoula.
1030-1100	Break
1100-1130	Trumpeter Swan Management in the Tristate Area. Barry Reiswig, Red Rock Lakes NWR, Lima, MT.
1130-1200	Models of Hunting Mortality in Game Bird Populations: from Errington to '88. Joe Ball, Mont. Coop. Wildlife Research Unit, University of Montana, Missoula.
1200-1330	Lunch
1330-1400	The Montana Riparian Association. Ronald Bachelor, M.R.A., Bozeman, MT.
1400-1430	Ethics and the Resource Professional. Tom Butts, Montana Department of Fish, Wildlife and Parks, Roundup, MT.
1430-1500	Applications of Geographical Information Systems to Wildlife Management and Research. Randy Matchett, Charles M. Russell NWR., Lewistown, MT.
1500-1530	Break

Wednesday, 10 February (continued)

- 1530-1600 Rough Terrain: A Refuge for Prairie Mule Deer?
Susan Ball, Mont. Coop. Wildlife Research Unit,
University of Montana, Missoula.
- 1600-1630 What's in a Trend?
Dick Mackie, Montana State University, Bozeman.
- 1630-1700 Density Dependence: Does It Work in a Fluctuating
Environment?
Ken Hamlin, Montana Department of Fish, Wildlife
and Parks, Bozeman, MT.
- 1800-1900 Social Hour
- 1900-2100 Awards Banquet

Thursday, 11 February

- 0730-1000 Business Buffet Breakfast
"What is our Role?" and other exciting topics.
BE THERE!
- 1000-1030 The World Outside and the Pictures in Our Heads:
Some Thoughts on the Identity and Images of
Wildlife Professionals.
Tim Clark, Northern Rockies Conservation
Cooperative, Jackson, WY.
- 1030-1100 Riparian Management in Upland Drainages in Eastern
Montana.
Mark Gorges, U.S. Bureau of Land Management,
Miles City, MT.
- 1100-1130 Does Montana Wildlife Need Wildlife Biologists?
Harold Picton, Montana State University,
Bozeman.
- 1130 Final Announcements and Close

Abstract

Winter Food Habits of Wolves in the North Fork of the Flathead,
Montana and British Columbia

Authors: R.R. Ream, D.H. Pletscher, M.W. Fairchild, and D.K. Boyd

Presented by: Mike Fairchild

Food habits of a pack of gray wolves (Canis lupus) inhabiting the North Fork of the Flathead Valley of Glacier National Park, Montana and adjacent British Columbia are described for 2 winters (1985-86 and 1986-87). The winter season was defined as 1 December through 14 April, a period when predictable snow cover facilitates discovery of verifiable wolf scats and kills. Fifty-three scats and 16 kills were examined in 1985-86; 66 scats and 36 kills were examined from the 1986-87 winter. Combined, deer and elk comprised nearly 100% of the biomass consumed. There was no significant difference ($P > 0.25$) in the relative frequency of deer and elk in the diet of wolves between years as determined by either scat analysis or kills. There was a significant difference ($P < 0.05$) between calculations of the relative frequencies of deer and elk by scat analysis and location of kills within years. Biases of determining relative frequencies and consumption rates of wolf prey items are discussed and a method for combining the 2 data types is presented.

ETHICS AND THE WILDLIFE PROFESSIONAL

Tom Butts

Mt. Dept. of Fish, Wildlife, and Parks

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Ethics is a hot topic lately. Media reports of insider trading on Wall Street, devious deals on Capitol Hill, and preachers gone amok are commonplace. U.S. News and World Report asked us "Are We A Nation of Liars?" Everywhere we look the cherished American values of fair play and sportsmanship seem to have been superceded by the cherished American values of avarice and deceit. Intense competition by the rules is still the game, but the rules have changed. Unfortunately, outdoor recreational pursuits have not escaped this trend.

Recently I attended the First International Conference on Outdoor Ethics, held in Missouri and sponsored by the Izaak Walton League. For several days, nearly 250 registrants, from six countries, including representatives of sportsmen's clubs, leaders of industry, outdoor writers, resource professionals, educators, and public officials, struggled with the topic.

Among participants at the Conference were a number of individuals who felt that too much emphasis had been placed on the negative behavior of outdoor users, and that we should instead focus on the positive aspects of outdoor recreation. There were also several participants that expressed the well worn platitude that, after all, it is only a few slob that spoil it for all of us. The Conference itself seemed to me to be a

statement of need, an admission that we have many problems related to outdoor behavior, and that these problems need to be faced squarely and addressed by all of us.

Any doubt that many hunters need to examine their values would be dispelled if you were to accompany me into the heart of antelope country here in Eastern Montana on the opening day of antelope season. Trespassing without permission, shooting from roads and from vehicles, shooting at herds of running animals, shooting with disregard for buildings or people in the line of fire, and chasing antelope with vehicles are commonplace and easily observed events. By evening of the opening day almost every landowner you visit has another horror story about something he witnessed that day, and dead and abandoned, or crippled antelope are commonly seen.

That many hunters and fishermen don't think too highly of the behavior of "the other guy" is evidenced by the many testimonials against innovative hunting and fishing regulations because of a fear that "there will be too many spikes just shot and abandoned" or too many fishermen will keep their biggest fish on a stringer, only to throw it back to die if they catch one bigger. We as wildlife professionals must admit that there are problems afield if we are to have any input at all in future decisions concerning wildlife and outdoor recreation.

My Webster's dictionary defines ethics as "a set of values; the discipline dealing with what is good or bad, right or wrong." Aldo Leopold said that ethics, philosophically, are a differentiation of social from anti-social behavior, while

ecologically, ethics are " a limitation on freedom of action in the struggle for existence." He sounds more like a professor than a poet here, but you get the idea. It sounds simple enough, a set of rules to live by, like the Golden Rule, to guide us, to help us decide what is right and wrong.

In "Zen and the Art of Motorcycle Maintenance" Robert Pirsig struggled with the concept of quality. He eventually decided that his students already knew what quality was, and that they didn't need to be taught, for instance, what was good literature and what was bad, for they could already recognize this innately. I once thought the same of ethics; now I wonder about either.

One definition of ethics insisted that ethics of individuals depended, to a great extent, on "community standards." This seems to be the tack taken by the framers of laws dealing with pornography. Controversy arises over whose community will be used as the standard. The community of fundamentalist churches will certainly have a different point of view from the community of strip joint operators. In some states the use of dogs to hunt deer is an old and accepted practice, and is legal; in others it is not. Wisconsin lawmakers recently admitted that "party hunting," where anyone in a party may fill anyone else's tag, is widely practiced, so they now issue a "party tag." Many practices approved of widely, however, are not considered ethical or legal. I'm told that baiting of ducks is widely practiced today in parts of the South, as it has been since the days of market hunting. Many of the current practitioners are descendants of market hunters, and were taught that baiting was

the only way to hunt ducks. The community of federal agents doesn't agree. In central Montana I know a number of hunters, raised on ranches or in small towns, that learned that hunting antelope was done from a pickup at high speed. They do it today, though the law frowns upon it.

We as wildlife professionals had better not forget that, to some, hunting and fishing are not ethical pursuits, regardless of method or intent. Many, including staunch conservationists, view our profession with disdain. Some feel that it is unethical to presume to manage wildlife for the "use of man." The term "good hunter ethics" is, to some, a contradiction.

Where do our values come from? I presume most of us would say that we love wildlife and the outdoors. Most of us grew up in rural communities, and had many opportunities to spend time outside. Perhaps our parents or a relative took us fishing or hunting. Perhaps a teacher turned us on to biology. I'll also bet most of us now pursue our outdoor activities a little differently than we did as a youth. Hopefully, we're more refined; maybe a few of us are even a bit snobbish. We opt for catch and release, dry flies, barbless hooks, instead of bobbers and night crawlers, and full stringers. How'd we get there?

As we have matured, our operational definition of community has expanded. Visualize a series of concentric circles, like the rings expanding outward across a still pond after the thrown stone. As a young child, our concerns and desires, wants and needs, are focused solely on the innermost circle. As we mature our concern takes in more circles. First, beyond our immediate

selves, is our family, and then the community we live in. Some people's view of the community they live in expands to the entire earth, or beyond. It is important to understand that everyone feels directly a part of whatever level of community they identify with, and that whatever is good or bad for them as an individual **must** be good or bad for that community as well.

This transition of focus occurs at different rates for different people, and of course some people get stuck at one level for a lifetime. I'm not sure how this progression takes place, but I assume experience and good examples enter into it, as well as reflection.

When we speak of "higher ethical standards" or "better outdoor behavior" we are simply recognizing that someone's decisions and actions could be based on a broader definition of community.

Drs. Norton, Jackson, and Anderson of the University of Wisconsin, found that an analogous evolution takes place in the behavior of hunters. Beginning hunters often define a good hunt as one in which they were able to do a lot of shooting, though they may have bagged nothing. Eventually they may succeed at hitting something, so their goal then becomes filling the bag limit. This, too, may become relatively easy if they persist. They then become trophy hunters. Once this is accomplished, they may seek further challenges by choosing difficult techniques, such as archery, or using a single shot rifle. Finally, a hunter's satisfaction may come from simply being afield.

In her book "Thinking Like A Mountain", Susan Flader has

documented the steps that Aldo Leopold went through as a hunter, outdoorsman, professional biologist, and ecologist, to arrive at an ecological worldview that "changed man from conqueror of the land community to plain member and citizen of it." An interesting and useful exercise for the professional wildlifer is to consider which "concentric circle" Leopold was speaking from, when considering one of his many, oft-quoted "Leopoldisms."

How can we, as wildlife professionals, use this information? First, we can be sure that our public, the outdoor recreationists, will cover the gamut of possibilities, and just as the age structure of a growing population is pyramid shaped, with many young and few old members, so there will be many folks that are primarily "me" centered and fewer whose value systems are more broadly based. Likewise, there will be many hunters whose chief aim is to expend great quantities of ammunition, and few that find satisfaction enough in just being out enjoying the hunt. Second, we can reason that for an expansion to occur, there must be examples to emulate, and an opportunity to do so. Third, we now have a means to evaluate values, including our own.

One of the strongest recommendations coming from the Outdoor Ethics Conference concerned the need for more education. In fact, education was felt to be the "key to meeting the challenge of solving problems caused by outdoor recreationists", requiring "instilling knowledge, skills, and responsible attitudes, through involvement and experience."

I agree that education is critically important, but we must be careful of our approach. Education, all too often, translates

to indoctrination. If our approach is to "teach good outdoor ethics" we will fail. Sponsor a symposium on how to call elk, and you will have a full house. Hold a free class on hunter ethics and you'll likely be the only one there. Part of the problem is that no one is walking around thinking "Gee, I sure have bad ethics. I wonder where I can get good ethics," Everyone has a code of ethics, and I'm sure everyone thinks they're just fine.

We can educate in other ways. Laws frequently are a community's attempt to coerce those centered at the "me" level to behave for the common good, through threat of punishment. To evolve beyond this level, there should be an opportunity and encouragement to do so. The creation of walk-in areas, for example, where hunters must park and walk to hunt and retrieve their game, has provided the opportunity for a number of hunters to discover that they can hunt on foot, and enjoy the experience. My acquaintances that hunt antelope from the window of a fast-moving pickup haven't been discouraged by laws against it, but are meeting more hunters each year that frown on the practice and refuse to participate.

Wildlife management has a long history of supporting laws regulating hunting ethics. Shotguns with plugs, firearms and caliber restrictions, bans on night hunting, or hunting from a vehicle: all of these regulations and more have nothing to do with how many animals are harvested, but how they are taken. We can't abandon the battle now, because the future of hunting, not wildlife, is at stake. Let us never convey the impression,

through our own behavior, or through our regulations, that animals are just moving targets, not worthy of respect. Let's try to move the hunter through the stages of maturation as quickly as we can through example and opportunity.

If we wanted one standard to judge our decisions as wildlife professionals, Leopold gave it to us, and this time he was speaking as an ecologist and a poet: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."

THE GIST OF G.I.S.

Marc R. Matchett, Charles M. Russell NWR, Box 110, Lewistown, Montana 59457

Abstract: Geographical Information Systems (GIS) can be valuable tools for resource managers and researchers. GIS involves computer mapping, analysis, and database management. GIS allows the user to organize, manipulate, and interpret map-based information. This presentation introduces GIS technology, gives examples of GIS applications, and describes costs and benefits. True GIS packages (e.g. MOSS/MAPS, VICAR-IBIS, and ARC/INFO) have the ability to manipulate, analyze, and create new data themes from existing data. Computer-Aided-Mapping packages are not a true GIS and only have the ability to "regurgitate" map information or overplot data themes. All GIS systems require digitized data. Maps are digitally coded into a data file of Universal Transverse Mercator (UTM) or longitude and latitude coordinates. Examples of the kinds of data (themes) that can be used in GIS systems include: water features, roads, vegetation cover types, habitat types, soils, recreation areas, wildlife locations, eagle nests, animal home ranges, elevation contours, grouse dancing grounds, or virtually anything that could be put on a map. Sources for these data themes range from field collected UTM coordinates of animal locations to standard topographic quadrangles to LANDSAT imagery. A USDA Forest Service video was shown illustrating how GIS was used as part of cumulative effects analyses on grizzly bears. In this video, various kinds of disturbance (e.g. roads, trailheads, campsites, etc.) were buffered with a "zone of influence" and then mapped with a vegetation cover map. The result was an illustration of the impacts of various disturbances on grizzly bears and their habitat. Suppose a management area was concerned with potential mountain pine beetle infestations in lodgepole pine stands. Suppose also that managers know that stands on southern or westerly slopes, between 5,000 and 6,500 feet elevation, with trees 60 to 100 years old are particularly susceptible to attack. GIS can quickly produce a map of the stands that met all of these criteria simultaneously. If the road network is then super-imposed over this map, the timber sale planners can be well on their way to designing timber sales to minimize losses from beetles. Suppose further that the wildlife biologist overlaid an elk calving map or threatened and endangered species habitat use map on the proposed timber sale map. Areas of potential conflict can be readily identified. Many different management alternatives can be plotted, examined, and discussed. Final management decisions can then be based on the best available facts and in an interdisciplinary framework. Another example of GIS use is in research on wildlife habitat use and selection. Any data theme or various combinations of data themes can be overlaid on an animal's home range. GIS programs can easily calculate acreages of various components contained within that home range. Home ranges can be re-plotted randomly on the study area to yield insights into habitat use vs. availability. The user's imagination is one limit to applications of GIS technology. The other basic limit is money. GIS is expensive. I perceive use of GIS as a cooperative effort among resource agencies. I believe GIS should be treated as a library. We all use a library, but for different purposes. Somebody spent a great deal of time, effort, and money on each book in a library. The same is true for GIS. Time and money will have to be spent on each map in a GIS system. Once completed, many types of resource managers with many types of applications can then access that GIS library. As more people use GIS libraries, the cost/project decreases. I predict that within 25 years, using GIS systems will be as commonplace as a research trip to the library.

Rough Terrain: A Refuge for Prairie Mule Deer?

Susan K. Ball

Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT 58712

Movement patterns and daytime habitat selection by mule deer (*Odocoileus hemionus*) were investigated using radio telemetry and sign transects. Home range sizes were intermediate between those in mountain-foothill and in rolling prairie habitats, indicating moderate habitat complexity. Home range size was negatively correlated with doe age and with the roughness of the area occupied. A positive relationship existed between age of does and roughness of core areas, suggesting that mortality rates may be lowest in roughest terrain. More than 90% of all deer sign and locations of marked deer were in rough breaks habitat. Deer avoided most plateau and river bench habitats, and selected mesic sites including steep north slopes and shrubby draws.

Mule deer in the upper Missouri River breaks fed in grainfields from September to April. Deer used grainfields primarily at night, fed more often in stubble strips than in new winter wheat, preferred field areas <200 m from escape terrain, and avoided areas >400 m from it. High reproductive and fawn survival rates of this population indicated the individuals were in excellent nutritional condition. The nutritional benefits and potential effects of agricultural crop use by mule deer on their population dynamics should be considered in management decisions.

Habitat use and movement patterns of mule deer were also investigated to determine potential impacts of a proposed hydroelectric dam. Floodplain riparian zones and islands made up 1% of the primary deer habitat but were used by approximately 3% of the fawns in July. Because elevations below the proposed inundation level were generally avoided by mule deer, potential losses of the resident herd were estimated at 4-8% rather than the 10% predicted by the overall loss of primary deer habitat. Major impacts could result from loss of rough terrain and woody riparian sites, and secondary impacts could result from increased harassment and hunting pressure if recreational access is developed. Mitigation should be directed at restoring and enhancing woody riparian and shrub cover, and discouraging recreational access into rough terrain if necessary.

ABSTRACT

"THE WORLD OUTSIDE AND THE PICTURES IN OUR HEADS:"

SOME THOUGHTS ON THE IDENTITY AND IMAGES OF WILDLIFE PROFESSIONALS

We wildlife professionals have been entrusted by society to make sure wildlife is just as well off, if not better off, when we turn the helm over to the next generation of biologists, as when the responsibility came to us. This is getting harder as threats to wildlife increase and because the world is getting more complex. Conserving wildlife is the bottom line and that means we must be effective. Many professionals feel we need to be more effective and see that keys to increased performance lie somewhere within our professional makeup, our agencies, and our relationship with the public. Three dimensions of wildlife work--our sense of professionalism, organizations, and policy processes--will be examined to suggest where professionals are constrained and where improved performance can be expected. The social sciences already have useful models and tools which can help wildlifers in practical ways, directly and immediately. But to use these tools will require some reorientation and broadening of our professional attitudes and knowledge of organizations and policy processes. Suggestions for enhanced effectiveness are offered. Our responsibilities to wildlife, society, and to ourselves demands that we move forward quickly to improve our individual and profession-wide performance.

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Paper Title: Riparian Management in Upland Drainages in Eastern Montana

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Abstract:

The management of vegetation in upland drainages has a major impact on fisheries in eastern Montana. Upland riparian areas and wooded draws help to hold soils, reduce channel cutting and provide habitat for wildlife species.

Fencing works for protection but is impractical on a large scale. A basic rest-rotation grazing system protects established riparian vegetation as well as the upland grasses. But to establish woody riparian vegetation requires more protection. Double rest-rotation is a grazing system that we are using. We have planted trees and shrubs within this system; we have also planted pole-sized cottonwoods with some success. We have had 99% success in leafing out of cottonwood poles up to 5 inches in diameter. Longterm saturation of roots has killed a majority of those trees. However, this inexpensive technique seems to work on drier sites where moisture is available to the trees.

The plantings in our double rest-rotation systems have not gone through an entire grazing cycle. The results we hope for are more stable uplands and better water quality in our downstream ponds and rivers.

DOES MONTANA WILDLIFE NEED WILDLIFE BIOLOGISTS?

by

Harold D. Picton
Fish and Wildlife Management & Research
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ABSTRACT

A study was conducted of 162 large mammal populations historically occurring in 24 mountain areas located in central Montana. These mountain ranges comprised about 35% of the total land area in this portion of the state. Extinction had claimed 42% of these populations by the early part of the twentieth century. Human factors played a major role in these extinctions. By the 1930's conservation efforts had stopped the extinction of the populations and had restored sufficient populations to increase the number of populations from 58 to 61% of those initially present. Wildlife restoration programs begun with the Pittman-Robertson act have raised the number of populations now present to 75% of those originally there. It is estimated that about 1/3rd of the populations in these ranges would not be huntable without modern management practices. This achievement implies that modern conservation programs have reduced the negative impact of an individual Montana resident at the current time to about 1/3rd of the impact that a Montana resident at the turn of the century had upon these mountain big game populations. This steady state situation involves the organization and functioning of the human side of the human-wildlife community. The relationships between the political and biological inputs to the system are discussed relative to wildlife biologists. Some prospects for the future are considered.

INTRODUCTION

Today's Montana has an abundance of wildlife resources. These resources are at least part of the reason that many of us have chosen Montana as a place to live. The records of the Lewis and Clark Expedition as well as those of other visitors and native americans indicate that this abundance was present before the settlement of the state. Thus one might ask, are the present day wildlife resources of the state a simple reflection of the historical abundance of wildlife; are they a sign that the modern world has passed the state by; or are they an indication that modern conservation practices do work and have been effectively applied? Is there any sign that the presence of wildlife biologists has had any effect upon these resources?

I have undertaken several studies of 162 historical large mammal populations located in 24 mountain areas extending in a belt across central Montana. These range in size from the 29 Km² of the South Moccasin mountain to 11,700 Km² of the Bob Marshall-Scapegoat-Big Bear Wilderness block. An analysis of the historical fates of these populations have given insight into the biogeographic, ecological and sociological processes involved in the decimation and conservation of the wildlife resources. Since large mammal management has been a responsibility of the state, the state organization is emphasized in this review.

RESULTS

Montana has historically experienced substantial population and economic growth which, while slower than some areas of the US, rules out the possibility that the present wildlife resources are due to a "time warp."

Previous studies have shown that the 162 populations of 10 large mammal species (white-tailed deer, mule deer, elk, moose, pronghorns, bighorn sheep, mountain goats, bison, black bear, grizzly bear) present at the historical high (before settlement) were distributed as expected by biogeographic theory for a continental area. The occurrence of these populations is also closely related to the number of habitat types in these mountain ranges (Picton 1979). These mountain areas include about 35% of the land area of this portion of Montana (44-49 degrees N; 108-114 degrees W).

Many of these historical populations became extinct during the settlement of Montana in the later part of the 19th and the early portion of the 20th century. The low point was reached in the early 20th century when 42% (68) of these 162 populations had become extinct. The smaller mountain areas were the most heavily affected with losses of up to 84% of the original populations of species. The percent of the species lost from mountain ranges increased in proportion to the area affected by human factors (mainly grazing and logging but also mining), the amount of private land (versus the amount of Forest Service or National Park land) and decreased by the mean area integrated precipitation for the mountain range (adjusted $R^2 = .76$, $P = .0000$).

Montana passed its first laws regulating the hunting of big game in 1872 (before it became a state). The next 65 years encompassed the period of political game management. Serious attempts at the enforcement of the laws began in 1901 with the creation of the office of State Game Warden. The Legislature attempted

direct management of the wildlife resources early in this period. Then, in 1921, some of the rule making authority was delegated to the Fish and Game Commission which had been established in 1913. This body of lay people appointed by the Governor also functioned as a relatively independent overseer of the Fish and Game Dept. Decisions were made on a purely political basis with a low level of input from Forest Service biologists about an area or two. The era of political game management ended with the acceptance of the Pittman-Robertson Act by Montana in 1939. The conservation efforts during this political era had stopped the loss of large mammal populations from the mountain areas included in the study. Several elk populations were restored increasing the proportion of populations from 58% of those historical present to 61%. Some other populations were increased to more viable levels during this period of time.

The next 35 years represents the era of biological management. Scientifically trained wildlife biologists were added to the state Fish and Game Dept. A wildlife curriculum had been started at what is now Montana State University in 1935 and the University of Montana graduated its first wildlife technologists in 1939. During this period the State Game Warden (Department Head) was hired by and responsible to the Fish and Game Commission. While political input continued, the state Big Game Manager (later Chief of Wildlife Restoration and then Chief of Game Management) had a relatively direct access to the Commission and was encouraged to express the views of the professional biologists. This gave a much more balanced input to the rule making body. The usual political input represented the human

side of the human-wildlife community and the biological input represented the wildlife side. The department head during this period was either a career member from the department or an outsider with the appropriate political connections combined with a deep personal interest in wildlife conservation. Populations of 5 different species were restored during the biological management era bringing the population total up to 75% of those historically present. These advances were achieved even though the human population in the study region had doubled. When the number of big game populations and the size of the human population are considered it is evident that the impact of an individual human resident upon the large mammals of these mountain areas had been reduced to 1/3rd to 1/4th of the impact of a resident at the turn of the century.

A new era management era began in 1973 when the Legislature made the department director a direct appointee of the Governor (RCM 1971). This has limited the role of the Fish and Game Commission. The political and biological input are integrated at least one and perhaps more administrative levels below that of the biological era. Wildlife biologists are underrepresented in some important administrative categories. The formal structure has been emphasized and the biological information flow has been reduced. No populations have been restored during this latest management era. It can superficially be argued that all of the restorable populations have been restored. However, closer examination of the situations suggest that perhaps sufficient additional populations could be restored to bring the number up

to 85 - 90% of the historical abundance, without more difficulty than has been experienced in the past.

DISCUSSION

Mankind and wildlife have been components of an ecological community since the advent of man upon the earth. If one favors the ideas of Paul Martin, about megafaunal extinction in North America, there have been previous times when the human side of the community has dominated. Since both are components of the human-wildlife community, it is the quality and magnitude of the interactions between the human and wildlife sides that are important.

When the political organization of the human side of the community permitted, wildlife biologists restored 41% of the large mammal populations that had been lost. At least 30% of the populations now present in these 24 mountain areas would not now be present without active management by wildlife biologists when population size considerations are included. Of course, biological input has also increased the sustainable hunter harvest by 2 - 3 fold over that which could be accommodated by a political management system. The number of hunters and the economic gain from non-resident hunters has also increased several fold. Therefore one can conclude that wildlife biologists have increased hunter harvest, increased numbers of big game animals and have increased the diversity of the large mammal populations of these mountain areas.

The management system has considerable inertia built into it and degenerates slowly as errors accumulate. Therefore the illusion that one need not pay attention to biology is easily created by the politically oriented. However, the human species

has often paid heavy economic and social prices for ignoring basic biology. A major body of evidence has convinced the international scientific community that we are now embarking upon a period of environmental change beyond the experience of urban man (Bolin et al 1986) which may occur over a short time (Broecker 1987). The mismatched political and biological inputs of the current management system are ill equipped to handle the challenges of this global climate change. Montana lies within the high impact zone of this climate change. Its implication is that the seat-of-the-pants management guidelines (trend line data bases) so beloved by game managers will soon be obsolete. Good management is inherently predictive management. This means that good wildlife management is highly sensitive to the quality and quantity of specific local data. Centralized management cannot be more than crudely effective in wildlife management but it is biologically and socially essential that the broad ecological zones receive coordinated management.

Yes, wildlife needs wildlife biologists and will even more in the future than it has in the past. Political input is necessary and desirable but it must not be used to suppress the input and use of biological information. The human side of our Montana human-wildlife ecological community includes the biologists of the state, the federal and state land managers and their biologists, the fish and wildlife programs of the university system, the sportsman organizations, the Fish and Game Commission as major actors. As the opponents of wildlife management point out, this is a system which can be destroyed by disrupting any of the components (Decker and Brown 1987).

LITERATURE CITED

- Bolin, B., B.R. Doos, J. Jager and R.A. Warrick. 1986. The greenhouse effect, climatic change and ecosystems. Wiley & Sons, NY. 541pp.
- Broecker, W.S. 1987. Unpleasant surprises in the greenhouse: Nature (London) 328:123-126.
- Decker, D.J. and T.L. Brown. 1987. How animal rightists view the "wildlife management - hunting system." Wildl. Soc. Bull. 15:599-602.
- Picton, H.D. 1979. The application of insular biogeographic theory to the conservation of large mammals in the northern Rocky Mountains. Biol. Cons. 15:73-79.
- RCM. 1971. Laws of Montana, Chapter 272, Title 82A-2003, Chapter 20 The Department of Fish and Game. 1160-1161..

