



The Governor's Conference  
Denver, Colorado  
March 30-31, 1973

Edited by

Eugene Decker  
and  
Gustav A. Swanson

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Environmental Resources Center  
Colorado State University  
Fort Collins, Colorado  
1973

# WILDLIFE AND THE ENVIRONMENT



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**WILDLIFE AND THE ENVIRONMENT**

Editors: Eugene Decker and Gustav A. Swanson  
Proceedings of the Governor's Conference  
held in Denver, Colorado March 30 and 31, 1973

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Friday

- 9:00 WELCOMING ADDRESS. The Honorable John A. Love, Governor of Colorado
- 9:15 KEYNOTE ADDRESS. "Wildlife and the Environment," Dr. Durward L. Allen, Purdue University
- 10:00 THE WILDLIFE ASSET. Moderator — Gustav A. Swanson, Head, Department of Fishery and Wildlife Biology, CSU
- COLORADO WILDLIFE REPORT — Wayne Sandfort, Game Manager, Colorado Division of Wildlife
- VALUES OF WILDLIFE — Ken Nobe & Harold Steinhoff, Colorado State University, Fort Collins
- SOURCES AND USES OF WILDLIFE MANAGEMENT FUNDS— Harry W. Woodward, Director, Colorado Division of Wildlife
- PAY-AS-YOU-GO HUNTING — Errol Ryland, Manager, Forbes-Trinchera Ranch, Fort Garland, Colorado
- 1:30 WILDLIFE ENVIRONMENTAL RELATIONSHIPS. Moderator — William L. Evans, Assistant Regional Forester, U.S. Forest Service, Denver
- WILDLIFE AND LIVESTOCK — Joseph E. Townsend, BSF&W, Washington, D.C.
- LIVESTOCK AND WILDLIFE MANAGEMENT IN COLORADO — Jack Orr, Past President, Colorado Cattlemen's Association, Kremmling
- WILDLIFE AND LAND-USE CHANGES — Keith Harmon, Wildlife Management Institute, Fargo, North Dakota

NONGAME WILDLIFE MANAGEMENT NEEDS — Charles Callison, Executive Vice-President, Audubon Society, Washington, D.C.

3:20 PUBLIC INTERACTION AND INVOLVEMENTS. Moderator — Dale Andrus, Colorado State Director, Bureau of Land Management, Denver

INTERAGENCY COOPERATION — Tom Borden, Colorado State Forester, Fort Collins

PROBLEMS IN PUBLIC UNDERSTANDING — Edwin J. Merrick, Field Representative, National Wildlife Federation, Boulder

THE POLITICAL ASPECTS OF WILDLIFE MANAGEMENT — Joseph B. Schieffelin, State Senator, Majority Leader, Lakewood

7:30 BANQUET. Host — John D. Vanderhoof, Lt. Governor; Master of Ceremonies — Ed Zern, Associate Editor, *Field and Stream*, Conservation Awards Director, American Motors Company

BANQUET ADDRESS. "Is Wildlife Doomed?" Dr. Laurence R. Jahn, Vice-President, Wildlife Management Institute, Washington, D.C.

Saturday

9:00 WILDLIFE MANAGEMENT AND TECHNOLOGY. Moderator — Thomas G. Scott, Director, Denver Wildlife Research Center, Bureau of Sport Fisheries & Wildlife.

TO HUNT OR NOT TO HUNT — Richard N. Denney, President, Colorado Chapter, Wildlife Society, Denver

THE RESIDENT VS. THE NONRESIDENT QUESTION — Robert A. Jantzen, Director, Arizona Game and Fish Department, Phoenix

CONSIDERATIONS IN SETTING HUNTING SEASONS — Jack R. Grieb, Chief, Game Research, Colorado Division of Wildlife, Fort Collins

THE ENFORCEMENT OF WILDLIFE LAWS AND REGULATIONS — Walter Neubrech, Chief, Division of Wildlife Management, Washington Department of Game, Olympia

11:00 CONFERENCE SUMMARY AND WRAP-UP — Hans von Barby, President, Colorado Wildlife Federation

# PROGRAM

The proposal to convene a high-level conference on Wildlife and the Environment in Colorado was conceived in an informal meeting early in 1972 between Regional Director William Lucas of the U.S. Forest Service, State Director Ed Rowland of the U. S. Bureau of Land Management, and Dean Robert E. Dils of the College of Forestry and Natural Resources at Colorado State University. The growing interest of the public in environmental matters was recognized, as well as the need for an informed public, when questions involving natural resources are considered.

Important decisions about wildlife resources affecting citizens are made by them and their elected and appointed representatives in the legislature, the Wildlife Commission, and the government at large. In fact, all three branches of both State and Federal governments are deeply involved in decisions affecting our wildlife resources.

These decisions, if they are to serve the public interest best, should be based on a tremendous complex of data gathered and coordinated by professional resource specialists who represent not only the biological and physical factors of the environment, but the social and economic as well.

Governor John A. Love early recognized the value of such a conference and agreed to sponsor it. He designated Lt. Governor John D. Vanderhoof to represent him in the very considerable responsibility of planning and implementing it. He also encouraged his Director of the State Department of Natural Resources, Tom Ten Eyck, and Director Harry Woodward of the Colorado Division of Wildlife to participate fully.

A group of sponsoring agencies for the conference was selected to draw upon the expertise and support of federal, state, and private groups. The group was to be small enough to work together effectively in the planning and implementation of the conference. These agencies designated individuals from their ranks to serve as a Steering Committee.

The costs of such a conference are considerable, so we appreciate the generosity of a group of contributing sponsors who were convinced of the importance of the meeting and contributed financially to its support. It is largely due to their generosity that it has been possible to publish the proceedings of the conference in this permanent form. It was particularly gratifying that so many agencies from out of state authorized staff members to participate, and in most cases without cost to us in Colorado. These agencies included Purdue University (Durward L. Allen), the Bureau of Sport Fisheries and Wildlife of the U. S. Department of the Interior (Joseph Townsend), the Wildlife Management Institute of Washington, D.C. (Keith Harmon and Laurence R. Jahn), the National Audubon Society (Charles Callison), the Arizona Game and Fish Department (Robert A. Jantzen), the Washington State Department of Game (Walter Neubrech), and the American Motors Company Conservation Awards Program (Ed Zern).

The audience visualized for the conference was to be as broadly representative of Colorado's people as possible. Announcements and invitations were sent to individuals and organizations representing youth and adults, business, industry, labor, conservation organizations, agriculture,

minority groups, all of the major professions, service clubs, the mass media, and many others. A sincere effort was made to reach all segments of the Colorado public, whether or not they had expressed any direct interest in wildlife, because in Colorado, perhaps more than in some states, wildlife and its environment are of importance and value to the entire state.

The goals of the conference were to promote public understanding of the importance of wildlife and the environment to the people of our state, the problems associated with using and managing the wildlife resource in the public interest, and the role of professional resource managers in these important resource programs. We sincerely hope that these purposes have been and will be accomplished by the 400 persons who attended the conference, the organizations they represented, and the many more who will be able to study and use these Conference Proceedings.

Eugene Decker, Assistant Professor of Wildlife Biology and Gustav A. Swanson, Professor and Head of the Department of Fishery and Wildlife Biology, Colorado State University  
June, 1973

# PREFACE

## **SPONSORING AGENCIES**

Forest Service, U. S. Department of Agriculture  
Bureau of Land Management, U. S. Department of  
Interior

Colorado Department of Natural Resources  
Colorado Division of Wildlife  
Colorado Wildlife Commission  
The Wildlife Society — Colorado Chapter  
Colorado Wildlife Federation  
Colorado State University  
College of Forestry and Natural Resources  
Department of Fishery and Wildlife Biology

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Malcolm S. Forbes — New York  
Adolph Coors Company — Golden

## **STEERING COMMITTEE**

Hans von Barby, Chairman, representing the  
Colorado Wildlife Federation  
Richard N. Denney, The Wildlife Society  
George C. Hinton, The Bureau of Land Management  
A.F.C. Greene, The Forest Service  
Laurence E. Riordan and Peter T. Hansson, The  
Colorado Division of Wildlife  
R. Withers Cool, The Colorado Wildlife Commission  
Eugene Decker, Douglas L. Gilbert, and Gustav A.  
Swanson, Secretary, Colorado State University

*It is very possible that the nice day we had two or three days ago was spring, and if so, spring went by pretty fast. I am very glad to see so many of you, but in some ways it's not too surprising, because I know the interest in our wildlife environment is widely spread all across the state and among many, many of our citizens. I sometimes think there is more interest in our wildlife than in anything else. When I come to the point of making appointments to the Wildlife Commission. I have more applicants than for any other jobs in the government. Why that should be I'm not sure, but nevertheless the interest continues. Anybody who's ever caught a fish or shot a deer or even looks at one becomes an expert on the wildlife situation. Of course this isn't true, but it is an indication of how widespread the interest is.*

*I think back over some of the history of our wildlife and wildlife management in the United States and the State of Colorado. Our predecessors for some reason thought the resource was endless and there was no need to control and manage. Not a typical example, but still an example of this attitude was the experience of Lord Gore, the Irish baronet who came out to this country in 1840. He arrived with a whole series of wagons, tents, and large supplies of spirits, canned foods, and everything else, first class. And he slaughtered all the game in sight. He then took his rather expensive outfit up to Port Union in Missouri and offered it for sale, and when they wouldn't give him what he thought it was worth he took it out to the outskirts of the town and piled it up and burned it.*

*That was when we thought the resource was endless, but it's only comparatively recently that Colorado established a system of licenses, bag limits, and so on. I think for some time we looked upon the management of wildlife as an economic benefit. We sold licenses and used the money to operate the department or division for conservation officers and habitat improvement and to subsidize many activities. Only comparatively recently have we begun to look upon wildlife not only for its effect on the cash register but also for other goals and objectives. Certainly a lot of these are for the preservation of our environment. The preservation of the ecology that involves our wildlife is the preservation that Colorado would particularly like to have.*

*In addition we are looking more at what is the optimum size of herds of game, which involves many problems, of course. It includes minimum habitat, winter range particularly, and interaction between wildlife and the ranching interests. I sometimes think that the overall problems are related to two things: One is what you don't know may not hurt you, but two is things that we know that aren't true do indeed lead us to error.*

*It is a complex discipline, the management of wildlife. It's an activity which touches so many people's lives that it does need understanding and help on the part of broad segments of the population. It was with this thought in mind that this conference was organized. We hope that it will result in helpful ideas and suggestions, but basically we hope that all across the state of Colorado we will all have a greater understanding of the problems and potentials of the wildlife environment.*

*We have come, not only in Colorado but all across the nation, to something of a turning point in the concern for wildlife and the environment. It is at a much higher level now than it has been ever before in my lifetime. Colorado, of course, has many problems as well as many potentials with the beautiful area we have, and the potentials include the great wildlife populations we hope to preserve, protect, and properly manage down through the years. We hope that you will have not only a productive, but an enjoyable series of meetings. Thank you very much.*

Governor John A. Love

WELCOME

*It was my privilege to work with the group of dedicated conservationists who arranged the 1973 Governor's Conference on Wildlife and the Environment for Colorado. The idea gained my support from the start for many reasons, not least among them my own personal enjoyment of Colorado's magnificent outdoor recreational opportunities.*

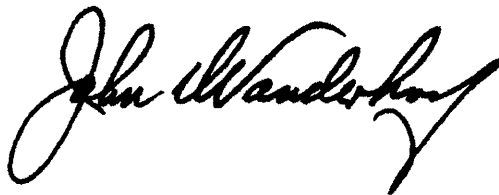
*The most important reason for this special conference, however, was to emphasize the value of our wildlife resources and the environment in which they live to all the people of Colorado. We are fortunate in having a great abundance of natural resources in our state. Sometimes we wish these resources were not so well-known, because they seem to act like a magnet and attract people to Colorado almost faster than we can gracefully assimilate them. However, it is through educating Coloradoans, new residents and old, that we can provide the necessary background for wise public decision which will determine the fate of our wildlife resources in the future.*

*The Governor's Conference brought together a remarkable group of experts from Colorado and elsewhere in the nation to discuss our environmental resource, their present status, their importance, the problems associated with them and their future. The Conference discussions include nongame wildlife appreciation and the attendant recognition that more and more people enjoy wildlife without consuming it. The needs of the wildlife photographer, the bird water, the nature-study student are as important as those of the hunter and the fisherman today.*

*I am particularly pleased, therefore, that the proceedings of this Conference can be published in permanent form and made available to thousands of interested citizens throughout the state. I am especially hopeful that this publication will be read and studied by students and teachers in our public schools and educational institutions.*

*The Governor's Conference on Wildlife and Environment represents a milestone in our recognition of the importance of wildlife to the State of Colorado. It is representative also of our determination to give the public an opportunity to become informed on current and future problems associated with the management of wildlife resources.*

*I commend all of those associated with this 1973 Conference for the valuable insight and wealth of expertise the Conference provided. I urge all Coloradoans who hold an interest in the future of wildlife resources in our state — as I do — to study this publication carefully and refer to it often.*



John D. Vanderhoof  
Governor of the  
State of Colorado



## DURWARD L. ALLEN

*Professor of Wildlife Ecology, Purdue University,  
Lafayette, Indiana*



*Dr. Allen's professional career as a wildlife ecologist and conservationist spans more than 35 years of service, including research for eleven years with the Michigan State Conservation Department and eight years with the U.S. Fish and Wildlife Service. He has been Professor of Wildlife Ecology at Purdue University since 1954, from which he has also directed and conducted long-term studies (over 15 years) of the wolves and moose of Isle Royale National Park in Lake Superior.*

*Author of many technical and popular articles and several books, including the widely known *Our Wildlife Legacy* and *The Life of Prairies and Plains*, he was selected by the Wildlife Management Institute to develop a new *American Wildlife Policy* to update the 1930 American Game Policy of Aldo Leopold. Having presented*

*this new policy in Washington last week, he draws upon it in his keynote address at the Governor's Conference and shows its relevance to Colorado.*

*Dr. Allen was appointed by Secretary of Interior Stewart Udall to the Secretary's Advisory Board on National Parks, and served under Secretary Rogers Morton as Chairman of this very important policy-making Board.*

*Among the many honors which have come to Dr. Allen are the Leopold Memorial Medal, highest honor in the wildlife field, in 1968, and the Gold Medal of Honor of the Angler's Club of New York — both awards were for his outstanding service to conservation. He has served as president of The Wildlife Society and is a fellow of the American Association for the Advancement of Science.*

As we open a conference on wildlife and the environment, there are assumptions to be made and questions to be asked. These are sure to reveal our biases, but biases can be right and respectable. We will require that they be shored up by the best available technology.

Conservationists have always been true believers. They have had the gut feeling that a cause is especially righteous when the things you want are largely for somebody else. There is a certain dignity in this position, although in the minds of many it casts suspicion on your judgment.

All of which says that our motivation is both rational and moral, a logical expectation when we deal in questions of human destiny. It is through the development of accepted mores that most people learn to do what the survival of their society requires. They know right from wrong, even though they can't explain it.

Our most basic premise is that wildlife and its associated outdoor amenities are important in our living standard and worth preserving. Such a view should come easily in the richly endowed state of Colorado. But this conference program attests that you partake in widespread problems and that you see a universal responsibility. All of us are citizens of the present, and we will be ancestors in the future. What we do now with wildlife and other resources represents the total provision anyone will make for people yet to come.

An assumption solidly based in life science is that man must survive in a biological world. His renewable resources — soils, waters, vegetation, and animal life — are managed through a knowledge of life processes. It is becoming evident that the welfare of certain wildlife populations can be an index to the health of our biosphere. For example, if our total environment is so permeated with toxic substances that certain predatory and fish-eating birds can no longer live in it, then I think that we have a red light of environmental hazard flashing before us.

The term "renewable resource" has implications for our policies in use and management. I think we can assume that the use of a renewable resource is optimal when it extracts the most significant benefits for generations of the present while improving productivity for the future. If such a commitment were generally accepted, the doubts about man's future would be largely removed.

Returning to the subject of mores, I am aware of a seedling idea developing in some segments of our society. It is a recognition that man must share the earth with other living things, that all forms of life have an ethical right to survive. How this seedling will fare in the competition of decades ahead I cannot foresee, but it has merit as a principle. It would assume that we must conserve all wildlife and rescue endangered species, which means preserving habitats. These include open spaces and greenery, waters and wetlands — aspects of the human environment whose extent and quality have become a big issue.

An oversimplified wildlife question of the day is, what does it do for me? We must give it an oversimplified answer.

For all but a short period of human history, wildlife was important as a subsistence resource. Until about 10,000 years ago, men made their living in natural environments by hunting, fishing, and gathering. Our world-wide commercial fishery is a continuation of this relationship.

A commerce in furs was the first major industry of immigrant Europeans in North America. We are only a century and a half removed from the colorful western phase of that fur trade, when beaver-trapping mountain men wintered in the Bayou Salado (South Park) and caroused at their annual rendezvous in Brown's Hole. In the middle 1800's, when silk hats replaced beaver as a status symbol in European society, the fur trade began a long decline, which continues as synthetic substitutes take over the market.

The arts of hunting and fishing are still with us, but today they are largely recreational. The back country was opened up, some of it being obliterated. The number of people increased, and harvest gear was vastly improved. By the turn of the present century it had become urgent to regulate and restrict hunting and fishing in order to preserve the sports. Administrative agencies now take for granted a commitment to regulations that will maintain game and fish at a high level of productivity. They accept the charge of management to build up that yield as best they can. In this they must coordinate and sometimes compete with other uses of land and water.

# WHAT KIND OF WORLD

KEYNOTE ADDRESS TO THE GOVERNOR'S CONFERENCE ON WILDLIFE AND THE ENVIRONMENT

by Durward L. Allen

Hunters are finding their version of outdoor recreation increasingly objectionable to a segment of public opinion that does not believe in killing anything. This attitude pointedly equates hunting with killing. Although the prejudice continues to grow, I doubt that it will put a stop to properly regulated hunting. On the other hand, some of those who bear arms afield engage in practices that ought to be stopped and for which hunters in general get the blame. I refer particularly to the indiscriminate shooting of nongame species, such as birds of prey. The nature-oriented public has deplored these activities and now is in open rebellion against them. On this score, public intolerance can be a wholesome influence and help clean up some historic abuses. It will be to the benefit of all, including the legal hunter and landowner.

We probably can say of recreational hunting and fishing that they are legitimate uses of wildlife and will continue to grow — though perhaps at a diminishing rate — in decades ahead.

Professionals have long assumed that the casual, nonconsumptive uses of wildlife represent its greatest value to man. Each of our human habitats is characterized and brought alive by the community of plants and animals it supports. Creature inhabitants are part of the living environment of dooryards, parks and urban greenbelts, farms and ranches, forests and wilderness, every kind of aquatic site. They are there for a variety of unexploitive uses, including feeding, viewing, photographing, listening, and just knowing they exist.

The esthetic worth of wildlife is something that defies measurement. Hence, it is ignored or downgraded by those who see every human asset as a commodity in the marketplace. This is hardly a sophisticated view, and it has outlived its time in well

worn economic attitudes. It has much in common with the thinking of the old-line forester whose calculations are totally in board feet, of the stockman who sees the cows but not the range, of the wildlife manager who thinks only of man-days afield and game in the bag. The guilt of parochialism is shared in many disciplines.

I have no thought of impugning the specialist. His incredible accomplishments have brought us into the atomic age. His further findings will be necessary to meet the many splended troubles of our future. But today and in that future it must be the burden of the generalist to add and subtract values having no common denominator. Assuredly, he must measure and assess our resource entities and residues. He must also consider trends and influences, and appraise the intangibles of culture and environment. These are part of a seat-of-the-pants synthesis by which we must recognize and contrive the kind of world mankind will find rewarding to live in. For now we don't know where we are going, but there are signs that probably can tell us when the course is right.

In decades immediately ahead, the high or low value people place on wildlife will determine its possibilities for all time to come. The wrong kind of change can easily be irreversible. In the development of ideas and policy, the urbanization of our population may have great significance. It could lead us in either of two opposing directions.

It is one estimate of the situation that people crowded into cities will seek some of their relaxation in the out-of-doors. They will come to enjoy wildlife related pastimes and develop a concern for the preservation of such privileges.

Another trend could have different effects. About 70 percent of the population now is found in cities of more than 50,000. It is expected to be 90 percent by the end of the century. Already we are dealing with second and third generation city dwellers. Many have been estranged from earth knowledge, outdoor pursuits, and pioneer traditions.

They see no limits to the resource base. Their leaders are the prophets of perpetual expansion in both population and the economy. Our educational system guarantees that many skilled professionals in engineering, economic, legal, and even social fields get no exposure to environmentally relevant biology. They are not impressed by the natural order. They do not see unnatural disorder. Their world is an arbitrarily cobbled-up habitat for man. If you don't like something, you apply more dollars and keep on cobbling.

If we are indeed producing large numbers of people in physical and intellectual isolation from earth relationships — and I think we are — we must ask what kind of resource policies these voting constituents are going to support. It would be presumptuous to say they should be "educated" to our point of view. But certainly it is defensible to assume that environmental information should be widely available in order that all citizens can make knowledgable choices. In this context, our ecological teaching in the schools, our writings, TV programs, and even conferences assume a critical social importance.

On the question of values, I think it a valid conclusion that people intelligently exposed to our natural environment and its life-support systems are unlikely to brush these aside as inconsequential. They may even come to understand the concept of diversity and our growing concern over certain worldwide trends: the progressive homogenizing of the earth's flora and fauna; the loss of mini-cultures in human society, especially those regarded as primitive; and the standardization of men themselves through a worldwide integration of gene pools.

Wildlife has a special place in these considerations. Nearly any reflective person can see why it might be desirable to preserve living things from extinction. After all, these could be put to some unforeseen use by people who will be smarter than we are.

It takes a bit more insight to see that each kind of plant or animal can be preserved only as part of a relatively natural community and ecosystem. And further, that there must be some limitation to the disturbance of ecosystems in order that they can go on producing and replicating themselves. The truth is, of course, that nature's so-called balance is seldom a narrowly critical thing. Stabilizing mechanisms are incredibly complex and adaptable. They became so through long trial and error. In a crude way we have begun to study and understand them. There will be applications for all we can learn from natural systems in solving the problems of human subsistence.

Sometimes it appears that we have applied our greatest ingenuity to setting up logistic challenges for people of the future. Obscure as that future is, we ought to have some substantial ideas about the kind of world we are aiming for. We cannot plan anything in detail, but based on experience we can try, in the major things we do, to stay on the safe side. It may be profitable to take a glance backward before we look very far ahead.

In recent years anthropologists have pieced together a fascinating story of man's early origins. Our immediate hominid ancestor was a biped with a long childhood and a specializing brain, who had not yet attained man status because he did not have a recognizable culture. This hominid lived in small bands on the savannas and forest edges of tropical Africa. He made a living by gathering a wide range of plant and animal foods, and his position in the life community is of particular interest in terms of our featured environmental problems today.

The prehuman, like other animals, had a self-renewing food supply, which he harvested by crude methods and hence could not overuse. Habitat pollution did not occur. All products were degradable and were recycled into the nutrient flow of the ecosystem. This included the man creature himself at all too frequent intervals.

We can, then, recognize food production and pollution control as two automatic services of the natural environment. The third I will mention was less comfortable to live with — population control. It is fair to conclude that the hominid maintained a relative stability of numbers in the habitats where he could make a living (an adjustment that took place slowly) and adapted to climate-based changes over long time periods.

According to modern definitions, our ancestor became a man when he developed a tool-using culture. No doubt he began by throwing rocks and using pointed sticks. Three to four million years ago he was knocking edges off stones, which led to a refined craftsmanship and efficient hunting culture. This kind of accelerated adaptation was something new to the biological world. It enabled man to escape from his primitive ecosystem and eventually to overrun much of the earth. About 10 milleniums ago the greatly elaborated stoneage industry became an agriculture. Less than 300 years ago the industrial revolution was under way. Within the present century we have gone from horses to moon rockets. Culture is now called technology.

A main point of interest is that man lost his "place in nature" when he spread out from that primitive environment to which he was ecologically adapted. In it he had survived for geological time periods, and in that sense he was successful.

Our own present outlook is less certain — the primitive security no longer exists. Now we are on our own for whatever we require, and some of the same old needs are still with us. In the matter of food supply we have increased production to a degree that human numbers could multiply seven times over in the past 400 years. By using the earth's wealth without stint, we have made a portion of humanity comfortable in other ways.

In the control of pollution and population we have not done much. These, too, must have our attention because nothing expands forever, and we must achieve ecological compatibility with our whole-earth ecosystem. Stability can never be absolute, but we must plan for it. And we can hardly afford the time and the hazard of leaving things to chance. Man's intelligence got him into a welter of difficulties, and it will have to produce the solutions.

Where does wildlife fit into all this? It is part of keeping those choices open for people 50, 100, and 500 years from now. We are talking about living standards. Even if you don't believe that spaces, natural beauty, abundant clean water, and living things are strictly necessary in human living, it would seem both arbitrary and stupid to foreclose the possibilities.

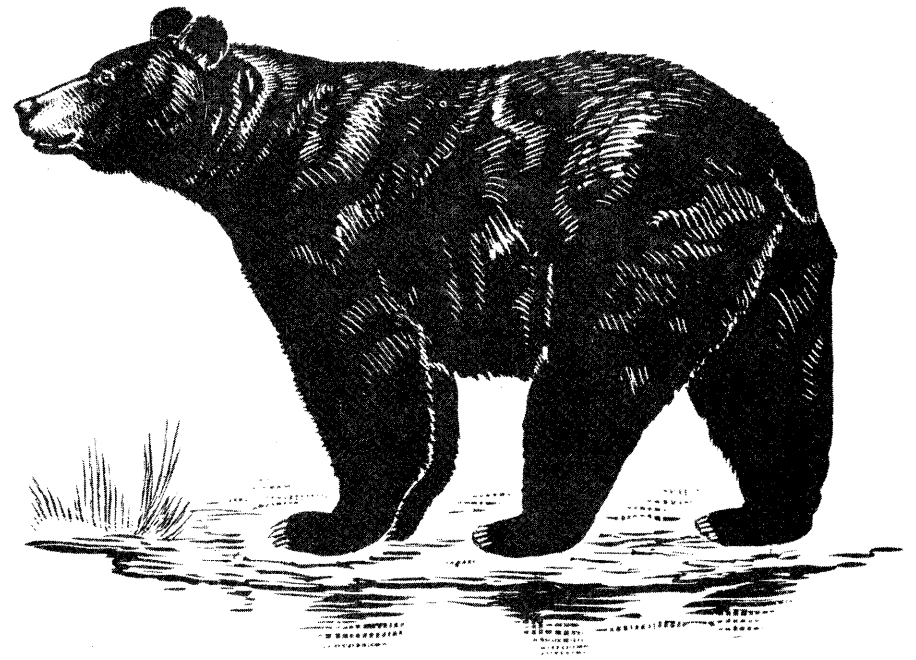
To defend this view, we do not need to make the arrogant claim that we are right about everything. We can simply stand on the prudent assumption that we might be.

## WAYNE W. SANDFORT

*State Game Manager and Chief of Wildlife Management, Colorado Division of Wildlife, Denver, Colorado, State Game Manager and Chief of Wildlife Management*

*Though a native of Nebraska, State Game Manager and Chief of Wildlife Management Wayne Sandfort was educated at Colorado State University, earning a Master of Science degree in 1952 under the Cooperative Wildlife Research Unit. Since 1949 he has served the State of Colorado in several professional wildlife management positions, including six years in Fort Collins as Game Research Chief. He has held his present position since 1968.*

*Mr. Sandfort has been active in wildlife organizations. For several years he has been a member of the Council of The Wildlife Society, serving also on several committees. He is also an active member of the International Association of Game, Fish, and Conservation Commissioners, serving on committees dealing with predatory animal and nongame species policies.*



*Other technical organizations in which he has been active include the Western Association of State Game and Fish Commissioners, the National Wildlife Federation, the Colorado Wildlife Federation, and Sigma Xi, the honorary scientific society.*

*Mr. Sandfort has written more than 50 technical publications and popular articles on various kinds of wildlife and resource management, including an appraisal of the game resources and management programs of Ireland, and a treatise on "definitions of wildlife."*

## BACKGROUND

Wildlife within the boundaries of Colorado constitutes a natural resource unequalled in collective terms of human interest, recreational enjoyment, economic value, and overall benefit to the state. By statutory definition, "wildlife" means all vertebrates, including fish, crustaceans, and mollusks. For purposes of this report, however, discussion will be confined primarily to terrestrial wildlife, collectively more than 600 species of mammals, birds, and reptiles.

The variety of wildlife in our state is a product of equally variable environments, created in part by latitude and in major degree by elevation varying from about 3,500 to 14,500 feet. Temperature, precipitation, and soil patterns characteristic of different altitudes as represented by plains, foothills, montane, subalpine, and alpine life zones have resulted in a myriad of vegetative types and ecosystems and perhaps the most diversified wildlife resource on the North American continent.

The U.S. Soil Conservation Service has classified natural vegetation into 15 major types, varying from the grasslands of the plains to the woodlands, sagebrush, and oakbrush of the intermountains; the grass, forbs, and woodlands of mountainous areas; and the alpine meadows. When one envisions the effects of farming, timber cutting, reservoir construction, and a vast number of other modifications through human activities, in conjunction with the variability of natural habitats, plus introductions, the presence of so many wildlife species in Colorado ceases to be overly surprising.

Colorado environments have not only produced a wide diversity of plant and animal life, but also have presented major attractions to humans for industrial development and recreational pursuits. Comprehension of these attractions can best be obtained by comparing trends in human population growth and employment in Colorado, 1950 to the year 2000. Figure 1 clearly indicates near doubling of both people and employment during the last 20

### Colorado Human Population And Employment

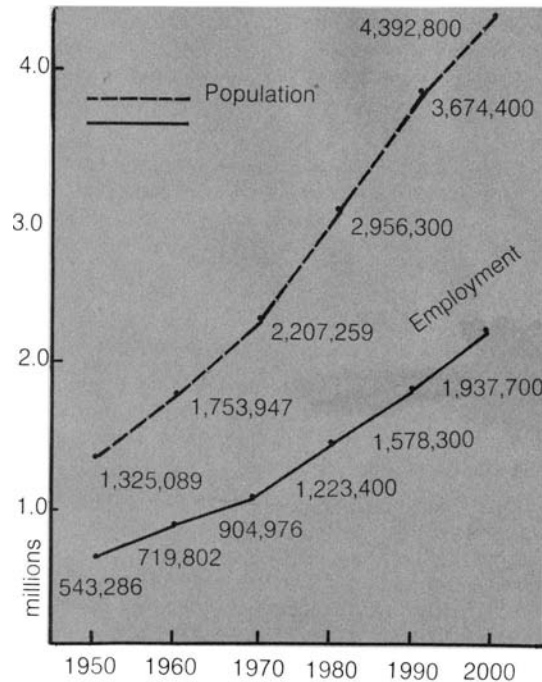


Figure 1

years. Projections into the future show an accelerated rate for the 30 years ahead.

Activities by humans are endless, but those most influential on environment and wildlife include grazing, lumbering, farming, drainage, mining, hiking, skiing, snowmobiling, automobiles, reservoir, highway and airport construction, and the building of towns and cities in which to live.

For many years, while human populations were relatively low, environmental effects from these activities were minimal and generally unrecognized; occasionally they were beneficial for wildlife. At present, however, many cultural activities have already affected the environment adversely and are causing increasing concern. Foremost in importance are disturbances by humans and intensive use of available space in the heart of wildlife areas.

As for population growth and employment, both dwelling units and residential acres have strongly increased in the past two decades. The rate of increase is predicted to accelerate until a half-million acres or more are occupied before the year 2000 (Figure 2).

Dwelling units and residential acres by themselves are not overly alarming, for a half-million acres is only slightly more than one percent of the state's area. Location of dwelling units, occupancy by three times more people than now exist in the state, and resultant activities and disturbances within wildlife habitats, are the main causes for concern.

# COLORADO WILDLIFE REPORT

by Wayne W. Sandfort

**Residential Development**

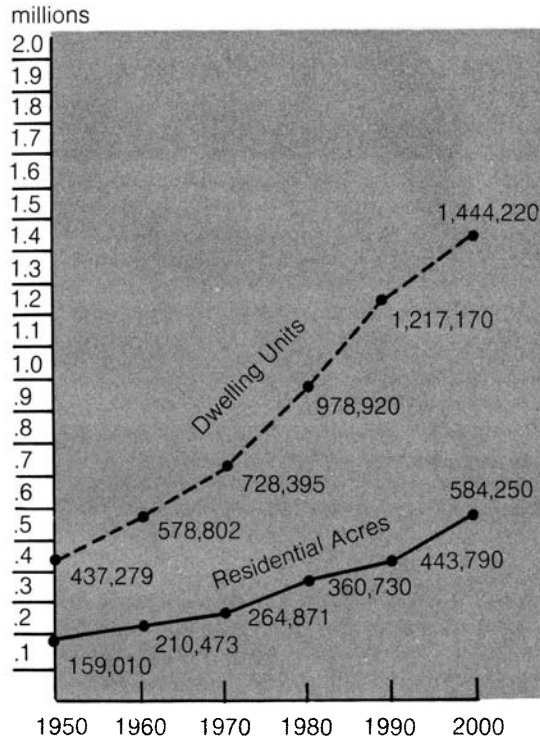


Figure 2

6

Further evidence of adverse human influences can be found in air and water pollution, overgrazing by domestic livestock, game losses on highways, removal of wildlife cover in farming operations, destruction of wildlife by farm machinery, improper disposal of oil wastes, losses of raptors on electric power transmission lines, destruction of sagelands, drainage of wetlands, inundation of game ranges through reservoir construction, and impeding of natural game movements through fence and canal construction, to name only a few.

Despite human encroachments and the increasing list of adverse effects on environment and wildlife, our state is still blessed with wide open spaces and areas where quiet and solitude abounds, attributable in a large degree to the presence of public lands. Approximately 36 percent of the 104,000 square miles of land and water in Colorado are under Federal jurisdiction, as indicated in Table 1.

Most of the remaining lands in the state are privately owned. State-owned lands amount to 4.63 percent, and municipal and county lands nearly 0.50 percent, a significant portion.

Large acreages of public lands, however, are no reason for complacency. Uses of both public and private lands are increasing to the extent that action must be taken, and soon, to prevent irreplaceable loss of wildlife environments. Although time is rapidly running out, there are still opportunities to develop effective land-use statutes and policies to

forestall the rapid expansion of subdivisions and harmful human activities. Land-use zoning involving the establishment and maintenance of low-disturbance areas for wildlife is mandatory if we are to hold or increase present wildlife population levels.

While there are increasingly adverse influences on wildlife areas from human activities, the Division of Wildlife, in cooperation with other agencies and organizations, has many programs underway to improve habitats and mitigate wildlife losses. A few of these are range restoration and improvement projects; underpasses and special signs and fences to prevent losses of wildlife on highways; land acquisition of benefit to game and nongame species; wetlands development; stream improvement; and lesser but highly effective projects such as providing nesting structures for Canadian geese.

Wildlife populations are products of the vast and variable habitats in our state and the result of beneficial and detrimental human influences present today. Let's take a general look at our wildlife resource, and then explore in more detail the status of individual species and groups of species, and the recreational opportunities which they provide.

**Table 1 — Public Lands in Colorado**

	Square Miles	Percent, Total Land Area
National Parks and Monuments	842	0.81
U.S. Forest Service Lands	22,314	21.40
Military Reservations	602	0.58
Indian Lands	1,175	1.13
Bureau of Land Management Lands	12,989	12.46
<b>TOTALS</b>	<b>37,922</b>	<b>36.38%</b>

## **WILDLIFE DEFINED**

The statutory definition of wildlife, as given at the beginning of this report, includes all vertebrates, crustaceans, and mollusks. Included in the vertebrate classes alone are approximately 124 mammals, 449 birds, 45 reptiles, 15 amphibians, and 82 fish. Many additional species of mollusks and crustaceans fall in the wildlife classification.

Recent development of a system for classification of wildlife resources places all species into "terrestrial" and "aquatic" wildlife categories. In this classification, terrestrial wildlife is defined as those species which are air breathing all or part of the time, while aquatic species are wholly inhabitants of water environments.

Terrestrial and aquatic wildlife resources are further separated into "Sport Game," "Sport Fish," and "Other Aquatic Wildlife," and "Nongame." In my interpretation, sport game, in both terrestrial and aquatic categories, are those which provide recreational benefits from the chase or pursuit by hunting and fishing. Nongame wildlife is comprised of species not intentionally removed from the population for any purpose except scientific study or to prevent individuals or groups of animals from causing economic damage.

Terrestrial game in Colorado are divided into eight categories: big game, small game mammals, migratory waterfowl, migratory shore and upland game birds, nonmigratory upland game birds, raptors used for controlled falconry use, furbearers, and special sport species such as the coyote. Terrestrial nongame wildlife is placed into three vertebrate classes — mammals, birds, and reptiles. Further grouping of all terrestrial wildlife places them into general categories of big game, small game, furbearers, special sport species, and nongame. Information presented later in this report will relate to the five major groups.

## **WILDLIFE INVENTORY AND CENSUS PROCEDURES**

Basic to all wildlife management programs, whether for consumptive or nonconsumptive purposes, is the procurement of accurate information on the presence of wildlife, distribution by species, and an indication of numbers and population changes. Individual species under all groups are, or soon will be, classified by status, such as common or stable, peripheral, uncommon, and endangered. Although such designation can be made at a given point in time, wildlife populations are constantly changing, affecting the classification status of individual species.

Wildlife population levels and status, of game species in particular, have historically been a point for disagreement and debate. Because of this, and primarily because of the need for accurate information on which to develop sound management programs, including hunting regulations, years of study have gone into developing reliable census methods.

Census techniques include direct observation and counts during systematic aerial and ground surveys; audio censuses such as those employed in pheasant crowing, mourning dove call, and bobwhite whistling counts; and indirect census or population evaluation procedures based on track counts, beaver cache counts, highway mortality tallies, and game damage appraisals. Other techniques for evaluating population sizes and trends include banding and marking, radio telemetry, harvest surveys, and special questionnaires requiring judgements on the part of professional wildlife personnel and other informed individuals.

At present, the Division of Wildlife is in process of completing the first phase of a computer mapping system designed to provide a variety of data on wildlife populations and habitat. Maps based on preliminary input by Division personnel showing distribution and density by individual species will be provided. Using these data, total population

estimates will be possible, and population trends can be determined through periodic updating of the information.

Procurement of population information in a uniform and systematic manner, year to year, is of particular importance in wildlife censuses. Insofar as possible, human procedures, climatic conditions, route or area, time of day and year, and other factors which may affect the number of animals seen or heard have been standardized so that a true picture of population trend may be obtained.

It is difficult to comprehend the monumental effort in terms of money, personnel, and equipment that goes into wildlife census on a nearly year-around basis. A part of the operation involves the use of fixed-wing aircraft stationed at the four regional offices, particularly useful in big game and waterfowl counts. In the last decade we have increased the use of helicopters to permit more complete counts and greater accuracy in enumerating deer and elk primarily, but also bighorn sheep, mountain goats, antelope, raptors, and beaver caches. The 1972-73 budget contains funding for more than 800 hours of helicopter flight. A rule-of-thumb procedure for game bird census, as well as for some game mammals, calls for predawn activity on the part of Wildlife Conservation Officers. Pheasant crowing, sage grouse strutting, and prairie chicken dancing are essentially complete shortly after sunrise, and many early morning hours are spent by research and management personnel in the census effort.

Not only Division personnel, but also land management agencies, the Bureau of Sport Fisheries and Wildlife, colleges and universities, bird clubs, and other organizations participate in the annual procedures to monitor wildlife population.



Considerable progress has been made in wildlife censuses, especially in the past 20 years, and cumulative statistics obtained in a standardized manner are providing increasingly accurate data for appraising population trends and species status. Nevertheless, those most directly involved with developing regulations and designing management programs recognize the need and desirability for still more accurate information. We have come a long way with many of our important species, but a monumental job remains in developing reliable population data for the hundreds of other terrestrial wildlife species in the state.

### THE STATUS AND RECREATIONAL CONTRIBUTION OF WILDLIFE

The two basic types of data used in showing the status of major wildlife species or groups of species include: (1) counts or indices which most accurately reflect population levels in the past and at present, and (2) harvest trends for game species. In using these data, recreational contributions are shown as the number of participants or license holders in combination with the number of days they participated in hunting during a given year or period; nonconsumptive uses, in terms of recreational days, are very substantial, and may exceed those provided by consumptive activities. They have not been determined, however, for purposes of this report.

### BIG GAME RESOURCES

Big game resources are responsible for much of the local, national, and international acclaim bestowed on Colorado as a wildlife mecca. Since the early 1940's, the abundance of big game has been synonymous with high hunter success, and highly favorable reports of harvest were, of course, recorded prior to and following Colorado statehood.

After the peak mule deer harvest (147,848 animals in 1963), a relatively strong reduction in deer numbers and hunter success occurred. This circumstance has been accompanied by nearly a

decade of rapidly expanding human population and greatly accelerated activities in wildlife areas. Perhaps most important of all is the increasing awareness by the general public that deer are fewer than in the recent past, and their desire to see something done about it.

While mule deer strongly declined in number in the mid-1960's, other big game populations, including elk, mountain goats, white-tailed deer, bear, and buffalo were increasing. Mule deer, too, have increased in the last few years, and the overall big game picture is bright. Data in the following sections are the best available and show trend and status for nine big game species.

### Mule Deer

Indices to mule deer population trends were derived from: (1) helicopter counts in eight areas for seven years, 1967-73; (2) Piceance meadow counts in eight like areas, 1947-71; (3) ground counts on Cedar Ridge in Middle Park, 1957-73; (4) estimated total population for Middle Park (big game management units 18, 27, 28, and 37), 1968-73; (5) field-officer evaluation of deer population status by big game management unit in 1972 compared to the five years previous; (6) an estimate of the overall statewide deer population in 1973 compared to five years ago (1968) by 14 biologists and game managers; (7) number of deer killed by motorists; and (8) statewide harvest figures, 1954-72.

**Mule Deer Counted By Helicopter on Nine Trend Areas**

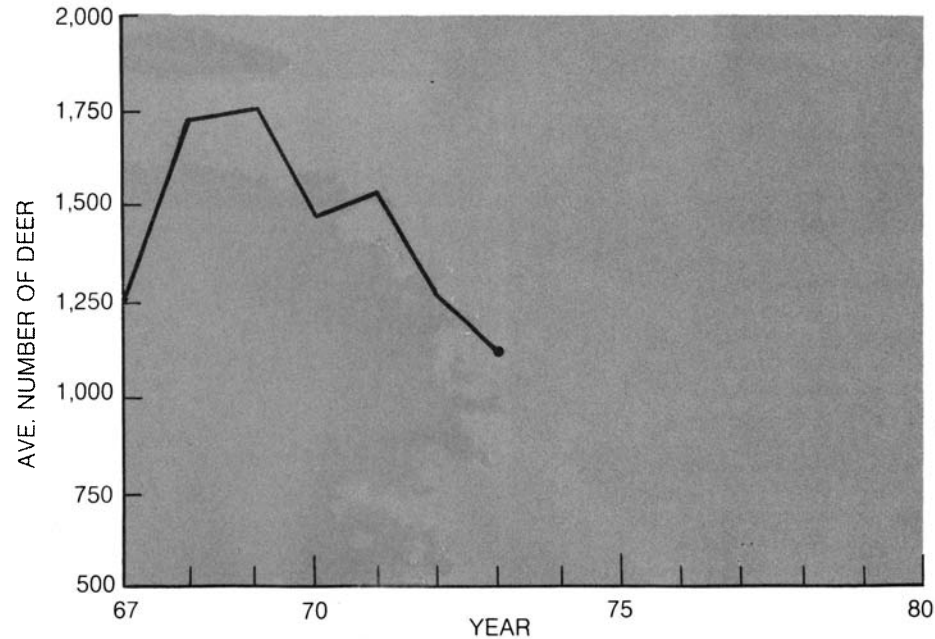


Figure 3

As shown in Figure 3, helicopter counts on Oak Ridge, Prince Creek, and Thompson Creek in northwest Colorado; Uravan, Dominguez, 25 Mesa, Log Hill, and Fruitland Mesa areas in the southwest region; and in North Park (northeast region) have ranged from an average of 1,296 in 1967 to 1,156 in 1973. Although counts in 1973 are the lowest of the seven-year period of record, areas counted represent only a small portion of the total deer range in the state and are not believed to be indicative of the statewide picture. They are significant in that recovery of deer on some important ranges in the state does not appear to have reached the level desired.

Counts of deer on meadows in eight areas of the Piceance Creek Drainage, 1947 through 1971, show lower overall deer populations in recent years, but also a recovery from the low of 1,154 in 1966 to 2,788 in 1971 (Figure 4). An accurate count was not obtained in 1972. Counts during April 1973 should provide data for use in evaluating the status of deer in this highly important big game management unit No. 22.

In Middle Park, direct ground counts on Cedar Ridge show a relatively stable population for the past six years, with substantially higher counts in 1972 and 1973 than in 1971 (Figure 5). Total population estimates during the winters of 1968 through 1973 indicate that substantial decreases occurred from 1968 to 1971 and proportional increases during 1971 and 1972. The estimate of slightly over 10,000 deer in 1973 is near the calculated number of 10,640 during the winter of 1968.

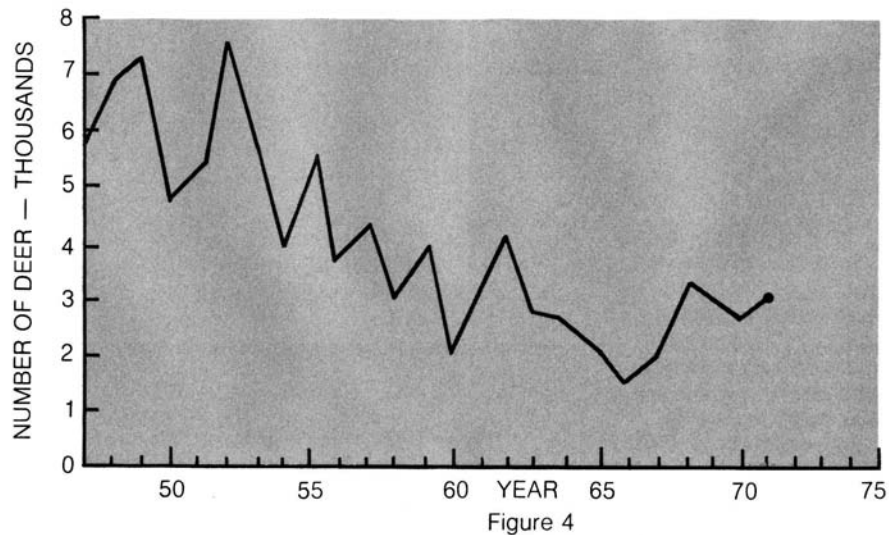


Figure 4

**Middle Park Deer Population Data**

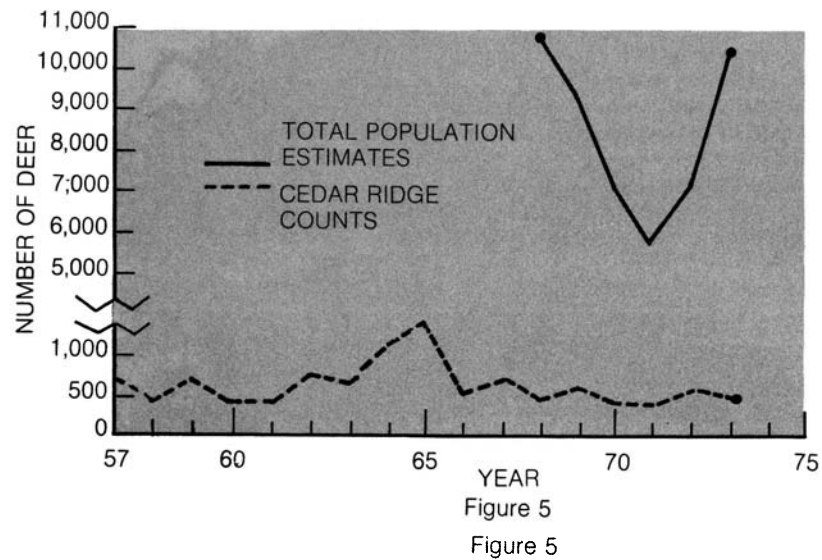


Figure 5

Figure 5

In the spring of 1972, 137 field reports covering all deer units in the state indicate that deer numbers were above those estimated five years previously in 57.7 percent of the areas. Increases varied from 2-30 percent; the majority estimated at 15 percent or more. Population decreases, compared to five years ago, were shown for 21.2 percent of the units, decreases ranging from 5 to 80 percent and averaging about 40. Field personnel estimated that populations remained stable in 21.1 percent of the units.

Current estimates of statewide deer population levels in 1973, as compared to 1968, indicate that the herds are 6 percent above the level of five years ago. This determination is based on the estimate of 14 biologists and game managers knowledgeable about mule deer resources. Population change estimates varied from minus 15 percent to plus 30 percent, a majority of reporters determining that numbers have increased since 1968.

Numbers of deer killed by motorists from year to year may give some insight into deer populations, although these figures probably reflect, in part, the increased use and higher speed of automobiles on Colorado highways. During an eight-year period, 1965-1972, 20,206 dead deer were reported by Wildlife Conservation Officers. The low of 1,694 occurred in 1966 and the high of 3,364 during 1972. According to Wildlife Researcher Dale Reed, a conservative projected highway loss for 1972 approximates 6,200.

An initial product of the Division's computer program for distribution and density mapping is the information that this species occurs in most plains counties of the state; preliminary estimates indicate at least 1,000 whitetails. There seems to be little question that this species has shown steady population increase during the past decade.

A final evaluation of deer population changes, 1952-1972, is shown in Figure 6. Hunters and harvest for the period show increases until the mid-1960's followed by declines until 1971. A substantial recovery in both categories from the 1971 low (86,441 hunters and a harvest of about 40,750 deer) occurred in 1972.

*White-tailed Deer*

According to Hunter (1948), white-tailed deer were found in the state during the 1920's and early 1930's. By 1948, however, he concluded that no white-tailed deer resided in the state year-around,

and attributed their disappearance to infringement of agriculture and domestic stock on their ancestral grounds. Some animals, however, continued to move into the state. Primarily through natural immigration from the south and east (Kansas, Nebraska, and Oklahoma), and partly from game trade agreements with Kansas and Oklahoma, white-tailed deer are becoming common in the plains area. Whitetails are occurring more often in the hunter's bag, and in 1970 an estimated 102 whitetails were taken in 19 big game units in eastern Colorado, comprising 8 percent of the deer harvest from these areas.

**Trend in Deer Hunters, Harvest and Hunter Success**

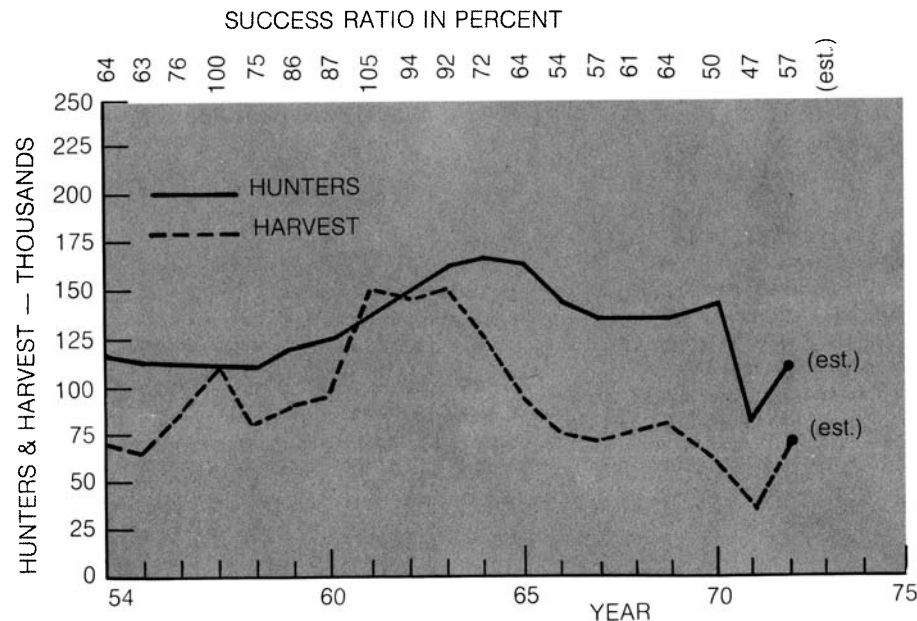


Figure 6

**Elk**

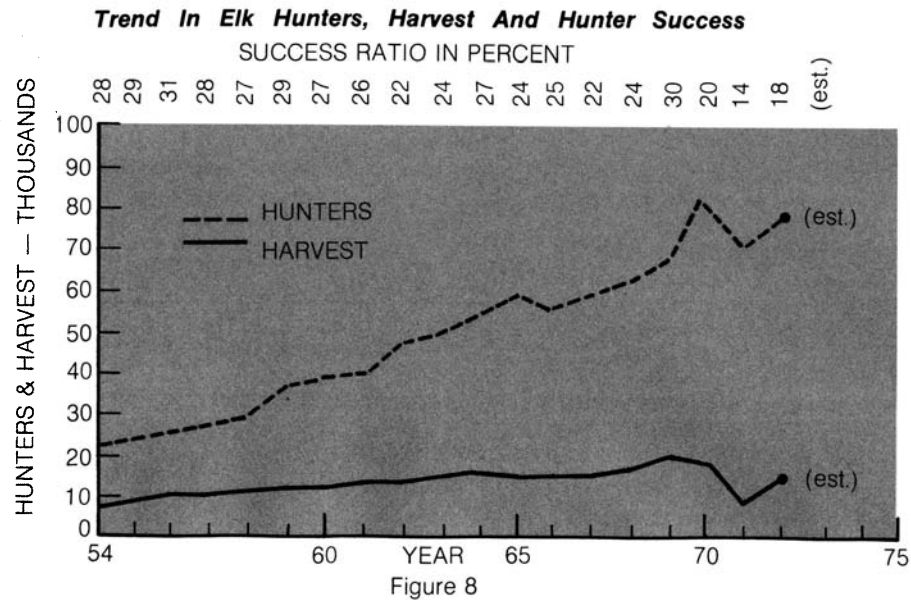
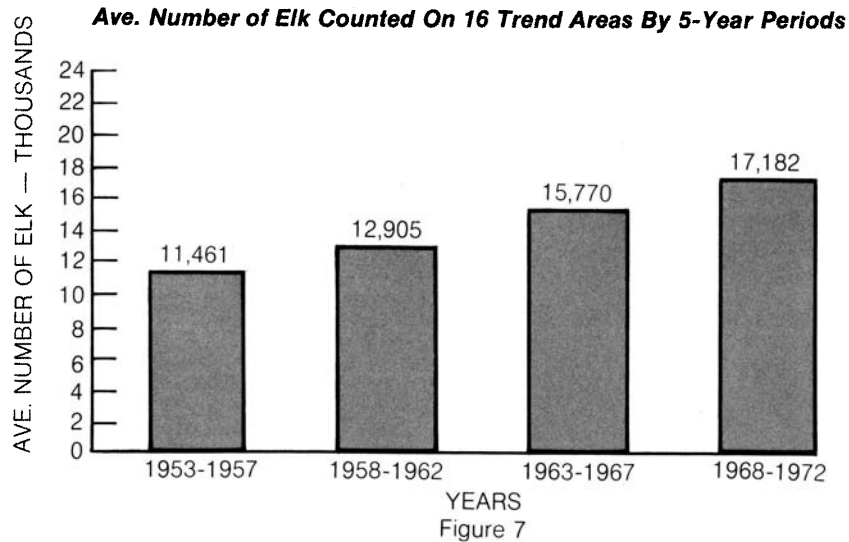
Population indices for this highly important big game animal are limited in this report to aerial trend counts and harvest. As shown in Figures 7 and 8, steady and strong increases in elk numbers have occurred during the past 20 years.

Count summaries in 16 important elk areas by five-year periods, 1953-57 through 1968-72, indicate a 50 percent increase in numbers during this time. Counts in 9 of the 16 areas totalled 14,237 animals during 1972 alone. During poor counting conditions in 1973, with animals moving out of some trend localities because of abnormal cold and snow, 15,339 elk were observed on 12 of the 16 trend areas.

Trends in the number of elk hunters and harvest since 1954 exhibited a steady increase during the first 15 years, reaching the record harvest of 20,940 elk in 1969. The number of hunters increased to a record high of 85,154 during the following year. Nearly 10,000 fewer hunters were licensed in 1971, and the harvest was only 10,693, the direct result of the statewide "bulls only" regulation. Preliminary estimates of hunters and harvest for 1972 are comparable to those of 1970. With strong indicated increases in elk populations, it is likely that new record highs in hunters, harvest, and recreational days will be reached in future years.

**Antelope**

Antelope populations are at high and relatively stable levels in Colorado. Aerial counts in over 40 areas show an average of 20,437 animals tallied during the five-year period, 1967-71. A total of 20,635 were counted in 1971 and 21,192 in 1972. For 30 areas, where usable counts were obtained during the five-year periods of 1963-69 and 1968-72, average numbers were 18,496 for 1963-69 and 20,108 for the latter period. An 8.7 percent increase in the most recent five-year period over a previous, and comparable, time interval is indicated.



Antelope hunters have enjoyed increasing recreational opportunities over the past 27-year period as shown in Table 2. Licenses permitted in recent years have numbered over 6,000, about six times the number available in 1945; the harvest of over 5,000 animals is approximately five times the annual kill during the late 1940's. Percent success has averaged 84.7 during hunting seasons extending from 1945-71. Success in the most recent five years of record, 1967-71, averaged 80 percent.

**Table 2 — Antelope Harvest Statistics 1945-1971.**

Year	No. of Hunters	Harvest <sup>1</sup>	Percent Success <sup>2</sup>
1945	1,120	834	74
1946	1,349	1,113	84
1947-48		NO OPEN SEASON	
1949	1,279	1,129	88
1950	2,396	2,148	90
1951	1,893	1,646	87
1952	2,125	1,922	90
1953	4,951	4,456	90
1954	4,033	3,338	83
1955	3,900	3,167	81
1956	3,437	2,969	86
1957	4,021	3,302	82
1958	2,692	2,262	84
1959	2,217	1,900	85
1960	1,820	1,713	94
1961	2,138	1,905	89
1962	2,894	2,588	89
1963	4,476	4,023	90
1964	5,751	4,885	85
1965	6,413	5,045	79
1966	4,046	6,192	88
1967	7,188	5,835	81
1968	6,617	5,490	83
1969	6,677	5,222	78
1970	7,052	5,633	80
1971	6,432	5,013	78

<sup>1</sup>Harvest during archery season not included. Twelve antelope taken during 1971 archery season.

<sup>2</sup>Success based on license sales 1945-55; thereafter on number of hunters.

## Bighorn Sheep

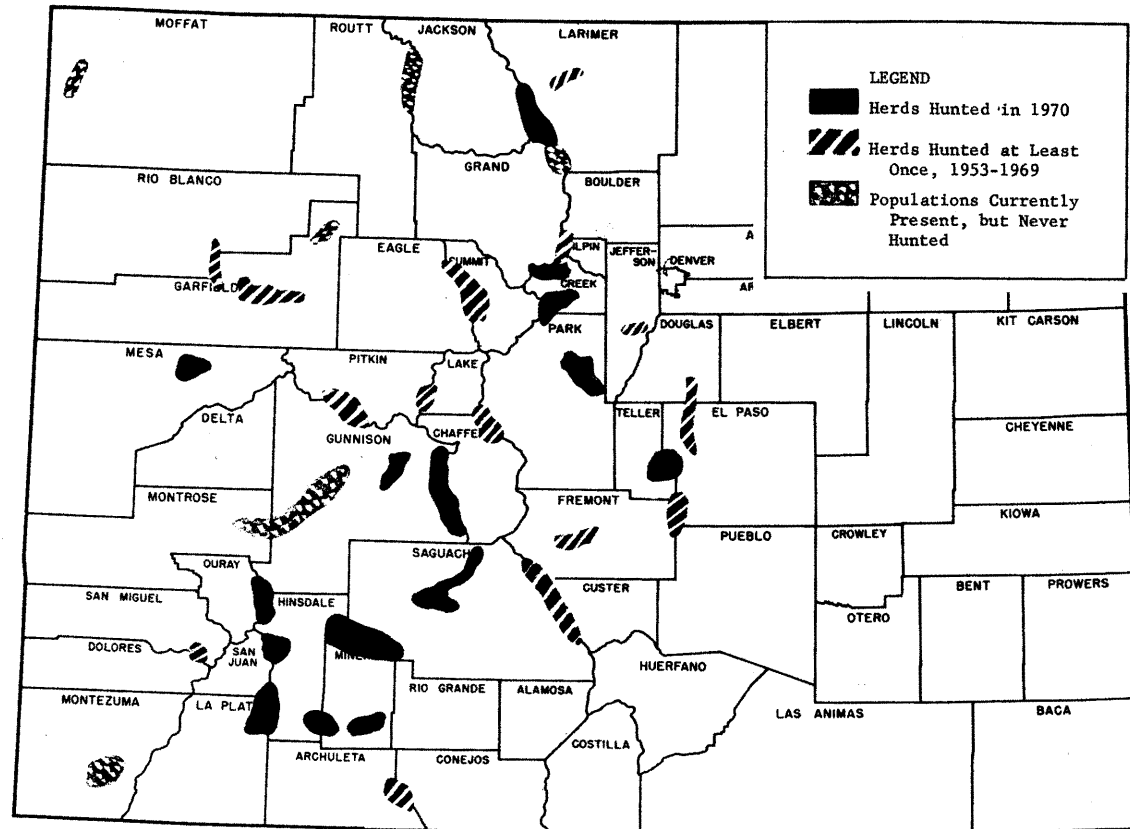
On May 1, 1961, the General Assembly enacted legislation establishing the bighorn sheep as the State animal for Colorado.

Although the bighorn is a magnificent and symbolically sturdy animal, it is not immune to disease and other factors which control animal populations. According to Moser (1962), bighorn sheep in the Tarryall Mountains of Colorado comprised probably the largest and best known sheep herd in the United States until the winter of 1952-53 when a die-off caused by lungworm disease decimated the herd. Prior to this event, the Tarryall herd was depleted in numbers in 1885, supposedly from losses attributed to hemorrhagic septicemia (Spencer, 1943).

Although strong reductions in bighorn herds have occurred in the past, these animals are currently present in most of their historic range. Populations are estimated at 2,000-2,200 animals.

The approximate distribution of bighorn sheep in 1971 is shown in Figure 9. As indicated, 16 areas were hunted in 1970, 15 additional areas were hunted in the past, and six areas have never been hunted. Fourteen areas were hunted in 1972. Areas never hunted are primarily those in national parks and monuments, as well as those containing low sheep numbers.

The first open season for hunting the trophy bighorn was established in 1953, and continuous open seasons have been held since that time. Information in Figure 10 shows that both hunter participation, controlled by license application and drawing, and sheep harvest have been substantially reduced in recent years. Hunter success, however, has remained relatively constant. During the past five years the number of hunters averaged 113, and the average harvest has been 27 bighorns.



Approximate Distribution of Bighorn Sheep in Colorado, 1971

Figure 9

**Mountain Goat**

On May 24, 1948, the first mountain goats to be introduced into Colorado were received from Montana. At that time, eight goats (4 adult females, 1 adult male, and 3 kids) were successfully released on Mount Shavano at the southern end of the Collegiate Range.

Since the first release, 43 additional animals have been brought into the state in seven groups during 1950, 1961, 1964, 1968, 1970 and 1971.

From the 51 goats stocked in the state, main herds have developed in the Collegiate and Mount Evans areas, now numbering 450 to 500 animals. The mountain goat also appears to be established in the Needles Mountains of the San Juan Range and in the Gore Range. Observations of goats on Mount Sopris and in the Never Summer Range north of Rocky Mountain National Park in recent years indicate that an expansion of numbers and occupied range is occurring.

The potential of the mountain goat as a game animal has not yet been fully realized. The initial hunting season in 1964 was followed by successive hunts through 1969. As shown in Table 3, 656 applications were received for 77 licenses, and 59 mountain goats were harvested during the six hunting seasons. Although the goat season has now been closed for three years, it is likely that this species will provide substantial recreational opportunity in the years to come.

**Black Bear**

Despite an all-time harvest low for the period of record (199 animals taken by licensed hunters during the 1971 hunting season) and preliminary indications of another low harvest in 1972, Division field reports show a substantial increase in the black bear population in recent years. Statewide estimates indicate that the 1972 population is up in 30 Wildlife Conservation Officer districts as compared to 1971 and the past five years,

down in only a few, and the same in approximately 40 districts. Reports for 1972, believed to be conservative, show that the total bear population approximates 3,000 animals and may be in excess of 4,300.

Partial evidence of increased bear numbers occurs in the form of "incident" reports. During 1972,

89 incidents were reported of injury or death to livestock; 45 involved damage to other private property; and 85 related to human harassment, primarily on or near campgrounds. Recording of incidents in future years will permit better evaluation of bear population trends and provide further insight into needed management procedures.

**Table 3 — Mountain Goat Harvest Data, 1964-1969**

Year	Number of Applicants	Number of Hunters	Number of Animals Harvested
1964	87	6	4
1965	84	6	3
1966	85	7	3
1967	127	18	14
1968	166	19	15
1969	107	21	20
<b>TOTAL</b>	<b>656</b>	<b>77</b>	<b>59</b>

14

**Bighorn Sheep Harvest Data**

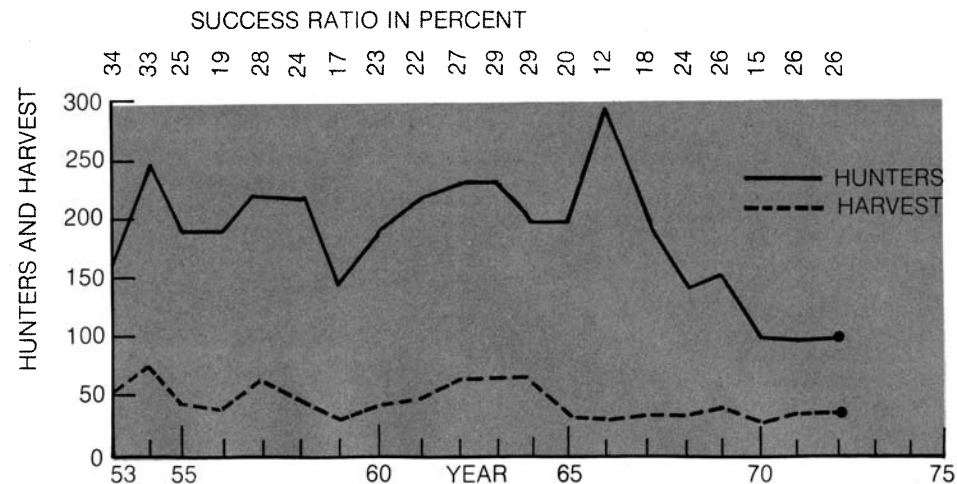


Figure 10

An increase in bear numbers is believed to be related primarily to progressively more restrictive regulations, including removal of the "bear tag" from deer and elk licenses and lower sale of sportsman's licenses because of separate deer and elk seasons beginning in 1971. Rain and snow during the past two hunting seasons, 1971 and 1972, probably forced animals into hiding or early hibernation, a circumstance contributing to low harvest and favoring population increase.

Bear harvest from 1955 through 1971 is shown in Table 4. Although the bear harvest has varied considerably, an average of 522 animals has been taken annually. This harvest should be reached or exceeded in future years if the bear population is to be controlled.

#### Mountain Lion

The mountain lion can be classed as common, but of secretive behavior, in Colorado. The species is not rare and is not in danger of extinction. A bounty of \$50.00 established by the legislature for the

**Table 4 — Bear Harvest by Year, 1955-71**

Year	Number Harvested
1955	590
1956	324
1957	552
1958	584
1959	555
1960	392
1961	586
1962	478
1963	570
1964	672
1965	728
1966	614
1967	519
1968	662
1969	406
1970	542
1971	199

lion in 1929 was removed on July 1, 1965. Populations appear to have remained relatively constant since the bounty, with indicated increases in recent years.

Questionnaires sent to field officers of the Division of Wildlife, 1970-73, indicate that the minimum number of lions in the state is between 600-800 animals.

Harvest of mountain lions between 1960 and 1971 averaged about 55 animals (Table 5). Decreasing numbers of lions have been taken by Division of Wildlife Services personnel during this period. The lower number of animals harvested during the last two years of the period of record is a result of more restrictive hunting regulations.

**Table 5 — Mountain Lions (reported) Taken in Colorado, 1916-1971**

Period or Years	Division of Wildlife Services <sup>1</sup>	Number of Animals Taken		
		Bountied <sup>2</sup>	Licensed Hunters	All Animals Reported
<i>Averages</i>				
1916-1919	35	—	—	3.5
1920-1929	58	15	—	7.3
1930-1939	13	563	—	57.6
1940-1949	34	84 <sup>3</sup>	—	11.8
1950-1959	117	503	—	62.0
<i>Totals</i>				
1960	6	31	—	37
1961	13	38	—	51
1962	7	34	—	41
1963	12	45	—	57
1964	2	45	—	81
1965	5	64 <sup>4</sup>	17 <sup>5</sup>	86
1966	3	—	47	50
1967	1	—	58	59
1968	6	—	50	56
1969	3	—	58	61
1970	1	—	47	48
1971	0	—	29	29
<b>TOTAL</b>				<b>656 (54.7 Av.)</b>

<sup>1</sup>Division of Wildlife Services reports based on fiscal year. Data derived from fiscal year reports originating with July 1 for years and periods shown.

<sup>2</sup>Bounties on fiscal year basis.

<sup>3</sup>Data for 1941, 1942, 1943, and part of 1944 incomplete. It is believed the take and bountied numbers were much higher than herein reported.

<sup>4</sup>Bounty law repealed and no bounties paid after June 30, 1965.

<sup>5</sup>Animals taken by holders of mountain lion licenses during the open season extending from October through December 31, 1965.



*Buffalo*

The State Legislature in the Session laws of 1887 created a 10-year closed season on bison. Killing of this species was prohibited for 79 years, or until 1967. Three buffalo were harvested during the September 2-12 season in 1967. In the next three years 7, 22, and 30 buffalo were taken by licensed hunters. Cropping of surplus animals in 1971 and 1972 was by public auction and sale to highest bidders. Fifty-six animals were sold for \$15,204.12 in 1971, an average of \$271.50. In 1972, four nuisance animals were sold for \$792.00, an average of \$198.00 each.

At present, the buffalo remains classified in the state statutes as a game animal, and the Division carries out a small program to maintain this historically significant species in several areas. On November 14, 1972, 86 animals were in Division of Wildlife herds as follows: Bonny Reservoir, 19; Lathrop State Park, 14; Greasewood-Great Divide Management Area, 34; and Little Hills Experiment Station, 19.

*Summary of Big Game Population Status —* Evaluation of population data and harvest statistics, in conjunction with population status appraisals by 14 wildlife managers, biologists, and researchers, gives reason for optimism and has formed the background for information contained in Figure 11. Relationships between current population levels and those of five years ago (1968) show that all big game species except bighorn sheep and antelope have increased in numbers despite human inroads in wildlife environments. The biggest increase was for elk, closely followed by bear, mountain goat, and white-tailed deer. Significant increases in numbers of mule deer and the mountain lion also are indicated.

The static population for antelope is probably conservative, since aerial counts show that overall numbers may have increased as much as eight percent.

Slight reductions indicated for bighorn sheep numbers are not believed to be serious. Research and management programs planned or underway for bighorns should result in net herd gains in the near future.

*Recreation from Big Game Resources*

Evaluation of the recreational contribution of big game in terms of hunters, animals harvested, and days in the field not only reflects the collective population status of big game species, but also measures overall management effectiveness.

Comparing the average of a five-year period 15 years ago, 1953-57, with the most recent five-year period, 1968-72, significant changes are readily apparent (Figure 12). Harvest of big game animals has dropped only slightly, while the number

of hunters and the days afield for hunting have each increased about 50 percent. Both buffalo and mountain goats were harvested for the first time during the recent five-year period. The overall drop in harvest can be attributed primarily to smaller populations of mule deer and a smaller kill, partly because of restrictive hunting regulations for this species in recent years.

Recreation days were determined by multiplying the average number of hunters for each big game species by the recreation factor, or average number of days an individual participates in each type of hunt. Increase of nearly a quarter-million recreation days in a 15-year period, at the same time as population increases for most big game species were occurring, is consistent with the goals of an effective big game management program.

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**Big Game Population Status (1973 Compared to 1968)**

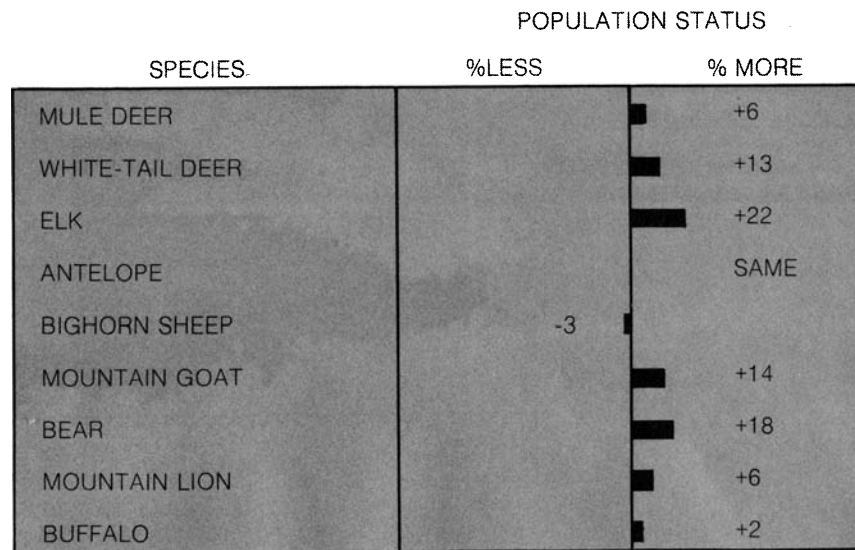


Figure 11

### SMALL GAME RESOURCES

Although the reputation of Colorado as a hunting state with abundant wildlife resources may have resulted primarily from big game, the many species of small game have provided greater recreational opportunity for sportsmen through the years in terms of animals harvested and recreational hours provided. Data presented in the following sections are drawn from the most reliable indicators available on the population status for migratory birds, nonmigratory upland game, and small game mammals. Recreational contributions for each group are given.

#### Migratory Birds

Migratory birds, primarily ducks and geese, currently provide a higher percent of the small game harvest and more recreational opportunity than either upland game birds or small game mammals (rabbits, hares, and squirrels). This has not always been the case, but as habitat for upland game has deteriorated, resulting in lower populations and decreased hunter interest and participation, attention has been directed toward doves, ducks, and the expanding goose flocks in the state.

*Ducks* — Breeding-pair counts conducted in six important waterfowl production areas in the state, 1954 to 1972, showed a strong increase during the early part of this period and a general leveling off in the estimated number of breeding pairs during the past 10 years (Table 6). Counts are made annually in the San Luis Valley, North Park, South Platte Valley, Cache la Poudre Valley, Yampa Valley, and Brown's Park.

### Recreation Provided by Big Game Resources (1953-57 Compared to 1968-72)

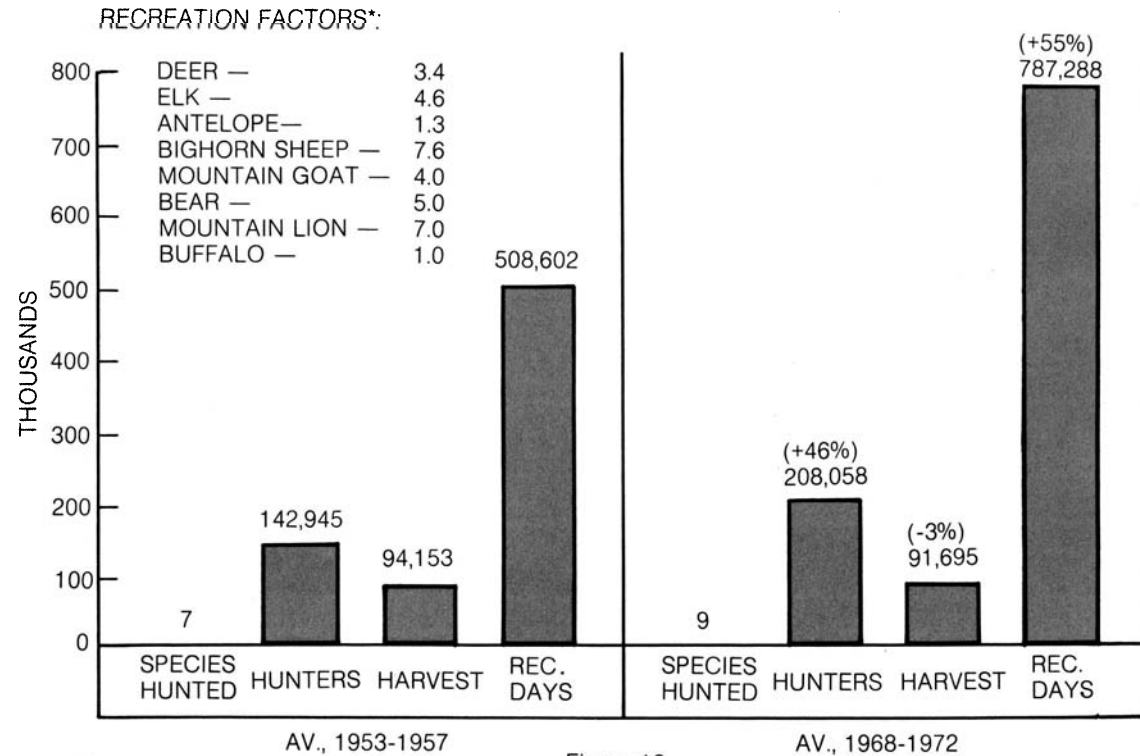


Figure 12

\*Av. days hunters hunted each species.

January duck inventory data show a widely variable pattern, with a high count of 626,835 birds in 1958 and a low of 217,364 in 1965. The count of 243,970 in 1973 is the lowest since 1971 and reflects, in part, adverse weather conditions which caused birds to winter farther south (Figure 13).

Interest in waterfowl hunting has been a reflection of duck populations and hunting regulations to a large degree during the past 18 years. As shown in Figure 14, the number of hunters and harvest was high in the mid-1950's, but declined to a low during 1962. Since that time hunters and harvest have gradually increased to record highs of 37,626 and 289,720 during 1971.

**Table 6 — Estimated Duck Breeding Pairs in Six Important Breeding Areas, 1954-1972**

Year	Number of Pairs	Year	Estimated No. of Breeding Pairs
1954	15,817	1963	38,998
1955	14,929	1964	45,689
1956	17,882	1965	55,933
1957	16,260	1966	50,417
1958	17,731	1967	67,731
1959	17,053	1968	72,714
1960	23,574	1969	69,025
1961	29,425	1970	57,389
1962	36,334	1971	60,691
		1972	47,276

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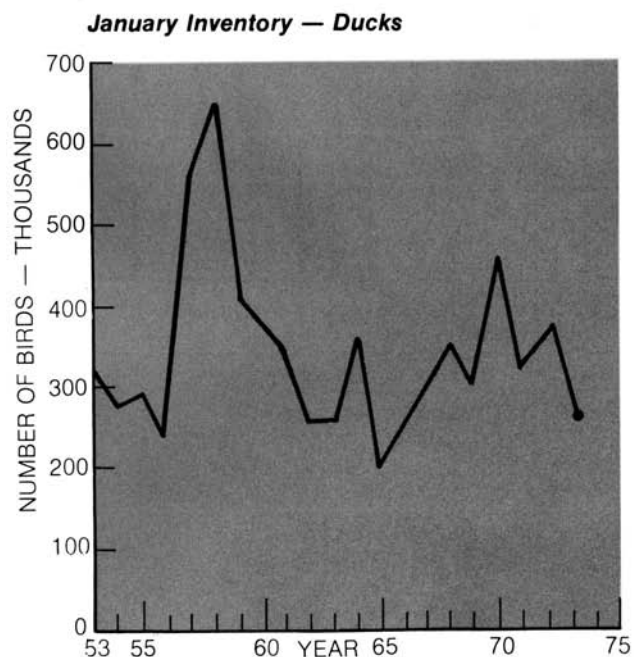


Figure 13

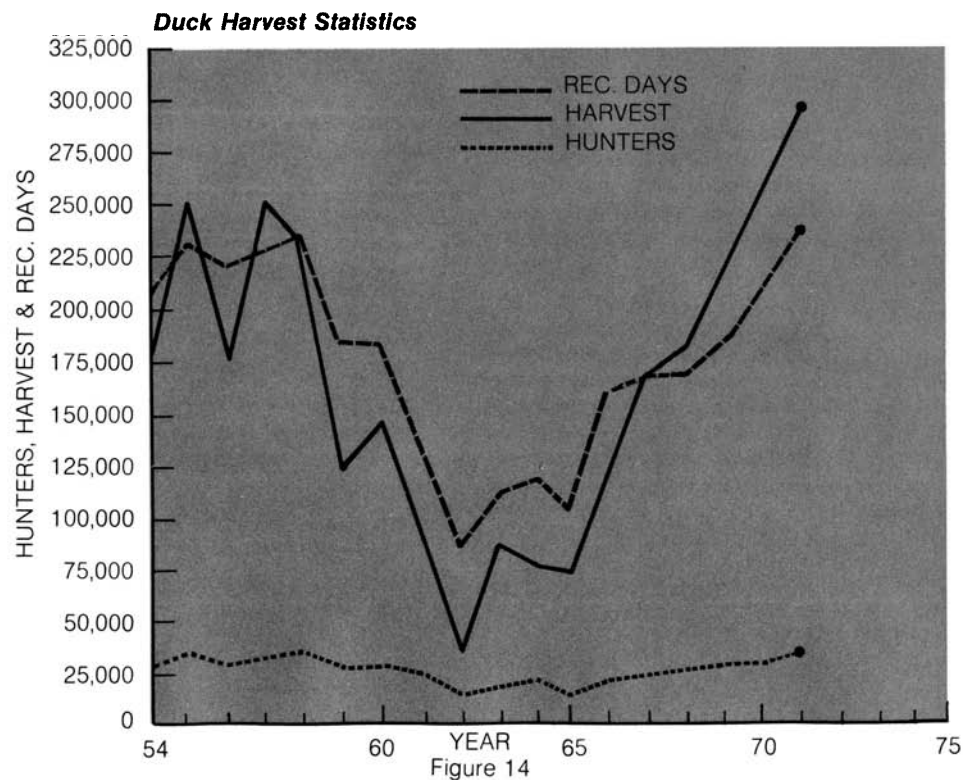


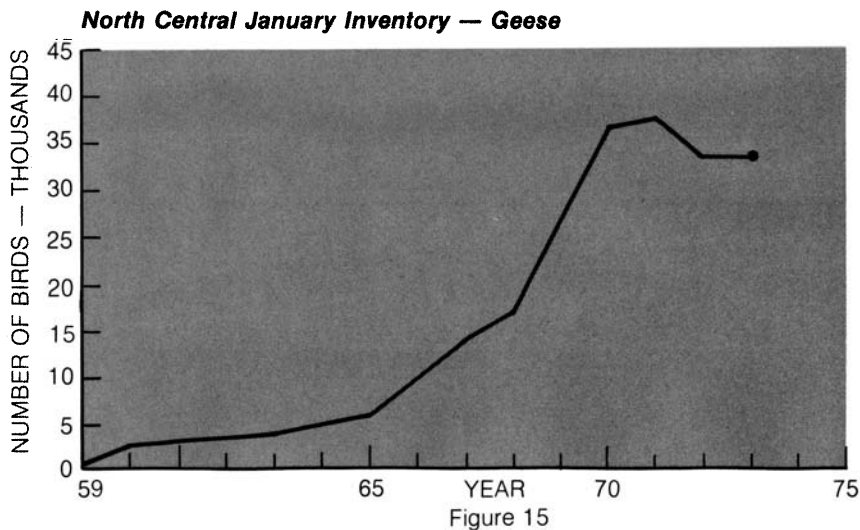
Figure 14

**Table 7 — Post-nesting Goose Flock Size, Larimer-Boulder Counties and Northwest Colorado, 1956-1972**

Year	Number of Geese	
	Larimer-Boulder Co.	Northwest Colo.
1956	0	105
1957	31	93
1958	54	166
1959	60	187
1960	121	255
1961	210	245
1962	400	502
1963	500	638
1964	775	954
1965	950	732
1966	1,150	970
1967	1,578	1,041
1968	1,546	1,325
1969	2,464	1,222
1970	2,458	1,178
1971	2,623	1,129
1972	2,427	1,097

Geese — One of the greatest wildlife management successes in Colorado and the Central Flyway has been the north central goose flock. Strong gains also have been made in Brown's Park and in the Grand Valley Area in the western part of the state and along the Pacific Flyway. Overall benefits from the goose resource have been realized to an increasing degree since the mid-1950's.

Successes in resident goose flock development are documented by post-breeding season counts in the Larimer-Boulder area and in Moffat County. As shown in Table 7, counts in north central Colorado increased from zero in 1956 to more than 2,600 in 1971, dropping only slightly to 2,427 in 1972. In northwestern Colorado, numbers increased from less than a hundred birds in 1956 to nearly 1,400 by 1968. Counts have remained high since that year, although a slight downward trend is indicated.



The successful goose restoration program in Colorado has been directly reflected in January inventory counts. For north central Colorado, goose numbers have increased from less than 700 birds in 1959 to about 35,000 during the recent four-year period, 1970-73 (Figure 15). Statewide, the increase has been nearly as spectacular, with numbers between 20,000 and 21,000 in 1953-54, increasing to an average of about 100,000 in 1970-73 (Figure 16).

It should be realized that the strong increase in Colorado goose populations during the winter is not only a reflection of a successful restoration program, but also the result of flyway-wide management efforts. The attraction of resident flocks to migrating birds also has been partly responsible for the buildup in wintering numbers.

As would be expected, the increase of geese in the state has resulted in improved recreational opportunities for sportsmen. The 12,136 goose hunters estimated for 1954 increased to more than 25,000 by 1971. Harvest increased even more dramatically, from about 8,168 birds in 1954 to more than 47,000 in 1971 (Table 8).

*Mourning Doves* — Migration data obtained in 1962 and 1963 show that nearly half the peak population of mourning doves in late summer will have left the state by the time the season opens on September 1. Despite this southward movement, the harvest of doves exceeds that for any other game bird species. During the five-year period of 1967-71, an average of slightly over 24,000 hunters harvested an average of nearly 275,000 birds annually. Population data for Colorado and for the Central Dove Management Unit indicate relatively stable numbers from year to year and the prospect for continued recreational opportunities in the future.

**Statewide January Inventory — Geese**

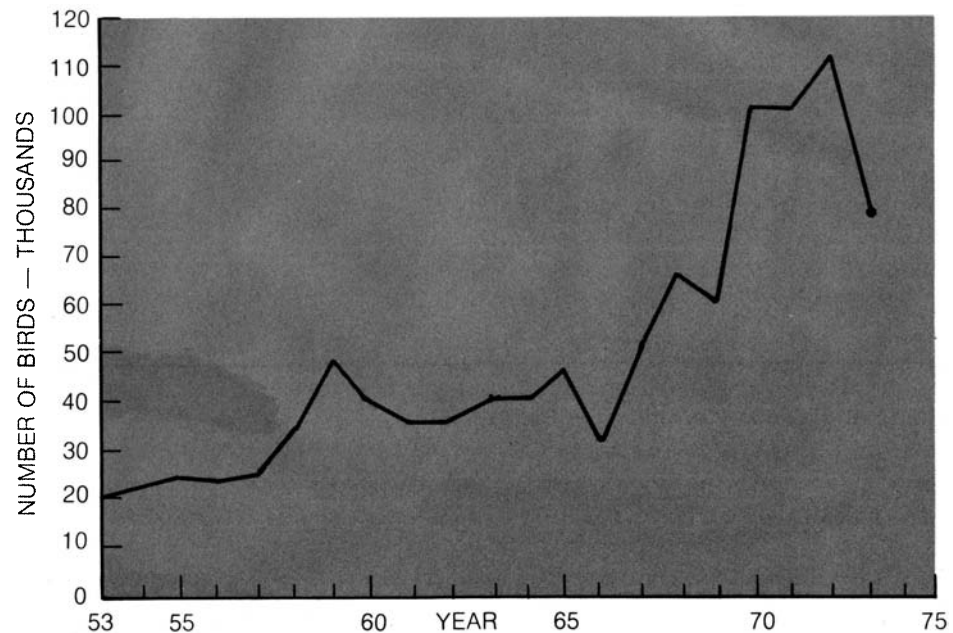


Figure 16

**Table 8 — Goose Harvest Statistics, 1954-1971**

Year	Number of Hunters	Estimated Harvest	Year	Number of Hunters	Estimated Harvest
1954	12,136	8,168	1963	10,841	17,899
1955	17,634	17,711	1964	13,678	24,123
1956	12,477	11,310	1965	11,344	13,658
1957	12,057	14,589	1966	15,807	30,033
1958	14,705	19,704	1967	13,748	23,372
1959	13,647	21,972	1968	13,467	19,379
1960	14,107	15,659	1969	13,282	17,939
1961	11,245	14,056	1970	18,774	40,574
1962	9,159	13,671	1971	25,189	47,036

**Table 9 — Band-Tailed Pigeon Harvest Statistics, 1970-1972**

Year	Season Dates	Length of Season	Bag and Possession Limit	Number of Permit Holders	Number of Birds Harvested
1970	Sept. 12-20	9	5 & 10	364	541
1971	Sept. 4-26	23	5 & 10	524	1,723
1972	Sept. 9-Oct. 1	23	5 & 10	562	822

*Band-Tailed Pigeons* — Hunting seasons for band-tailed pigeons were terminated after 1944, when it was felt that the interior flock in Colorado, Utah, Arizona, and New Mexico was declining.

Through cooperative research in the four states, beginning in the late 1960's, it was determined that bandtails were present in sizable numbers and that limited hunting was justified. In Colorado alone, 16,149 individual birds were banded during the period 1969-72, not only indicating a substantial pigeon resource, but establishing an all-time national banding record.

Experimental hunting seasons were allowed 1970 through 1972 in Colorado. Statistics for these three seasons are given in Table 9.

*Other Migratory Shore and Upland Game Birds* — In addition to the mourning dove and band-tailed pigeon, several migratory shore and upland birds contribute to hunting recreation in Colorado. Included are the little brown crane, Virginia rail, and common snipe. Population and harvest data are generally lacking for these species, and studies are contemplated or under way to gain more knowledge of these important species. Recent information indicates a minimum snipe population of 10,000 birds in the fall.

Following the first hunting season for the little brown crane in 1967, harvest has been largely dependent on the presence of this migratory species. Estimated harvest has been 2, 0, 0, 35, and 20 for the years 1967 through 1971, respectively.

*Nonmigratory Upland Game Birds*

Our upland game bird resource, nonmigratory in nature, consists of the wild turkey, pheasant, grouse, quail, and chukar partridge. Included in this group are 10 species that have been hunted in recent years, counting four species of grouse and three species of quail.

*Wild Turkey* — The wild turkey is of such trophy value to the hunter that for several years it was classified as big game. Presently it is listed in Colorado statutes as a small game species, although a special hunting license must be purchased.

Population data, gathered annually, include winter flock counts and brood counts to determine reproductive success. Statistics for a long-term period of record have not yet been fully analyzed, but show, generally, a small increase during the past five years. More than 1,600 birds were counted in seven areas in southwest Colorado during 1972, probably representing less than one-fifth of the total wild turkey population in the state.

The total wild turkey harvest 1949 through 1971 is 9,719 birds, averaging 423 per year. Detailed information is contained in Table 10.

*Summary of Population Status, Migratory Birds* — Migratory game bird populations appear to have increased or remained relatively stable as compared to populations of five years ago. The greatest increase was for geese, the 1973 population estimate being 20 percent above that for 1968 (Figure 17).

*Recreation Provided by Migratory Game Bird Resources* — Migratory birds have provided substantially more recreation during the five-year period 1967-71 than during a comparable period 13 years ago, 1955-59. Hunters, harvest, and days of recreation increased appreciably during the latter period, as shown in Figure 18.

**Migratory Game Birds Population Status (1973 Compared to 1968)**

POPULATION STATUS

SPECIES	%LESS	%MORE
DUCKS		+8
GEESE		+20
MOURNING DOVE		SAME
BAND-TAILED PIGEON		+2

Figure 17

**Recreation Provided by Migratory Game Bird Resources (1955-59 Compared to 1967-71)**

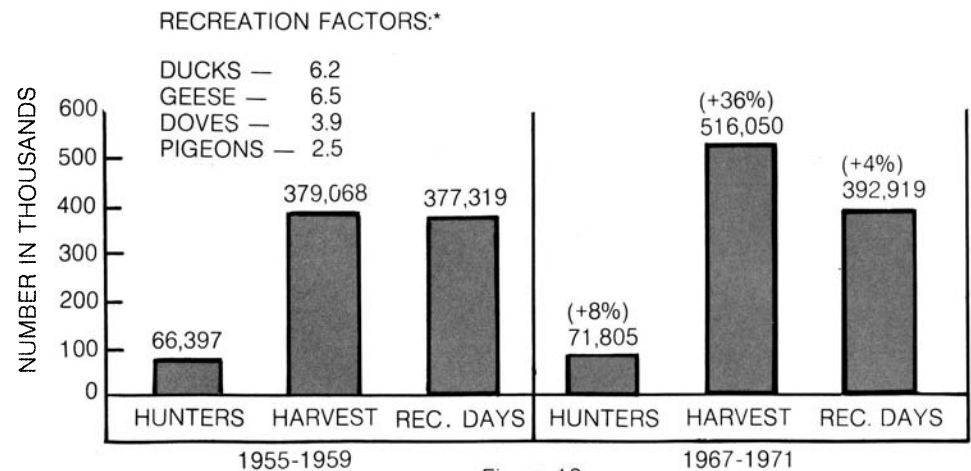


Figure 18

\*Av. days hunters hunted each species.

**Table 10 — Wild Turkey Harvest, 1949-1971**

Year	Number of Hunters	Harvest	Year	Number of Hunters	Harvest
1949	Unk.	188	1961	1,027	543
1950	Unk.	358	1962	—	485
1951	Unk.	243	1963	1,135	710
1952	Unk.	138	1964	1,524	624
1953	Unk.	429	1965	1,127	489
1954	Unk.	536	1966	980	517
1955	Unk.	381	1967	1,024	365
1956	560	363	1968	1,039	419
1957	535	328	1969	760	242
1958	561	343	1970	893	326
1959	760	506	1971	937	344
1960	1,541	792			

Although population indices appear to have been somewhat stable the past 10-year period, hunter success reached all-time lows during the seasons of 1971 and 1972 (Figure 20). Lower hunter success has occurred during recent years even though hunters have declined in number since the 1950's and early 1960's (Table 11). Widespread activities to establish undisturbed cover, such as effective Federal farm programs or increased land lease by the Division of Wildlife, must take place if pheasant populations are to be brought back to prior abundance.

*Pheasant* — If the wild turkey can be called the trophy species of upland birds in Colorado, the pheasant can be said to have the most universal appeal and has been the "bread and butter" species since the initial hunt in 1929. Although agriculture created a favorable environment for this Chinese import, "clean" farming and other factors responsible for cover removal have caused a substantial population reduction since the late 1950's.

The tablelands in the state, and population data from these areas, have been used to show the trend in pheasant numbers. Average cock calls per two-minute period, and the average of birds per mile, 1956 through 1972, obtained from eight census areas, show substantial reductions from the high populations of the late 1950's (Figure 19).

**Pheasant Population Indices, Northeast Colorado**

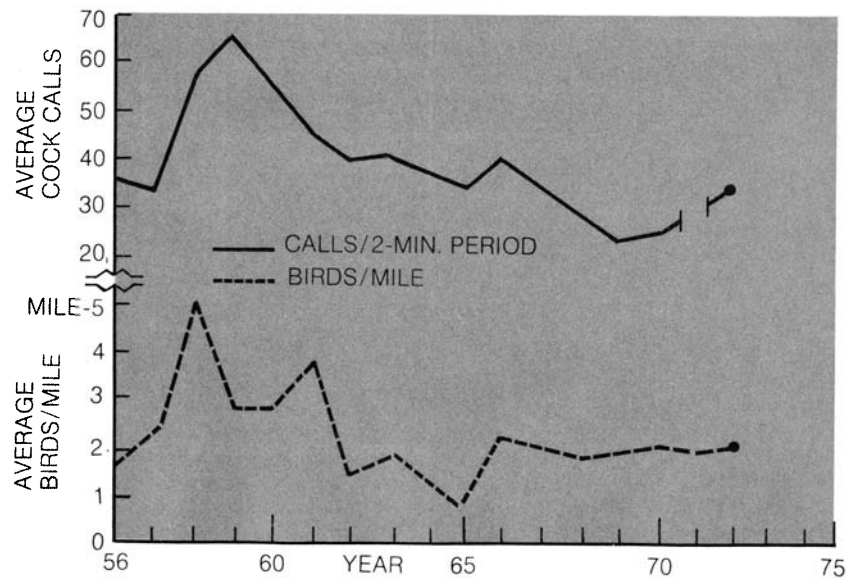


Figure 19



**Pheasant Check Station Data, Fleming, First Day**

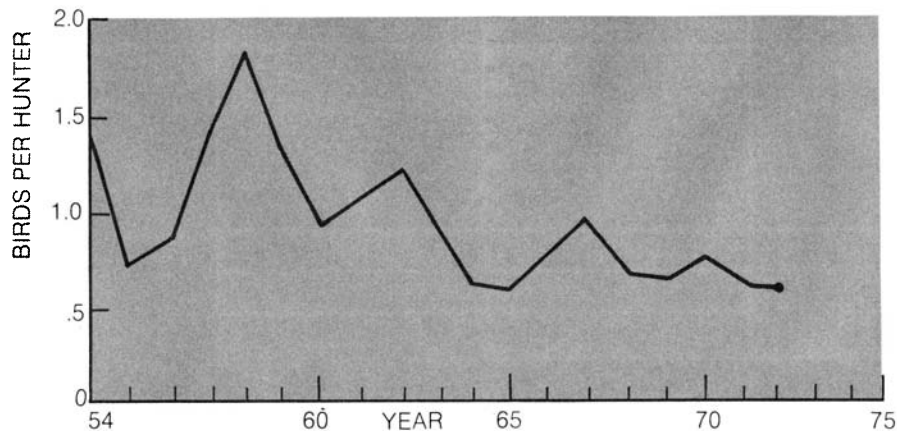


Figure 20

*Grouse* — Four species of grouse — the ptarmigan, blue grouse, sharp-tailed grouse, and sage grouse — have been hunted in Colorado since 1953. Prior to that year the season had been closed since 1945 for sharp-tailed and sage grouse, and since 1946 for blue grouse and ptarmigan. Prairie chickens also are found in the state, but these have not been hunted since 1936 except for a two-day season in 1945.

Population data for grouse have been gathered systematically mainly for the sage grouse. Counts have been made of cocks on strutting grounds, and young and adult birds along brood-count routes have been observed in late summer. Both of these population indices have varied widely from year to year, but counts in 1971 and 1972 were comparable to those for previous years. The number of cocks on strutting grounds has varied from 1,820 in 1965 to a high of 4,403 in 1969. The average for the period 1962-72 was 2,735. In 1971, 2,905 birds were observed and in 1972, 2,386.

Sage grouse observed per mile on established brood-count routes have varied from 0.38 in 1965 to 1.68 in 1969. The average was 1.02 in 1970, 1.45 in 1971.

Although population indices indicate relatively stable populations of sage grouse in recent years, other data show that gradual losses in numbers are occurring. These losses are attributed primarily to the loss of sagelands.

The harvest of all grouse, an indication of hunter interest, for the past five years is as follows: ptarmigan, 2,343; blue grouse, 17,685; sage grouse, 15,692; and sharp-tailed grouse, 1,875.

Results from check stations in North Park show declining sage grouse hunter success for that area. The average number of birds per hunter for the first weekend of the 1972 season was 0.56, well below averages of 0.71, 0.87, 1.31, and 1.36 for the periods of 1968-72, 1963-67, 1958-62, and 1955-57, respectively.

Increasing attention has been given to the greater and lesser prairie chicken in recent years, and a comment on populations of these species is worth making. In 1962, 130 lesser prairie chickens were observed on 13 dancing grounds in Baca and Prowers Counties in southeastern Colorado. In 1972, 110 birds were noted on 9 dancing grounds, and the total population in the state was estimated to be in excess of 200 birds.

**Table 11 — Pheasant Harvest Statistics, 1955-1971**

Year	Number of Hunters	Harvest	Year	Number of Hunters	Harvest
1955	71,741	117,655	1964	63,234	132,791
1956	65,670	108,355	1965	58,103	93,546
1957	75,349	121,312	1966	71,598	157,516
1958	91,625	245,555	1967	61,920	157,277
1959	99,450	248,624	1968	62,664	146,563
1960	99,929	203,855	1969	69,007	148,585
1961	94,990	211,828	1970	64,613	126,700
1962	97,560	195,120	1971	56,900	111,626
1963	82,412	156,583			

In 1952 there were an estimated 2,000 greater prairie chickens in east central Colorado, primarily in Yuma County. Twenty years later, in 1972, 233 birds were observed on 39 booming grounds and the estimated population was 600. Both species of prairie chickens are considered endangered in the state, and immediate attention to habitat acquisition and improvement appears warranted if they are to be retained as part of the wildlife fauna in Colorado.

*Chukar Partridge* — The chukar was introduced in relatively large numbers during the late 1930's and early 1940's, with follow-up releases mainly during the period of 1955-61. Over 24,100 birds were released during stocking programs. Most of the birds were reared at game farms, although some 350 wild chuckars were trapped and transplanted.

The chukar, a native of southeastern Asia, prefers semi-desert conditions typified by low precipitation, low-growing vegetation, and relatively high temperatures, with terrain characterized by rocky canyons and talus slopes. Although the chukar appears to be permanently established in the state, the overall habitat is neither suitable enough nor extensive enough to produce large numbers of this desirable game bird. Population decline (approximately 28 percent) during the past five years has apparently been more pronounced than for any other game species in the state.

Despite population decline, the chukar partridge should provide substantial hunting opportunity in years ahead, provided climatic conditions are such that suitable feed, primarily cheatgrass, is produced, and excessive winter losses do not occur.

Since the first hunting season in 1958, an estimated 45,242 chukars have been harvested by approximately 21,250 hunters. The average season bag has been slightly over 2.0 birds per hunter. The 1972 season was closed because of the declining population of birds and their poor reproduction during that year.

*Quails* — Scaled, bobwhite, and Gambel's quail, in descending order as to size and in contribution of hunting opportunity, are found in substantial numbers in Colorado. The mountain quail, introduced in west central Colorado during the 1960's, appears to have become established in a small area and may contribute to recreational hunting in future years.

Counts of scaled quail along established trend-count routes in southeast Colorado, 1962 through 1972, have ranged from a high of 1,889 in 1967 to a low of 686 in 1972. Although counts were made on only 9 of 14 routes in 1972, the low count of 1.12 birds per mile is believed to be indicative of a declining scaled quail population in recent years. Improved climatic conditions should result in a substantial increase.

Recent bobwhite quail research by Warren Snyder on a 3,840-acre area along the South Platte River in northeast Colorado showed an estimated fall population of 2,114 birds in 1971 and 2,300 in 1972.

Total population data on this species are lacking for its range in general, as is also true for the Gambel's quail, common in its prime west central Colorado habitat.

Contribution of quail to the hunter's bag averaged 24,351, 19,612, and 4,238 during 1968-72 for scaled, bobwhite, and Gambel's quail respectively.

*Summary of Population Status, Nonmigratory Upland Game Birds* — The nonmigratory upland game bird resource has sustained the greatest population loss of all game species in the state. As shown in Figure 21, losses are estimated for six of the eleven species, that for the chukar partridge being most substantial. Significant losses also are indicated for the pheasant and sage grouse. Small gains during the past five years appear to have occurred for the wild turkey and bobwhite quail.

**Upland Game Birds Population Status (1973 Compared to 1968)**

SPECIES	POPULATION STATUS	
	%LESS	%MORE
WILD TURKEY		+2
PHEASANT	-6	
PTARMIGAN		SAME
BLUE GROUSE		SAME
SAGE GROUSE	-6	
SHARP-TAILED GROUSE	-3	
PRAIRIE CHICKEN	-4	
SCALED QUAIL	-2	
GAMBEL'S QUAIL		SAME
BOBWHITE		+4
CHUKAR PARTRIDGE	-28	

Figure 21

*Recreation Provided by Upland Game Bird Resources* — Losses in upland game bird populations resulted in decreasing hunter interest and recreational hunting days during the 13-year period of 1955-59 to 1967-71. As indicated in Figure 22, losses in all categories have approximated 15 percent.

*Small Game Mammals*

Included as small game mammals are the cottontail, snowshoe hare, and fox squirrel. Although generally unrecognized, these three species provide annual hunting recreation comparable to or exceeding that for all nonmigratory upland bird species.

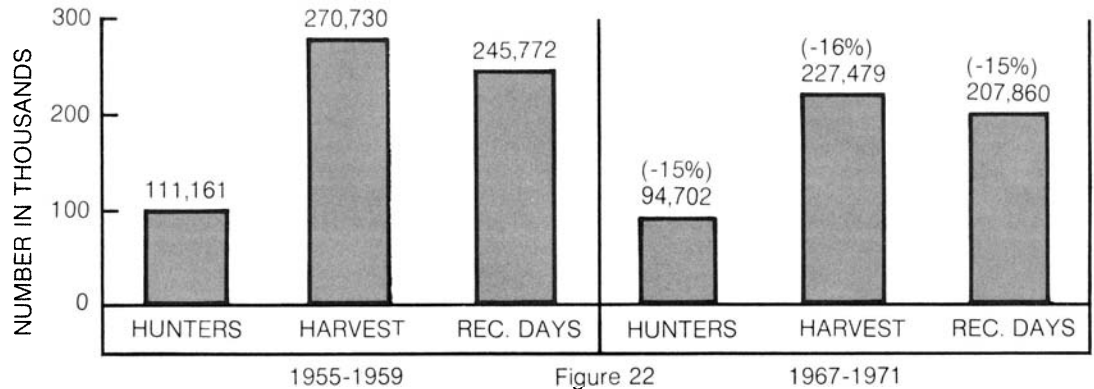
Populations of small game mammals, particularly the cyclic rabbits and hares, vary widely. An evaluation by wildlife managers and researchers in the Wildlife Division indicates that populations are relatively the same now, in 1973, as they were five years ago (1968), with slight increases indicated for cottontails and the snowshoe hare (Figure 23). Although fox squirrel populations are shown as the same, the destruction of cottonwoods and river bottom habitats has almost certainly reduced populations of this species.

As with upland game birds, recreation provided by the cottontail, snowshoe hare, and fox squirrel has declined considerably during the past decade. This decline is believed to be related more to a lack of hunter interest than to decreased numbers of small game mammals (Figure 24).

**Recreation Provided by Upland Game Bird Resources (1955-59 Compared to 1967-71)**

RECREATION FACTORS:\*

WILD TURKEY	2.2
PHEASANT	2.2
GROUSE	1.9
CHUKAR	2.3
QUAIL	2.7



\*Av. days hunters hunted each species.

**Small Game Mammals Population Status (1973 Compared to 1968)**

POPULATION STATUS		
SPECIES	%LESS	% MORE
COTTONTAIL		+2
SNOWSHOE HARE		+1
FOX SQUIRREL		SAME

Figure 23

**FURBEARER RESOURCES**

Furbearers are defined in Colorado statutes as "... beaver, fisher, marten, mink, muskrat, otter, weasel, wolverine, ring-tailed cat, ferret, coney, and opossum, and all subspecies or variations of the foregoing and any other animals that may be declared by the Commission under regulation to be a fur bearer." A number of animals listed as furbearers are protected from harvest by Commission regulations, and several species not listed as furbearers such as the bobcat, coyote, raccoon, and skunk, are trapped for profit.

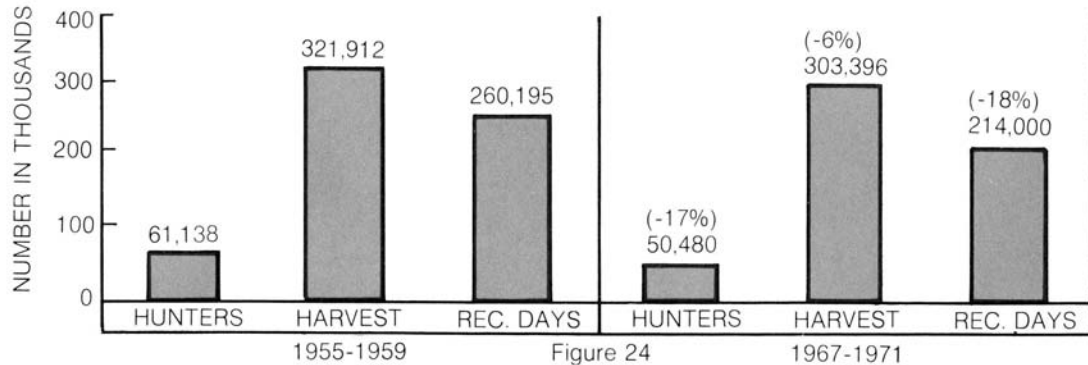
Good population data are generally lacking for fur animals. However, judgments and estimates of population levels for several species trapped for fur at present, compared to 1968, were made by 14 Division personnel with responsible wildlife management positions. In their determination, populations of nine animals have remained the same or shown slight to moderate increases during the past five years. The biggest increases are believed to have occurred for the coyote and raccoon (Figure 25).

The beaver is one of the most prized fur-bearing animals in the state. Although a considerable number are trapped annually, populations have maintained themselves, and beaver are common to abundant in many areas. Overpopulation of animals can occur, sometimes to the detriment of the habitat, the watershed, and the welfare of the species itself.

Harvest of beaver 1957-58 through 1970-71 has varied from a low of 5,596 in 1958-59 to a high of 10,005 in 1968-69. As shown in Table 12, the number of state-trapped beaver has been greatly reduced in recent years. The number taken by private trappers has increased, while the number taken by landowners has remained more constant and has contributed most to the beaver harvest.

**Recreation Provided By Small Game Mammal Resources (1955-59 Compared to 1967-71)**

RECREATION FACTORS:\*  
 COTTONTAIL 4.3  
 SNOWSHOE HARE 4.2  
 FOX SQUIRREL 3.2



\*Av. days hunters hunted each species.

**Furbearer Population Status (1973 Compared to 1968)**

SPECIES	POPULATION STATUS	
	% LESS	% MORE
BEAVER		+5
MUSKRAT		+2
MARTEN		SAME
MINK		+1
WEASEL		+1
BADGER		+1
RACCOON		+13
BOBCAT		+3
COYOTE		+17

Figure 25

Data on the sale of furs from other species are available in Division files. They include, for fiscal year 1971-72, 15,318 muskrats, 47 mink, 12 marten, 17 weasels, and 23 ring-tailed cats. Relatively few trappers operate in the state, and trapping license sales declined from a high of 3,670 in 1943 to a low of 508 in 1958 (Table 13). Since 1958, sales have increased somewhat to an average of 896 during the five-year period 1967-71.

**Table 12 — Beaver Harvest Statistics, 1957-58 to 1970-71**

Year	State Trapped	State Transplanted	Landowner Trapped	Private Trapped Public Lands	Total
1957-58	4,870		623	198	5,691
1958-59	4,423		1,073	100	5,596
1959-60	4,386		1,881	135	6,402
1960-61	3,172	655	3,120	154	6,446
1961-62	1,398	663	5,579	472	7,449
1962-63	1,315	512	6,811	1,716	9,842
1963-64	572	445	7,373	1,823	9,768
1964-65	1,105	321	4,605	2,088	7,798
1965-66	867	178	5,635	2,920	9,422
1966-67	624	308	6,515	2,629	9,768
1967-68	618	198	7,073	2,147	9,838
1968-69	547	129	6,705	2,753	10,005
1969-70	321	81	4,652	1,572	6,545
1970-71	509	60	4,276	3,033	7,818

**Table 13 — Trappers Licenses Sold, 1941-1971**

Year	Licenses Sold		Year	Licenses Sold	
	Resident	Nonresident		Resident	Nonresident
1941	3,516	5	1957	592	4
1942	3,018	2	1958	505	3
1943	3,670	1	1959	505	4
1944	3,486	3	1960	536	5
1945	3,307	5	1961	566	4
1946	2,981	8	1962	789	16
1947	2,584	4	1963	621	10
1948	2,534	4	1964	611	5
1949	1,967	5	1965	889	9
1950	2,068	6	1966	1,039	8
1951	1,393	-	1967	903	11
1952	1,503	5	1968	868	5
1953	1,187	-	1969	1,171	12
1954	930	3	1970	783	4
1955	834	4	1971	719	6
1956	780	-			

## **SPECIAL SPORT SPECIES**

A number of animals have been placed in the category of special sport species by the Division of Wildlife. These include coyotes, prairie dogs, certain ground squirrels, and other mammals, birds, and reptiles which may become a nuisance or cause damage, and whose control as a matter of sport hunting is more desirable than control under government directed programs.

Wildlife Commission policy on animal damage control encourages the removal of offending animals by sport hunting. While both the Commission and Division support this approach, it is likewise recognized that management programs for special sport species should be as carefully designed as those for other game animals, and that regulations should be such that proper populations of all species are maintained.

Coyotes have received primary attention in Colorado and elsewhere since the Executive Order of February 8, 1972, banning the use of toxicants for controlling this species on public lands. As indicated under the section on "Furbearer Resources," populations of coyotes are believed to have increased at least 15 percent during the past five-year period.

The Bureau of Sport Fisheries and Wildlife is intensifying efforts to upgrade data on coyote numbers and their effects on domestic livestock and wildlife and to develop preventive methods to alleviate damage. During 1972 paired scent-plot routes in Western states were established to obtain more reliable information on coyote population trends. Preliminary results from 18 routes in Colorado show a high population index on four routes, a medium one on nine, and a low one on five. Indices relate to the number of operable scent stations and coyote visits based on tracks.

The Division of Wildlife also recognizes the importance of upgrading population data and closer evaluation of predators and their depredations on wildlife, domestic livestock, and other property. Special research is planned on the effects of predation on deer fawn survival in the near future.

## **NONGAME WILDLIFE**

Thus far this report has dealt with approximately 60 of the more than 600 terrestrial wildlife species in Colorado. Primary consideration has been given to game species, mostly because these have historically received major attention from the standpoints of recreational participation, funding of management programs, and procurement of information on populations and harvest.

By law, however, the Division of Wildlife has the responsibility to preserve, protect, enhance, and manage all wildlife in the state, and we are moving rapidly in developing research and management programs for nongame wildlife.

Nongame wildlife are those species which are not commonly pursued, captured, killed, or consumed either for sport or for profit. They are not intentionally removed from the wild, except for special scientific purposes. Recent evaluations show that 342 bird, 76 mammal, and 43 reptile species occur in the nongame category. These total 461, or 75 percent of all 618 species of terrestrial wildlife. They include avocets, egrets, hummingbirds, passerines, turnstones, and many other species of birds. In the mammal group are the bats, pikas, river otters, shrews, and dozens of others. Included among the reptiles are lizards, snakes, and turtles.

A long-range plan for Colorado's nongame wildlife resources has been receiving primary attention and clearly defined goals, objectives, and procedures to accomplish these are being identified. The eventual success of our efforts will have a strong relationship to adequate funding with which to accomplish the job. Appropriation of general fund monies and the use of revenues from the voluntary purchase of Conservation Stamps are but two of the approaches proposed.

Despite the lack of special funds obtained to date, the Division has directed increasing attention to nongame; in addition to the planning effort, it has established new positions and encouraged additional activities by present personnel. A nongame specialist and a raptor biologist were employed to initiate special field studies of our important nongame resources. In addition, we recognize the monumental nature of nongame wildlife programs and hope in the near future to obtain the assistance of citizens in short-term task force work to update information on mammals, birds, and reptiles.

Our work with nongame is far from complete, but significant progress has been made. We have completed preliminary identification of endangered species deserving of immediate attention (Table 14). Data are being gathered by our Division and by the Bureau of Sport Fisheries and Wildlife on such species or groups as raptors, bats, and ground squirrels.

Work with the bald and golden eagle is receiving the primary attention of our raptor biologist. Initial information shows that wintering populations of the bald eagle range from 500 to 700 birds. This species migrates northward, and we have no documented evidence of this bird nesting in the state. During the winter of 1972-73 our estimate of golden eagles was in excess of 2,000, and many of these remain to nest.

Monthly observations of eagles by field personnel in the Bureau of Sport Fisheries and Wildlife since July of 1970 show that peak numbers of both bald and golden eagles are found during December and January, with low population in mid-summer (Figure 26). No bald eagles were observed during June, July, and August of 1971 or during August and September in 1972.

The brief sketch of part of the activities directed toward studying eagles is representative of the present and future programs related to nongame species. As programs are developed, we will give primary attention to those species which are endangered. Following this, programs will be directed toward nongame of special interest to the public, and to an overall determination of status for all species and the identification of specific problems. We will be looking closely at the environment, and we anticipate the implementation of programs as necessary to preserve endangered habitats and enhance the overall nongame resource.

**Table 14 — Preliminary Recommendations — Endangered (Terrestrial) Wildlife**

<u>Mammals</u>	<u>Birds</u>
Grizzly Bear	Whooping Crane
Gray Wolf	Peregrine Falcon
Black-footed Ferret	Greater Prairie Chicken
River Otter	Lesser Prairie Chicken
Wolverine	Greater Sandhill Crane
	White Pelican

30

**Monthly Eagle Observations in Colo. By Division of Wildlife Service Personnel, BSF&W, July, 1970-December, 1972**

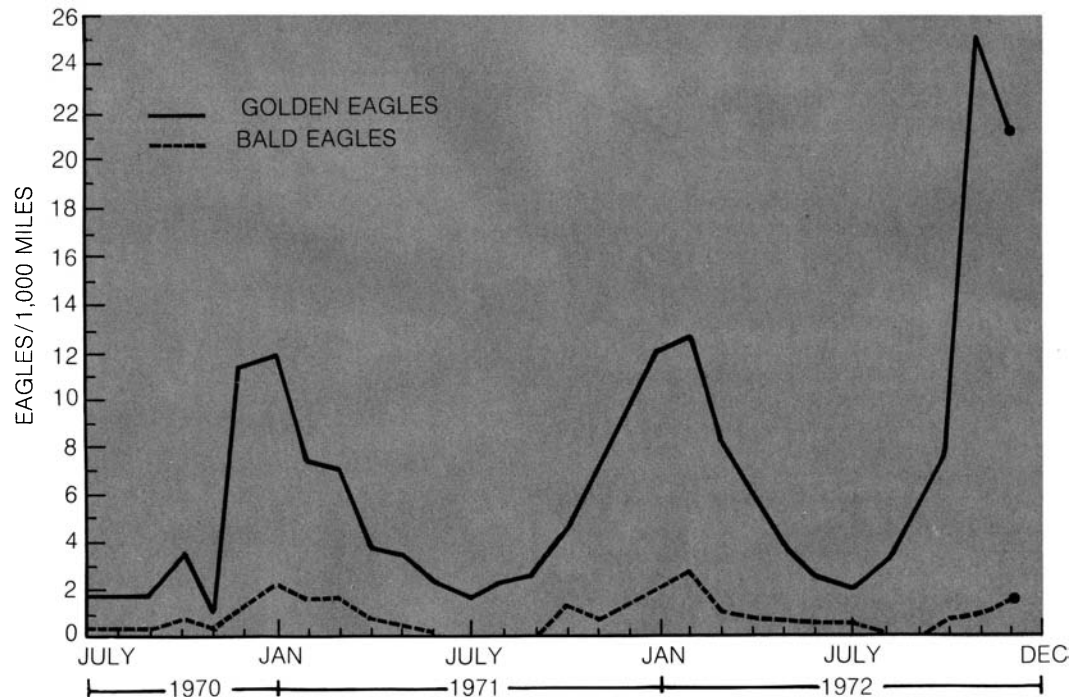


Figure 26

## SUMMARY AND CONCLUSIONS

Wildlife populations in Colorado are the product of many and widely variable environments. Although human activities are shrinking wildlife habitats and lowering the quality of some which remain, population levels of game and nongame species are surprisingly high in most cases.

As a group, big game resources and migratory birds have exhibited the biggest gains during the past five years in terms of populations and the recreational opportunity provided. Small game mammal and furbearer populations appear to have remained relatively stable. The biggest losses have occurred with the upland game bird group, reflecting the deterioration of habitat, primarily on farm and grazing lands, and emphasizing the urgent need for corrective action.

The Division of Wildlife recognizes its statutory responsibility for all wildlife in the state and is directing increasing attention to nongame as well as game animals. With the cooperation and support of all citizens in the state we look forward with optimism to accomplishing the difficult but challenging job ahead.

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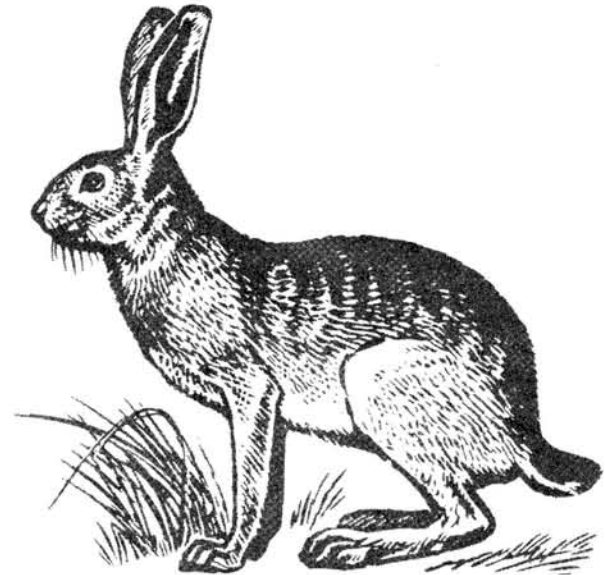


## KENNETH C. NOBE

*Chairman, Department of Economics, Colorado State University*

*Dr. Kenneth C. Nobe is Chairman and Professor, Department of Economics, at Colorado State University. He has served as Leader of the Potomac River Basin Survey; Chief of the Economics Section of the Colorado River Basin Water Quality Control Project; Chief Economist of the Bureau of Outdoor Recreation; Chief of the Agricultural and Economics Branch of Harza Engineering Company International; and General Consultant to the Director, Water and Power Development Authority in Lahore, Pakistan.*

*He presently is providing consulting services on the economics of natural resources management to the U.S. State Department, National Marine Fisheries Service, Bureau of Land Management, Bureau of Reclamation, Economic Research Service, National Water Commission, and Colorado Division of Wildlife. He is actively engaged in natural resource economics teaching and research, and is the author of more than 85 technical reports, university bulletins, and professional articles.*



## HAROLD W. STEINHOFF

*Centennial Professor of Wildlife Biology, Colorado State University*

*Dr. Harold W. Steinhoff is Professor of Wildlife Biology and Centennial Professor of Forestry and Natural Resources, Department of Fishery and Wildlife Biology, at Colorado State University. He was employed by the U.S. Forest Service and the U.S. National Park Service, and was Research Professor of Wildlife Management at the University of Alaska in 1968-69.*

*He has been the CSU representative on the Interagency Committee on Wildlife Ecology, which includes representatives from the U.S. Forest Service, Colorado Division of Wildlife, U.S. Bureau of Sport Fisheries and Wildlife, Bureau of Land Management, Soil Conservation Service, and National Park Service. He has served in numerous administrative positions at CSU, has been project leader or co-leader of six major funded research projects since 1964, and has taught courses in a wide variety of natural resources and ecology fields. Dr. Steinhoff's primary interests are in multiple use resource management, natural resource economics, wildlife population dynamics, and natural resource ecology.*

The values of wildlife are consistently underestimated in public decisions that involve choices among alternative uses of natural resources. Specific cases include storage of water for irrigation and grazing of public lands by livestock, in part at the expense of reduced wildlife populations. Such choices are made partly because we have failed to develop acceptable ways to place a unit value on wildlife, particularly in dollar terms, which is commensurate with that of other resources, and partly because we have not fully recognized all of the kinds of value that wildlife provides for Colorado's citizens and its frequent visitors.

The status quo is unacceptable, but we think something positive can now be done about it. We would like to show you our views of how wildlife can receive a fairer value consideration in resource allocation decisions, discussing first what the many types of wildlife values are, then showing how they can be measured, and finally stressing implications for the planning and decision making processes.

#### **WHAT ARE THE VALUES?**

Values are a personal thing, and they vary with the individual. Thus we must specify not only the value, but who holds it. Wildlife value to Colorado as a whole is the algebraic sum of values to its individual citizens, minus the costs of providing the wildlife resources.

Some type of classification system is desirable when we discuss the varied values of wildlife. We shall use two such systems in order to explore the values thoroughly — one based on the socioeconomic objectives of the user and the other on the role of the resource user. The first system was proposed in 1947 by Ralph T. King (6). The second is a modification of a system devised at a recent workshop on fishery economics sponsored by the National Marine Fisheries Service (3).

#### **SOCIOECONOMIC OBJECTIVES OF THE USER**

Socioeconomic objectives of the user of wildlife may be recreational, esthetic, educational, biological, social, or commercial.

#### **RECREATIONAL VALUES**

The recreational values of wildlife are those related to recreational use of leisure time, including sports and hobbies. Hunters, fishermen, birdwatchers, wildlife viewers, photographers — and those who camp, hike, or canoe in an area because wildlife is there — are putting a recreational value upon wildlife. The commodity which the wildlife recreationist is purchasing is the *experience*, not the deer or the trout that he saw or harvested. And the unit of measure of the experience is the recreation day. We need also to include Marion Clawson's (4) idea that the experience really consists of five phases: anticipation, travel to the site, realization of the experience, return travel, and recollection. Each phase contributes to value.

#### **ESTHETIC VALUES**

We define esthetic values of wildlife as objects and associated environment possessing beauty, affording inspiration, and contributing to the arts. These values may overlap recreational ones, as in fact all values overlap and interrelate to one another. Esthetic values may be enjoyed in the field, as part of a recreational experience, or in the home, theatre, or art gallery. They provide our society with a special quality of life beyond that gained by recreation of mind and body.

#### **EDUCATIONAL VALUES**

Educational values are those which add to man's knowledge, both collectively through research, and individually through personal learning. Wildlife, from mice to monkeys, has been used in pioneering experiments in medicine and space, as man has used them to explore the unknown prior to venturing forth himself. Man learns how to react more intelligently to his environment by studying time-tested and genetics-tested responses of other animals to environmental variation.

# **VALUES OF WILDLIFE**

by Kenneth C. Nobe & Harold W. Steinhoff

### **BIOLOGICAL VALUES**

King (6) defined biological values as the worth of services rendered by wild animals. In the broad sense "wildlife" includes all wild animals — beetles, nematodes, earthworms, and mosquitoes as well as deer, trout, and ptarmigan. Each organism provides a service to the ecosystem, so each contributes to the value. All the ecology of a mule deer is integrated in one fact — the presence of the deer. The worth of an earthworm which produces organic matter on which to grow deer food shows up in the expenditures of the deer hunter. Similarly, the biological values of wildlife in Colorado ecosystems are integrated into any value of any kind which is derived from those ecosystems.

### **SOCIAL VALUES**

Social values are those accruing to the community as a whole because of the presence of wild animals. These values are demonstrated by what people do, say, and commemorate. The flavor of a community or state, or of the nation, results from the things people do with both their working and leisure time. It also results from what they discuss in social conversation, the nature of newspaper stories, the presence of national symbols like the bald eagle, and the use of place names such as Turkey Creek, which are constant reminders of social experience and of a wildlife heritage.

### **COMMERCIAL VALUES**

Dollar income derived from the conversion or sale of wild animals or their products is classified as a commercial value. Commercial fishes, furs, game farms, domestication, the value of game meat, and the sale of trespass rights to use wildlife are included here. Most commercial values are tangible and are easily evaluated because they are exchanged in the market place for the conventional unit of measure, money.

### **ROLE OF THE RESOURCE USERS**

The second system of classifying wildlife values is based on the role of the resource user. He may be a direct user, a primary or secondary beneficiary, an option holder, a vicarious user, an altruist, an environmentalist, or an alternative resource user.

#### **DIRECT USER**

People who make direct and overt use of the wildlife resource are the most obvious group of value holders. They express this value in part by their expenditures, which are sometimes huge, for equipment and travel in order to possess and consume the experience. In some cases they also pay entrance fees which are analogous (though usually not by any means equivalent) to market prices. In most cases the net value is inferred by the "consumer surplus" method. If it costs a Meeker, Colorado hunter \$10 for a day of local deer hunting, but costs a comparable (whatever that is) Texas hunter \$50 per day for the identical experience, then the Colorado hunter is receiving a consumer surplus value of at least \$40 per day in addition to a direct value of at least \$10 a day (his direct expenditure).

#### **PRIMARY BENEFICIARY**

Sporting good storeowners, Western Slope motel keepers, Granby gasoline station operators, and Middle Park dude ranch operators all gain a direct dollar value from their sales to sportsmen. Although most of these dollars are simply a reallocation of money that recreationists would otherwise have spent in television stores and filling stations in Denver or Chicago, they nevertheless represent a real and essential value to the providers of wildlife goods and services. Such expenditures constitute significant inputs into local economies dependent in part on recreational activities, for example, those in Grand County, Colorado.

### **SECONDARY BENEFICIARY**

The secondary effects of gross expenditures (the multiplier effects) put dollars in the pockets of citizens who may not even realize they are reaping a wildlife value. The grocer in Gunnison who sells bread and baloney to the big game guide, who pays for it with money from Oklahoma hunters, is getting a secondary benefit from wildlife values.

#### **OPTION HOLDER**

The premium that individuals averse to risk would be willing to pay to assure future access to the wildlife resource, where the supply of wildlife is uncertain, is an example of option demand. Usually this value is expressed by a vote to retain a wilderness area or a wild river, but it may take the form of a long-term lease on a hunting area.

#### **VICARIOUS USER**

Some Colorado citizens may never personally see an elk in Colorado. But if they vote to maintain the resource so that they can read about elk in magazine articles or see elk in the motion pictures of others, they are vicarious users. They may express their sense of value through the vote, or more tangibly (economically) through magazine subscriptions and motion picture admissions.

#### **ALTRUIST**

One who maintains the wildlife resource so that others in present or future societies can use and enjoy it is an altruist. Very little is known about the degree to which this objective enters into the vote of the citizen on wildlife issues, but one of the strong pleas for preservation is often "for future generations."

## **ENVIRONMENTALIST**

Perhaps this is an over used term nowadays. By it we mean the person whose ethical philosophy attaches great value to all "natural" things. Preservation of nature is very high on his value hierarchy, and wildlife is one of the most appealing components of nature. To date, the courts have not permitted this general sort of value concern to apply to specific cases. For example, the Sierra Club-Mineral King decision in California held that the Sierra Club could not intervene to prevent Disney Enterprises from developing the Mineral King area because the Sierra Club did not show that the Mineral King proposal would damage the Sierra Club specifically. But we think that governmental policy decisions should consider specific local proposals as part of an interconnected national system and should include general value systems in the national decision making process.

## **ALTERNATIVE RESOURCE USERS**

Users of wildland natural resources — wildlife, timber, water, range, and outdoor recreation — cannot all be accommodated in maximum numbers at the same time. When one of the uses is increased through management, often one or more of the other user groups must settle for less. This is known as a diseconomy, or a loss of value, to the other resource. Under present accounting philosophies we would include this diseconomy as a cost of increasing the favored resource. Thus if wildlife is the favored resource, it has a negative value to some other resource, such as timber. However, when we consider all resources in a single management system, with a combination of multiple resources which would optimize total multiple resource value, both the positive and negative trade-off values can be taken into account in order to optimize national or regional welfare.

## **MEASUREMENT OF WILDLIFE VALUES**

The values of wildlife are difficult to measure in dollars. The difficulty arises because no market exists for most of these values in the same sense as it does for the goods and services produced in the private sector, which are determined by an interaction of supply and demand in the market place. It is unrealistic to use market pricing when evaluating the recreational, esthetic, and related social benefits of wildlife because they are provided primarily through the activities of government. Yet we need to measure the benefits from wildlife in relation to dollar costs, and we need to know when investment in more wildlife is a preferred decision. Therefore, it is becoming increasingly necessary to provide a proxy for wildlife values.

There have been numerous attempts to place meaningful proxy values on wildlife and on recreation benefits in general. These efforts may be broadly aggregated into three basic approaches: 1) estimates based on what people do (i.e., spend money for); 2) estimates based on what people say these things are worth; and 3) estimates based on the level of voter sanctioned government expenditures to provide for wildlife and its habitat. Elements from each of these approaches are significant when one is dealing with various wildlife management problems and will be discussed in its turn.

## **ESTIMATES BASED ON WHAT PEOPLE DO**

Grouped under this broad category are three distinct methodologies that have evolved in response to specific valuation data needs. These are: 1) Travel Cost Market Simulation Method, 2) Direct Expenditure Method, and 3) Input/Output Analysis.

*Travel Cost Market Simulation Method* — The objective to the Travel Cost Market Simulation Method is to determine the demand for wildlife by analyzing variations in the number of visits to a wildlife area and by measuring the associated variation in travel costs. It is assumed that the cost of

travel to Colorado for a Texas fisherman is equal to the value which a Colorado fisherman gets but does not fully pay for because he lives nearby. A recent Oregon study by Brown (2) showed that this kind of consumer surplus may average as much as \$20 per day for salmon and steelhead sport fishing. A 1968 study on the Kenai National Moose Range, Alaska (9), showed this value to be at least \$7 per day. The authors of a recent "Sport Fisheries Economics" report (3) noted seven major criticisms of the method, yet opted for its use in most cases for benefit/cost analysis when evaluating wildlife values associated with major Federal and state water resource development projects.

*Direct Expenditure Method* — Most evaluations using the Direct Expenditure Method have relied on questionnaires mailed to a sample of recreation users. Respondents are asked to list their expenditures for specified wildlife activities during the year.

A 1968 Colorado survey (7) obtained data from a randomly selected sample of 12,000 sportsmen out of a total population of 300,000 license holders, both resident and nonresident. The researchers concluded that sportsmen make a very substantial contribution to Colorado's economy. In 1968, they spent an estimated \$250,000,000 on goods and services used in connection with hunting and fishing.

Gilbert (5) addressed himself in a 1971 report to the questions of demand and nonmarket value of hunting and fishing in Colorado. Utilizing 1966 survey data and the consumer surplus method, he concluded that the total annual value of the hunting and fishing resources in Colorado is approximately \$500,000,000. About 58 percent of the total was attributable to actual purchases of goods and services for hunting and fishing and 42 percent was from nonpriced benefits received by the participants. The 42 percent is an estimate of what participants would have been willing to pay in excess of what they were actually required to spend.

*Input-Output Analysis* — Regional planning efforts require a technique for thorough analysis of the complex interrelationships within the regional economy. One tool available for this purpose is interindustry analysis — the input-output technique. Rohdy and Lovegrove (8) used this approach in a recent study of the economy of Grand County, Colorado, in which they sought to determine both the primary and the secondary local economic effects of sportsmen's expenditures for hunting and fishing. Primary economic effects were defined as the original expenditures made by sportsmen. Secondary economic effects were the multiplier effects of these primary dollar expenditures.

The Rohdy-Lovegrove study found that in 1968 the total primary effects of hunting and fishing expenditures in Grand County totaled approximately \$3,000,000, which in turn generated \$3,000,000 of additional secondary effects. They also estimated that economic activity generated by sportsmen's expenditures represented about 12 percent of the total 50 million dollar local economy in Grand County in 1968.

#### **ESTIMATES BASED ON WHAT PEOPLE SAY**

Another approach is to ask value questions of users of wildlife. An example of this type of question is: "What is the largest sum you would be willing to pay for the right to fish at a certain location and for a specified length of time?" Or, conversely, "How much money would you take to stop fishing?" Answers to these two basic types of questions should differ significantly. Without belaboring the point, note that one cannot pay more than his discretionary income for the right to continue fishing, but one can require compensation greater than this amount if one is to give up his right to fish.

The well-known criticism of these kinds of user opinion questions is: "Ask a hypothetical question and you will get a hypothetical answer." This is a basic issue that will likely not be resolved until more response data are matched against actual

consumer behavior. In this regard, questions asked about proposed license fee increases during the 1968 Colorado sportsman expenditure survey (5) obtained responses greatly at variance with actual license purchase behavior recorded in a resurvey the following year after the license fees had in fact been significantly increased.

An interesting variant of the opinion survey is to address valuation questions not to a user group but to professional wildlife managers. Peter Ashton is employing this approach in Colorado. He is obtaining probability estimates from a group of Division of Wildlife employees on what they perceive to be the valuation estimates of the "average" hunter and fisherman. For example, a local wildlife conservation officer may believe that the value to a hunter of one day of elk hunting is most probably \$20-25, and least probably either as little as \$10-15 or as much as \$35-40. Similarly, opinion data are being obtained on the value of nonconsumptive use of wildlife. The data obtained are being employed in an economic model designed to aid Division managers and administrators in decision making where a number of management alternatives are involved.

*Attitude Surveys* — The vote is a very tangible expression of value preferences. Holding a general referendum or a special election would be an ideal way for a state to stay out of trouble by finding out what people want in advance of making management decisions. But this method would be prohibitively expensive and time-consuming. However, attitude surveys from a sample of the public are very useful as a proxy for the vote. The "hazard of the hypothetical" is present here too. But with careful technique, including the "small public conference method" which is being used by some agencies now, we should be able to ascertain public attitudes quite satisfactorily. Selection of *which* attitudes we wish to measure, and from what groups, is a very important part of the decision process for this method.

#### **ESTIMATES BASED ON LEVEL OF GOVERNMENT EXPENDITURES**

The rationale for basing estimates of wildlife value on the level of government expenditures allocated to wildlife programs is a simple one. It assumes that a private individual (or a social group) will not spend money to acquire a good or service beyond the value one expects to obtain for this expenditure. Once society approves or condones a given level of expenditure for propagation of wildlife and the management thereof, we can assume that society believes it is acquiring a value at least equal to, if not greater than, this level of expenditure. Combined with attitude surveys, this method can be used in attempting to determine in advance the probable value of wildlife as a basis for *additional* government expenditures. This method is commonly referred to as the simulation approach.

#### **IMPLICATIONS FOR THE PLANNING AND DECISION MAKING PROCESS**

In order to deal with wildlife values in planning and decision making, one must visualize the institutional milieu in which the values will be used. The era of relying solely on the wisdom of public decision making without citizen involvement has come to a close in the United States. Its demise was clearly evident in the President's austerity budget presented to the Congress in late January 1973. Acting on what he perceived to be an overwhelming voter mandate to reduce public agency involvement to the lowest point possible, the President has proposed major cuts in agency budgets and manpower allocations across the board. As a result, some long-standing wildlife management and natural resource conservation programs may be eliminated or, at best, severely curtailed.

This major change in direction of Federal policy was largely unforeseen by public agency natural resource managers. However, early signs were clearly evident of emerging voter concern with public agency accountability and an increasing

preference for environmental quality considerations rather than for maximum physical output. The recent abrupt halt of the Florida Barge Canal by the President at the midway point in the face of firm opposition of environmentally concerned citizens and the 1972 rejection by Colorado voters of state funding for the proposed 1976 Winter Olympic Games are cases in point. Adverse citizen reaction to many resource oriented public programs has developed because administrators have failed to secure adequate public input on management alternatives before action decisions were made. Negative feedback has occurred increasingly often because of a tendency among administrators to continue to take action because they feel they alone know what's best.

This "leave the driving to us" attitude was particularly prevalent in the past in Federal natural resource agencies such as the Forest Service, Bureau of Land Management, Corps of Engineers, and Bureau of Reclamation, and in the state conservation departments. Some agency administrators still believe strongly that "professionalism" requires a foundation of strong philosophical opinion to the effect that they alone must act as stewards to protect resources for the uninformed layman. In today's era of political involvement and demands for accountability, however, continuation of this "I know best" attitude of administrators will surely lead to further voter disenchantment with government at a time when both resources and credibility may already be in the critical zone.

Particularly frustrating to wildlife administrators who view themselves as "wise-use managers" has been the often unexpected adverse reaction of large vocal components of the citizenry to such previously condoned and time-tested management tools as clear-cutting in some areas under Forest Service supervision, stream channelization by the Soil Conservation Service, or reclamation of sport fishery lakes with rotenone by

state wildlife agencies. Managers now find themselves confronted with a hostile new world reflecting new consumer preferences, changing voter psychology, political activism, and resource economics. Bolle and others (1) have recently illustrated both the problem and the need for a change in management philosophy in their "Bitterroot Report" to the U.S. Forest Service. They stated, in part:

*Institutions and agencies currently are undergoing major changes in relationship between practitioners and clients, between purveyors of services and constituents. Resource management and agencies in common with educational, religious, medical, and other service institutions are caught between the conventional essentially conservative, bureaucratic structure of the past and the modernistic conception of service as a two-way process. The patient today is insisting on being fully informed about the diagnosis and prognosis of his case by the physician. The recipient of social aid insists on being part of the decision that affects him. The modern parishioner demands a reciprocal interaction with his priest or pastor. Clients no longer are willing to receive passively whatever good the dispensing person or agency chooses to dispense. . . .*

The clients of goods and services dispensed by wildlife management agencies are now asking loudly and clearly: "What values are being provided; who gets them, and what will it cost us?" Transformation of wildlife management concepts into effective action programs within this new context of citizen concern will now require an input of wildlife values and sociopolitical attitudes, as well as biological expertise — a multidisciplinary effort.

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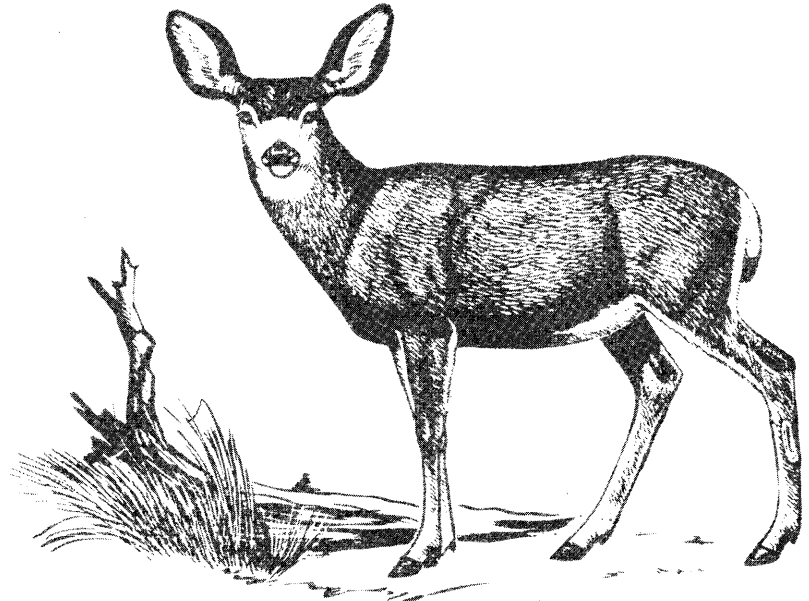
## HARRY R. WOODWARD

*Director, Colorado Division of Wildlife*

*On February 15, 1961, Harry R. Woodward assumed his duties as Director of the Colorado Game and Fish Department, now the Division of Wildlife.*

*Woodward is a native of South Dakota. He attended Colorado State University for three years before transferring to Utah State University, where he received a B.S. degree in 1941. He served as an Artillery Officer in the Pacific Area during World War II. In 1946 he began working for the South Dakota Department of Game, Fish and Parks as a biologist, and in 1948 was named State Forester and Director of State Parks. He was named Director of the South Dakota Department in 1958.*

*In 1963 Woodward was invited to the Republic of Ireland to consult with the Irish National Game Council and assist them with their plans to establish a national program of game management.*



*He is a past president of the International Association of Game, Fish and Conservation Commissioners. He is also a past president of both the Western Association of State Game and Fish Commissioners and the Association of Midwest Fish and Game Commissioners. He is a past president of the National Association of State Outdoor Recreation Liaison Officers. He is active in many other conservation organizations and is an avid hunter and fisherman.*

*(Since the Governor's Conference Mr. Woodward resigned his position as Director of the Colorado Wildlife Division, effective June 1, 1973, and assumed new duties as Regional Director of Ducks Unlimited.)*

The history of wildlife management in Colorado, like that in other states of the United States, has been one in which most of the funding for wildlife conservation programs has been contributed by consumptive wildlife users. By consumptive users I mean those licensed individuals who buy licenses and who harvest animals for their own personal use. These hunters, fishermen, and trappers have been footing the bill for many other people also interested in the conservation of wildlife. They have contributed their money through license fees and taxes on guns, ammunition, and fishing equipment. There has been little objection on the part of these individuals to some of their money being spent for the management of wildlife species little valued by hunters, fishermen, or trappers. However, the day has arrived now when nonhunting segments of our citizenry are going to be called on to fully and adequately fund all wildlife activities other than hunting and fishing. This means the adoption of a system of cost accounting which will be the basis for the determination of "cost sharing," for most wildlife populations serve the dual purpose of benefiting both the hunter and the nonhunter, or the fisherman and the nonfisherman, as the case may be.

In recent years the rapidly increasing human population of the United States has made continuing to finance wildlife conservation as we have in the past less defensible than before. With the increasing human population have come increasingly intense land uses. Land areas which traditionally had been kept in a relatively natural state are now being used intensively for such purposes as residential development, recreational development, industry, and agriculture. The result has been the beginning of a decline in many wildlife populations, especially those most sensitive to changes in their

environment. At the same time, the dollar value of wildlife acres which could be readily developed for intensive use has risen sharply. Extreme examples are some lands in the Vail and Aspen areas which were key deer and elk winter range less than ten years ago. At that time, the land was used for sheep grazing and its capital value probably did not exceed \$30-40 per acre. Today it is selling for between \$35,000 and \$40,000 per one-third acre lot for recreational housing construction. This is just one example of a statewide trend. As the need to preserve key wildlife environments is magnified, the buying power of the sportsman's dollar is deteriorating.

Another fact which further complicates the situation is that more people than before are now demanding services from the Division of Wildlife. People are now demanding active conservation efforts for species which have pretty much gotten along on their own in the past. The Division is also being asked to take over certain activities which are only remotely related to wildlife conservation, such as the registration and law enforcement of snowmobiles and recreation vehicles. Although the operation of these vehicles in the field must be controlled to prevent damage to wildlife populations, the cost of certifying the competency of the operators and issuing registration numbers has little relationship to wildlife conservation. It all boils down to the fact that because of these expenditures unrelated to hunting and fishing the Division is being forced to spread the sportsman's dollars too thin to do an adequate job on any of its programs.

# SOURCES AND USES OF WILDLIFE MANAGEMENT FUNDS

by Harry R. Woodward



Today, by public demand we enter into programs designed to manage and enhance nongame and nonhunted species of animals. We must now be concerned about song birds. We have a new project concerning raptors, and our area of responsibility encompasses all birds of prey. We must regulate the use of public areas to protect these areas from their overzealous users. No longer are we concerned merely with putting fish in streams. In some cases we have to put water in the streams first. And in the not too distant future, it is highly possible that we will be called on to control the damages done to private property by species of animals that are considered nongame, including those commonly referred to as "predators." These programs provide little benefit, and certainly no direct benefit whatsoever, to the hunter and fisherman.

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Demands from growing human populations exert pressures on wildlife agencies in two dominant ways — politics and public opinion. Realistically, they cannot be avoided, nor is either one always receptive to realistic reasoning. The political facts of life often force wildlife agencies into actions or programs they know to be indefensible, both biologically and practically unsound. Public opinion, blunt, unreasoning, and irresistible, acts similarly. Millions of dollars have gone down the drain, lost forever, pumped into projects of little or no worth to hunters and fishermen. And the sad truth is that it was the hunter's and fisherman's dollars that went down the drain.

In the past and up to the present day, the Division has derived revenue to support its operations in the traditional ways. License sales produce the major share of revenue, with hunting licenses bringing in about three times as much as fishing. Federal aid is obtained from taxes on guns, ammunition, and fishing equipment and is earmarked for fish and wildlife restoration. Federal Land and Water Conservation Funds are available for planning, acquisition, and development of wildlife lands, but their availability fluctuates considerably and is now subject to the whims of the State Park and Outdoor Recreation Board. Miscellaneous income is derived from magazine subscriptions and from fines levied for wildlife law violations.

The Division's budget was presented in four broad categories — services, field operations, planning, and capital construction. Field operations had five general categories: for the most part, administration, and the four regional operations that cover the state. Under capital construction are two major areas: land acquisition and development.

This, of course, is oversimplification, for these major areas break down into hundreds of lesser cost centers relating to division operations. But for our purposes today, I believe that this classification is adequate, especially in the light of current developments.

The Division is in the process of abandoning this method of budgeting and is turning to a "program" system with an accounting system to match. The old method of budgeting could not tell us the functional things we needed to know about the Division operations and their costs because it did not relate to wildlife products.

In the past when programs were less sophisticated and more easily defined and categorized, such a method of financing and budgeting was adequate. However, the complexities of operations in the current decade and the demands for more and more services imposed by the exploding population with its diversity of opinions and priorities have made this method no longer valid. If we are to preserve the integrity of the sportsman's dollar against the continual assault of demands not related to wildlife management and enhancement, we must be able to identify programs, determine needs to be accomplished in terms of quantified objectives, determine their costs and manpower requirements, and finance them from the Wildlife Cash Fund only when they are beneficial to hunters and fishermen. We must be able to identify those programs that have lesser benefit to the hunters and fishermen, determine their costs, and then attempt to find alternate methods of financing these programs with monies other than those provided by license fees, or perhaps with "cost sharing" of license fees and other funds.

The Division recognizes and accepts the fact that nongame animals, raptors, rodents, predators, so-called "trash fish," and song birds are wildlife and therefore fall within the scope of responsibility of the Division. These species need help in this rapidly changing world, a world which seems bent on endangering most of our wildlife.

But it is the feeling of the Division that the well-being and management of these species is the concern of everyone. Programs devised to assist these species and management techniques shaped to help these species fit into the ecological chain should be supported by everyone — the nonlicense buyer, the hiker, the photographer, the bird feeder, the nonhunter who frequently resorts to rhetoric but seldom demonstrates his dedication to principle by dipping his hand into his money pocket.

With program budgeting we will be able to determine the specific cost of our raptor project and then place the burden of support on those who benefit. If we move into coyote control, the exact cost of such a program can be identified and the burden of support for it placed on those who benefit from it. For the first time, we will be able to identify the total cost of management programs for deer, elk, bighorn sheep, or antelope and can then place the burden of support on the particular section of the population that benefits from these programs.

Another important aspect of program budgeting is that the Governor and the General Assembly, by agreeing to a proposed program budget, are providing an excellent method of communicating policy to the Wildlife Division. In this way, they can direct that those programs be carried out which they see as most beneficial to the overall public interest. It is the best method that we have yet seen to communicate *intent* from the legislative and executive branches or government to the Wildlife Division.

The Division has already begun to program its budget in this direction. Our budget request to the General Assembly this year includes a request for general fund money to support our management of nongame and nonhunted species of wildlife. The Division spent \$20,000 on this program this year and anticipate spending approximately \$65,000 in 1973-74.

We have requested that general fund money be used to pay the damages incurred from the washout of the Clay Creek Dam in southeast Colorado. This body of water was constructed under the general guise of a fishery, although everyone involved knew that it was not primarily a fishery, that it would be a general recreation area, used more by boaters, picnickers, swimmers, sunbathers, tourists, and bird watchers than by fishermen. The Wildlife Cash Fund was tapped then for financing construction and is being tapped now for the adjudicated damages done to downstream properties when the dam washed out during an

abnormal downpour of rain in 1965. We had hoped that the state would at least pay the damages out of its General Fund rather than taxing the hunter and fisherman through the Wildlife Cash Fund, but to present time, the legislature has not indicated a willingness to do so.

The reconstruction of the Georgetown Dam is another case in point. Washed out earlier, this dam has been rebuilt, forming a lake on such toxic mine tailings that fish will not long survive in the waters. Politics has decreed that the Wildlife Cash Fund finance a great deal of the cost of this construction. Adjacent to the interstate highway as it is, the Georgetown Lake will be a fine recreation stop for passing motorists and will be an attraction that will draw the metropolitan picnicker and sightseer. The economy of the town of Georgetown undoubtedly will benefit from the lake construction. Interestingly enough, housing developments already threaten to envelope the lake area. Almost everyone is going to benefit from this lake restoration project except the hunters and the fishermen who have been forced to pay for it.

The Division spent about \$5,000 in 1972 moving prairie dog towns out of the path of earth-moving machines in housing development areas in the Denver metropolitan region. Why did it do this? It was forced to by public pressures. Neighborhood ladies with great concern for wildlife, school children who observed the imminent danger to a wildlife species, people who are reluctant to see anything disturbed or killed — all raised a hue and cry. The mass media, sensing a good human interest story, gave each incident a good public display. And the pressure was promptly applied, not on the land developer who was directly responsible and who would profit from the change of land use, not on the legislature to require the developer to foot the bill and carry out the program, not on the use of general fund taxpayer money to do the job. It was applied to the Division of Wildlife to do this with personnel, equipment, and time paid for by the hunter and fisherman.

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While the Division is organizing its budgeting process on a program basis, it is also exploring several other methods of financing, such as raising money by different techniques for specific programs, with the money earmarked for that specific purpose only.

## **TWO PROPOSALS ARE NOW BEFORE THE LEGISLATURE.**

The first is a Habitat Preservation Stamp. This stamp would be required of all big game hunters and would cost \$5.00. One stamp would cover the hunting of all big game species. There would also be a small game and fishing stamp that would cost \$3.00.

Money accruing to the Division through these stamps would be earmarked and could be used only for the acquisition, through lease, agreement, or purchase, of big game habitat and especially winter range. With Colorado losing its winter range for big game at an alarming rate, the Division has found it necessary to gain surface control of winter range areas so that in the future these lands cannot be diverted to uses other than those of supporting big game animals. The money is needed to compete on the open market, if need be, with developers and others who would change the use of these habitat areas. Since the preservation of these ranges would benefit big game animals, which in turn would benefit hunters, the hunter will be called on to pay for this program. The same is true of the small game and fishing stamps. Revenues from them would be earmarked for the acquisition of small game habitat and stream frontages and public access to stream fishing through lease, agreement, or purchase. With adequate financing, the Division can compete with private fishing clubs or individuals

who would gain control of fishing waters to the exclusion of the public and with subdividers who would close whole sections of fishing streams to public use. Fishermen and small game hunters would be called on to support this program.

The other approach to determining responsible ways of financing wildlife programs involves a legislative proposal, already submitted to the lawmakers, that would call for the establishment of a Wildlife Conservation Stamp to sell for \$5.00.

This stamp would carry with it no privileges and would not authorize anyone to do anything. It is being offered so that those people who express such great concern for wildlife but who do not hunt or fish and therefore do not buy hunting or fishing licenses with which to support wildlife can in this way provide money for the wildlife agency. This money would be earmarked for support of nongame and endangered species only. It would give people an opportunity to supplement their rhetoric with their cash earmarked for wildlife.

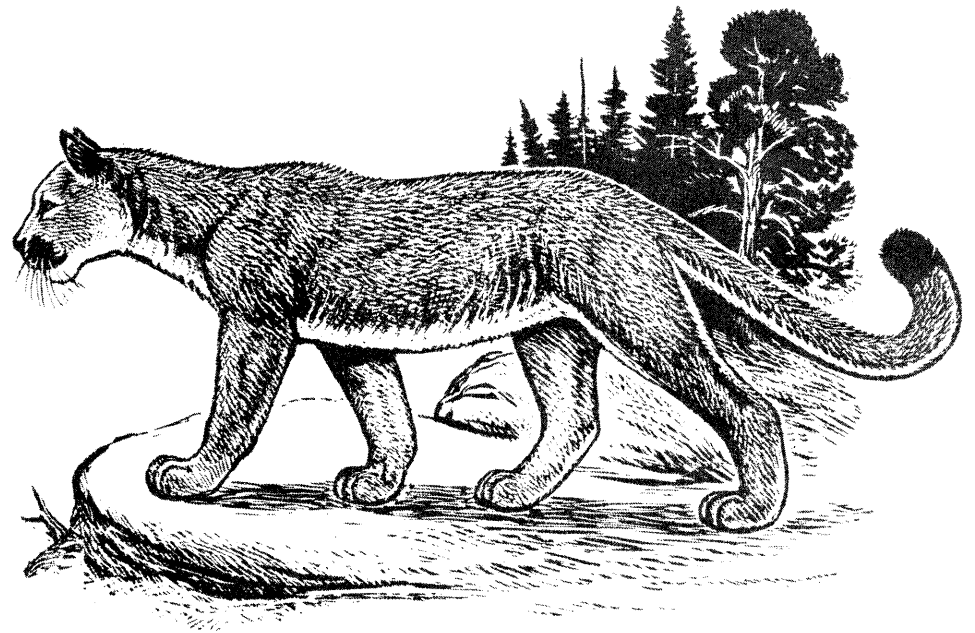
There are other sources of revenue, including the State General Fund, that probably will be identified in the future. Other states already are using various methods not now used in Colorado.

But the important thing, I think, is that wildlife programs be accurately identified as to purpose and benefits, that strict cost accounting be instituted so that accurate costs can be applied to each program, and that the financing of specific programs then be borne by those who would derive benefit from them.

The Division recognizes that it is going to have to make some hard decisions in the near future. In preparation, we have initiated long-range comprehensive planning. We will strive to gather the right kind of information to enable us to make the wisest decisions, and we will structure Division operations to get the maximum benefits for the sportsman's dollars. We are learning to get more for the money.

It is my opinion that the days have passed when wildlife funds raised through the sale of hunting and fishing licenses can be called on to support activities that have little to do with hunting and fishing. The demands have become so heavy that there is not enough money in the Wildlife Cash Fund even to pay for the essentials needed to maintain hunting and fishing. Nor in fairness should this fund be subject to raiding for purposes other than those that directly support hunting and fishing.

The day has come when costs must be borne by those who benefit. The word "wildlife" has become too all-encompassing a concept to be financed exclusively by hunting and fishing.



## ERROL E. RYLAND

*Manager, Forbes-Trinchera Ranch, Fort Garland, Colorado*

*Errol E. Ryland is a 1960 graduate in wildlife management from Colorado State University.*

*From 1961 to 1969 he was employed by the Colorado Division of Wildlife, first as a Wildlife Conservation Officer in the Durango area, then as Principal Big Game Biologist for Southwest Region.*

*When Malcolm Forbes purchased the Trinchera Ranch and decided to emphasize wildlife management on this vast area, he selected Errol Ryland as the*

*logical man for the new enterprise. From 1969 to the present Mr. Ryland has been employed by Forbes, Inc., first as Wildlife Manager, then as General Manager of Forbes-Trinchera Ranch, Fort Garland, Colorado. In 1971 he became also Vice-President and General Manager of Sangre de Cristo Ranches, Inc., a subsidiary of Forbes, Inc.*

If Colorado is to retain its wildlife resource for the enjoyment of its citizens, both hunters and nonhunters, more emphasis must be placed on retaining and improving existing habits. I realize that this is not an original statement, as it has been the main emphasis of wildlife management for the last fifty years. Many of you may also want to know what this has to do with pay-as-you-go hunting. Pay-as-you-go hunting has the potential of providing a necessary element (money) to encourage some private landowners to become involved in wildlife management.

Colorado, like many other western states, is blessed with a great amount of public land. This land is for the most part the summer (and in many cases, the winter) grounds of our elk and deer herds. Even so, many herds spend at least part of the year on private lands, normally during the critical winter period. Many other wildlife species, however, are highly dependent on private lands. Purchase of this needed habitat is one possible solution. However, because of legislative or county commissioner pressure or other political problems, to do so is not always possible.

An example of the problem with purchasing land occurred twelve years ago when the Division realized that a narrow strip of land between Pagosa Springs and Bayfield was critical to the large San Juan elk herd. Several attempts were made to purchase several key parcels which, if managed properly, could sustain a large portion of the herd. The landowner was willing to sell at the approved price, but the proposal never got past the Commission. Some of this land is now within a subdivision. Another example involved some of the best waterfowl production and harvest areas in the San Luis Valley. This area was owned by a gun club, and its officers came to the Division to ask if it was interested in purchasing the area. A considerable amount of work was done, biological reports were completed, and Federal aid money was approved.

The Commission gave its unanimous approval. The request for purchase was then sent on by the Commission, and that was the end of it.

The point I am trying to make is that the state cannot be expected to purchase all the lands needed to sustain even the most important game populations.

Another possible way to preserve some of the needed habitat is through one of the many Federal programs such as the Cropland Adjustment Program or the newer Set Aside Program. For many years the Federal government has tried various programs in order to entice landowners to improve habitat or to allow public access, or both. I don't feel there is any great need to go into detail about these different programs, as I am sure many of you have more experience with them than I. I feel, however, that there are a number of things that must happen in order for any of these programs to be successful. First, the programs obviously must improve, or at least preserve, the needed type of habitat. They also must encourage some form of access. This access need not necessarily be for the sole purpose of hunting. In fact, more and more emphasis needs to be placed on the nonconsumptive enjoyment of wildlife, but whenever a surplus population exists, controlled hunter harvest should be allowed.

The most important consideration enticing the landowner into "farming" for wildlife is that he receive financial benefits equal to or greater than the current highest and best use of that portion of his land. Unquestionably, I feel, most programs to date have failed to offer the landowner that inducement. It is, however, unrealistic to expect that Federally funded programs should provide this type of benefit.

We can look around and see a number of Federal programs that started out with the highest of objectives, well-financed, but because of changing national objectives ran into problems. In order for a wildlife habitat program to be successful, the landowner must be assured that the benefits are going to be lasting, not here today and gone tomorrow.

This brings us to another choice — pay-as-you-go hunting, or fee hunting, whichever you wish to call it. Let me break this down into three general types of operation. The first is the development that devotes most of its energy to wildlife production and harvest.

# PAY-AS-YOU-GO HUNTING

by Errol E. Ryland

The second type is one where wildlife usually is attracted to the area because of some special development and where the sole purpose is harvest. Production is usually not a major consideration, and the operation is usually seasonal.

The third type is basically an opportunistic operation. Only minimal effort is put forth by the landowner, and it is strictly for harvest.

Texas probably provides the best examples of all types of fee hunting. Unless you are the friend of a landowner, or at least a friend of a friend, you will probably have to pay some type of fee to hunt anything, from mourning doves to deer. Most landowners charge fees to hunt but make little effort to encourage wildlife. I know a number of landowners in Texas, and all but one of them have some form of fee hunting on their property. Several take into consideration wildlife in their land management practices. The money derived from the fees not only pays for this practice, but equals the money derived from the normal utilization of the land.

Texas also has some of the most sophisticated wildlife operations in the country. One of the best is the Y O Ranch just out of San Antonio. On this large Texas ranch you can hunt anything from turkey to black buck. Fees vary from \$50 for wild turkey to \$200 for the native white-tailed deer. Fees for the hunting of exotic game range from \$300 for Wild Corsican Rams to \$600 for African Aoudad sheep. Within this range the ranch offers hunts for fallow deer, Axis deer, Sika deer, and black buck antelope. Fees include the services of a guide and the care of the game. Lodging and licenses, if needed, are extra.

Many smaller ranchers throughout Texas have also become involved in the production of exotics. Fees for hunting them are normally a little less, perhaps as low as \$250 per animal. However, quality is sacrificed somewhat on these smaller ranches.

Another fairly typical preserve is the Dye Creek Preserve in northern California. This preserve takes in about 100 square miles and is managed primarily for wildlife and outdoor oriented recreation. Fees are fairly typical. Let me review them, hitting only the high spots.

*Fishing* — both warm water and cold water species. Year membership \$100. Weekly rate \$60.

*Deer* — \$70 per day.

*Wild boar* — \$80 per day; but if you make a kill with tusks over 2" (I think) you have to pay a trophy fee of \$30.

*Dove and quail hunting* — \$100 for the season.

*Pheasant* — Maximum of 40 birds, plus quail and dove — \$350.

*Duck, geese, snipe hunting* — \$200 for the season.

*Waterfowl, quail, and dove, plus 20 pheasants* — \$400.

There are a number of other examples of preserve hunting throughout the country, and we have several fairly close to us in New Mexico, the Chama Land & Cattle Co. and Vermijo Park. Both of these ranches charge about \$1,000 for a bull elk hunt.

One thing all these areas enjoy is long hunting seasons on state controlled species. In New Mexico, both Chama Land & Cattle and Vermijo Park normally enjoy about a 90-day elk and deer season. Dye Creek in California hunts wild boar for 150 days and the Y O Ranch is allowed to hunt native wildlife during November and December.

Coloradoans are horrified when they hear about operations such as these and the fees associated with them. However, for the most part the alternate choice to this type of operation is either an intensively managed farming or ranching operation with reduced wildlife capabilities or subdivisions. Fees may seem high, but let me assure you costs of operation are high also. Have you ever stopped to think what it costs to feed a herd of deer and elk? I think a good example is the Forbes Trinchera Ranch. When we purchased the property it was carrying about 4500 head of cattle and 3000 sheep. During the first two years of ownership, we reduced the cattle to 2000 head and eliminated the sheep because we felt the domestic stock were competing with the elk and deer. Our grazing fees are \$4.50 per AUM.

I would like to refer to a study done by Dr. Hansen of the Range Science Department of CSU and one of his graduate students, Loren Reed. They worked our ranch almost two years gathering data on diet similarities between mule deer, elk, and cattle. This study showed that the diet of mule deer overlapped with that of cattle from a low of 12 percent to a high of almost 40 percent. The overlap of elk diets varied from a low of 30 percent to a high of well over 50 percent. What this means is that on a ranch such as the Forbes Trinchera wildlife are utilizing more than \$70,000 worth of forage annually. Another way to look at it would be that if there were no elk and deer on the ranch we would be able to more than double its present carrying capacity of domestic stock.

We also charge for guided hunts on the ranch. Our fees are \$1,000 for bull elk and \$400 for buck deer. However, because of very limited season lengths, the number of hunters that can be handled is limited. Fees collected do not pay the grazing bill. This is why we are gradually shifting away from a wildlife oriented operation.

The second class of fee area is seasonal, and it usually has a development that attracts wildlife only for harvest. The land is normally used for other purposes the remainder of the year. Most of these areas are for migratory birds. Of the two best examples, one is in California, the other here in Colorado. A dairy farm in California runs a fairly intricate operation. The owner has developed his irrigation system so that during the waterfowl season he can flood most of his 600 acres of meadow. In that area he has constructed 27 blinds. During the long Pacific Flyway waterfowl season most of them hold two hunters. He charges \$10 per day per gun.

The second example is provided by a landowner in southeastern Colorado who has a small, 5-to-10-acre pond that for one reason or another is very attractive to geese. A firing line with about 50 pits is arranged at a discreet distance from the pond. A goose inventory done several years ago by the state shows how successful his operation is. On this small pond there were 20,000 geese on December 23. On the same day, the Two Buttes State Management Area adjacent to his land but many, many times larger, had 20,400 geese. On other state management areas in the area — and again, all of them are many times larger — the following numbers of geese were found: Eads Lake (5 lakes) — 11,000 geese; John Martin Reservoir — 14,000 geese. At this same time, all of the Western Slope of Colorado had only 800 geese. Division personnel indicate that, at the rate of \$7 daily per gun, the landowner is netting about \$25,000 to \$30,000 per year from this pond and his modified farming practices.

Many landowners make daily charges for hunting privileges. Normally, these costs are minimal and the landowner does not make any particular effort to increase wildlife, since either his land is located in an area normally utilized by wildlife or his normal operation is attractive to wildlife, or both. He basically is an opportunist. This is by far the most common type of fee area.

I talked to several of the biologists in Colorado to get their ideas on the percentage of hunters who pay to hunt in Colorado and some of the fees paid. They felt that 20 percent to 25 percent of all waterfowl hunters pay for the privilege of hunting, at one time or another during the season. In most cases they are goose hunters hunting on the third type of area. Fees are usually about \$5 to \$7 a day. Yearly leases can vary from \$50 to \$500.

Also, the sale of land to waterfowl hunters is increasing. In many cases the landowner sells to an individual hunter; the hunter in return leases the land back to the landowner for grazing and in some cases for the production of certain crops. Land costs for this type of operation again vary greatly, but I've heard estimates of \$1,000 an acre in some of the choicest waterfowl areas.

Upland game hunters also get into the act to a certain degree, and some of the biologists felt that up to 10 percent of the upland game hunters have at one time or another paid a fee of some type to hunt. These fees vary considerably. Again, they usually hunt on the third type of area described.

Big game hunters, according to my informants, were probably the least apt to pay to hunt. Probably fewer than 10 percent actually paid any type of fee, and most of these were probably antelope hunters.



Residents of Colorado have long resisted the idea of fee hunting. But attitudes are changing slowly, and they will have to change more if Colorado is going to receive any appreciable benefit from wildlife management on private lands. Current thinking as to season opening dates, length of seasons, and bag limits will also have to change if large landowners are to be enticed into entering the complex wildlife development projects.

**Question:** *Would there be any real chance or reason for reintroducing the wood buffalo (also called the mountain buffalo), a subspecies of the bison, into Colorado?*

**Response by Dr. Allen:** This is a wonderful idea, and I think there would be a good potential for such an introduction. There is a pure strain of this subspecies in the Wood Buffalo Park in Canada. Some of these were taken to Alberta and this herd has increased, so that surplus animals could be made available if a suitable isolated release area could be made available. I feel that these animals, if released, should be treated as "wildlife," not as livestock, and should be subjected to natural predation.

**Question:** *Does the Division of Wildlife have plans for reintroducing the grizzly bear?*

**Response by Wayne Sandfort:** We have been considering a long-range plan for bringing the grizzly back to the San Juan Mountains where they were last known to exist. We are approaching this idea most cautiously. The first animals would probably be a sow and her cubs, and they would be equipped with radio transmitters so that we could keep track of them. After several years we would evaluate this release. We would want to know whether it was good for the bears and what the effect was on other animals. After this evaluation, we would decide if further introduction would be feasible.

**Question:** *Wouldn't such a release of grizzly bears provide a direct conflict with backpacker use of the area?*

**Response by Sandfort:** I feel there is a place for both grizzlies and backpackers in the wilderness. Bears would help make an outing here a fuller experience for all who use the backcountry. (FOLLOWED BY RESOUNDING APPLAUSE)

**Question:** *How can the diverse publics who benefit from our wildlife be tagged to help pay the bills for wildlife programs?*

**Response by Harry Woodward:** Ways must be found to do this if wildlife programs are to be maintained or increased. Such ideas as specific taxes for those who benefit from wildlife or an appropriation from the general fund may be necessary. I urge that the number of the small nonconsumptive groups interested in wildlife join together and push for legislation to bring about such funding for the benefit of wildlife.

**Question:** *Isn't the "pay-as-you-go" hunting idea a return to earlier times when only royalty or the very wealthy could hunt?*

**Response by Errol Ryland:** Not at all. I feel that such programs would retain wildlife habitat on private lands. If the landowner cannot obtain some financial return from the wildlife on his land, it will be diverted to other more productive uses. Also, wildlife on these private lands under a "pay-as-you-go" system do not respect fences and may provide additional wildlife and public hunting for adjoining land areas.

**Question:** *The Division of Wildlife is responsible for all wildlife, but it is oriented to the hunter and fisherman. Is the Division interested in other wildlife?*

**Reply by Harry Woodward:** We certainly are interested, but the facts of life are that we are spread too thin, since our only source of funds is the sportsman. However, nongame wildlife benefit from most of our land management programs and our law enforcement activities. We also have two full-time staff members working on nongame wildlife in our Division.

**Question:** *When you were making your estimates of the expenditures by sportsmen, how did you handle the cost of the high-priced equipment?*

**Reply by Nobe:** We did not use the high-priced equipment as a one-time item but amortized it over a period of time.

**Question:** *If the bighorn sheep numbers are low or are going down, why do we continue to hunt them in this state?*

**Response by Sandfort:** Hunting seasons were reintroduced into Colorado bighorn herds after a severe die-off caused by overpopulation. We've had continuous hunting since then; and since only the older mature rams are being harvested, there is little impact of such hunting on herds.

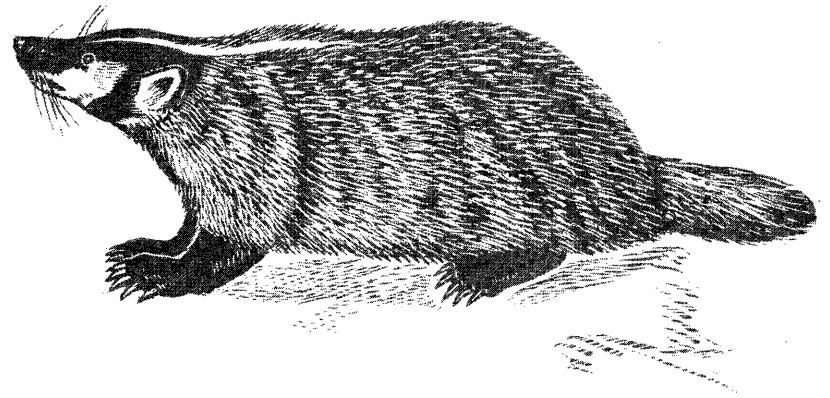
**Question:** *Are there any wolves present or are there plans to reintroduce them into the state?*

**Reply by Sandfort:** At this time we need to authenticate the presence and determine the status of any wolves in this state and decide whether there is a place for them. As with the grizzly bear, we would approach this whole situation most cautiously and it would require a well planned program. We must know if we have room for these animals where there would be no livestock conflicts or similar economic factors.

## JOSEPH E. TOWNSEND

*Division of Wildlife Research, Bureau of Sport Fisheries and Wildlife, U.S. Department of Interior, Washington, D.C.*

*Born in Great Falls, Montana, Mr. Townsend worked during school years as a ranch hand, logger, lumber mill supervisor, mechanic, school teacher, laboratory assistant, and wildlife research assistant. His B.S. in zoology and M.S. in Fish and Wildlife Management were from Montana State University. He worked for the Montana Fish and Game Department as Beaver Research Biologist, 1952-55; District Game Manager at Bozeman, 1955-60; District Game Manager at Billings, 1960-64. He then worked for the U.S. Bureau of Land Management as Montana State Wildlife Specialist, 1964-65; Wildlife Staff Leader in Denver Service Center, BLM, 1965-72; and in the Bureau of Sport Fisheries and Wildlife, Washington Office, as Wildlife Research Staff Specialist for Endangered Species, Wildlife Ecology on Public Lands, Marine Mammals, and Raptors, from 1972 to the present.*



*Joe Townsend's primary interests have been in wildlife habitat management and research, primarily as related to livestock grazing and other land uses. He has had extensive experience in big game management and research and has spent considerable time on development and implementation of habitat management systems. His professional activities include membership and past offices in Sigma Xi, Phi Sigma, Wildlife Society, and Society for Range Management. He is presently on the latter's Public Affairs Committee and contributed to several of the most recent position statements of the Society. He is a firm believer in systematic interdisciplinary resource management planning and has published several papers on this subject.*

When it comes to managing the wildlife-livestock relationships, we have a serious problem, one which makes us nearly incapable of arriving at an equitable allocation of our resources. Management of our wildlife-livestock, wildlife-timber harvest, wildlife-energy development, or any combination of resource uses *all lack a common denominator* for our personal interests and for the real relative values of the resources involved. So what happens?

We all try to trick or "con" our fellow countrymen into supporting our personal interest by chanting such slogans as: "Good Range Management is Good Wildlife Management," "Good Forest Management is Good Wildlife Management," "Good Conservation is Good Environmental Management." Sure, all of these, under certain specific circumstances, are probably right, but when we actually manage by applied generalization we get into trouble.

To push our cause we even encourage misunderstanding and confusion. A recent TV commercial creates a new "old wives' tale": "We are shooting our bald eagles out of existence" or into extinction. This can be interpreted to mean that the bald eagle as a species is in danger primarily because we are shooting, and thus all shooting is bad. The truth is that pesticides, proliferated throughout the world, are very effective in keeping the bald eagle from reproducing, and human development has deprived the eagle of a significant amount of habitat. Shooting probably won't help in this situation, but it is not the real cause of the decline of the eagle as a species.

Let's take a look at how we presently express our interest in wildlife and how we measure relative resource values.

Why are you concerned about wildlife? You like to hunt. You want to take pictures. Wildlife eats your livestock forage. You just like wild animals. People tell you wildlife needs some of the trees you intend to cut for lumber. These reasons and others like them are usually what we hear.

What do we use as a basis for management decisions when wildlife and other interests conflict? The dollar — or which use is worth more money — or political clout — or which interest has the most votes or campaign money. The sad part about this is that these reasons for our concern and these bases for management decisions are presently being used (generally in some artificially quantified format) as major inputs into and components of our own developing, sophisticated, and computerized resource planning systems. These new planning systems are becoming highly complicated

procedures for determining the equitable allocation of resources for any particular set of circumstances. And yet, despite the importance of this effort, we are not using a basic mutual personal interest or a common value denominator.

# A CONCEPT FOR MANAGEMENT OF WILDLIFE- LIVESTOCK RESOURCE USE

by Joseph E. Townsend

I believe our natural resources, including our wildlife, deserve better treatment than this. We need to have a fundamental concept to explain and define our concern, and to guide our actions. We have this concept. It is called life, our basic need to respect — to maintain — to perpetuate life. Every living thing — every plant, every animal, even you and I — has a basic driving desire, or inner force or instinct, to live and reproduce. This driving force is extended, intensified, and expanded to cause a species of life to maintain and perpetuate itself.

We, as humans, have extended this intense concern for life to include not only other forms of life but also those complexes of interdependent and dynamic combinations of life, nutrients, and energy which we vaguely call ecosystems. And we have even gotten to the point where we have some respect for our large home, or ecosystem — the Earth. So what does this mean when we talk about wildlife-livestock relationships — when we are trying to plan management for a sheep range which is also a deer winter range?

It means that all of us, no matter how we earn our livelihood or what our personal interests may be, are basically interested in the same thing — life, and, by necessity (if nothing else), the maintenance and health of our ecosystems. And that's a pretty good common and mutual interest. It also means that we can determine relative values of proposed alternative resource uses by determining and predicting the effect of that use on our life sustaining ecosystems. And that isn't a bad common denominator of value.

This concept is not new. Aldo Leopold in "The Land Ethic" (A Sand County Almanac, Oxford Univ. Press, N.Y., 1949) describes this attitude toward resources in terms of an "ethic dealing with man's relation to land and to the animals and plants which grow upon it." The report of the Committee on North American Wildlife Policy, submitted just 10 days ago, refers time and time again to this primary concept.

So let's take another look at the reasons why we are interested in wildlife.

- Wildlife, wherever it is found, is a living, functioning, and essential part of its ecosystem.
- Any action on our part which causes that wildlife population (as an element of an ecosystem) to become nonfunctional endangers the life of that ecosystem and all other interdependent ecosystems.
- When wildlife species "die out" and when ecosystems are vitally changed or cease to function, we have reason to fear for our life and for the survival of our species — mankind.

Why are we concerned with wildlife-livestock relationships?

- Any resource use has an effect on the ecosystems involved.
- This effect can change the functions of an ecosystem to the detriment or benefit of any living component, including wildlife.
- Whatever is done to manage livestock will in some measure affect the other living components of the ecosystems; i.e., all wildlife populations will be affected in some way.

So let's use our basic common denominator, the effect of our actions on our ecosystems, as a basis for management decisions. Our primary mission in resource management must be to maintain the life of our Earth. Our goals, objectives, and management methods must be compatible with and help us carry out this mission. They have to provide for the maintenance of our healthy ecosystems and the recovery of those in jeopardy.

The finest, most advanced technology in the world is available for our use in planning and managing resource uses. We have a primary common interest and the best common denominator in the world to use in making management decisions.

One thing more — our ecosystems are not bounded by political or ownership lines. We have to manage the resources on Federal, state and private land. The privately owned resources are just as much the heritage of future generations as are our public lands. Private ownership or some proprietary interest in public land does not constitute a license to destroy the heritage of the future.

In summary, if our wildlife resources, as well as all other natural resources, are to survive through the next 100 years and more, all resource owners will have to get away from the old "seat of the pants" management and outmoded concepts. Resource use will have to be regulated by comprehensive multilevel management plans based on factual knowledge and incorporating modern technology. All interests must be involved, with the primary consideration given to the perpetuation and survival of the human race. If the time comes when we can no longer maintain wildlife in our ecosystems, then all ecosystems, including the big one, Earth, are in jeopardy and human civilization as we know it and want it will perish.

## JACK ORR

*Rancher, Kremmling, Colorado*

*Jack Orr was born in Kremmling, where he still operates a highly successful ranch and is nationally and internationally recognized for his registered Hereford breeders. He has won many prizes in cattle shows in the West and in Chicago.*

*In his community he has been active in many community affairs, having served as Secretary of his local school board, President of the Fair Board and of the Stockgrowers' Association, and President also of his Kiwanis Club.*



*He has long been an active member of the Colorado Cattlemen's Association; since 1965 he has served on its Board of Control and in 1971 was elected its President. He attended Colorado State University and is a member of the Advisory Committee to the University's State Board of Agriculture. Mr. Orr is President of Agri-International, a corporation organized to promote Colorado products, particularly agricultural products for foreign export.*

The conflict between livestock and wildlife in Colorado is a big problem. I will try to give you some of the ranchers' problems as well as joys.

First a little background. When this country was settled years ago the homesteaders took out their homesteads in the green, fertile valleys. They had the water they needed and took land where they could raise hay crops to feed their cattle in winter. The summer feed was taken care of primarily by national forest grazing permits and Bureau of Land Management (BLM) permits. We ranchers pay a fee for these permits. In order to balance an operation — and I am speaking primarily now of mountain ranches in Colorado — you have enough summer grazing so it balances an operation where you put up your hay for the winter. We needed the Federal grazing permits to make this kind of operation practicable. If you are running, say, 100 head of cattle on a forest permit for four months, you must have enough land of your own to take care of that number of head for the other eight months of the year.

This is the way the whole system was set up. Right now the agricultural industry in the state of Colorado has grown to have an impact in the state of 4.1 billion dollars. Of that sum, 60 percent is directly related to livestock.

Let's discuss the multiple use theory on our public lands. In our mountain areas about 78 percent is public land, so only about 22 percent of it is private, deeded ground. Of the 78 percent that is public land, livestock permits have been granted on only about 40 percent. Let's give you some examples of some of the things the ranchers have been doing for the last twenty to twenty-five years on Federal ranges to increase production and improve the habitat not only for livestock but also for wildlife.

In some areas an immense amount of sagebrush has been sprayed. In some areas that is detrimental to winter deer range. However, in most cases the sprayers avoided areas where winter deer ranges are important. In 90 percent of the cases where spraying has been selective, it has increased the habitat for deer and elk and other species. Ranchers use a rotation grazing system which has proved very successful; it requires fencing and putting the cattle in one pasture in the spring and going on into other pastures later. Ranchers have built many, many miles of fence on public lands for a rotation grazing system which has improved the habitat.

They have also gone into a seeding program not only on their own private deeded land but also on the Federal land and have also developed stock ponds so a deer or an elk or a cow won't have to walk four or five miles to a water hole, only a mile or less. Besides the convenience, grass is much better utilized if the water holes are scattered, not all in one place. For these range improvement programs on Federal lands the ranchers themselves are paying

much of the cost. I'll give you one example on a particular ranch I know well. The government paid \$71,000 toward the cost of programs that I've been talking about. The rancher himself paid, for work on the Federal lands, an additional \$23,000, for a total of \$94,000. He wasn't improving the habitat only for his livestock but also for wildlife for all of us. And there's case after case of this.

It has been said that in the mountain area the winter range for wildlife is anywhere from 30 percent to 80 percent on private, deeded ground. In some areas use is heavier than others, but I know in our area a lot of wildlife winter on private grounds. In eastern Colorado your antelope, your pheasants, and similar types of animals spend 90 percent of the year on private land that ranchers pay taxes on and then realize very little from the wildlife on their land. I know of no case where there's been grass damage paid by the Game and Fish Department. In some cases we'll realize a payment for hay damage where elk get into our haystacks and eat and waste our hay. Frankly, it's not so much the hay that they eat that bothers ranchers; it's the hay they waste. It's a shame to go out there and see the haystack with a big manure pile around it and hay tramped under their feet — and this happens in a rough winter.

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# LIVESTOCK AND WILDLIFE MANAGEMENT IN COLORADO

by Jack Orr



Up in our country, to prevent a large winterkill of deer and elk there must also be an adequate harvest. As you saw on the charts here this morning, about the drop in deer population in 1965 — I assure you that that drop in deer population wasn't caused by overdevelopment because there wasn't that kind of overdevelopment in the winter range at that time. That drop in deer population was strictly from winterkill. Most of us who live there saw it — we saw thousands of dead deer the next spring when we rode all over the country. It wasn't anything other than winterkill, and I think there's got to be some way that the Game and Fish Department can prepare for these tough winters. We're going to have more of them, and there's some way to prevent this severe loss by winterkill.

I just want to touch briefly on fish. I think that you'll find in the near future more and more ranchers raising fish and going into it as a business to provide fish for stocking our streams.

I want to go into a few problems we have in the ranching business with hunting and fishing. There are about 3 percent of the people that sure make it bad for the other 97 percent. When they come through and leave the gates open and cut the fence and you have cattle separated and it takes hours to do your job over again, you can understand why some ranchers get a little mad. I know many, many have had it happen, and I personally have had the experience. Trash left all over the country may be serious, not just a nuisance. I had the best saddle horse I ever sat on step on a jug left beside a fishing stream and practically cut his leg off. It injured him so badly I had to destroy him. Fishermen cutting across the meadows ruin part of the hay crop. Scaring the cattle causes weight shrinkage. Four years ago, right on my own land I lost three cows — shot during hunting season. I don't know whether a hunter did it or not; all I know is that I lost three cows and it was during hunting season and there was no way I could find or apprehend whoever did this.

When roads in the mountains have a lot of moisture, jeeps going in cause ruts; eventually those ruts erode and soon you have a gully. This is the type of thing that should be stopped.

The question is often asked, "Aren't you ranchers getting a good return for your work and trouble when you charge to hunt on your land?" Some ranchers are charging, but many ranchers don't. In some areas I think as high as 50 to 75 percent of ranchers aren't charging a dime. I know my dad has been in that country for years and until two years ago he never charged anybody a dime to come on his place to hunt or fish or anything else — all he asked was a little respect for his property. But things got so bad he leased it to an international sportsmen's club so they would patrol it for him. He ended up really having no choice.

True, some ranchers do charge. But do you realize what they also put out in some services with their charges? For example, a lot who will charge will guide people into an area and show them where to hunt, or they'll pack them in and help pack. In fishing areas there might be some other services, like a little campground, or cabins to rent. But a lot of ranchers won't charge and don't realize one dime out of it. They aren't interested in recreation; they are interested in raising beef. We will lease our ranches to the Game and Fish Department or the international sportsmen's clubs or whoever.

Predators, especially coyotes, are an interesting problem. I don't know for sure how many sheep there were in our part of the state, but I suppose 30,000 to 40,000. Today there are only two sheepmen left in our county. Coyotes used to prey on lambs. They had to eat something, and lambs were easy prey, so they preyed on them. Today, with hardly any sheep left in the country, when the coyotes get hungry they are going to prey on something. And now they are preying on calves, on wildlife, on fawns, antelope, and deer. Are we going to let the coyotes decrease the numbers of wildlife? We saw in the charts here this morning that coyotes have increased by 17 percent. We also saw on the charts that deer and pheasants were down considerably in the past few years. I assure you that a big reason for that is nothing but coyotes killing the young. Let me read you an article from the Grand Junction paper written by Grace Henders:

*Big game herds are already suffering from severe winter conditions that make them easy prey for growing numbers of coyotes. According to Lyle Bennett, Norwood wildlife conservation officer, evidence is accumulating daily that predators are responsible for greatly increased wildlife loss along with steadily mounting livestock loss. A small antelope herd grazing this winter in Dry Creek Basin has almost disappeared. At least three antelope deaths have been verified as coyote kills, Bennett says. When the coyotes take after the antelope they're light enough to stay on the top of the crust, but the antelope fall through into deep snow under the crust. They don't have a chance, Bennett explained. A lot of the deer are dying this winter the same way. Also there is the sheep loss. Some ranchers have already lost more than fifty sheep to coyotes. People just don't realize that it's going to be pretty hard for those ranchers to stay in business.*

We've had reports from eastern Colorado where the animals and pheasants are way down. Coyotes are beginning to run in packs out there. Let the coyote problem go on and wildlife is going to diminish. Poison has been the only economical way for the rancher to stay in business and keep on top of the predators. We aren't for poison if we don't have to use it, but let's get a new means to preserve our livestock and an economical means we can live with before we cut the poison off altogether and let these predators have a lot of wildlife and livestock to feed on. There has to be a new way, but let's find that new way before we just cut everything out.

The smaller the food supply, the higher the price is going to be. You want recreation. I just hope that ten years from now we aren't going to start wondering how we're going to feed our population at a reasonable price. The answer to it is forums just like this, and Operation Respect — to get discussions started in a really constructive manner. The land is our livelihood; without it we wouldn't be in business. We are interested, I think more than anybody, in conserving that land from erosion and destruction. The recreationists need this land for their enjoyment and the government needs this land for future generations. If we all work together I know we can come up with the right answer.

The only reason the Game and Fish Department doesn't get more ground under lease is that they aren't competitive. We have been through several meetings on this. If they had come up with a fair deal and not a 99-year lease, if they would do it on a short-term basis and be competitive, they might be allowed to lease a ranch for the general public. Our basic concern is the harassment. We aren't interested in all that much money on it.

Another problem that we have faced in the past few years has had to do with the Game and Fish Department's buying of lands. This looks good on the surface, but when you live, like us, in a rural area and this land goes off your tax rolls, it puts a heavier tax burden on you and your whole community to pay for your schools and local government. If you would give us some income tax legislation or some sales tax legislation that would relieve this heavy property tax burden, then we would have no objection to the Game and Fish Department's buying up of lands. I think one of the best things that ever happened was Operation Respect: sportsmen and landowners getting together and shaking hands and coming up with answers to our problems. I would like to see Operation Respect get much bigger.

We've also heard about private landowners shutting the gates so people couldn't get into the public lands. But that problem isn't as serious as one might think. I'm the first one to admit that we have our bad guys in the ranching business too; we have had cases where they've cut off public access, and I think probably where it wasn't justified. But there isn't a case that I know of where people couldn't get into public lands by going another route. Maybe it is 20-25 miles out of their way; maybe they do have to park and walk a couple of miles. But that's what the wilderness area is all about today — walking, instead of driving.

I know that in some areas fishing is being cut off from public use, but I think if it weren't for some of our private fishing waters there wouldn't be nearly as good fishing in the state today as we have now. I'll give one example: near Hot Sulphur Springs there's a public land area with private land right below it and private land right above it. Some of that private land has been restricted for private fishing, but because of that the public stream in between has been much better fishing.

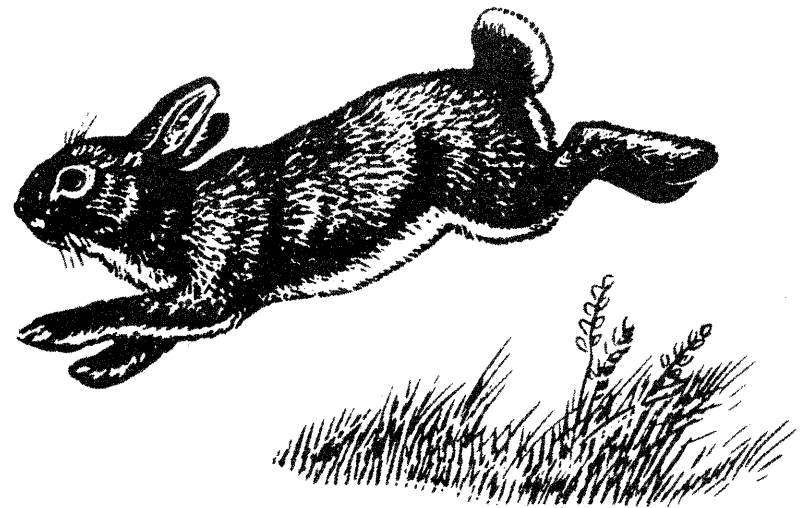
We have been concerned about an early hunting season in the state of Colorado. This causes problems for us as well as for the wildlife managers. I'll try to explain it. With the hunting season up before the middle of October, ranchers must bring their cattle down out of the high country and thus can't utilize the grass fully. The biggest grazing pressure on the private grasslands is in fall, winter, and spring. If the cattle are forced down from the public lands to the private lands in the fall, ranchers are utilizing their winter feed. In the springtime if you turn out of the area too early, the grass isn't ready; it isn't mature, and you hurt the grass that way. Consequently, fall, spring, and winter are critical times; the summer will take care of itself. The more time we can graze in the high country to utilize that feed, the more feed in the low country for wildlife winter range.

## KEITH W. HARMON

*Northcentral Field Representative, Wildlife Management Institute, Fargo, North Dakota*

*Dr. Harmon was educated at Michigan State University, where he took the bachelor's and master's degrees in wildlife management, and at Colorado State University, where he earned his Ph.D., also in wildlife biology, in 1968.*

*He has worked for the states of Michigan and Minnesota as Wildlife Biologist and Game Manager. After completing his doctoral requirements at Colorado State University he accepted a position with North Dakota State University as their first Wildlife Extension Specialist and served in this position for four years. Two years ago he assumed his present responsibilities as Field Representative for the Wildlife Management Institute of Washington, D.C.*



*Dr. Harmon has as special areas of interest the economic and political aspects of land use and wildlife populations, and the effects on wildlife of Federal water resource development projects and Federal agricultural programs.*

*He is an active member of the Wildlife Society, the Soil Conservation Society of America, the Mississippi Flyway Council, and the several state organizations in North Dakota concerned with environmental matters.*

Few topics are as clear-cut as wildlife and land use. Changes that supply a species' basic needs increase its numbers, while changes that eliminate such needs result in decreases or even complete elimination. With this fundamental knowledge, plus an accurate assessment of a species' requirements, wildlife management should be home free. This being the case, there should be no need for this important conference. But the element that has been lacking has been the ability to influence land-use changes that favor a species or group of species and yet meet other public demands.

Others on the program have discussed or will be discussing the population status of wildlife species in Colorado along with their needs and values. Therefore, I have elected to take a broad approach to "Wildlife and Land Use" and deal with programs, or the lack of programs, that influence wildlife. Many find this area of concern less than glamorous but long-term gains are made only by taking this approach.

Nationally, the U.S. Forest Service is responsible for managing 187 million acres in the National Forest System, approximately 14.3 million acres of which are in Colorado. The 1897 Act provided that the Secretary "may make such rules and regulations and establish such service as will insure the objects of such reservations, namely, to regulate their occupancy and use and to preserve the forests thereon from destruction." The 1960 Multiple Use and Sustained Yield Act directs the Forest Service to make decisions "... with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output." There is considerable misunderstanding of the term "multiple use." To many, the term means maximum production of all values from each acre of national forest. This is no more possible than for a farmer to raise 100-bushel corn while grazing cattle at the maximum AUM rate on the same acre of land. For now, it is sufficient to say that multiple use management is a

framework within which to approach land management on the forests — this framework includes wildlife.

The concept of multiple use is only as effective as the budget constraints under which the Forest Service must operate. This, in the final analysis, is what determines the direction and the degree of attention given to wildlife and critical land-use changes on the forest. Of the budget *increases* requested from Congress during the years 1954 to 1970, the following levels of financial support were achieved for the Service's programs: timber sales administration and management received 66 percent of the new dollars requested; recreation and public use, 20 percent; reforestation and timber stand improvement, 17 percent; wildlife habitat management, 17 percent; and soil and water management, 15 percent. While the Forest Service has a mandate for multiple use management, there is little evidence of a multiple use budget.

Looking at Colorado, one sees strong evidence to support this. Of the 14.3 million acres of national forests in the state, approximately one-third is considered commercial. On these acres, one can, with some reservations, assume that some benefits accrue to big game and other wildlife species from the harvest of timber. This leaves nearly

10.0 million acres (excluding wilderness areas) where specific funding is needed if land-use changes are to yield maximum wildlife benefits. But funding for wildlife on the forests in Colorado is only \$449,239 (including fisheries) or about .04 cents per acre on noncommercial forest sites.

Overall, the picture is one of benefits from and improvements to big game summer range where commercial timber operations set back forest succession. On the other hand, little if any improvement is possible on winter range where tree species have little commercial value. Little can be expected there at the present level of funding for wildlife.

Not only is funding inadequate, as shown by the F.Y. 73 figures just given, but there also will be less opportunity in the Administration's proposed F.Y. 74 budget. Proposed budget cuts for the Forest Service now stand at \$105 million.

As limited as financial capabilities are for the Forest Service to effect specific management for wildlife in Colorado, the picture for the Bureau of Land Management is even worse. While the statement that good range management benefits wildlife is generally true, that it does so is not always the case. In those instances, funding and manpower must be directed toward land-use changes with wildlife as a major consideration.

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# WILDLIFE AND LAND-USE CHANGES

by Keith W. Harmon

Bureau of Land Management biologists have estimated that nationally 79 million acres of the public domain are in unsatisfactory condition relative to optimum wildlife production. This has resulted in a decline of 17 and 13 percent in deer and antelope, respectively, since 1962. The Administration's proposed BLM budget for F.Y. 74 is \$97.6 million, a decrease of \$7.0 million even in the face of declining public values. Oddly enough, only \$3.4 million are scheduled for range management, yet income from the public domain is estimated at over \$2 billion.

The BLM manages over 8.0 million acres in Colorado. Funds earmarked for wildlife management total \$196,400 or about two cents per acre. If overhead is subtracted from this meager fund, it is doubtful that any wildlife management will be done on the land — the only place it counts.

60 If Colorado is sincerely interested in protecting and enhancing its valuable wildlife resources, its citizens, along with all owners of public land, must face the problem of funding for the administering agencies. For without a solution, land-use changes will continue but they will not be to the benefit of wildlife. Hearing records of the annual Congressional debate which determines Federal funding for wildlife on the public lands clearly show that the wildlife interests have not become involved in issues that ultimately determine land use. On the other hand, most can and do become passionately involved in season length, bag limits, restrictions on nonresidents, and other aspects of harvesting wildlife. A setting of priorities seems to be in order.

Changes in land use as it affects wildlife also occur on private lands. Some are stimulated by the private sector, others by Federal agencies. The economic objectives of the farmer, along with the fact that income generated by farm wildlife does not readily find its way into the farmer's pocket, make production of wildlife on private lands difficult. This still leaves opportunities for enhancing farm wildlife, and these opportunities lie in effective management of private lands withheld from crop production through farm programs.

In 1972, Colorado farmers diverted 1.7 million acres from crop production. During that year, surveys were conducted by the Colorado Division of Wildlife to determine the management of those acres. The survey showed that this land-use change — cropland to noncropland — provided little in the way of wildlife production and soil conservation benefits, although over \$53 million of taxpayers' money was involved. Two-thirds of the 1.7 million acres were devoid of any protective cover. Thus, public values were actually degraded or destroyed and the taxpayer footed the bill.

Congress is, at this moment, considering new farm legislation to replace the 1970 Agricultural Act, which expires with the 1973 crop year. The critical issue is whether the Department of Agriculture will continue to administer a program that deprives this nation's citizens of farm wildlife and sound soil conservation or whether a new program will be developed which protects and enhances these public values. In large part, the decision will depend on your expressing your wishes to those who represent you in Washington.

For more than 35 years the Federal government, through the USDA, has administered a program originally designed to conserve soil resources. This program, voluntary in nature, uses taxpayer monies to compensate farmers for installing practices which protect public values. Since 1962, practices to enhance wildlife populations have been eligible for cost-sharing assistance. This program — first named the Agricultural Conservation Program and now called the Rural Environmental Assistance Program — has been under fire for stimulating land-use changes that are income-producing and insensitive to national needs. The controversy culminated in the first months of 1973 when the Administration impounded all program funds. Subsequently both Houses of Congress have passed legislation to reinstate the program.

In terms of benefiting wildlife, an evaluation of REAP is in order. In 1962, approximately 56 percent of the Colorado budget for ACP was devoted to irrigation — a questionable conservation practice. When he changed the name from Agricultural Conservation Program to Rural Environmental Assistance Program, Secretary of Agriculture Butz announced that those practices conducted as a normal function of farming or that were income-producing would be deemphasized. Yet in 1971, the first year REAP was operational in Colorado, 49 percent of the allotment went for irrigation.

Additional insight into Federal cost-sharing for so-called "conservation" practices can be gained by looking at data from a township in Larimer County which has a high percentage of irrigated land. During the period 1957-65, almost 98 percent of the Federal cost-sharing went for irrigation practices. During this period, at least two marshes were filled during Federal cost-shared land leveling operations. USDA cost-shared no wildlife practices although they had been available for four years.

Statewide, in 1962 (the first year cost-sharing was available for wildlife habitat development) no funds were spent for wildlife — exclusive of fish ponds. In 1971, the first year for REAP, cost-sharing for wildlife development on private lands consumed the grand total of two-tenths of one percent (0.20 percent).

An overview of the contributions to enhancement of wildlife on private land through USDA programs indicates little or nothing. They include the administration of land retirement programs which have no requirement for protective cover and cost-share programs that expend far less than one percent of the state allocation for wildlife. Yet Environmental Impact statements proclaim their virtues for wildlife. If land-use changes are to be implemented through the Department of Agriculture for the benefit of wildlife in Colorado and the nation, a major overhaul and redirection is in order. However, constructive input for realigning these programs has been minimal.

In closing, several remarks on land-use planning and zoning appear to be in order, although a full discussion is beyond the scope of this presentation. It is my understanding that Colorado has embarked on such an effort. This is essential. For example, Colorado cannot maintain its big game herds if uncontrolled residential development is permitted on critical winter ranges. This is no more possible than for that farmer to raise 100-bushel corn while intensively grazing the same acre.

Most of the literature on planning and zoning stresses the need for decisions to be made at the lowest possible level of government. This is necessary if support is to be gained. But I believe that a paradox exists, for few examples are available to indicate that local decisions have adequately protected state, regional, or national values.

Drainage provides a classic example. From the turn of the century until about 1950, local landowners eliminated half of this nation's prime waterfowl- or other wildlife-producing marshes in the upper Midwest on a farm-by-farm basis. In 1954, a new era of planning on a watershed basis was ushered in with the Small Watershed Protection and Flood Prevention Act. Even here final decisions still rested with local interests. Today, this program of enlightened planning is the major threat to the remaining marshes, and it's business as usual. In 1967, the Souris-Red-Rainy River Basins Commission was established in the states of North Dakota and Minnesota and charged with comprehensive planning for three river basins. As one reads the final reports, he discovers that the plan is nothing more than a large watershed project with drainage a dominant feature, and again it's business as usual.

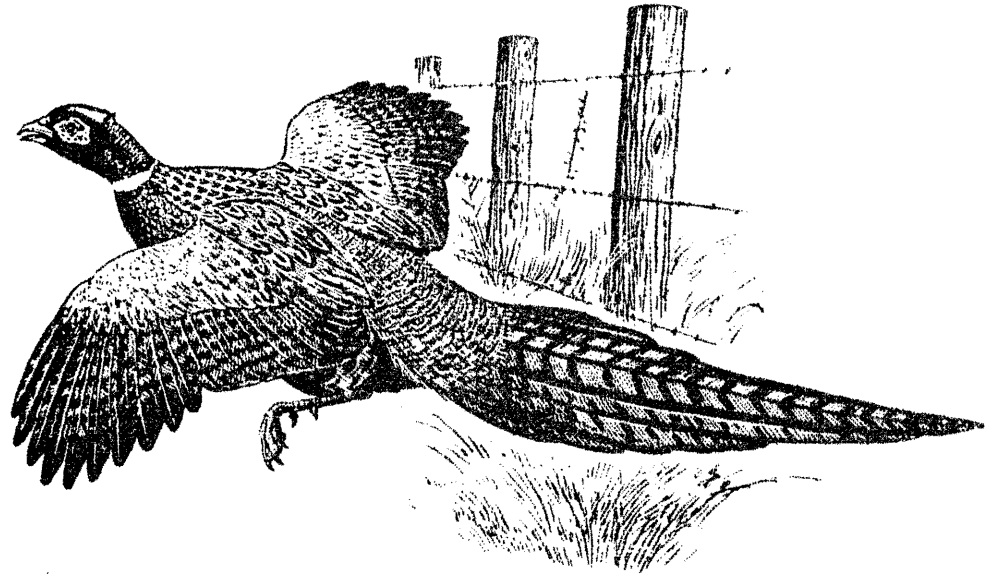
The point to keep in mind in land-use planning and zoning is that the need for local control must be tempered with comprehensive guidelines that protect state and national values. It is a fine line and one that is not easy to draw — nevertheless, it must be drawn.

I have not given you precise answers but rather problem areas that need attention. That is because there are no pat answers in land use as it relates to wildlife. At an environmental meeting in Bismarck, North Dakota, a concerned lady said, "I'll be glad when all these environmental issues are solved." But environmental problems, like problems with land-use changes, will never be solved. They will require a continuing effort. This was dramatically brought home when the Water Bank Act was enacted, funded, and made operational. No sooner were we into the second year of operation than the Administration impounded the second \$10 million. The battle over drainage and channelization has been going on for over 20 years and redirection of land retirement for almost 12 years. The problems must be given a series of short-run solutions, for public and economic values are ever-changing.

This should not, however, lead to discouragement. The stakes are high and the only ones we have to play for. The real gains lie in sound programs and budgets for the agencies that control the public lands and influence private lands.

Be interested in season dates and bag limits; but first be interested in the land and the care it receives. For without proper care, you won't have to worry about seasons and limits.

The future of land use and wildlife is exciting, and it's in your hands.



## CHARLES H. CALLISON

*Executive Vice President, National Audubon Society*

*Mr. Callison is a 1937 graduate of the University of Missouri, where he majored in journalism.*

*After several years of editing newspapers, Mr. Callison joined the staff of the Missouri Conservation Commission as Chief of the Division of Information. He then served for four years as Executive Secretary of the Missouri Conservation Federation before moving to Washington, D.C., where he was Conservation Director for the National Wildlife Federation for nine years.*

*Since 1960 he has been with the National Audubon Society, first as assistant to the President, later as Executive Vice-President.*

*Mr. Callison has served in many important capacities dealing with conservation in Washington and New York. Among these are the chairmanship of the Natural Resources Council of America and membership on the New York State Environmental Board. He is a member of the Wildlife Society, Wilderness Society, Sierra Club, and American Ornithologists Union. He has written many articles on conservation and natural resources, is editor of the book "America's Natural Resources," and is author of the book "Man and Wildlife in Missouri."*

The subject of nongame wildlife management needs can be interpreted two ways. To illustrate, let me rephrase it as two questions:

1. Does a state wildlife agency — or specifically, in the context of this conference, the Colorado Division of Wildlife — need to broaden and deepen its research and management programs to take care of the nongame species as well as the game species?

2. What does a state wildlife agency *need* in order to manage nongame wildlife effectively?

I shall address myself to both questions. The answer to the first must be an emphatic yes for two reasons. The wildlife professionals — the men and women who staff the wildlife agencies — are as a group ready and eager to take on broader responsibilities. As evidence I submit the fact that a "Model Law for a State Nongame Wildlife Program" has already been drafted and recommended jointly by the Wildlife Society and the International Association of Game, Fish and Conservation Commissioners. Not only drafted and recommended, it has already been introduced in the legislatures of at least twelve states and passed in at least four; and plans are being made for its introduction in several others.

The second reason why the answer to the first question must be affirmative is that the public is beginning to demand it. That is, a broad cross section of people interested in wildlife and the natural environment, a cross section so broad that I am convinced it constitutes a solid majority of Americans, is beginning to demand that some agency of government be constituted and empowered to look after and protect all of the furred, feathered, finny, and scaly critters that formerly were considered of no account because no one wanted to hunt or fish for them.

If not the regular, experienced state wildlife agencies, the Game and Fish Departments, the Divisions of Wildlife, then who else should do this job? No one else. It is a natural.

Why do I say the public is beginning to demand it? I have two pieces of evidence, the first of which you'll have to accept. It is the fact that state legislatures are passing the model nongame law in states where they've been asked to do it. And Congress has been passing laws for the protection of endangered species, whether such species have been game or not, and whether Mammalia, Aves, Amphibia, Reptilia, Mollusca, or Crustacea.

You may consider my other evidence somewhat subjective, but I stand by it. It is the fact that I work for the National Audubon Society, an organization that has its fingers on the pulse of the public that is interested in nature. Helping the state game departments move into nongame wildlife is an *Audubon action priority*. Our chapters and members are ready to help.

So from the viewpoint of the professional in wildlife management, or from the viewpoint of the interested public, the answer to the first question is yes. A state wildlife agency does indeed need to get actively into the business of research, management, and protection of nongame species.

*Now, what does the agency need to get the job done?* The answers are easy to put into words, but not so easy to accomplish. The most urgent necessity is money — and money in proportion to the size of the responsibility. This is a need common to all the states. Last month I sent a brief questionnaire to the wildlife departments in all fifty states to find out if they needed legislation like the model law, and if so, what was being done about it. Forty-five states replied. Of these, twenty-six said their laws were all right — they had ample statutory authority to manage the nonhunted species — but I know that none of them have the money to do it except in a tiny and tentative way.

# NONGAME WILDLIFE MANAGEMENT NEEDS

by Charles H. Callison



Eighteen states said they did need new legislation, and most of these have such legislation in process or under study. One of those was Colorado. Here a bill similar to the model nongame law is pending in the legislature, unless it has passed since I heard from your director about one month ago.

The broadened statutory authority can be secured fairly readily, I believe, once the effort is made. But getting money to implement the law will not be so easy. It can be secured, though, if we put our whole team to work on it. Our whole team, if successfully recruited and coached, is a solid majority of the American tax-paying public.

Who benefits from the programs of the state wildlife agency, programs now paid for almost entirely, from one end of this country to the other, by hunters and anglers through license fees and through excise taxes on their guns and tackle? I think I could convince any open-minded person, whether a hunter or not, that everyone benefits, but it would be easier to do so if the state program truly attended to all wildlife.

According to the 1970 Federal survey of outdoor recreation activities, about 25 percent of Americans over 12 years of age went hunting or fishing in 1970. In the large cities only 13.3 percent engaged in either sport, while the percentage in small cities and suburbs was 21, and for town and rural areas, 28.5 percent. While the population zoomed upward during the decade of the sixties, the number of licensed hunters changed very little, although the number of licensed anglers increased by about one-third.

I cite these familiar figures only to make the point that the hunters and fishermen who support the state wildlife programs with their money and, when necessary, their votes, are a minority and probably a diminishing minority. Accordingly, the general public and their legislators tend to look upon the state's wildlife program as a special interest activity catering to a special interest minority group of resource consumers.

But count all of the people who are interested in wildlife for nonconsumptive kinds of recreation and add them to sport hunters and anglers and you have, I am convinced, a solid majority.

Take bird watchers, for example. No one has ever come up with a good estimate of the number of bird watchers, although recreation surveys indicate there are at least as many active birders today as there are hunters. Then add to the ranks of real and potential wildlife program advocates all of the nature photographers and everyone else who thrills to the sight of a deer or an eagle or a flight of wild waterfowl when in the out-of-doors, and I think you've got about everybody who ever gets into the out-of-doors.

The National Audubon Society insists the whole public has a stake in the healthy functioning of natural ecosystems. The conservation of wildlife and of wildlife habitats is essential to such functioning. Therefore, every citizen should support the wildlife programs of Federal and state agencies. His own health and welfare depends on the ecosystem.

The hunters and fishermen will continue to pay their license fees, and for the most part quite willingly, for the privilege of taking the harvests they seek. It isn't fair to ask them to pay extra money to support nongame programs as well. Since the whole public does indeed benefit from wildlife conservation, and would benefit more from a broadened program of research and management to enhance nongame wildlife, the fair way to get the extra funding is through general revenue appropriations. Another way would be by special taxes, as Missouri has proposed to do through a one-cent levy on soft drinks. The Washington State Legislature recently passed a bill earmarking revenues from personalized auto license plates for nongame wildlife — a device expected eventually to raise more than a million dollars annually.

I strongly recommend the general revenue approach. All it will take is the courage to ask the state legislature for an adequate appropriation and the skill to mobilize the interested public behind it. And the patience and persistence to follow through in case the legislature isn't convinced on the first try.

**Discussion of Panel No. 2**

**Question:** *Do you think wildlife have a right to graze on private land?*

**Response by Jack Orr:** Yes, they do have a right. And despite what many people think, we ranchers do not get paid for the wildlife grazing on our land. However, we do still pay taxes on these lands. Most of the landowners do not expect or want to pay for wildlife use of their land. However, we are concerned about other losses on our lands, such as cattle being shot or fences being broken, etc.

**Question:** *How do you feel about the state government paying for livestock losses caused by predators?*

**Response by Jack Orr:** We were against such a program, but now we have changed our ideas. If you will pay for our losses, we will let the coyotes have at it. But we have a big problem in proving the losses because the killing is seldom witnessed. The burden of proof would be upon us, and we would have to definitely prove the cause of loss, which is a very big problem. However, we do need an economical means for controlling predators, and in the past, the most economical and effective means has been the use of poisons.

**Question:** *You stated in your talk that the building of fences by leasees on public lands improves these lands for wildlife. How does this occur?*

**Answer by Orr:** By rotating our livestock among the various pastures, we obtain better range management, which results in more and better forage for livestock and wildlife both. Many people feel that it is much cheaper for us to graze our cattle on public land than on private land. However, we feel that the cost of operation on public land is equal to or higher than on private land.

**Question:** *Does the Wildlife Division have any programs concerned with relationships between deer and coyotes?*

**Response by Jack Grieb:** We are now in the process of planning a coyote-deer relationship study.

**Question:** *In reference to the problems of coyotes and livestock, are there other ways to control coyotes other than poisoning and trapping?*

**Response by Charles Callison:** Many people have felt that the recent increase in coyotes has been due to the ban on poisoning, but this may not be true. Some authorities feel that the recent increases are due to a normal cyclic condition in coyote populations similar to the increase we had in the 1960's.

I think many of you are aware that coyote food habits are in general beneficial to the livestock interest, as coyotes eat many of the rodents which consume plant food which is then unavailable to the livestock. However, there are a few damaging individuals who must be controlled through selective methods. It is the selective methods that many of us hope will be developed for coyote control. The use of bounties to encourage taking of coyotes would be doomed to failure, as the bounty system has never worked and has been proved to be a complete waste of money.



From the time the first explorers broke through the wilderness to reach the area of the Rocky Mountain States, the deer and buffalo and other wildlife which inhabited the region were regarded as the property of everyone. They were killed for food, for sport, for clothing, or for trophies.

Perhaps the first residents of the Rocky Mountains — the Indians — had a better appreciation of the real value of the wildlife — and a recognition of the fact that the supply of game and fish *could* be depleted and even exhausted. With the demand for buffalo robes and beaver hats, the fear of Indians for their wildlife resources became a fact. As the pioneers settled within the borders of the Colorado territory, they — like their red brothers — also depended upon the wildlife for food and clothing.

The passing years changed the reliance upon wildlife as the major source of food and clothing, but *did not change* the general assumption that the wildlife within this area, which had now become the state of Colorado, was still inexhaustible. Hunters regarded the wildlife and the lands on which it foraged as their special interest. Few if any of the general public protested. Sheepmen and cattlemen controlled predators in whichever way seemed most efficient to the individual stockman. And who cared? They were exercising the right of any citizen to protect his own property.

Cities mushroomed, forests were cut or burned, mining and oil operations grew and stripped portions of the land — removing the protective ground covering that provided food and shelter for the creatures inhabiting the area. Roads were built and then super highways, providing barriers to well-established game trails; erosion everywhere doubled and tripled and continued to increase, with more devastation to the habitat of the wildlife. As the population grew within our state and men looked yearningly toward the mountains for their own back-to-nature property, the development of rural subdivisions spread like the proverbial wildfire and is still growing, with too little regard for the danger of the depletion of our wildlife.

During this period, wildlife had ceased to be regarded as the property and interest of every resident and seemed to belong almost exclusively to those with special interests.

Then, almost overnight, “ecology” and “environment” became household words. Anything that endangered or *seemed* to endanger any living thing on our national resource lands attracted attention and created controversy, as well as a great deal of misunderstanding. Special interest groups, all within the broad framework of the environment or ecology, presented their special viewpoints, making wide and effective use of the media and the political forum.

Decisions on public land use, including every aspect of wildlife, were, by constitutional requirement, made by our elected and appointed officials. These decisions, more frequently than not, were both applauded and criticized, not only by the environmentalists, but also by the subdividers and mining and oil interests, as well as stockmen who felt their livelihood was being threatened.

Environmental specialists, biologists, foresters, water experts, and others from the academic and the business worlds met and talked, argued, and recriminated. They all pressed their views on the officials who make the legal decisions on wildlife and public lands.

But the general public, the major portion of the state's population, the people to whom all the wildlife belongs, took little part in these arguments

and decisions. They were not consulted nor did they use their voices to reach the decision makers.

1973 might be called “the year of the people.” We've moved through the environmental revolution era. It's time we settled down. It has become evident that there is no single best way. We have reached that point where direction must develop. In other words, it is time for decision. If the public, for whom all this action and reaction has taken place, fails to respond, who is to say what decision may result? And who will be to blame if the decision is a wrong decision?

A successful wildlife program depends upon the continued understanding, participation, and support of all the citizens, not a few special interest groups, to achieve success in preserving our wildlife.

The Federal and state agencies responsible for the management of wildlife and its habitat on the public lands have never been so keenly aware of their responsibility, not only to the wildlife but to you, the common owners of this valuable and irreplaceable property. But their success depends on you. Your presence here today indicates that you recognize that you must participate actively as well-informed owners in the wildlife program if it is to be successful.

The subject of this panel, PUBLIC INTERACTION AND INVOLVEMENTS, is already more than obvious to you. We hope that the knowledgability of the panel members, as well as their genuine interest in your wildlife, will become equally obvious before our panel discussion is over.

# PUBLIC INTERACTION AND INVOLVEMENTS

by Dale Andrus

## THOMAS B. BORDEN

*Director, Colorado State Forest Service, Colorado State University, Fort Collins, Colorado*

*Tom Borden, a high school dropout, enlisted in the U.S. Marine Corps and reported to Parris Island, South Carolina on December 26, 1944. On December 27, he was ready to return to high school. Although he had to wait until 1947 to reach this goal, he eventually received both a bachelor's and a master's degree from Purdue University.*

*Tom joined the Colorado State University staff in 1959 as Director of the State Forest Service, a division of the University. He holds that position today.*

*He has been president of the National Association of State Foresters and chairman of the Rocky Mountain Section of the Society of American Foresters.*



On the surface, the topic "Inter-governmental Cooperation" seems absurdly simple. All one has to do is make vague references to the lack of cooperation between agencies, cite a few specific instances to reinforce the generalities and follow with a dissertation on ways governmental agencies can work together. But the more I thought about the topic, the less sure I became of this approach.

The first question I asked myself was, "Is cooperation between individuals, groups, or agencies a natural thing, or is cooperation essentially unnatural?" I hate to say it, but cooperation is essentially unnatural. Both heredity and environment enter into these observations. Visualize two cave men, who had never seen another human, suddenly encountering each other. You would have a hard time convincing me that they both didn't start swinging their clubs at each other. However, at some time in the evolutionary process, man learned he could live and work harmoniously with other human beings. My guess, however, is that his attitude was "What can they do for me?" rather than "What can I do for them?"

The lack of cooperation between small children is well-known. One of the first words a child learns is "Mine!" To be asked to share a plaything with another child brings cries of anguish. It is unreasonable for us to assume that individuality and selfishness are learned that young. Therefore they must be hereditary.

Throughout life we are taught to compete in sports, in academics, and finally, as grownups, in the business world. This is the "American way." Consequently, when we talk about cooperation among agencies, we are really demanding something that has to be learned by the individuals in the agencies rather than to assume that interagency cooperation is automatically going to exist.

Society professes cooperation, but generally it is only lip service that it gives. Though cooperation within a group, agency, or a team is perhaps the most easily attained, even this is achieved with great difficulty. "Teamwork" is the watchword not only in the agency, but also in such undertakings as the Denver Broncos football team or the DU hockey team.

Cooperation between various "teams," agencies, or businesses sometimes leads to disaster. Fifty years ago, the Chicago White Sox baseball team cooperated with a National League team and purposely lost the World Series. This type of cooperation was more rightly called collusion. Another instance occurred a few years ago when six purchasers of a resource on Federal land agreed that five of them would submit the minimum bid and the sixth company would bid a few cents above the minimum asking price. This kind of cooperation-collusion extends to agencies as well. About a month ago, one of the major television networks carried a one-hour special on the \$1 Billion Weapon which covered the efforts of the Navy to acquire a super aircraft carrier. Various citizens, politicians, Navy personnel, and pacifists commented both pro and con on the needs. The presentation pointed out that no critics from the Army were willing to be interviewed. Why? The allegation was that the Army and Navy were "cooperating."

Before the days of consolidating branches of the service to "save money, be more efficient, and avoid duplication," almost open warfare existed between the Army, the Navy, and sometimes the Marines. The combining of these agencies under the Secretary of Defense and the Joint Chiefs of Staff ended most of the conflict. Now no critics of the Navy carrier appear among the other branches of the services. In other words, all agencies are "hitched to the wagon." Each cooperates in supporting the other's priorities. And the defense budget has risen dramatically over the last decade. Certainly the news special may have been overly simplistic in its conclusion, but this illustration has some validity.

I might add parenthetically it is fortunate that the military services are not all put in the same uniform, as is often suggested from time to time. Otherwise we would probably have a mediocre military posture, in part because of lack of competition and *esprit de corps*. The arguments for standardization of the uniform were economy and efficiency.

There are other problems involved in achieving intergovernmental cooperation. I call your attention to an often-quoted statement from the private area that "government should be run in a businesslike manner." Some of these same businessmen become legislators and almost immediately erect barriers which discourage

# INTERAGENCY COOPERATION

by Thomas B. Borden

agencies from cooperating with each other. As an example, if the Wildlife Division were to come to the State Forest Service tomorrow and ask that we do a job for them between now and the end of the fiscal year, for which we would be reimbursed, we would have to turn them down. For, you see, the State Forest Service has reached the limits of its spending authority for this fiscal year; any additional cash income would revert to the State General Fund.

Secondly, cooperation is discouraged by the budgetary process. Within the last year, I heard this statement from a government budget officer. "The laws pertaining to Department X are too general. We will consider funding only specific charges of the law." A specific charge is "to examine applicants and issue licenses to operate a motor vehicle" or "to house and provide subsistence and training for inmates of an institution." What impact does this attitude have on an agency given a charge to "cooperate with all agencies of the state which need and request the aid and assistance of a trained game biologist, forester, recreation planner, engineer, and so forth"? In other words, if an agency cooperates with another and the involvement is more than just a passing thing, money must be diverted from specific programs which were funded by the legislative body. Cooperation is not specific enough to warrant consideration by the legislative branch. For example, many hundreds of man-hours went into formulating the State Forest Management Plan. The State Land Board, the Division of Wildlife, Parks, the State Forest Service, and Watershed and Range Management personnel at Colorado State University were all involved in developing this plan, but the agencies were not funded specifically to cooperate with each other to do the job.

All of my rambling comments so far would lead one to believe we should forget interagency cooperation and just go on our way trying to get our various jobs done in a vacuum. Of course I am not suggesting that at all. In these days of static budgets and worse, and of limits on manpower allocated to an agency, cooperation between agencies is imperative. For example, there is no reason at all for the State Forest Service to hire a big game biologist or a recreation planner to round out the staff of its professional foresters. These people should be freely available to us from the Wildlife and Parks Divisions. Likewise, foresters should not be hired as foresters by Wildlife or Parks, since these services can be supplied by the State Forest Service. Actually this cooperation exists today.

*Here are some examples:*

- Several years ago, the Division of Wildlife contracted with 17 landowners in the Limon, Colorado area to plant and maintain trees and shrubs for wildlife habitat. The Division came to the State Forest Service and asked us to do the job for them — the job of establishing the plant materials. Supplied with funds from the Wildlife Division, the State Forest Service has been quite successful in establishing the cover.
- The U.S. Army Corps of Engineers was confronted with managing 8,000 acres of land within the take line of the Chatfield Reservoir. The Corps came to the State Forest Service and asked that we perform this chore for them under contract, and a very successful partnership has been the result.
- Previously mentioned was the Colorado State Forest Management Plan. We asked the sister agencies to participate in its development; consequently we have one of the finest multiple use plans for forest land in the nation.

- The CSU College of Forestry and the State Forest Service mutually agreed that the course in Forest Fire Protection could and should be taught by forest fire specialists employed by the Colorado State Forest Service. With this arrangement the college has not had to ask the legislature for additional staffing to do this job.
- The State Forest Service is charged with reviewing all new subdivisions, as defined in Senate Bill 35 of 1972. Contrary to popular opinion, foresters cannot do everything. Consequently, other state and Federal agencies are being asked to participate in a review team approach to subdivision reviews. Hopefully the other agencies will find it possible to support their costs of doing this job with us.
- We recently experienced a very bad safety year. Rather than hire a man to be our safety officer or contract for services from an independent source we borrowed an expert from the U.S. Forest Service to set up our safety program. There was no charge for this help.
- The State Department of Health, specifically the Air Pollution Control function, has been concerned about the burning of wood residues after a harvest operation in Colorado forests. Instead of making a case before the legislature and the Governor for hiring the forester to help them, the department instead asked us to cooperate in issuing permits and overseeing the burning operations.

- The university extension services in the other 49 states have foresters employed on the extension staff. This is not true in Colorado; the State Forest Service handles both the extension and service phases of forestry, thereby avoiding much duplication of time, effort, and money.
- With mountain pine beetle and Dutch elm disease pests nearing or in the epidemic stage, the counties are employing pest inspectors to provide local leadership in combating these forest enemies. The licensing agency of the state is the Colorado State Department of Agriculture. Rather than make a pitch to the budgetary officials about the need for funding to train and examine these people, the State Forest Service is doing this job for them.

Here are just nine examples of interagency cooperation. Many more can be cited not only by me but by others in the audience. With budgetary attitudes what they are, it is possible for an agency to cooperate itself right out of existence. This problem could be overcome by a recognition by the legislative and executive branches that cooperation should be encouraged and recognized when it is time to allot budgets. In fact, I recommend that each agency be required to submit a report to the Governor and the Joint Budget Committee outlining involvement in cooperation with other agencies, if indeed they really want agencies to cooperate.

In summary, while interagency cooperation is as unnatural as any other kind of cooperation, while it can be overdone to the point of collusion, the benefits of cooperation, especially in this period of tight budgets and manpower ceilings, far exceed the disadvantages. A major breakthrough in encouraging cooperation can be realized through the funding process of government. Such recognition plus efforts to develop the team approach to state and national problems will result in effectiveness and efficiency for all agency programs. Solutions to our mutual problems will be better developed. The "spinning of wheels" will be reduced. Recognition that we are all in the same organization will be strengthened — I call that organization the *Department of Taxpayers*.

Cooperation is *my* goal; I know it is the goal of all of us.

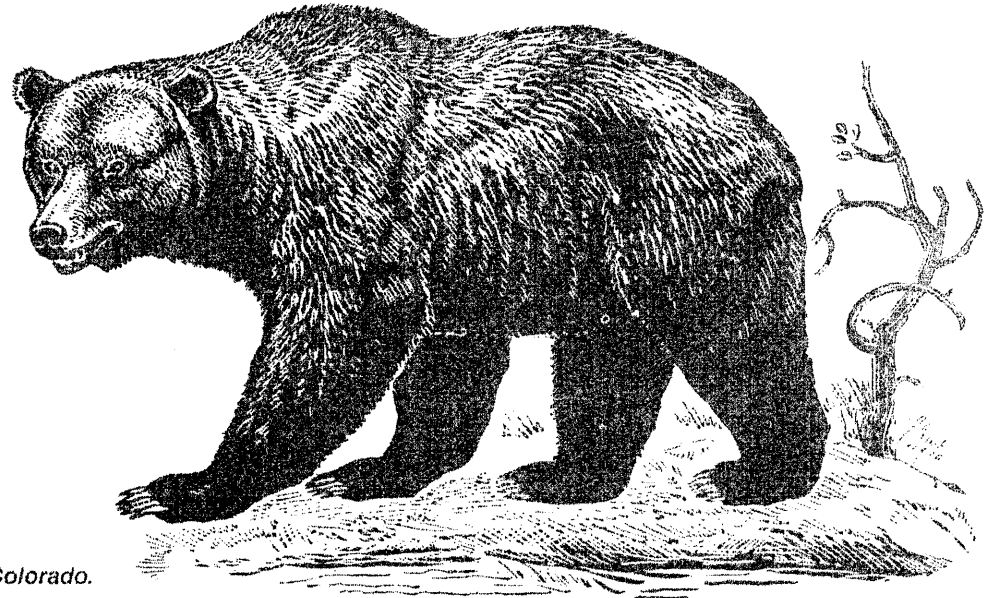


## EDWIN J. MERRICK

*Regional Representative, National Wildlife Federation, Boulder, Colorado.*

*Edwin J. Merrick represents at this conference the National Wildlife Federation; he is the Southwestern Regional Executive covering the states of Arizona, Colorado, New Mexico, Utah, and Wyoming. A graduate of the Massachusetts Institute of Technology and the University of Maryland, he holds a master's degree in mechanical engineering with a minor in business administration. He is also a graduate of the U.S. Department of Agriculture Graduate Program on National Ecology.*

*Mr. Merrick served for sixteen years as an advanced engineering and corporate marketing executive for the General Electric Company in the Aerospace and Defense Group in Philadelphia, Pa., Houston, Texas, and Washington, D. C. He is a member of the eagle workshop of the Edison Electric Institute, the Advisory Boards for the Westwide Water Study, the Nebraska Mid-state Project, and the Western*



*Systems Coordinating Council. Mr. Merrick is also a director and past president of the Virginia Environmental Council, Inc.; a director of the Washington, D. C. chapter of Trout Unlimited; a member of the Human Factors Group of the American Society of Mechanical Engineers; and past president of the Kiwanis Club of Seabrook, Texas.*

*He has served as editor of The Astronautical Review for the American Astronautical Society and as editor of Stresses and Strains, a publication of the Society for Experimental Stress Analysis. He is a member of the British Interplanetary Society, the Aerospace Medical Association, and the Flydressers' Guild of Great Britain. He is also a private pilot, both land and seaplane rated. Mr. Merrick is an active fly fisherman, photographer, archer, and canoeist.*

## HISTORICAL PERSPECTIVE

Let us consider the problem of public understanding and misunderstanding — its roots, its effects, its tenacity. To obtain an historical perspective I recently reviewed a fascinating volume entitled *A History of the Warfare of Science with Theology in Christendom*, by Dr. A. D. White, co-founder and first president of Cornell University. The understanding of wildlife problems, he reported, was given a great boost by St. Augustine, who wrote in his *Commentary on the Book of Genesis*, "Nothing is to be accepted save on the authority of scripture, since greater is that authority than all the powers of the human mind."

An understanding of nature continued to be developed by purely theological methods. Medieval naturalists ignored such approaches as the dissection of animals and continued to develop a knowledge of wildlife by ingenious use of scriptural texts, by research among the lives of saints, and by the plentiful application of metaphysics. From the efforts of men like St. Isidore of Seville and others came, Dr. White recounts, "Such contributions to knowledge as that the basilisk kills serpents by his breath and men by his glance, that the lion when pursued effaces his tracks with the end of his tail, that the pelican nourishes her young with her own blood, and that serpents lay aside their venom before drinking."

Other difficulties developed in understanding the distribution of animals. St. Augustine, writing in *City of God* comments, "How they could find their way to the islands after that flood which destroyed every living thing not preserved in the ark. . . it cannot be denied that the transfer may have been accomplished through the agency of angels, commanded or allowed to perform this labor by God." You will admit, I believe, that this is the most unusual and unlikely role in which our state fish and game directors might be cast.

## MODERN BASES OF MISUNDERSTANDING

Many people in reviewing the examples of medieval theological natural history may conclude that it can't happen here in America today. I am not so sure that it isn't simply a case of the names having been changed, though hardly to protect the innocent. The names of the actors, the events, and the disciplines in the establishment have changed; instead of the divine revelations of the scriptures, we have the guidance of profit and loss statements, the inspiration of cost-benefit analyses, and the proclamations of agency bureaucrats. As before, the crisis of new knowledge about ecology and environment is alarming, unwelcome, and upsetting to the establishment.

Currently the main factors which appear to lead to immediate public misunderstanding of environmental issues lie in noncommunication and nonresponse by administrative agencies and by corporations. For example, it is reported that a large corporation in Colorado has been approached repeatedly by a citizens' group concerned with the corporation's proposed strip-mining activities in Larimer County. Evidently the corporation has thus far elected to ignore the public's concern. Further examples of noncommunication and nonresponse are multitudinous. William Tague, an attorney on the Spy Pond Highway controversy in Massachusetts, writes in the *Berkshire Review*:

*It was as they say a lesson in "Political Reality." The reality is that in the Massachusetts legislature (in 1965, anyway) appeals to reason generally don't work: one must play the politicians at their own game on their own terms, which means he who has the most votes wins. Votes are gotten by threats, maneuvering, and deals, or by arousing an outraged public and forcing the politicians to do right. We chose the latter route.*

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# PROBLEMS IN PUBLIC UNDERSTANDING

by Edwin J. Merrick

## POLARIZATION OF ISSUES

Many people in public office feel that polarization of issues is an unwelcome development. One might properly inquire, "What causes this polarization, and is it indeed universally to be avoided?" Dr. Edward T. Hall in *The Silent Language* expands the effects of polarization into overall communications problems:

*... this bipolar way of analyzing events soon spread to other fields, such as political science and scientific management. The use of these polarized categories made it possible to make distinctions which were important and which had not been made before. Moreover, they were consistent with the American tendency to see things as opposites — in black and white. The ease with which Americans tend to polarize their thoughts about events may make it difficult for them to embrace an approach which employs three categories rather than two.*

At this point it seems clear that we are already subject to a heavy emotional load in general communications, constrained to a great degree by our tendency to characterize people, events, and ideas as good or bad, black or white. As if this were not enough to create serious problems, we have the additional burden of accommodating our own hidden assumptions.

Clearly as individuals we tend to polarize the inputs we receive, tuning in the favorable, tuning out the discordant. But there are further effects caused by external polarization created by other parties. A specific case occurred in Colorado not too long ago dealing with a segment of the White River National Forest. Evidently the Forest Service had contracted timber rights to a lumber company in an area asserted to have wilderness qualities. Local citizens filed suit to have a moratorium declared until Congress could determine whether the purposes of

the wilderness law were being violated by an administrative *fait accompli*. Joseph Sax in *Defending the Environment* writes:

*Government lawyers responded in predictable fashion. No mere citizen could sue to enforce the wilderness act, they said, and tried to persuade the court not to hear the case. Lawsuits of this kind, they gravely intoned, threaten the democratic process. . . further projects planned by the executive branch and funded by the legislature would be frustrated at the whim of any citizen — and — if the plaintiffs review the judgment of the foresters to cut or not to cut public timber, the next step would be review of employment practices, procurement procedures, the location of offices and finally what segment of the public is to be favored.*

Unfortunately we behold here a case of emotional polarization initiated and abetted by government lawyers. Fortunately they lost. Sax observes, "It is not the citizen plaintiff in such cases, but his opponent, who is likely to be undermining the opportunity for open and genuine public debate on uncertain or unresolved issues of public policy."

Polarization, *per se*, is hardly the entire problem. Polarization without communication, without concern, without feedback, without conscience is more likely the dangerous situation. And in this case the public is rarely at fault. More often that not, the corporation and the Federal, state, and local governmental agencies either refuse to communicate, or choose to obfuscate the issues or to select a path of influence and deception to gain their ends. The only way for the public to balance these well-established, well-financed, exploitative forces is increasingly through direct legal confrontation in the courts.

With respect to the role of emotional involvement in environmental issues, I would like to quote William Ruckelshaus, Administrator of U.S. Environmental Protection Agency, who in an address at the recent National Wildlife Federation's annual meeting in Washington, D.C. commented, "When people get mad, they can do wonders."

## THE PUBLIC EXPERTISE

Strangely enough, the majority of bureaucrats seem to hold to the view that the public itself possesses **no** expertise about the public interest. The interesting question is whether this same criticism doesn't apply to the people in the administrative agencies. Joseph Sax notes with respect to the complaints about lack of expert knowledge on the part of the public:

*Moreover, contemporary environmental disputes are not of a kind where technical competence is central; they are essentially controversies over policy choices.*

An unanticipated ally appeared in this quarter when Judge Warren Burger, sitting on the U.S. Court of Appeals after a second hearing on a citizen challenge to a Federal Communication Commission license procedure case which was handled with extreme bias by the FCC, exasperatively concluded, "Consumers are generally among the best vindicators of the public interest."

## THE BROAD PROBLEM OF COMMUNICATING CHANGE

If consumers are the best vindicators of the public interest, then surely the mass media, particularly the newspapers, are the best publicizers of that interest. Change is extraordinarily difficult for most people to accept; yet accept it we must, then adapt; if not, we perish. Dr. Norbert Wiener, father of cybernetics, counsels:

*...we have modified our environment so radically that we must now modify ourselves in order to exist in this new environment.*

The lack of a multidimensional approach is quite evident in many of our recent public works projects. In fact the absence of adequate consideration of ecosystem values has been noted by most perceptive observers. Joseph Sax notes:

*But environmental questions are preeminently problems caused by powerful and well-organized minorities who have managed to manipulate governmental agencies to their own ends.*

## COMMUNICATION WITHIN AND AMONG AGENCIES

The information load for an agency is becoming exceedingly burdensome. In *Science* magazine for 1969, John Platt summed up the effects of modern science in changing human life by showing that in this century we have increased our speed of communication by a factor of  $10^7$  (10 million-fold).

Because of the ever increasing flow of information and the inherent difficulty we humans have in accommodating new information, the problems of our environment are likely to require massive social and economic adjustment before they are ameliorated. Some authorities have estimated that realistic and sincere commercial accommodations of environmental requirements in consumer products and services will probably not occur much before 1990 when the crisis is fully evident to even the least perceptive individuals.

## THE PROBLEMS WITH INSTITUTIONS

Many well-meaning people believe that our problems with the natural environment could be readily solved with another administrative agency. But observers who are presumably objective are disenchanted with such institutions. Dr. Albert Szent-Gyorgi, Nobel Laureate in medicine, in his essay "The Crazy Ape," comments:

*Most of our social institutions now serve mainly their own interests while pretending to serve the purpose for which they were created. This holds equally for armies, churches or governments and means that we are living in a hypocritical world.*

On the other hand, acceptance of public participation in agency matters is advocated by Hendee and Clark in their paper, "Concepts, Assumptions, and Philosophy From Public Involvement." They note:

*The balance of preferences can be considered in light of each interests' numerical and political strength. Finally, the manager can consider resource programs under which demands of the largest number of interests can be satisfied, and conflicts between interests minimized.*

Unfortunately these authors, like many agency managers, seem bent on executing a management philosophy which might be characterized as "minimize the bitching." This approach can and usually does result in a set of fragmentary goals and an unintegrated system. Many of our current problems of wildlife and environment have arisen because of highly specialized, single-valued philosophies of management.

Another undesired result of the piecemeal philosophy followed, perhaps unwittingly, by many public resource managers is what has been called the "salami effect." This strategy has been credited to Matyas Rakose, General Secretary of the Communist Party of Hungary. He explains, "When you want to get hold of a salami which your opponents are strenuously defending, you must not grab at it. You must start carving for yourself a very thin slice. The owner of the salami will hardly notice it, or at least, he will not mind very much. The next day you will carve another slice, then still another. And so little by little, the whole salami will pass into your possession." Anyone who has observed the steady slicing away of our forests and watersheds by ski resort and vacation home developments, etc., is quite familiar with the process.

Obviously the losses of natural resources such as irreplaceable wildlife habitat, endangered species, and scenic wild rivers should be viewed with extreme concern. Dr. Jean Dorst, Curator of the Museum of Natural History in Paris, in *Before Nature Dies*, observes:

*And yet man, if he took the trouble, could rebuild the Parthenon ten times over. But he will never be able to recreate a single canyon, which was formed during thousands of years of patient erosion by sun, wind, and water.*

We need to carry out a reevaluation on a total systems basis, not specialized or focused on some limited goal such as maximum man hours in the field, or maximum pounds of fish harvested. These patterns we have all acquired continue to bring us great grief in our attempts to resolve the massive social, economic, and ecological dilemma in which we find ourselves.

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The strong self-focus we observe in territoriality pervades most of our behavior and can create difficult barriers to the acceptance of genuine long-range planning. Dr. Szent-Gyorgi argues, "With rare exceptions people are really interested in one thing only — themselves. Everybody, by necessity, is the center of his own universe." Yet we must resolve our problems and develop new means, organizations, and philosophies to carry them out. Rational negotiation when the positions of all parties have been objectively explored may offer a desirable path.

## FUTURE PLANNING

Another problem we seem to have as a society is our sensitivity to immediate time. Most Americans are concerned with deadlines and appointments; the future for most citizens lies very close at hand; results must be obtained quickly — in one or two years or, at the most, five or ten. This undue emphasis on the immediacy of results creates a situation in which events which are separated by too much time are difficult for us to connect in our minds. As Dr. Edward T. Hall notes, "This makes it almost impossible for us as a nation to engage in long-range planning."

However, plan, choose, negotiate we must. Lynton Caldwell, author of *Environment*, reasons:

*Modern man has let himself into a game of ecological truth or environmental consequences. If he ignores or misreads the ecological facts of life, he must endure the consequences of existence in an environment that can no longer respond adequately to his needs.*

The facts, indeed, seem to support the thesis that we have a new hierarchical level of problems that will require uncommon creativity and understanding to resolve. In *The Crazy Ape*, Dr. Albert Szent-Gyorgi strongly states his beliefs ". . . that we are still acting like man of thousands of years ago. Through the ages man's main concern was life after death. Today, for the first time, we find we must ask questions about whether there will be life before death."

Today on superficial examination the problems don't appear to be quite that drastic, and hasty rationalizations dismiss the public's concern as emotional, misinformed, misguided, or anarchical in intent. However, many agencies regarded as quite conservative and cautious are beginning to voice similar concern over the continuing degradation of our environment. In a publication of the Arizona Fish and Game Department, the authors argue that wildlife serves as an environmental barometer for mankind and conclude, "By saving wildlife man may save himself."

## CONCLUSION

Today our communications systems have multiplied so rapidly that the healing and ameliorative effects of the passage of time are no longer available. We are, indeed, in the field of ecology, in a state of cultural future shock. It is small wonder that emotionalism is playing such a major and significant role with all participants and forces in environmental activities. Some people recognize intellectually, *most* recognize viscerally, that the stakes in the game are very high. We must convince industry, government, and one another that we must sacrifice some of our present benefits for the sake of tomorrow's children.

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## JOSEPH B. SCHIEFFELIN

*Majority Leader, Colorado State Senate, Denver, Colorado*

*Joe Schieffelin was born in New York City but grew up in Oklahoma and New Mexico. He returned East for his university education, taking his B. A. at Yale in 1950. Later he earned a certificate at the Colorado School of Banking at the University of Colorado in Boulder. He operates his own insurance company at Wheatridge.*

*First elected to the Colorado State Legislature in 1962, Schieffelin served for two years in the Lower House before being elected to the Senate in 1966. In 1973 he was elected Senate Majority Leader. He was for four years Chairman of the Senate Game, Fish and Parks Committee.*



*Joe Schieffelin has been the chief sponsor of land-use legislation in the Colorado Senate; he has advocated as well more specialized environmental legislation such as Colorado's Stream Preservation Act. This year he was one of the sponsors of the bipartisan Senate Bill #377, designed to introduce more effective land-use controls, a controversial measure which has probably received more public attention than any other bill in recent years. Although the bill did not pass, the numerous discussions of it throughout the state have helped as nothing else has to focus public attention upon the problem of land-use control.*

I became interested in the subject of Colorado wildlife a number of years ago, and my interest was increased by my service in the Senate as Chairman of the Game, Fish and Parks Committee for four years. I found during those years, as some of you have found, that our Colorado wildlife is obviously in great danger of depletion, and in some cases extinction, and that we will have to take some definite steps so that it doesn't become extinct or depleted from neglect.

This came to me on a trip that I made by helicopter about five years ago to the Snowmass ski area. The area, at that time, was still being developed. Sitting beside me was a wildlife biologist from the Game, Fish and Parks Division who said to me, "Senator, do you realize, looking down on that wonderful ski development, that it has taken out of production the winter feeding grounds for up to 50 elk and 250 deer?"

I said that I didn't realize that, but what would happen to those animals? He replied, "One of two things can happen. We either open the hunting season this fall so that more of these animals will be harvested by the hunters, or they will move to a neighboring mountain where there are already elk and deer to vie with them for the winter feed that is left. If we have a severe winter there will be a large winterkill, or else the animals that do survive will be in a weakened condition and will be in a sadder shape to combat the predators. So nothing good can happen as far as the wildlife is concerned."

So we have in that one example an almost classic confrontation between the desires of people for one type of recreation in competition with the for one type of recreation, skiing, in competition with the desires of people for another type of recreation, confrontations have become increasingly apparent in the last few years in this state, and a number of people have observed quite correctly that wildlife and people don't mix. The more people you have in a given area, whether on foot, skis, snowmobiles,

boats, or what have you, the more they push the wildlife further and further back. Finally, there's no place for them to go.

We're beginning to realize in this state that we must set up a system to try to put into perspective the value of wildlife as opposed to other values. This challenge is not an easy one to articulate. If we want to control our own destiny in our state, if we want to protect the wildlife herds, and now I'm speaking not just of big game, but small wildlife too, then we must control the use of the land.

Now bear with me for a minute if you will to review a little history of land use. Up until now, in Colorado history, land-use decisions have been made by two parties — the landowner and the local government. The legislation that we will be introducing soon will suggest that there ought to be a third party involved in that decision and that party is the state. We're suggesting that the state has a unique perspective, and I use the term *unique* in its proper meaning. The state is the only level of government or level of anything that has a proper perspective on land use vs. the goals of our people. Not the Federal government, not the local government, but only the state government.

Having said that, I now ask — is the state government at this time prepared to take a role in this type of decision? I believe that it is. I believe that the laws that were passed three years ago and one year ago have led us to the point where the state is now ready.

Now the question comes to mind, "If the state is ready, what is its role, what should be its role?" In answering this question, we legislators have been struggling to come up with a meaningful piece of legislation. The first thing that we have to decide — and indeed probably the most important thing — is the answer to the question, "What is it that Colorado ought to be? What is it that we don't want Colorado to become?" It's very easy to say that we don't want it to become another California, or, specifically, another southern California.

# THE POLITICAL ASPECTS OF WILDLIFE MANAGEMENT

by Joseph B. Schieffelin



But why is that? What is a southern California? The challenge of putting into words what we want Colorado to be is a difficult challenge. I want to read to you, from one of the recent drafts of the proposed bill, how we had at this point articulated these goals because I think they are vital to the future of this state:

*The general assembly finds and declares that the state's population will continue to grow. That the manner in which the various portions of this state are developed, as well as protection of the quality of the environment, in each portion of the state are matters of statewide concern and are definitely in the public interest. That it is desirable and necessary to formulate policy to deal with the increasing number and complexity of problems relating to the further development of this state. After provisions of this type are enacted for the purpose of protecting the general health and welfare of the people of this state, the following policies and goals will be used in all state and local government decision making in the state, regional, and local plans and programs, in the implementation of regional plans, and in the implementation of this law:*

1. *Control of development which may result in harm to life and property in hazard areas and suspected hazard areas. (We then define hazard areas as: avalanche areas, flood plains, fire-prone areas, areas susceptible to slides of land, rock, or mud, unstable land masses. We're suggesting in this law that we define every area of this state where these hazard areas exist, and we are suggesting that no building occur on them.)*

2. *The development of recreational resources which will not deplete those resources for future use. (As you all know, one of the key parts of the economy of this state is the recreation industry. It's made up of many parts. As you also know, last summer the Superintendent of Rocky Mountain National Park had to put restrictions on the use of certain trails during certain months because he felt, and properly so, that these trails were being over-used. He felt that if he didn't put restrictions on them, pretty soon that resource would be ruined. So he had to ration the use of that resource in order to save it for future generations. That same reasoning must be applied statewide.)*
3. *Elimination of air, water, and noise pollution, over-congestion of highways, urban and rural decay, unemployment, inadequacy of low- or moderate- cost housing, and the destruction of wildlife.*

That's a complex statement, but it becomes, hopefully, a goal for this state. A goal by which all land-use decisions will be measured in the future. Following that is our concern for reconciliation and elimination, where possible, of conflicts between incompatible land uses. In other words, we're saying that we're going to set up a formal system in this law, if it passes, of reconciling conflicts in land uses. And the Snowmass experience I related is a conflict. So for the first time we're saying that here's a place where this conflict can be raised and judged, and a decision made.

Moderation of both the amount and rate of population growth in the Front Range — that's a mouthful too, but what we are saying is that we do want to keep the Los Angeles experience from happening in the Front Range in Colorado. We know we cannot achieve this goal if we allow the existing system of land-use control by only the local government and the landowner.

Finally, we must urge stimulation of population growth in rural areas outside the Front Range where local and regional plans call for such growth and development. We would like to adopt the policy wherein we may moderate the growth here and encourage growth in certain other areas of the state. Now I would certainly urge all of you that when the land-use bill is introduced, get a copy and, if you feel so inclined, actively support it. I think you will find in it the kinds of goals that parallel those of this Governor's Conference. I want to tell you that this is going to be a whale of a battle to pass this legislation. I anticipate powerful and well-organized opposition because we are proposing to change the traditional way of doing things in this state for the last 98 years. When you try to change that kind of tradition, you're in for a battle.

Those of you who are close to representatives and senators, I hope you will make your feelings known because I anticipate a close vote on such a bill. If ever we needed citizen support, we're going to need it now.

I read this act not only because I've been involved in writing it, but because I read the results of last November's election in this way. The results I'm talking about are the defeat of the Olympics and the defeat of Representative Aspinall and Senator Allott. I read the results as saying that the people of Colorado want some changes, and they want them to come fast. They want them to come in such a way that the resources, specifically the wildlife resource and what I call the "beauty resource," remain viable in this state. They were afraid that the two gentlemen who were defeated were not doing that and were not moving fast enough. They further felt that the Olympics were a threat to them.

Indeed, if I have read the electorate properly, then that feeling must be submitted to all legislators, and particularly to the ones who almost inherently will be against such a bill. So if ever there was a time for citizen participation, a time to effect what must be a major change in Colorado history and in its future, now is the time. I hope you will support that kind of effort.

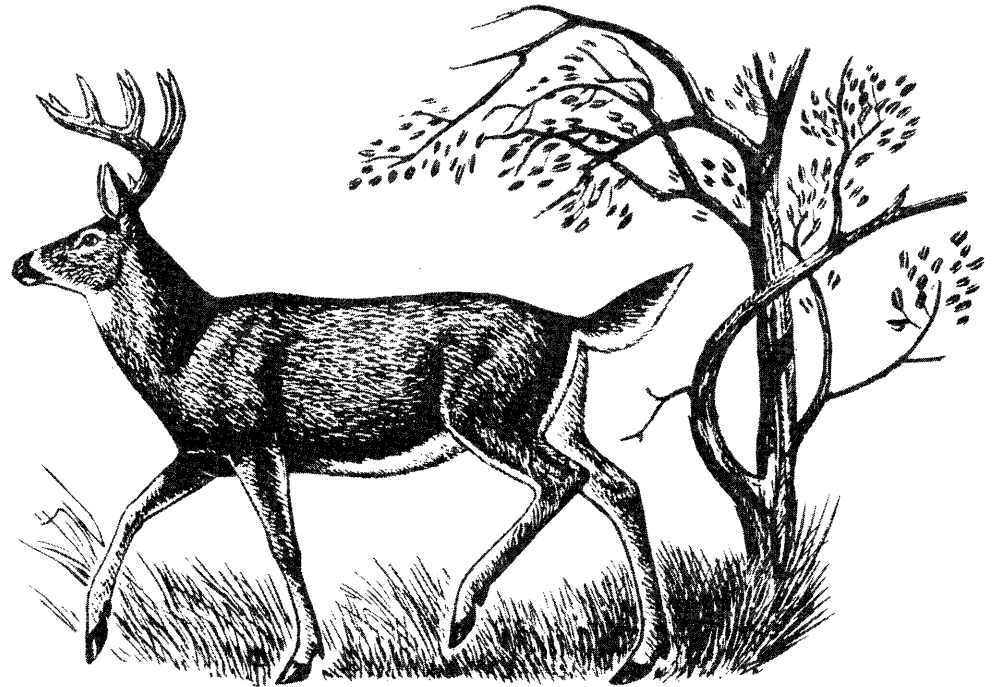
**Discussion following Panel 3:**

**Question:** *How do you foresee a proposed land-use commission would coordinate with the state Wildlife Division?*

**Reply by Senator Schieffelin:** The only effect the land-use commission's activities would have on wildlife would be related to the competition for various proposed land-use activities. Probably the most affected would be big game habitats. The coordination with the Game and Fish personnel, I foresee, would be that of expert witnesses to provide information for decisions.

## LAURENCE R. JAHN

*Vice President, Wildlife Management Institute, Washington, D.C.*



*Laurence R. Jahn, Vice-President of the Wildlife Management Institute, holds three degrees from the University of Wisconsin, two of which are in wildlife ecology. Prior to moving to the Washington office of the Institute in May, 1970, he served for 11 years as its field representative for the North Central states. Preceding that he was a wildlife research biologist for 10 years with the Wisconsin Department of Natural Resources where he was group leader in charge of management research on migratory bird populations and wetland habitats.*

*Mr. Jahn's activities include serving as Chairman of the Department of Interior's Special Advisory Panel to evaluate operations of the Office of Water Resources Research and of the National Mosquito Control — Fish and Wildlife*

*Management Coordination Committee. He is the Institute's representative on the Secretary of the Interior's Waterfowl Advisory Board, the U.S. Geological Survey's Advisory Committee on Water Data for Public Use, the Department of State's Wildlife Advisory Committee, and the national panel to judge the Duck Stamp contest. He received official commendation for his special dedication to advancing sound principles for land use and migratory bird management from the Soil Conservation Society of America (1969) and the Mississippi Flyway Council (1970). In 1971 the American Association for the Advancement of Science elected him to the select fellow membership.*

Is wildlife doomed?

In accepting this speculative topic, I join a host of earlier prophets whose batting averages are considerably below those of the long-range weather forecasters. In the early 1900's, Dr. William T. Hornaday and other notable naturalists foresaw little future — except as zoological and park specimens — for any of the larger North American mammals much beyond the 1930's. In 1912, Edward Howe Forbush, the illustrious and articulate state ornithologist of Massachusetts, wrote off the salvation of all species of shorebirds as a hopeless cause. Similarly, he was certain that the wild turkey, whooping crane, wood duck, and trumpeter swan could persist as wild species no longer than a few more years. "The trumpeting (of the trumpeter swan)," he lamented, "will soon be heard no more. In the ages to come, like the call of the Whooping Crane, it will be locked in the silence of the past."

These earlier prognosticators would enjoy quite a few surprises if they could return from their graves today. More than 60 years after Forbush penned his gloomy observations the population of the whooping crane has quadrupled, and the trumpeter swan has been removed from the endangered species list through intelligent management. All species of shorebirds, with the possible exception of the Eskimo curlew, are still with us, and most in abundant supply. In much of the East, the wood duck surpasses the black duck and mallard in the bags of hunters, and modern sportsmen probably harvest as many or more wild turkeys, deer, elk, and pronghorn antelope as existed in the opening years of the present century.

Where had our prophetic predecessors gone wrong? In the first place, they lacked a firm factual foundation on which to base their projections. And most of them appeared to be mistaking projections for true forecasting or predictions. There is a vast difference. Projections start with the basic assumption that existing trends will last indefinitely, or at least for long periods of time. True prediction,

however, must take into consideration a wide range of constantly changing variables, and perhaps in no field are the variables as complex and of a broader scope than those influencing trends in wildlife populations. Nearly everything that man does to the landscape and everything that occurs in nature affects wildlife for good or for bad, and what may harm one species may benefit another.

In addition to a scarcity of precise information on individual species, subspecies, and manageable populations, the crystal balls of early prophets apparently did not disclose the initiation, growth, and success of professional wildlife management, buttressed with broad public support, which occurred over the past four decades. More intensive management of wildlife populations and their habitats is clearly revealed in my crystal ball and calls for action to benefit both consumptive and nonconsumptive users of wildlife.

What is a bit hazy are the land- and water-use changes of the future that will determine the distribution, abundance, and composition of wildlife populations. Here I may join the prophets rather than the predictors, largely because evolving changes in urban areas, agricultural production, range management, and forests are undergoing drastic modifications to meet expanding demands for food, fiber, recreation, and environmental quality.

The future of our wildlife is inextricably involved with the needs and desires of people and the future of the American landscape. Man has become a geological force second only to climate in shaping the destinies of the other living creatures with which he shares this planet. He is the only creature that can and does literally move mountains, create vast lakes, reroute and reshape rivers, convert forests into grasslands and grasslands into forests, and make the desert bloom with crops. All of these massive man-made changes influence the distribution, abundance, and composition of wildlife communities.

Terrestrial wildlife, under existing conditions, is a byproduct of human activity as much as it is a product of nature. But man — as another animal, in the zoological sense — is a serious competitor of wildlife for living space. The continuous mushroom growth of the human population over the past two centuries has created some of the basic problems facing wildlife today. We can expect continued population growth at least to the end of the present century, but according to demographers, at a rate considerably lower than that which existed during the last three decades. Stability is anticipated not long after the year 2000, barring some incredible cataclysm like World War III.

This means that human beings will continue to usurp wildlife habitat for urban, suburban, and

# IS WILDLIFE DOOMED?

by Laurence R. Jahn

industrial development for at least the next half century, but again, at a reduced rate from which we have seen in the years since World War II. Urban expansion undoubtedly will continue at a rapid pace, but the cities of the future should be much more attractive than those of today. Urban planning and rapid transit are still in their infancy, but, as they mature and are applied more widely, the city residence, with its potential convenience and comfort, is certain to attract many who today have fled to the suburbs. Moreover, if the high-rise apartment houses and condominiums that push above the old skylines of every major city today are indeed a foreshadow of the future, we shall be able to house more people on smaller acreages than our suburban sprawls are occupying today. This will be a plus for maintaining wildlife habitat. But whether residents in their neatly stacked living quarters will be as interested in wildlife as suburbanites, such as those who feed birds, remains to be determined. I believe they will be interested in wildlife and the out-of-doors. Current traffic jams when urban and suburban residents now leave for or return from a weekend or long holiday are testimony to their desire to maintain contact with nature.

On the negative side, there is another trend in housing that may negate at least part of the gains that will be realized if the human population continues to concentrate in urban centers. This is the boom in second homes, most of them in areas previously devoid of development and inhabited largely by wildlife. With increased prosperity, more leisure time, and excellent transportation facilities available to the American public, there will be a continued proliferation of second home development well into the foreseeable future. Additionally, there will be a great expansion of related facilities, such as roads, chair lifts, ski runs, bathing beaches, and trailer-camper parks in areas where none exist today. If the human activities and associated disturbances leave the landscape ecosystems functioning and are restricted only to periodic seasonal occurrences, many forms of wildlife will continue to co-occupy the

habitats, especially during those periods when disturbances are minimal or people are absent. Colorado's winter skiing demands could be compatible with wildlife habitat needs if the skiers and their developments stick to the upper slopes, do not stimulate erosion problems, and avoid winter ranges where wildlife, particularly the large ungulates, concentrate.

It is unlikely that the trend toward larger and more intensively managed farms will be checked. Large-scale mechanized agriculture is as efficient as it is profitable. If anything, more croplands will be larger than they are today and with little or no more diversity of cover types. However, I foresee an early and radical change in the conflicting and chaotic farm policies that our government has been and is following. A rapidly urbanizing American public is already beginning to rebel against having its tax dollars misused on contradictory farm programs, many of which destroy public values associated with the resource base for the benefit of a relative few.

I refer specifically to the stream modification programs of the Soil Conservation Service of the Department of Agriculture and also of the Corps of Engineers, Bureau of Reclamation, and Tennessee Valley Authority. Strong opposition to the general use of the highly questionable practice of channelization already is evident, and I believe that it will grow in strength within the future as more of the public becomes aware that their tax money is being used to degrade the natural environment. The engineers justify stream channelization projects primarily on the basis of flood control. Sometime in the near future, I expect floodplain zoning and other nonstructural alternatives, especially in rural and suburban areas, to replace most engineering structural approaches to flood problems.

Only last January, Secretary of the Interior Morton approved a \$959,000 grant for acquisition of 210 acres of land along South Dakota's Rapid Creek floodplain, the site of a disastrous flood last June. The tract will be maintained primarily as a natural area with little structural development. Only a few years ago, the approach would have been to build dams and levees, channelize the stream, rebuild the residences on the floodplain and "wait" for the next flood to sweep them away. In sharp contrast to this outmoded approach is the plan for a floodplain park to replace proposed channelization of the South Platte River here in Colorado using money originally authorized for channel construction. This is commendable progress of the type needed in many more river valleys.

The Corps of Engineers, the oldest and most engineering oriented of the Federal construction agencies, in recent years has become one of the strongest proponents of floodplain zoning. This, in conjunction with the long overdue nationwide effort of the U.S. Water Resources Council to improve management of floodplains and shorelands, signals the beginning of an about-face in our traditional approaches to flood problems. Now the volumes of rhetoric must be reinforced with a multitude of constructive actions on the land. Such efforts should bring pluses for wildlife, as well as heavily burdened taxpayers. But concerted efforts of wildlife managers, as well as all other resource managers, elected officials, and citizens will be required to bring about needed program changes and to register accomplishments.

I foresee, too, the injection of more common sense into our national approach to surplus crops. It may take threat of another Dust Bowl disaster or the loss of stream, lake, and reservoir values to accelerated sedimentation to show the danger of leaving vast acreages of the soil unprotected from rain and wind for months at a time. Or public pressure may force Congress to back away from its present insistence that land retirement contracts be written on an annual basis. Either way, the benefits to wildlife

in the corn and grain belts will be enormous. Dahlgren estimated that the Soil Bank added 4 to 5 million pheasants each year to South Dakota's wildlife population in the late 50's and early 60's. Waterfowl, sharp-tailed grouse, prairie chickens, Hungarian partridges, rabbits, and dozens of song birds all depend on grassy and herbaceous cover to raise their young.

I expect to see much closer cooperation and coordination between wildlife managers and foresters in planning and programming timber cutting and between wildlife specialists and range managers in brush clearing and reseeding operations. A large proportion of these activities are underwritten by public funds, and the hard-pressed taxpayers are beginning to insist that more public benefits accrue from investments of their money. Abundant wildlife is one dividend that all can appreciate, and it is easily achieved in forests and on rangelands with minor adjustments in current programs. The U.S. Forest Service, even with limited funds dedicated to wildlife management, has demonstrated this in its multiple use program for many years, and several of the larger forest products corporations have progressive wildlife management programs. These relatively new programs are commendable, but they must be planned and applied in more places. According to my crystal ball they will be if working arrangements between wildlifers, foresters, administrators, and citizens are strengthened as needed.

I suspect that the current bitter controversy over clearcutting will resolve into a compromise that will greatly benefit wildlife, including deer, elk, and other larger forest mammals, as well as many species of smaller wildlife. Clearcutting is the most efficient method of growing some species of commercial trees and the only practical method of producing others. It is, however, aesthetically offensive, particularly immediately after harvest and especially when applied on a large scale. And, as used in some areas, it is a source of erosion and damaging to streams and water supplies. The Forest Service is already revising its approach to timber management, and I believe that the result will be a policy of clearcutting in smaller blocks widely distributed with a general prohibition against cutting strips of trees, except on a very selective basis, near roads and stream banks and in small patches on steep or erodible slopes and fragile soils.

I expect to see a wider application of prescribed burning in forest management in future years. Fire was a natural element in the forest for thousands of years before the white man arrived on the scene, and its exclusion rather than its application causes an unnatural and often dangerous situation. After years of rigidly adhering to the Smokey Bear approach, foresters are beginning to realize that prescribed burning can eliminate the buildup of inflammable forest debris and encourage the germination of seeds of a number of commercially valuable tree species. Burned areas also develop an understory of shrubs, forbs, and berry canes that provide excellent browse and food for a wide variety of wildlife.

The lesson on handling fire is clear. Indiscriminate, uncontrolled forest fires can damage property and threaten lives. Smokey Bear helped to stimulate the public to seek control over these and other types of wild fires. But the idea that all fires are bad has been oversold. The immediate task is to achieve a greater use of prescribed burning, consistent with anti-air pollution requirements, to

meet specified management objectives in delineated areas. This will be accomplished if knowledgeable people work closely with interested citizens. Wildlife will benefit from these needed changes in policy.

I believe that more public funds will be devoted to management of wildlife in national forests and on the other public lands in future years. The Bureau of Land Management, which administers nearly 700 million acres of public land — more than 8 million in Colorado alone — has an ongoing program for endangered species. Bills to provide the Bureau of Land Management with an organic act that would give the agency more management authority on the lands it administers failed to pass in the last Congress, but have a good chance for enactment in the near future. This undoubtedly will be followed by better funding for wildlife and other natural resources programs for the public domain.

With the steadily increasing recreational use of public lands, wildlife production will assume increased importance in national forests and the public domain. In some areas, especially those nearer the larger metropolitan centers, recreation and wildlife may outstrip forestry and other economic uses in importance. This point is now being reached in some slow-growing forests in the north central states. Timber, like agricultural crops, should be produced where the individual tree species do best.

More people, including foresters, wildlifers, government officials, and citizens must recognize wildlife as an important value of forested lands. Foresters, economists, and business leaders will come to appreciate that wildlife produces an annual crop, part of which can be harvested yearly. A wildlife population has a considerably shorter rotation period than a forest. An elk, deer, moose, or some other trophy animal reaches harvestable age in five or less years. This means that on forested lands a number of wildlife population rotations can be achieved within the same period that it takes to obtain only one rotation of trees. Through careful planning and conscientious management forested lands can be made to yield these additional recreational, social, and economic values. My crystal ball says that resource managers will move forward to plan for greater outputs of wildlife values from forested lands.

86 The creation of wilderness areas under the Wilderness Act of 1964 almost certainly assures the perpetuation of some wilderness wildlife species whose long-range future might otherwise be clouded. These include the grizzly bear, moose, mountain goat, and wolverine, among others. The larger wilderness areas also are lands where the large predators, like the cougar, timber wolf, and coyote, can live out their lives without serious conflict with man.

What many people must come to understand is that in these unique areas it is likely that man will, in many instances, have to refrain from interfering with nature's ways. Already land managers are permitting some wild fires to run their course when hazards and risks are low, thereby encouraging early successional stages of vegetation and adapted animals to thrive. Even more of nature's manipulations, in such forms as insect and disease outbreaks, may be needed in the future to perpetuate some forms of wilderness wildlife.

A recent change of public attitude toward predators is stimulating widespread debate and encouraging improved management programs. The American public has suddenly become aware that animals which for centuries were mislabeled pests and varmints have a place and vital function in ecological communities. Fifteen years ago, the timber wolf was all but universally regarded as a savage, worthless beast, an economic hazard, and a potential danger to the life and limb of unwary campers. Today the pendulum has swung the other way. Much of the public press and other media are depicting the wolf as a cuddly puppy dog with subhuman intelligence that protects the forest from mice and rabbits and disdains meals of venison, pork, or mutton. The truth, of course, lies between the two extremes. But special societies have been formed for the purpose of promoting wolf conservation, and the remnant populations in Minnesota and Alaska are the object of new Federal and state management programs being designed for their protection and expansion.

The long-entrenched bounty system has all but crumbled and the cougar has been upgraded to a game animal under most western state laws. In this category the lion receives protection during the reproductive season and is managed as a trophy member of the wildlife community. Poisons, like 1080, with the potential for killing a wide range of wildlife beyond the target species have been banned or seriously curtailed, and the national predator control program is being retailored to avoid some of the disastrous effects of the past, while still affording protection to the farmer or rancher from depredations by individual renegade animals.

This is as it should be. While predatory and pest species must be controlled in local problem situations where they threaten or seriously impair human health or welfare, blanket condemnation of any species and programs aimed at extermination should not and, in my crystal ball, will not be tolerated any longer by the American public.

Here in the West, predator control is a matter of considerable controversy. Out of this debate should evolve control procedures that are ecologically sound and tailored to individual renegade animals in specific problem situations. You are fortunate in Colorado to have a dependable Wildlife Commission that has achieved a national reputation in conservation circles for its courage and forthrightness in meeting the controversy head on with objective information and in-depth understanding of both wildlife and people's needs.

The suddenly emerging environmental awareness that the public has demonstrated in the past few years is unlikely to wind down in the future. It appears more likely that it will accelerate as environmental education expands for adults as well as children and as more, and increasingly mobile, Americans take to the roads and highways. This means continued and increased pressure on our elected and appointed officials to correct long-standing abuses of the nation's natural resources. In time some of these concerned young people will be our elected officials and will be instrumental in correcting our current abuses of natural resources.

Continuous concern and pressure from citizens has for the first time in history provided pollution laws with teeth instead of only soft gums. We have Federal, and an increasing number of state, environmental agencies, like the Environmental Protection Agency, with backbones and guts, and we are obtaining appropriations to clean up messes that have accumulated for centuries. The volumes of the

more hazardous poisons that industry has been spewing into our air and waters are being eliminated or greatly reduced, as are DDT and other persistent agricultural pesticides. Much progress is already evident in the treatment of municipal and industrial wastes. More gains are anticipated as the newly established goals for cleaning up and preventing pollution are met in the 1970's and 1980's, and if and when the human population achieves stability — possibly shortly after the year 2000.

The task of cleaning up the waters of America are herculean, but every advance on this front will be accompanied by benefits to wildlife. The elimination of some of the more hazardous and persistent agricultural chemicals even gives a glimmer of hope that some species now endangered may escape what seemed to be inevitable extinction. In 1972, for the first time in a number of years, the brown pelicans on California's coast produced a number of chicks. Another colony, established by introducing birds from Florida to Louisiana, appears to be maintaining itself. The species virtually disappeared on the Gulf of Mexico during the 1960's. The eastern peregrine may be too far gone to save, but the reduction of poisonous substances in the environment will benefit the other species and sub-species of the falcons, the bald eagle, osprey, and a number of other species whose decline has been associated with pesticide ingestion.

The acreage of aquatic wildlife habitat that can be restored to productivity by the application of antipollution measures is almost limitless. To what degree the restoration takes place will depend upon the will of citizens to see it accomplished.

The courts continue to issue decisions that aid in avoiding damage to the environment, maintaining the diversity of the landscape, and incorporating ecological soundness in economic developments. The Supreme Court in Wisconsin recently upheld the validity and constitutionality of the state's wetlands protection statutes. The police power of the state has been applied through zoning regulations administered and enforced jointly by the Department of Natural Resources and the counties to maintain wetlands, shorelands, and public waters of the state. Shorelands are defined as lands within 1,000 feet of the normal highwater elevation of navigable lakes, ponds, or flowages and 300 feet from navigable rivers and streams or the landward side of the floodplain, whichever distance is greater.

The precedent ruling established that the wetlands filling restrictions do not severely limit the use or depreciate the value of the land, do not constitute a taking of private lands without compensation, are not unconstitutional, and are a proper use of the police power of the state in managing its resources. The judge stated, "An owner of land has no absolute and unlimited right to change the essential natural character of his land so as to use it for a purpose for which it was unsuited in its natural state and which injures the rights of others. . . . The changing of wetlands and swamps to the damage of the general public by upsetting the natural environment and the natural relationship is not a reasonable use of that land which is protected. . . ."

That landmark decision (1) extends the meaning of the "public trust duty" of a state, (2) revises the old claim of absolute ownership of land, (3) notifies every landowner in the state that his use of the land depends on his not using it to the detriment of the general public and public rights, and (4) promotes

the continued functioning of nature's ecosystems. Other states should examine these findings and use them to develop guidelines for maintaining the ecological integrity of their lands and waters and prevent further rapes of their landscape. Generations using the land now and those still unborn would benefit, as would our fellow living creatures.

My crystal ball is absolutely clear on one point. Most states and the Federal government must realign and strengthen their laws, regulations, and guidelines for using land and water resources. The entire system currently used by all Federal agencies to evaluate proposed water development projects for dams, canals, and other physical modifications of aquatic areas is undergoing careful scrutiny. New policies, standards, and criteria proposed by the U.S. Water Resources Council and the National Water Commission are thoroughly supported by conservationists and others. They would assist in improving outdated procedures used to determine the feasibility of water development projects and aid in determining which ones to authorize and construct.

These proposed changes of policies and procedures are crucial. They deserve careful attention by every elected official, resource manager, and citizen. The open economic competition which has governed the use of land and water and led to sacrifices of many values — including fish and wildlife — important to society must be bridled. Colorado could continue its leadership role in resource management by moving forward with this critical activity immediately.

Wildlife, in the past, has been of vital interest to a comparatively small segment of the American public — primarily the hunters and a coterie of nonhunting nature enthusiasts. This is reflected in the fact that practically all funds available for wildlife conservation in the United States have been received, directly or indirectly, from the pockets of sportsmen. The long-standing hunting license fee and the 11 percent manufacturers' excise tax imposed in 1937 on sporting arms and ammunition,



through the Federal Aid in Wildlife Restoration Act, have been the financial mainstays of the wildlife restoration activities in this country. Only since 1970 have the receipts from the long-standing 10 percent tax on handguns been dedicated to this effort. This firm base of financial support was further enlarged in 1972 when an 11 percent tax was imposed on archery gear to further strengthen wildlife management programs. A similar tax is anticipated on component reloading parts used in the shooting sports.

Public interest in wildlife — in part due to the influence of television, in part to a growing public interest in the total environment, and in part because of the impetus of endangered species programs — has broadened greatly in the past decade. And the public is demanding more comprehensive wildlife programs that embrace both hunted and nonhunted species. Several state wildlife agencies have launched programs designed to benefit endangered and other nongame species, but the burden for much of their support falls on the fisherman and hunter. Somewhere along the line, the nonhunting public that benefits from these programs must help pick up the bill. Whether this takes the form of general appropriations to the wildlife agency or special earmarked taxes on luxury or recreational items, this also is the trend of the future. A recent contributor to the *Atlantic Naturalist* wrote:

*To speak and act effectively, birders may have to do what hunters and anglers have done for years; pay a substantial part of the cost of protecting the natural resources they cherish. Perhaps the Pittman-Robertson tax should be extended to opticals and to birding guides and to waterproof clothing. Perhaps a special type of Golden Eagle pass is needed — one which would be, in effect, a birdwatching license.*

Those who love the outdoors, the wildlife, fish, trees, and well-managed areas, must and will, in my view, finance, better organize, and advance the use of sounder guidelines for using lands, waters, and other resources. The only question remaining to be answered is, when will more of these desirable changes be incorporated into more action programs? The needs and potentials exist. Citizens, resource managers, and elected officials must meet those needs and convert those potentials into accomplishments.

Until now, the potential of the wildlife professionals to produce wildlife has scarcely been tested, except on a few restricted areas, even though glowing successes can be identified with a number of prominent species and on some particular management areas. In future years, I expect to see much more intensive wildlife management over broader areas than has been applied in the past. The sustained yields of big game animals and the dramatic increases of the wild turkey and Canada goose populations in a number of states in recent years are examples of what can be accomplished when wildlife management is applied intelligently.

It is unfortunate that the current anti-hunting debate is distracting attention from pursuit of scientific management. Assistant Secretary of the Department of the Interior Nathaniel P. Reed stated that the issue of anti-hunting is a false one because it sidetracks people from attacking the real threats to our native wildlife. In considering what is humane in the treatment of animals, is it worse to cleanly kill a selected duck or deer with a gun, or to cover it with oil, drain its marshes so it cannot reproduce or eat, or subtly poison it with pesticides or other chemicals over a period of years? The real danger is that, while those interested in wildlife debate hunting, those for

“progress at all costs” will continue merrily on their path of sending needed habitats and the wildlife they support into oblivion. Strange though it may seem at first glance, my crystal ball indicates that anti-hunting interests will in time join with other long-standing interests and support efforts to maintain, restore, and create habitat for wildlife. Hunters and others must and will continue to support the current demand to upgrade, where necessary, their ethics and performance to insure humane treatment of individual animals and to improve the quality of the hunting experience.

In spite of the current agitation of anti-hunting groups, I expect hunting to persist as a part of the American outdoor scene and tradition. But I do foresee major changes in the present situation. Hunters most certainly will be subject to more stringent requirements and regulations to control hunting pressure on identified game stocks and distribute hunting pressure more equitably, both by time and place. Colorado pioneered in subdividing the state into management units for handling big game populations and hunting pressure. Many other states have adopted this exemplary system. Only one or two states, however, have progressed very far in redistributing hunting pressure by permitting half of its hunters to pursue their sport in Season A while the other half is confined to Season B. The great need for this may not now be apparent to many, but it is a mechanism that is needed to curtail excessive hunting pressure and upgrade the quality of the hunting experience.

Minnesota's experiences in 1972 with a 30-day deer season in which hunters had a choice of hunting any three consecutive days in the first 15 days of November or any five consecutive days in the last half of the month confirm what predictions had disclosed years ago. Hunters had more choices in which to select hunting days to fit their personal schedules, hunting pressure was spread out about equally for participants afield in the 30 days rather than being concentrated in the traditional two- to

nine-day period, and the quality of the hunting experience was reported by hunters to be much better than under more crowded conditions.

This Minnesota system for accommodating hunters and upgrading the quality of the outdoor experience holds promise for handling increasing numbers of nonresident, as well as resident, hunters. As long as total wildlife harvests are regulated to maintain optimum-sized populations and hunting pressure is distributed to avoid degrading and crowded conditions, demands for recreational opportunities should be met.

More of these innovations are needed to benefit people and wildlife. My crystal ball shows that sex and age regulations will be used to a greater degree to adjust herd and flock compositions, especially to restore or bring wildlife populations to the carrying capacities of their habitats. As you people in Colorado have demonstrated so beautifully, an antlered or buck-only season can help rebuild a low deer or elk population quickly. But both males and a specified number of females must be harvested to keep thriving populations from growing too large and damaging both their habitats and the health of individual animals. Intensive harvest management is required to prevent excessive harvests and to maintain optimum relationships between wildlife populations and their habitats. The harvest of wildlife through hunting is critical in maintaining these desirable relationships.

The screening of hunters to eliminate those with dangerous and destructive tendencies will become more intensive, and we will out of necessity continue to move toward the European system, where hunters are not permitted to enter the field until they have undergone intensive training in firearms safety, outdoor manners, wildlife identification, wildlife management procedures, and game laws. Additional steps to curtail and eventually to eliminate the activities of the road hunter, the indiscriminate shooter, and other outdoor misfits are in the offing and long overdue. The recently adopted regulation of

the Colorado Wildlife Commission that bans shooting along highways and adjacent roadsides is a commendable example of such action. The immediate need is to have each hunter improve his knowledge, skills, and ethics, understand how he and wildlife function within the different ecosystems or units of the landscape he enjoys, and carry out his activities in a responsible manner. Hunters and fishermen are unique in maintaining close contact with nature. They can continue to help read the landscape and use wildlife as the barometer to alert all of us of resource management problems and needs.

In general, so long as America remains a decent place for human beings, I am optimistic that wildlife will persist in substantial supplies in the future. There will, almost inevitably, be reverses in dealing with some species, particularly those which are now or will become endangered in the future. The California condor population is in a precarious situation. Since there is little chance of expanding the habitat on which it depends, only minor adverse influences might topple it over the brink of extinction. But for those species, like the American alligator, wolf, and grizzly bear, for which substantial breeding stocks persist and for which adequate unstocked habitat is available, the future is much brighter.

With more intensive management such species can thrive in the future if their habitats are maintained and populations are managed wisely. The serious question is whether integrated Federal-state-local programs can be designed and executed to accomplish specific objectives before people in their uncoordinated multitude of activities unknowingly and knowingly usurp the living space required for wildlife to reproduce and survive.

Our game supplies, especially under more intensive management, can thrive even under more heavily regulated hunting pressure than they absorb today. The reproductive and recuperative powers of wildlife populations which have adequate protection during the breeding season and access to good habitat is almost unbelievable.

The one gray spot on the horizon is in the future of some species of waterfowl, notably the canvasback and redhead, which are already receiving special consideration under Federal and state laws. To improve population management we must strengthen hunting regulations and law enforcement throughout the North American range of these wide ranging species. Preservation of their pothole breeding habitat must be accelerated. Overall management on an international basis must be made more effective. Therein lies the fate of our cherished waterfowl and other migratory wildlife.

With all of the many variables and their constantly shifting and changing influences on wildlife populations, some species now in abundance may dwindle while others now considered endangered may be made to thrive through intensive management. It has happened in the past, and there is every likelihood that the ups and downs of populations of individual species that comprise our total wildlife resource — influenced as they are by human uses of the lands and waters — will continue in the future. I am confident, however, that in the overall picture the intelligence of the American people will prevail in preserving an environment in which human beings and wildlife can exist together in prosperity and health.

In closing, let me make one solid unequivocal prediction totally devoid of ifs, buts, or other qualifications. There will be change. Our own individual hiking trails, quiet bird watching areas, and deer hunting stands, as we know them today, will be different tomorrow. Our challenge, as citizens, resource managers, or elected public officials, is to understand and anticipate the changes and provide guidelines to insure that people's activities are in harmony with nature's requirements. If we accomplish this, wildlife will survive.

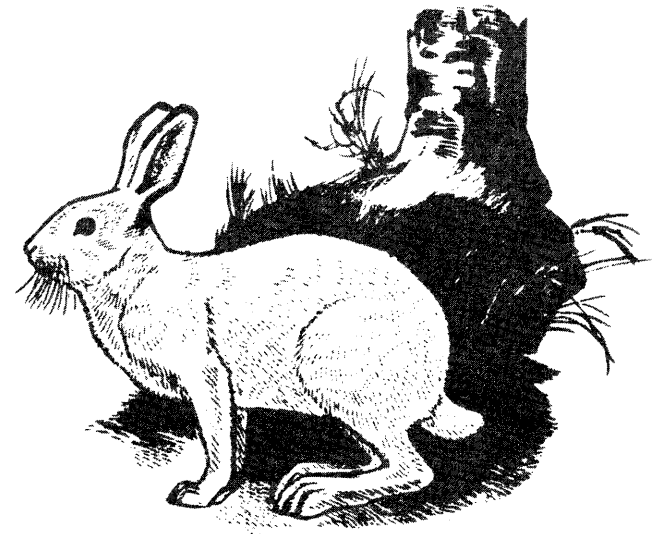
## RICHARD N. DENNEY

*Wildlife Consultant, American Humane Association, Denver, Colorado*

*For the past two years Richard Denney has served as Wildlife Consultant to The American Humane Association, whose national headquarters are in Denver, Colorado. Before that he was in charge of wildlife investigations for the Kenya Range Management Project of the Food and Agriculture Organization of the United Nations with headquarters in Nairobi for four years.*

*Before going to East Africa, Mr. Denney worked 16½ years for the Colorado Game, Fish and Parks Department as Assistant State Game Manager. He was in charge of big game research and range investigations at the time of his departure.*

*Mr. Denney spent two years at the University of Arizona before World War II; he received a B.S. in wildlife management and a Master of Science in wildlife from Colorado A & M College (now Colorado State University) after military service.*



*The first president of the Colorado Chapter of The Wildlife Society, Mr. Denney is now serving a second term. He was awarded the Wildlife Conservation Award for 1965 by the National and Colorado Wildlife Federations and the Sears-Roebuck Foundation.*

*Recently he has been investigating alternate harvest methods for the northern fur seal and marine mammal legislation; he is also assisting in developing the United States' position on the IUCN and Kenya proposals for the international convention for the control of trade in endangered species of wildlife.*

This is a compound question, one not to be answered with one of a number of simple alternative choices. First of all, will we be able to hunt target species of wildlife from the biological standpoint — that is, will there be enough animals remaining to allow a harvest, and will there be the opportunity to take them in terms of land ownership and open spaces? If the answers to these provisional questions are in the affirmative, will the moral guidelines of society allow one to indulge in sport hunting as we know it today? The answer to this question may well be based not on biological supplies and demands in the near future, but on moral grounds and grounds of public acceptance.

#### **ECOLOGY AND HUNTING**

From the biological standpoint, the question is can man and wildlife maintain their present precarious existence under threat of nuclear annihilation and the human population explosion and in the face of the exceedingly complex and unstable ecological conditions man has created during the last 50 years? If so, the question may resolve itself to a merely philosophical one. However, the biological aspect may well be influenced adversely by opponents to sport hunting if they succeed in obtaining anti-hunting legislation based on moral issues. At present there is a group of organizations which feels that hunting and other forms of wildlife resource management should be terminated at once, and that nature be allowed to take its course. Aside from the ethics involved, the very serious ecological consequences of such a reversal of policy must be considered.

The United States has developed a large contingent of instant ecologists who, because of recently acquired environmental awareness engendered by modern affluence, increased leisure time, higher educational opportunities, and the development of more sophisticated mass media, are largely uncompromising protectionists.

Since these preservationists feel that sport hunting is unjustifiable under any circumstances, they are in direct opposition to the approximately 20 percent of the American adult male population who hunt (U.S. Department of Interior, 1972). Much of the anti-hunting sentiment is voiced by organizations well-funded by solicitations to the general public based on emotional photographic and verbal appeals. As recently as September, 1972, Leonard (1972) felt unaware of any substantial anti-hunting movement in the United States. But the abundance of recent literature blaming many of the environmental ills, particularly wildlife problems, on field sportsmen, suggests that the sentiment promoted by Schweitzer's "reverence for life," and supported to the extreme by Krutch (1957) and Butcher (1955), has indeed become a movement (Toker, 1972; Gilbert, 1972; Harvey, 1972; Reddall, 1972; Humane Society of the United States, 1971, 1972; Friends of Animals, 1972; Satran, 1972; Buyukmihci, 1971; Colton, 1972; Maher, 1968; Animal Care and Welfare, Inc., 1972; Owings, 1972; and Braddock, 1972).

This sentiment has been more than evident in the anti-management type of marine mammal legislation supported by groups like these in 1971

and 1972, the endorsement of national legislation in 1972 to prohibit hunting on public lands, and the drafting of anti-hunting legislation for the 93rd Congress by Friends of Animals' satellite Committee for Humane Legislation (Herrington, 1972). The late Dr. Ralph MacMullan, addressing the the 62nd Annual Meeting of the International Association of Game, Fish and Conservation Commissioners as its president, cited the anti-hunting movement as one of the most serious problems facing wildlife management today.

On what are these dedicated and well-intentioned anti-hunters basing their attitudes and judgements? Apparently they are not fully informed on the actual physical and ecological data. There is a difference in interpretation of facts and definitions, and there are questions involving the ethics of killing wildlife. Philosophical opposition to hunting has been an established element of intellectual life for centuries. Although killing animals for the meat industry and for scientific research can be satisfactorily rationalized for all but a few, hunting for sport is often regarded as morally indefensible. The need to defend hunting must be examined through an analysis of the arguments against it.

# **TO HUNT OR NOT TO HUNT**

by Richard N. Denney

## WHAT IS HUNTING?

Let us now consider the question, what is hunting? For over 99 percent of the two million years that cultural man has been on this planet, he has lived as a hunter-gatherer, and over 90 percent of his number have followed this way of life, which, to date, has been the most successful and persistent adaptation man has achieved (Lee and DeVore, 1968). *Webster's Third New International Dictionary* (1969) defines hunting as the act, practice, or an instance of following, searching for, chasing, taking or killing game or wild animals for the purpose and with the means of capturing or killing; the pursuit of game or prey for food or in sport.

"Sport" is defined as something that is a source of pleasant diversion, a pleasing or amusing pastime or activity, recreation; a "sportsman" is a person who is active in sports, as one who engages in the sports of the field, especially in hunting and fishing; and "sportsmanship's" definition includes skill or an instance of skillful performance in some sport. Ortega (1972), in his philosophical discourse published in 1942, indicated that a sport is the effort which is carried out for the pleasure that it gives in itself, and that when an activity becomes a sport, the hierarchy of its values becomes inverted.

In utilitarian hunting the true purpose of the hunter is the death of the animal; but to the sportsman, not the death of the game, but everything that he had to do to achieve that death is the hunt; and what was before only a means to an end has become the end in itself. Killing of the animal is essential as the natural end of the hunt and is the goal of hunting itself, not of the hunter. However, Ortega maintains that it is not essential to the hunt that it be successful; and, on the contrary, if the hunter's efforts were always and inevitably successful, it would not be the effort we call hunting — it would be something else.

Sport hunting is attacked on both the biological and the philosophical fronts. Butcher (1955) typifies many of the biological arguments against hunting in attributing the decline in wildlife to gunning and the destruction of habitat as the chief causes, but emphasizes the former when he cautions that the pressure for sport hunting is so great and so rapidly increasing that target species will soon become extinct. His logic escapes me when he states:

*With such human activities as cutting of forests, agriculture, urban development and inundation by dam-building wiping out more and more wildlife habitat, it must be clear to any thinking person that we shall not long continue to have many of the wonderful wild creatures unless we cut down the present trend toward sport hunting.*

The opponents of hunting seem to be unrealistic and inconsistent when Butcher (1955) and Reddall (1972) say that hunters are increasing rapidly each year, while Gilbert (1972) states (incorrectly) that hunters are minority users of wildlife and their numbers are declining. The 1970 National Survey of Fishing and Hunting (U.S. Department of Interior, 1972) indicates that although the number of hunters increased by about two million compared to the 1965 survey, there are still not as many as reported by Butcher (1955).

### Hunters and wildlife

Anti-hunters seem ready to make the accusation that sport hunters are responsible for the extirpation of the passenger pigeon, heath hen, and Eskimo curlew, and the near extermination of the bison, pronghorn, grizzly bear, wolf, mountain lion, and eagle (Gilbert, 1972; Colton, 1972; and Toker, 1972). The inroads on the animal population made by market hunting, poaching, and the habitat destruction caused by changing land-use patterns have little effect on their anti-hunting generalizations; further, many protectionists have created their own lists of endangered wildlife species. It hardly seems necessary to point out here, and yet it probably

should be pointed out, that none of the so-called target species of wildlife which have been under wildlife management within the last 50 years are on the United States list of native endangered species because of sport hunters (Saldana, 1973a; Poole, 1971; and Heuser, 1972).

According to statistics presented by the National Wildlife Federation (1971), there are 796 species of birds in North America, of which 74 are hunted; there are 914 species of mammals in North America, of which 16 are hunted in Canada and 35 are hunted in the United States. It is noteworthy that the largest number of species on the endangered list are nontarget, or nongame, wildlife. Obviously, then, it is not the hunters who are the most destructive factor in wildlife loss; rather, other human activities have resulted in the reduction and degradation of habitats.

The Wildlife Management Institute (1972) reported that American sportsmen supported wildlife protection and management efforts to the amount of over \$256 million in 1971. In fact, it is this support of the hunters — since the beginning of this century — that halted the decline of many wildlife species and built their numbers to a point that annual surpluses could be taken on a biologically sound basis. The thousands of acres purchased from hunting and fishing license revenues and excise taxes on sporting equipment have undoubtedly been of inestimable value to nongame wildlife species, as well as to the nonconsuming, and generally noncontributing, user. For example, a grant-in-aid project by the National Rifle Association (1973) in Pennsylvania revealed that 70 percent of the use of state land purchased for hunting and wildlife was by nonhunters.

It is a common tactic for the anti-hunter to say that the hunter is a predator, even an unnatural one, and that he has put himself in this role so that he has a continuing potential for killing the overpopulations of target species which have been stimulated by the lack of control by natural predators, which the hunter has removed as a competitor. One such critic (Reddall, 1972), gave as such an example, the fox, who is "often falsely accused of killing large numbers of pheasant, a favorite prey of shooters," and that, therefore, the hunter "assumes the role of an unnatural predator opposed to the fox who is merely acting from necessity." Many anti-hunters are apparently oblivious to the fact that the pheasant is an introduced wildlife species; that it was, in fact, introduced by Judge O. N. Denny in 1881 in the Willamette Valley of Oregon specifically for hunting (Bent, 1932).

One must face the realization that modern game management strives to produce a harvestable surplus consistent with environmental constraints and in the best interests of a given wildlife species. Therefore, it must be admitted not only that hunters are used as one of the most practical tools available to the wildlife manager for the reduction of big game overpopulations in relation to range-carrying capacities or other limiting factors, but also that hunting is endorsed to utilize surpluses of small game that are not necessarily excessive but are allowable in excess of the breeding stock requirements.

If the shooting of wildlife by licensed sportsmen is not causing the decline in numbers of animals, then what is? Perhaps further reference to habitat will give an indication. According to a study by the Economic Research Service (Williamson, 1973), about 34 million acres of rural land, much of it wildlife habitat, will disappear by the year 2000 as cities continue to sprawl. Urban growth has obliterated 750,000 acres annually over the past decade, while roads and airports have taken another 130,000, and 300,000 acres have gone into reservoirs. This study predicted that the United States population will be almost 308 million by the year 2000. Already habitat

diminution through drainage, lowland inundation from dams, and recreational and subdivision developments have affected wildlife populations. Further degradation of environments is progressing through pollution and poor land-use practices. It would seem that the sport hunter is one of wildlife's lesser problems!

Many anti-hunters charge that wildlife managers are the tools of special or vested interests — the arms and ammunition makers, for example — but then one of the accusers (Friends of Animals, 1972) urges their members to report shooting, setting of the traps for, or poisoning of protected birds to their local agent of the state conservation agency immediately, because they will not rest until all animals are protected. This is the same organization that urges members and the public to ask the PTA to bar speakers from the Game Commission, and advocates repealing the Pittman-Robertson and the Dingell Johnson Acts so as to free "Mother Nature from the stranglehold of 'management'" (Herrington, 1972).

Many organizations opposed to hunting are basing their protests on a mixture of personal convictions about how things ought to be with selected scientific "facts." An example of such action, without benefit of professional expertise, was the recent litigation brought by the Humane Society of the United States against the Secretary of the Interior challenging his determination that an overpopulation of deer existed in the Great Swamp Refuge. They contended that public hunts in Great Swamp, Chincoteague, and Eastern Neck refuges utilizing buckshot, bows and arrows, and muzzle-loading rifles were not consistent with the principles of sound wildlife management (Williamson, 1973). Fortunately, Judge Charles Richey granted judgement in favor of the Secretary in this landmark case.

During the past year an interesting situation has developed that illustrates the power and the insidious ways in which some anti-hunting organizations operate. Such an organization was bequeathed several million dollars, and with some of it purchased lands at the lower and upper ends of Aravaipa Canyon, northeast of Tucson, Arizona. The canyon itself had been declared a primitive area in 1969, and is administered by the Bureau of Land Management, but the private organization now controls the access. It is limiting public entrance and use of the canyon area, as well as denying access to state hunting lands adjacent to and above the rim of the canyon proper. The group will not allow anyone to take a firearm across its land to either the primitive area or the state lands; it has thus effectively blocked hunting on thousands of acres of public land. If an agreement with the organization cannot be reached soon, the Bureau of Land Management will condemn a right-of-way across the organization's land to the primitive area.

The president of this organization told me that they had always maintained that without hunting there would be enough game to feed the predators, thus cutting down or eliminating livestock losses. He stated that they have proven their point in this mountain lion and Mexican wolf refuge by not allowing hunting of deer and javelina, and that they reimburse adjacent ranchers for any livestock losses.

Another method that some of the anti-hunting organizations recommend for solving wildlife overpopulations is to have professional hunters or rangers hired specifically to cull or reduce the herds. Such suggestions seem even more impractical and inane when I recall the tremendous task it was to get several thousand hunters, many with multiple deer licenses, to help reduce the deer herds to the winter range carrying capacity here in Colorado during the 1950's. In lieu of this, then, the Humane Society of the United States recommends the reintroduction of large predators and/or the use of reproductive inhibitors (Hoyt, 1972, 1973). It's

fairly obvious that large predators are not compatible with modern development even now, and that the livestock industry could not tolerate them even if the idea were feasible — witness the current questionable status of the grizzly in a large protected habitat, Yellowstone National Park.

Contraceptive devices and chemosterilants? The state of the art right now is such that these organizations cannot even control man's pets, much less free-roaming wildlife! And yet, one of HSUS's vice-presidents decried the wildlife and livestock losses due to feral dogs, and stated that there are an estimated 15,000 dogs and cats born per hour in the United States that will never have a home (Caras, 1973)!

This same organization also brought suit against the Arizona Game and Fish Department over their annual bison cropping program. It would appear, however, that the primary issue behind HSUS's deer suits and objections to sport hunting is that the public should not be allowed to hunt because public hunting is inhumane and inefficient.

In contrast, the largest and oldest of the humane organizations in the United States, The American Humane Association, has issued a position statement on hunting which recognizes that the licensed sportsman is the only *practical* game population reduction tool currently available on a broad scale to the state conservation agencies throughout the country. It also recognizes the inadequacies inherent in such a tool, comprised as it is of a cross section of the American public lacking specialized qualifications and proficiencies and generally inefficient. AHA recommends upgrading the quality of the hunting public through education about wildlife, ecology, and the environment, as well as about outdoor skills and the sporting ethic. It also suggests definite restrictive required hunting license examinations.

In 1971 The American Humane Association made a plea to hunters through the International Association of Game, Fish and Conservation Commissioners at the 61st annual meeting (Phillips, 1971) to clean up their own ranks. It urged stiffer licensing requirements for the average sportsman, aimed at increasing hunter efficiency and decreasing wounding mortality. A similar presentation to the IAGFCC Executive Council meeting in Mexico City for hunting license examinations was made in 1972 by Denney.

In the established tradition of wildlife management leadership, the Colorado legislature considered a bill (S.B. 115) in 1973 which would have required hunting license applicants to have eyesight equivalent to that required to obtain a motor vehicle operator's license; but, unfortunately, the House killed the Senate-passed bill by one vote. It seems that some representatives felt it was unnecessary from a hunter safety standpoint, and did not realize its implications in regard to target species identification and shooting proficiency. Even in some of the developing nations of Africa one must demonstrate recognition of game, nongame, and protected wildlife species in order to obtain a hunting license.

### **HUMAN VALUES OF HUNTING**

Since the anti-hunters, both the organized and the unassociated, have no real biologically supported argument against sport hunting, their contentions must be based on something just as real to them, but more in the realm of a human value system. This, then, involves philosophy, ideals, ethics, morals, and possibly even religion. Let's just touch briefly on some of these human values.

It is most certainly true that the average modern American does not *have* to hunt for subsistence — though this may be overly simplistic in view of today's meat prices! But, seriously, many still hunt in part for, if not primarily for, the meat. In fact, the willful negligence causing spoilage or wastage of game meat is a violation in most states.

Most of the moral concept of man's right to take any life is based on Schweitzer's ethic of "reverence for life." However, Klein (1973) pointed out, Schweitzer made rather arbitrary qualitative distinctions and exceptions in his own practice of shooting snakes and predatory birds and animals to protect his domestic animals. Shepard (1959) was one of the first of modern game managers to analyze the Schweitzer-Krutch syndrome which has resulted in the dogmatic condemnation of the hunter.

A certain selectivity or sensitivity as to just which of the animals are accorded this ethical consideration can be discerned amongst the ranks of the anti-hunter. For example, the more highly developed and closely related the animal is to man, and the more subject it is to anthropomorphism through personification by the entertainment media, the more intense the emotion. To put it another way, the concern and sensitivity decreases as you go from mammals to birds to reptiles to fish to crustaceans to insects, etc. One anti-sport hunter (Hoyt, 1973) bases his discrimination on physiological and biological characteristics of species considered capable of the feeling of pain and suffering, which he considers to be any warm-blooded vertebrate animal. There can be no justification for the needless cause of pain and suffering in animals, but when it comes to the moral right or justification to kill animals, there is again a double standard displayed by many persons between wild and domestic animals.

It would seem that many anti-hunters are not necessarily against the death and utilization of an animal *per se* if done humanely, but more against the person who performs the act and obtains pleasure or satisfaction from it. Perhaps here we have — pardon the expression — the real “meat” of the problem. Many of the psychological interpretations underlying hunting motivations are based on definitions and, again, human values. If we look back at the definitions given in the beginning, we find that many of those relating to field sports are deeply integrated with recreation, pleasure, or *fun* in a broad sense. One of the more vociferous and irrational critics says that hunters only hunt because it’s fun, fun, fun to kill, kill, kill. The accusation is half true in view of the foregoing statements, but it is my personal opinion that the fun is not derived from the act of killing itself.

Fun may have many meanings to many people, and one of the first connections of sex with hunting comes from an archaic term meaning both sexual pursuit and hunting game. Some opponents of hunting stress that men only hunt to prove their masculinity and virility, and that, in essence, the rifle is a phallic symbol. Friends of Animals has urged men to prove their manhood in the bedroom, and not in a perverted manner in the field. This obsession with perversion and sexuality makes one wonder how this organization views the approximately one million women who were licensed hunters in the 1970 survey.

Dr. George C. Thornton, III, a psychologist at Colorado State University, pointed out several common theories as to why men hunt. These theories suggest that hunters are more domineering than others, that they are more aggressive and need to vent their aggressions in ways other people don’t; that they are more sadistic; and that hunting is a substitute for sex, with guns serving as symbols of masculinity. Based on a study of the personality traits of 150 big game hunters in Colorado, Dr. Thornton termed the above theories pure speculation; he found the personality characteristics of hunters within the normal range for the general population (Walter, 1972).

## MOTIVATIONS FOR HUNTING

The reasons and motivations of the individual hunter are probably as varied and composite as the number of hunters. Stop and think for just a minute if you are a hunter — have you ever actually considered in all seriousness the reason or reasons that you hunt? Would you be as equally satisfied with a nonconsumptive form of outdoor recreation? Many authors have cited a long list of reasons for and benefits to man from hunting, aside from the meat aspect. Most of them include the cultural influence under which people have grown up, which Thornton (Walter, 1972) found true of 80 percent of Colorado big game hunters, who grew up in rural or small-town communities where guns are more acceptable than they are in an urban area. Prince Philip summed this up nicely (1970):

*Stalking roe deer and red deer and shooting game birds was so much a part of the life of many of my relations that it has never become a moral problem as far as I am concerned, although I realize it can raise strong emotions in others. The sight of blood had nothing of the mystical significance which it seems to hold for those who grow up shielded from the facts of life . . . I am always amazed that so many townspeople seem to be incapable of understanding that hunting and conservation are now entirely compatible so far as conservation is concerned.*

The fact that most anti-hunters are largely urban-bred has been discussed by Oberst (1969) and Stingley (1971), and supported by Walter (1972), Madson (1967), and Van Gelder (1972). One of the most frequently cited reasons people hunt is to get away from everyday routines; others include esthetic appreciation, companionship, challenge, health benefits, identifying with nature, solitude, reliving the American pioneer heritage, association with the past, and psychological release. Many of these are overlapping and may be the stimulation for hunting in various combinations.

We must admit that there are those who hunt primarily for the trophy, or at least that the trophy is an important part of their hunt. Do you recognize yourself or your motivations here? Personally, I hunt because I enjoy the composite act of hunting as well as the taste and substance of the meat, and I have never been aware of a particular awareness or enjoyment (blood lust) at the instant of kill. However, I like the challenge of the hunt and the skill involved in getting a good clean shot. I also feel that, perhaps, I have a more profound awareness, knowledge, and respect for what I consider a practical concept of the reverence for life than do many of the anti-hunters. At any rate, I feel that the choice should be up to the discretion of the individual, and I resent having someone else’s morality or philosophy imposed upon me, either psychologically or legislatively, without justification. I also appreciate and encourage the nonconsumptive utilization of wildlife and the natural resources on which they are dependent, and I hope to hunt legally as long as I feel the urge and do not jeopardize the rights of others in either consumptive or nonconsumptive uses of wildlife.



## SUMMARY

From the biological and ecological aspect, it is obvious that lessened hunter opportunity in the future will exist because of the smaller numbers of game animals produced on habitats much reduced in quantity, and probably in quality. In addition, the increase in number of hunters (even though hunters decrease on a per capita basis) will result in more demand for the available animals, resulting in shorter seasons, reduced nonresident hunter opportunities, more restrictive permit hunting, lower bag limits, less or no vehicular hunting, and stricter law enforcement. The objectives of the hunt, then, will be primarily for the management of a species and its habitats and for the spirit or essence of the hunt, with meat and trophy motivations ancillary. As pointed out by Burger (1971), the challenge for professional wildlife and resource managers is going to be in the production of more, through improved techniques, on less.

Hunters are a small percentage of the population, and the trend is that they will become an even smaller one in the near future. Therefore, it behooves hunters to represent themselves in a positive manner to nonhunters (who outnumber hunters approximately four to one), through education, exemplary behavior, and understanding. Upgrading hunters can be done through higher requirements for licensing, such as physical or eye examinations and examinations to test knowledge and understanding of the wildlife laws and regulations, identification of wildlife species, and field and firearms proficiency. Such steps would eliminate many of the criticisms of hunting caused by the behavior of hooligan hunters and the high incidence of wildlife wounding.

The primary point is that, in spite of the polarity between hunters and non- or anti-hunters, we all share one environment as a part of nature, and there are greater issues at stake than our polarizing differences. Working together we would form a tremendous force for the cause of the environment, which would transcend both protectionism and consumptive utilization in realizing the need for a national land-use policy which would recognize wildlife as an index to environmental quality. With proper habitat and environmental considerations we should be able to maintain and perpetuate wildlife populations to accommodate both consumptive and nonconsumptive activities.

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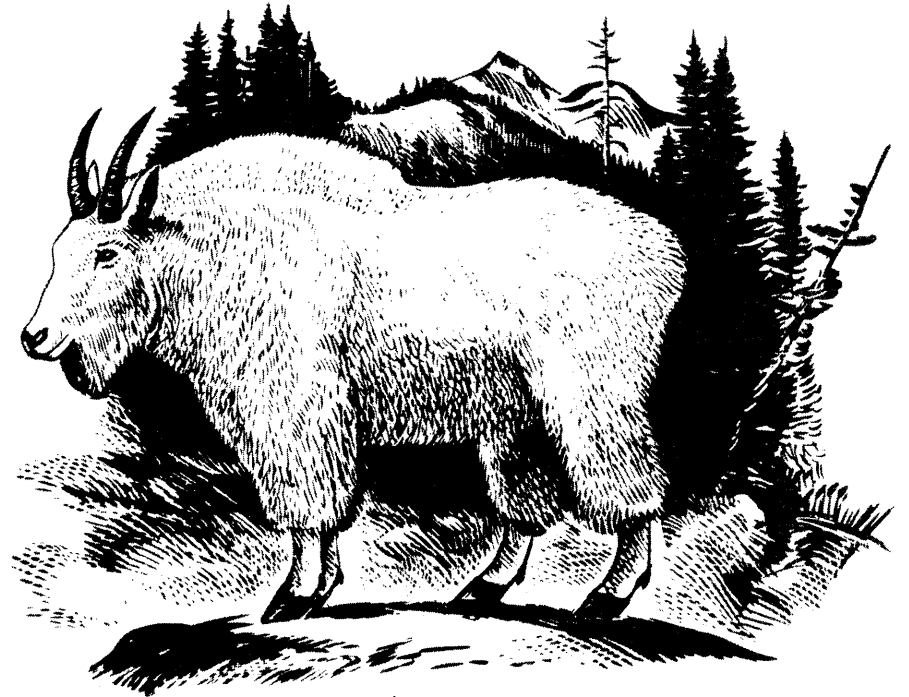
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## ROBERT A. JANTZEN

*Director, Arizona Game and Fish Department, Phoenix, Arizona*

*Mr. Jantzen was born in Phoenix, Arizona; he graduated from the University of Arizona in 1953 with a B.S. in wildlife management.*

*He joined the Arizona Game and Fish Department upon graduation, working as a field biologist in northeastern Arizona until 1957. He has served (1957-59) as a research biologist, Big Game Management Supervisor (1959-63), and Chief of the Game Management Division (1963-68). He was appointed Director of the Arizona Game and Fish Department on June 16, 1968.*



*Mr. Jantzen is a member of The Wildlife Society and served as the Regional Representative for Region Five, covering the states of Arizona, New Mexico, Texas, and Oklahoma. He is a past president of the New Mexico-Arizona section of The Wildlife Society. Other affiliations are with the American Institute of Biological Science, Boys Club of Scottsdale Board of Directors, Scottsdale Jaycees (past director), National Rifle Association, and Tonto National Forest Multiple Use Advisory Board.*

It is fitting that this discussion should take place at Denver, Colorado. The primary impetus for an examination of the problem of the resident vs. the nonresident hunter came from Colorado through the leadership of former Congressman Wayne N. Aspinall. The passage of P. L. 88-606 in the 88th Congress was an attempt to deal with the multitude of perplexing questions about present and future use of the nation's lands that arose after World War II. Formulated on the model of H.R. 8070, the bill was made the law of the land on September 19, 1964, and it established the Public Land Law Review Commission, which was chaired by the Honorable Mr. Aspinall. The charge of this Commission, though stated simply in the law, was staggering in its dimension of accomplishment. The Commission's final report, "One-Third of the Nation's Land" (submitted June 20, 1970, after an extension by amendment to the original Organic Act), is well known to all of us. Without question there was, as has been said, something for everyone — for public or private land managers or entrepreneurs utilizing the public lands of the nation — in that 341-page report. It contained 137 specific recommendations for the future use and management of public lands. Though it is recommended reading for all of us, this paper will not review this important report and all its potential ramifications — rather, it will deal with one of its specific recommendations.

Recommendation number 67, found in Chapter Nine of the report, deals with fish and wildlife resources. The recommendation is as follows.

#### **NONRESIDENT DISCRIMINATION**

*Recommendation 67: State policies which unduly discriminate against nonresident hunters and fishermen in the use of public lands through license fee differentials and various forms of nonfee regulations should be discouraged.*

Several paragraphs providing the rationale for this statement follow; though I have not included them here, I wish to point out that the Commission found that in states where public lands are important

for hunting and fishing (primarily the eleven western states region) the cost of big game permits and licenses and the subsequent disparity between resident and nonresident fees charged is greater than elsewhere in the United States. It found the same condition to be true for fishing license fees, although the level of charges to both classes of citizens was substantially lower than that for hunting.

The Commission recognized that states depend heavily on the revenue from license sales to administer their fish and wildlife programs, and acknowledged that there are special conditions which apply to nonresidents more than to residents and which raise the cost of the annual program. Therefore, the report was agreeable to a reasonable differential for nonresidents. However, it did not define "reasonable."

The report went on to discuss discriminatory regulations or practices which some of the states have, in addition to differential fees, which effectively favor residents hunting and fishing on public lands, and stated flatly that such restrictions and exclusions are unjustified. For example, it mentioned the statutory prohibition in Colorado against nonresident hunting of mountain sheep, goats, and buffalo; the Montana law which requires a nonresident to obtain the services of a resident possessing a big game license in order to hunt big game; the prohibition against nonresident hunting of migratory waterfowl in South Dakota; the

requirement that nonresidents must be accompanied by a licensed guide or a resident hunter with a guide permit when hunting big game in Wyoming; the Nevada practice of limiting nonresident deer hunting tags, but not the tags of residents; the prohibition in Arizona against nonresidents taking buffalo, and the differential arbitrarily established for bighorn sheep in my state (Arizona), which limits the nonresident participation to no more than 10 percent of the available permits.

# THE RESIDENT VS. THE NON RESIDENT QUESTION

by Robert A. Jantzen

The last portion of the text under Recommendation 67 is pertinent to this discussion, and is presented verbatim as follows:

*We believe the elimination of both kinds of unreasonable discrimination against nonresidents is necessary if the public lands are to serve all citizens of the nation equally and contribute effectively and fairly to meeting the growing demand for hunting and fishing opportunities.*

*The present situation appears so discriminatory as to raise constitutional questions. While the courts ultimately may rule on these issues, we believe it essential to adopt additional means of discouraging these practices. **We recommend, therefore, that existing Federal programs which provide financial support for state fish and wildlife programs, as well as the new Federal cost-sharing program which we recommend for cooperative improvement of public land habitat, be conditioned upon the states revising their fee and licensing provisions to remove unreasonably discriminatory differences between residents and nonresidents.** We also encourage the states to cooperate in reaching agreement among themselves on reasonable differentials based on uniform principles in both fee and nonfee regulations.*

Realizing the significance of the Commission's action in the field of fish and wildlife management, particularly the programs of individual states for residents, the International Association of Game, Fish and Conservation Commissioners established the specific job of Special Liaison Officer to the Public Land Law Review Commission. This action was taken at the Association's annual meeting in September, 1965, shortly after the formation of the P.L.L.R.C. Colorado again figured prominently, since Harry Woodward, Director of the Game, Fish and Parks Division, assumed this most important post. Mr. Woodward served ably and well, as did James B. White of the Wyoming Game and Fish Commission in following the progress of the P.L.L.R.C. and chairing a special committee of the International Association for that purpose. This effort culminated in the Association's response to the Public Land Law Review Commission's Report in published form entitled "Public Land Policy Impact on Fish and Wildlife" (December, 1971).

The Western Association of State Game and Fish Commissioners in coordination with the International Association acknowledged the significance of Recommendation 67 of the P.L.L.R.C. in January, 1971 (again, under the leadership of Mr. Woodward). The Western Association at that time contracted with the Wildlife Management Institute "to study the nonresident hunting situation on all lands in the West for the purposes of recommending a common course of action for states of the Association to use in resolving increasingly complex problems."

The Western Association sought an independent and objective review of both the recommendation of the Public Land Law Review Commission and the actual conditions existing in the Western states with regard to discrimination between residents and nonresidents by fee and nonfee regulations as well. The Institute recognized at the outset that it would be very easy to be led into a philosophical discussion of states' rights versus Federal rights in such a review. This was avoided by dealing primarily with factual data and viewing the problem in its essential terms. Consequently, the Institute established baseline information on nonresident hunters and anglers in the thirteen member states of the Association. Most importantly, they attempted to define what "reasonable" fees, quotas, and other restrictions on nonresidents should be, and to develop recommendations that could be implemented as policy guidelines for the Western Association and all of the affected states. Their report was delivered to the Western Association in July of 1971.

Their analysis led them to identify five possible courses of action available to the states to resolve the problems identified by Recommendation 67 of P.L.L.R.C. They are as follows.

1. Charge residents and nonresidents equal fees and give them equal recreational opportunities.
2. Maintain the status quo with existing fee differentials and restrictions on nonresidents.
3. Define reasonable fees and restrictions and initiate long-term adjustments to attain them.
4. Increase fees, quotas, and other controls to severely limit nonresidents.
5. Eliminate the nonresident.

After examining the wildlife management, financial, political, and social factors surrounding each of the alternatives, the Institute recommended action number three. They then recommended nine policy guidelines in order to implement alternative number three:

1. *That nonresident license fee differentials to hunt any species in the western states be reasonable. Reasonable is defined as the general ratio of 1 to 5 between resident and nonresident fees which existed in the 37 non-western states in 1970. Thus, it is recommended that nonresident hunting fees be no greater than five times the amount a resident would have to pay for the same privilege.*
2. *That angling license fees for nonresidents be established so the nonresident pays not to exceed three times what the resident pays.*
3. *That quotas on nonresident hunters be established only for wildlife management reasons, which include safety, open space, quality hunting, and the necessity to control the total harvest of a species; and that no quota shall be imposed on nonresidents unless there also is a quota on residents.*
4. *That states may prohibit nonresidents from participating in hunting for species that are harvested in limited numbers — such as small herds of trophy animals, in limited damage control hunts, or in hunts on a once-in-a-lifetime or once-every-several-years quota basis.*
5. *That mandatory use of guide service be eliminated unless there are overriding reasons of human safety, such as terrain clearly recognized as hazardous, the possibility of severe climatic dangers, or other serious hazards, all of which are found in relatively few areas.*

6. *That State Wildlife Commissions be authorized to set quotas, specific controls, license requirements, and allied regulations to accomplish recommendations 1-5 within broad limits prescribed by their legislatures.*

7. *That residence requirements be uniformly set at not to exceed six months domicile within the state.*

8. *That states heavily dependent on nonresidents for income should actively seek to obtain funds from other sources; i.e., increased resident license fees and substantial general fund appropriations.*

9. *That uniformity and reciprocity of fees among states be established as a desirable goal and studies and actions be initiated immediately to achieve it.*

The statement following number 9 is significant, in that it says: "The member states of the Western Association, by resolution and singly, should urge their commissions and state legislatures to avoid abrupt action on this overall subject. Major efforts should be made to adopt a regionwide, uniform system for accommodating nonresident sportsmen. It is believed that the western states should act simultaneously to achieve this goal."

The Western Association accepted the report of the Institute at their annual meeting in 1971, and immediately established a working committee to further evaluate the recommendations of the Institute's report, and to study potential methods of achieving more equitable systems of accommodating nonresident hunters and anglers in the western states. Last year this committee reported to the Western Association, after careful review of the Institute's recommendations and the impact they would have on each of the member states. The committee report was accepted without change by the Association, and has therefore set the guideline for continued action by the Association to attempt to resolve the problem on a regional basis with cooperation among the affected states. The Institute's recommendations 1, 2, 3, 5, 6, and 7 were accepted without change. Recommendation 8 was also accepted, but the Western Association felt that the reference to increased fees and use of the general fund was too limited as written. Additional funding sources should not be limited to these two sources, as there may be others as good or better, depending upon the socioeconomic climate in each state. Regardless of the funding source, the Association believes that in seeking supplemental funding the state wildlife agency should lead in developing new money sources, rather than relying solely on traditional tax revenues. The Western Association further felt that any new sources should, if at all possible, reflect nonhunting and nonfishing values of the wildlife resource, which are appreciated and used by the general public.



The Association also accepted recommendation 9, but deleted the words "and reciprocity." As you might expect, there was considerable question as to the meaning of this term, and clarification of it as used in the Institute's report was asked of President Poole. He replied that the Institute did not mean one state should charge a hunter from another state the same amount the latter state would charge a hunter from the former. He did suggest, though, that cooperating states might wish to consider staying with similar resident-nonresident fee differentials, selling the same kind of license or licensing package, and/or working out a procedure on a cooperative basis where nonresidents of one state would receive some special consideration reflecting the treatment accorded that state's resident in some other state. The Association accepted this further definition, but believed the suggested actions should be accommodated under the definition of "uniformity" without the confusion that would result from the commonly understood definition of reciprocity.

Going to recommendation 4, it is significant to note that the Association did not accept this recommendation for fear that it could be taken out of context and used as a justification for continuing unreasonable nonresident quota systems. Although some members felt that instances could occur under which recommendation 4 could apply, it was too broadly restrictive, and did not address itself to a solution of the problem of discriminatory practices.

This summarizes the development of the problem, and recapitulates the initiative the western states have taken to solve it on a cooperative basis, both regionally and individually.

I believe it is essential that the objectives in the Institute's recommendations 1, 2, and 3 be met carefully and with full coordination among the Association's member states. Keeping in mind that state legislatures and policy makers are directly involved in any significant changes in fee structures or discriminatory practices between residents and nonresidents, the Association is attempting to establish briefing sessions which would involve both the Governor's office and key legislators and commissioners from the member states as an appropriate beginning for putting these recommendations into motion on a regional basis. Obviously, the involvement of these people is necessary when one considers the legislative action necessary to implement such long-term coordination. Good decisions which reach toward the objectives can only be accomplished by informed decision makers in each state. It is through forums such as this that a better understanding can be created among those people who will be calling the shots.

Individual wildlife agencies are keenly aware of the ramifications of the P.L.L.R.C. report recommendations, and on their own initiative are keenly aware of the need to correct the problem before umbrella legislation from the Federal government is developed which would, in effect, take jurisdictional authority away from the states.

How successful has the interest and action on the part of the Western Association been to date?

We have not been too successful. Between 1970 Wildlife Management Institute analysis of fees and a reevaluation in 1971, there were changes in quotas or fees in five of the western states. Comparing those changes to the 1970 Institute baseline data, we found that with the exception of elk fees, the average cost and ratios showed increased rather than decreased discrimination against nonresidents. Individually, we seem to be headed in the opposite direction from our collective concern; this may be due to the provincial nature of the individual states. I do not mean to be derogatory, but rather explanatory, in making that statement. I believe this is the biggest problem we have to deal with in eliminating discriminatory practices on a regional and cooperative basis.

Since last year's examination, we have found that changes were made this year by individual state legislatures. A case in point is the recent law enacted in Utah which limits nonresident deer hunters to 20,000 in number, and establishes a price of \$75 per hunter. This legislation was passed in spite of the efforts and best advice that Director John E. Phelps of the Utah Division of Wildlife Resources could provide to the legislators. He pointed out the ramifications of such action in view of the problem we have been discussing today, and did his best to persuade the legislature that this action was not in the best interest of the state. Nevertheless, the law was passed.

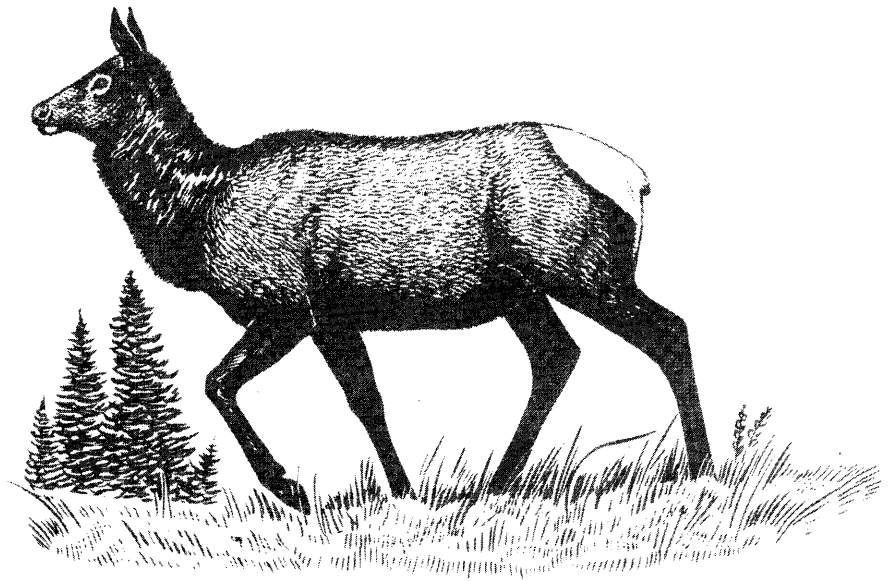
From that example you can see the problem we are facing. I don't believe it is an insurmountable problem, but we must have the understanding and cooperation of our policy makers in each state. The Institute and the Western Association recognize that changes in attitude toward nonresident hunters will not occur overnight, that the change will have to be gradual and in a climate of developing awareness of the rights of the people of the nation to the use of resources on the public lands of the nation.

## JACK R. GRIEB

*Wildlife Research Chief, Colorado Division of Wildlife, Fort Collins, Colorado*

*Jack Grieb was born and raised in Nebraska, where he graduated from Benson High School, Omaha. After serving for three years in the Navy, he entered Colorado State University, September, 1946, graduating with a B.S. in 1950 and an M.S. in 1952. He has been employed continuously since graduation from college by the Colorado Division of Wildlife as a Wildlife Statistician, Assistant Game Manager, Wildlife Researcher, Wildlife Research Leader, and Wildlife Research Chief.*

*His responsibilities have included leadership of the following research projects: (1) Waterfowl, 1954 to 1968; (2) Deer-elk, 1966 to 1968; (3) Bighorn sheep-*



*mountain goat, 1966 to 1968; and (4) Antelope, 1966 to 1968. He is currently Wildlife Research Chief in charge of all wildlife research projects in Colorado.*

*Memberships in honorary and professional societies include Xi Sigma Pi, Sigma Xi, and The Wildlife Society. His technical publications consist of over 80 articles and papers written for professional journals, transactions, special reports, and conservation magazines.*

*(Since the Governor's Conference, Mr. Grieb was appointed Director of the State Division of Wildlife, succeeding Harry R. Woodward on August 1, 1973.)*

Aldo Leopold, in the first sentence of the first chapter of his book *Game Management*, first published in 1933, defines game management as the "... art of making land produce sustained annual crops of wild game for recreational use." And he goes on for nearly 500 pages to explain this opening statement. Since that time hundreds of books, technical papers, and reports, containing millions of words, have enlarged on the subjects he discussed.

Obviously, I have neither the time nor the assignment of explaining the meaning of game management to this interested group. Instead, I must direct my remarks toward one facet of this complex subject — the mechanism by which we extract those "... sustained annual crops of wild game. . . ." But this is no simple task, because intelligent harvest regulations must be based on a comprehensive knowledge of game management.

Without question, I must deal in generalities. It would take far more than a book the length of Leopold's to cover the regulatory details needed to establish harvest seasons for eight species of big game and 19 species of small game in Colorado, not to mention the furbearers, predators, and nongame birds and mammals which are part of the regulatory responsibility of the Wildlife Commission. All of this is further complicated by our system, which establishes hunting seasons for big game on the basis of game management units — by last count there are 114 of these. By areas, there are about 60 of these for elk; fewer for antelope, sheep, and goats. Small game is no different, since the state has been divided into 20 units to facilitate its management.

To add spice, let me mention that we further complicate the situation by establishing regulations for regular gun hunting, primitive firearms, archery, and raptors. And we have special regulations on lakes, rivers, and state management areas which govern in some manner the taking of all species of game.

Fortunately, regulations are not promulgated at one time of the year or at one Commission meeting. Thus, the regulatory task begins in March, with the Commission considering which areas will be regulated by limited licenses or special permits for such species as antlerless elk, antelope, and bighorn sheep, and for special deer areas. This procedure is largely completed in September with the establishment of pheasant and quail hunting seasons. In between, specific harvest regulations are approved for all other species and/or areas.

The point is that regulations are promulgated at a time when they can be based on biologically sound information for each species, but still consider the need of hunters in planning vacations and submitting permit applications. Big game seasons are set early in the year because the biological information on population status and range information is available then. Our consideration largely ignores production information because experience indicates we can accurately estimate the annual recruitment to the herd on the basis of previous performance.

Conversely, the size of harvestable surplus for such species as pheasants, quails, and grouse annually depends upon the production of young. Thus, the establishment of regulations for game birds is delayed until as late in the summer as possible so that recommendations can contain an assessment of this important factor.

I hope these introductory remarks have indicated that establishment of harvest regulations for wildlife species in Colorado is indeed a complex and difficult job which requires a major Division effort. At the same time, you should understand that despite the complexity, we have established a degree of order based on years of experience of "playing the game," and understanding the types of information needed to make intelligent recommendations for each species.

In the remainder of this discussion let us examine some of the details of the decision making process, including management principles, techniques, and considerations necessary for the use of game birds and mammals by the public we serve.

## **BIOLOGICAL FACTORS**

To intelligently establish harvest regulations, wildlife managers must understand the biology of the species with which they are dealing. This plays an important role in actually shaping the regulations or in providing techniques which can be used to gather information.

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# CONSIDERATIONS IN SETTING HUNTING SEASONS

by Jack R. Grieb

## **PRINCIPLES**

1. Breeding seasons, gestation periods, and parturition or hatching dates. When do birds and animals breed and when are they born? I'm sure I don't have to explain the implication of this knowledge in setting hunting seasons. The need to protect animals during young-rearing periods was recognized long ago. Leopold (1948) recorded that Marco Polo, in an account of his travels across Asia, indicated that Kublai, the Great Khan (A.D. 1259-1294) prohibited the killing of hares, roebucks, fallow deer, stags, or other animals of that kind, or any large birds, between March and October. More recently, the Migratory Bird Treaty of 1916 between Great Britain and the United States prohibited hunting of migratory birds between April 1 and August 31 each year.

2. Reproductive potential. At what rates do populations multiply? Is the species a high producer like the pheasant, capable of an annual increase of 300 to 400 percent and more during a good production year, or a low producer such as the elk, capable of increasing its numbers by less than 50 percent each year? You can see that harvest considerations for these two species must be vastly different.

3. Annual mortality rates. The sum of all losses to the population including those lost to harvest, disease, parasites, predators, accidents, old age, starvation, etc. What can we expect for each species, and how does this influence the degree of harvest which can be taken? Species like quails turn over rapidly. If surpluses of such species are not harvested in the fall and early winter they do not carry over to the next breeding season. Other species such as deer have a slower turn-over rate. Surplus big game not harvested in the fall will be there next spring, providing herd levels are within the carrying capacity of the range. I wish I had more time to explain this principle because it is the basic reason that we must manage birds and big game differently.

4. Habitat requirements. Leonard Foote (1971) of the Wildlife Management Institute described habitat very well in his discussion of carrying capacity: ". . . the sum of the environmental factors which make a game range habitable. Food, water, escape cover, nesting cover, loafing areas, brood and feeding areas are all important. All of these must be within daily and seasonal range of the animals."

These are some of the major principles with which wildlife managers deal. Now we will examine some of the techniques used in developing annual and long-range information for harvest consideration and promulgation.

## **TECHNIQUES**

1. Aerial big game trend counts. Deer, elk, and other big game are annually counted by both fixed-wing and helicopter aircraft on about 90 areas in Colorado. The intent is to count all animals of a particular species on their wintering areas. Comparison of these counts from year to year provides an index to population size. Managers must interpret these data, of course. When snow is deep and animals are concentrated on their winter ranges, higher counts are obtained than during open winters when animals are more scattered. This year, for example, winter conditions were so severe in the San Juan area that elk moved past traditional winter grounds, some into New Mexico, and therefore were not counted. I'm sure the public sometimes feels we are making excuses in years when counts are low when we try to explain why the counts were not representative.

2. Pre- and post-season big game herd composition counts. These are usually conducted by helicopter to determine numbers of males, females, and young. This is a very important survey that gives us information on herd status, production, and impact of harvest regulations.

3. Browse production and utilization. Habitat information is gathered by reading range transects for key browse species on deer and elk winter range. This is a cooperative effort between the Forest Service, Bureau of Land Management, and this Division, executed when field men representing these agencies meet to examine the range and discuss the relationships between habitat and population size. From these meetings comes agreement (usually) on population goals — whether herds may be increased in number, held the same, or reduced.

I'll never forget the comment of one Forest Supervisor several years ago when I was discussing the new ball game we were playing. "That's right," he said, "but, don't forget you're still playing on our ball park." And I knew what he meant, for these public agencies also have goals for the management of lands for which they are responsible.

4. Big game check stations. The Division currently operates six permanent check stations during big game season. Data obtained at these stations permit us to assess the level of harvest as it occurs and to estimate age and sex of animals harvested. This information assists us in monitoring the performance of our deer and elk herds.

5. Harvest surveys. Estimates of harvest are made for each species of game birds and animals. As with check-station data, it permits us to assess the impact of regulation decisions and provides knowledge about population status.

The foregoing are the major big game techniques that provide input leading to sound regulations, and I have discussed them in some detail to facilitate your understanding of how we put this all together, which I will present later. There are other basic techniques for birds. To name a few, we conduct aerial breeding pair counts of ducks and geese on major breeding areas; we band both upland and migratory birds to determine annual mortality and harvest rates; we conduct pheasant crow counts, roadside counts, sex ratio counts, and production counts to determine population status; and we use call, roadside, and booming ground counts for quail and grouse for the same reason.

All these techniques have an important place in providing information used to make harvest recommendations, and it is significant that each species requires some special field technique based on one or more behavioral characteristics to provide the information required for management purposes.

### **SOCIOLOGICAL FACTORS**

We have examined the biological input needed to implement the regulatory process; now let us look at the people side of the coin. To date, much of our effort has been in the area of understanding how we can use hunters to accomplish harvest goals. This is particularly true of deer and elk management where we attempt to shift hunting pressure to specific areas where harvest is needed or away from areas where our goal is to increase population size. And we have learned to do this quite well through manipulation of season dates, bag limits, and extended and/or pre hunts.

As we move into the future, our efforts in this area will not diminish. However, with hunters continuing to increase in number, we will be faced with more complex decisions, particularly when we recognize that our ability to produce game will, at best, remain static. Certainly, we can increase carrying capacity of many ranges through habitat improvement; but in my judgment, this will hardly offset the continuing and serious loss of range through subdivisions, construction of reservoirs, development of ski areas, and other competing uses. This situation will demand new people approaches as we try to maintain quality hunting recreation.

On one hand we can try to educate sportsmen to accept a lower degree of success — the hunt's the thing! Eastern states have come to this. Pennsylvania and Michigan, for example, commonly have a deer hunter success ratio of 10 to 12 percent compared to our traditional ratio of over 50 percent.

Other alternatives would require hunters to choose which big game species they would hunt during any particular year by permitting them to purchase a license for only one species or limit the number of hunters for any particular big game species by a permit system. We have moved in this direction by splitting deer and elk seasons, by not permitting those who purchase a primitive firearm license to also purchase a gun license for that species, and by going to complete permit systems on antelope, sheep, and goats.

But before these or other choices are made, we must know the public we serve. Why do hunters hunt? What motivates and satisfies them? These are questions which must be answered and understood. I want you to know that research has been accelerated in this area, and many of us are anxiously awaiting the results.

### **EXAMPLES OF THE SYSTEM**

To this point, I have discussed my subject somewhat in philosophical terms. Now let's use deer and elk to demonstrate how we put hunting seasons together.

The initial input of information for deer and elk harvest recommendations is made at the field level. In many areas this begins in the fall with the measurement of browse transects by Division personnel in cooperation with the Forest Service and Bureau of Land Management. Determination of browse status is followed by pre- and post-hunting season sex and age ratio counts in major herds and, later when snow cover provides optimum visibility of herds concentrated on winter ranges, aerial trend counts.

As early in spring as snow cover permits, personnel are back in the field remeasuring browse transects to determine winter utilization, and counting deer and elk pellet groups to assess animal days of use. This is where things begin to fit together, where discussions on herd goals are conducted among field men of the cooperating agencies. Ideas are offered and challenged, and usually agreement is reached on whether herds should be increased, decreased, or held static.

At about this time harvest information from the previous year becomes available. These data are examined in the light of the previous season's recommendations to determine how well the system worked and our management performance in relation to goals previously decided upon.

Regional meetings are held, usually in late April, with the land management agencies in each area supervisor's district. Each game management unit is discussed in terms of herd objectives, range data, population status, and harvest, and specific season recommendations are developed. It is unfortunate that the public is not aware of the volume of factual information presented at these meetings. It would certainly help them understand why specific recommendations are made.

Now the pace quickens. Recommendations from areas are consolidated on a regional basis, and further discussions are held between regions and the Denver staff to resolve differences on a state basis. Such components as length of season, type of regulations, and extended seasons are decided so there is a system for the entire state wherein certain harvest goals can be achieved for specific areas.

These recommendations are drafted, and maps depicting them are prepared. Public meetings are held throughout the state, culminating in the annual sportsmen-stockmen meeting in Denver, usually about the third week in May. This meeting is designed to brief representatives from various groups and record their comments for presentation to the Commission.

Then, at long last, usually in late May, the Division recommendations are presented to the Wildlife Commission along with comments received from all public meetings. It then becomes the responsibility of the Commission to consider these recommendations and approve the final big game harvest regulations for the year.

Permit me to add a few personal comments. As a professional wildlifer, it concerns me that there seems to be a growing criticism of our regulatory procedures. It bothers me because I know how much individual and team effort has gone into this: thousands of man-hours by all agencies on cooperative surveys, and hundreds of hours flown in both fixed-wing craft and choppers — not at thousands of feet above the ground, but at near ground level where mistakes are made only once. These men put everything they have on the line to obtain information for regulatory use. They work hard and long trying to come up with the very best data possible.

Certainly, we can improve our procedures, and we spend long hours in meetings discussing and arguing these very points. We are making progress with new techniques, better understanding of management principles, and establishment of a goal-oriented program, which I am confident will provide continuation of quality recreation for all people, hunters and nonhunters alike.

And one outstanding thing we have going for us. Because of the foresight of administrators like Tom Kimball, our former Director, and the implementation of current Director Woodward, is the concept of a highly trained professional staff at all responsibility levels. In my opinion, this staff cannot be equalled by that of any other wildlife conservation agency; this absolutely has to provide the strong foundation for the very best management system possible.

Frankly, I'm proud to be a part of an organization such as this!

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## WALTER J. NEUBRECH

*Chief, Division of Wildlife Management, Washington State Department of Game, Olympia, Washington*

*At the time of this meeting Mr. Neubrech was Chief of the Division of Wildlife Management for the Washington State Department of Game and had been for more than 25 years. He had acquired his extensive field experience in the area of game law enforcement as a game warden. He has worked for the Washington Department of Game for more than 35 years and is an acknowledged expert in the law enforcement field. He has taught game law enforcement courses for state conservation departments in six of the western states.*

*Mr. Neubrech retired shortly after this meeting to his fishing cabin on the Washington coast.*



It would indeed be enjoyable to ask you to pull up a chair so we could just reminisce about the good old days. But instead I prefer to draw upon my experiences in days gone by, hoping to help improve the sport of hunting and fishing in the days to come. Please permit me to be so bold as to make a few suggestions, as I go along, which I believe will be helpful in managing future hunting and fishing programs.

I am sure we all accept the old adage that "an ounce of prevention is worth a pound of cure." That surely applies in the field of gaining compliance with conservation laws. Preventative enforcement must begin with a public understanding of the reasons for having the various regulations and a knowledge that enforcement will be firmly applied. An attempt to gain compliance will unmistakably be more effective if the public sees or knows about the need for such restrictions. Certainly, the user of the resource is entitled to expect the set of rules that he is required to obey to be uncomplicated and understandable. When it becomes necessary to draft new rules or laws for the management of the resources, let us first make sure they are necessary. Then let's make them so clear that no one could misconstrue their meaning. Let's scan our game laws and see how many that are on the books can be repealed. I can't subscribe to the idea of having a regulation that isn't expected to be enforced. In such a case, only the conscientious will obey, and the others will develop disrespect for law itself. If you don't want it enforced, take it off the books. There is an old saying, "If you have a bad law, just enforce it and you will get rid of it." I am a firm believer of that old cliché, "Spare the rod and spoil the child." Certainly, if a regulation exists it should be enforced fairly and impartially in all instances. Unless a community is interested in enforcing its laws, it is most difficult for the wildlife officer to do his job well.

If our environmental laws are to be enforced, there must be citizen interest and participation. This is particularly true if violations are being committed by government agencies or big businesses, or when the project has major financial benefits for the community. A case in point: A survey has been completed for a fine new road to come through your community. The contract has been let. Everyone agrees that all will benefit except the hunter and fisherman. The survey directs the road to parallel a fine, natural meandering trout stream with native vegetation overhanging its irregular banks. The bed with the occasional boulder has caused many ripples and fine pools. The prime contractor was aware of the environmental impact statement, as was the subcontractor. But maybe the foreman didn't tell the catskinner, or maybe the catskinner didn't see the importance of leaving the stream intact. Now the damage is done. The stream is no longer the home for wily trout, but now a straight raceway designed to get rid of the water. First, who is responsible? Let's agree the general contractor is the bad guy. Let's agree your laws are adequate and amply clear. Let's agree someone must go to court. Here we have a case of questionable intent. So our judge dishes out a small fine. This shortcut saved the construction company a few thousand dollars, and you lost another fine trout stream.

Show me a community where the prosecutor and the judge have become complacent about wildlife violations, and I'll show you a community where the sportsmen haven't done their homework. Law violators have lost a lot of respect for our courts. Many years ago, I remember a learned judge advising me, after he found the defendant "not guilty," that we would have no more law than the people of the community wanted. That bit of advice turned out to be — oh so true!

In years past, when the dollar was worth much more than today, some interested sportsmen convinced the legislature that the penalties for certain game violations must be in the "gross misdemeanor" class — \$250 to \$1,000 with a year in jail. Although the value of a buck has changed greatly, the penalties are, in my opinion, still adequate. But all too many judges have a habit of assessing only the minimum and even suspending a portion of that penalty. Why not extract the words "suspended sentence" from the judge's vocabulary? I'm sure a judge would like to know your feelings on these matters, particularly when it's time to run for reelection.

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# WILDLIFE ENFORCEMENT NEEDS YOUR ATTENTION

by Walter Neubrech

Let me tell you an instance where people cared. In 1938, two agents apprehended and convicted 32 men for operating set gill nets in one of our rivers. That year we had about 14,000 steelhead sports fishermen. Last year we had some 150,000 steelhead fishermen, but only one set netter was arrested. Why the change? Steelhead fishermen just wouldn't permit the netting of this fine sporting fish. Today, if a steelhead should show up with a net mark we would receive many calls.

I believe wildlife law prevention is a job for *all sportsmen*.

Now, let's call a spade a spade. I believe that the image of those who hunt or fish must be improved with utmost haste. Let me suggest that there are all too many imposters trying to pose as sportsmen. I visualize a sportsman as a person who plays the game by the rules. He gives his prey a sporting chance. He and his friends are the elite among those who hunt or fish. To improve the image of those who hunt or fish, who can do a better job than the sportsmen themselves?

Last year, our agents in the state of Washington found it necessary to issue some 6,000-plus citations. These men found that one out of every 31 fishermen checked was without a license. They found one person out of every 14 checked was in violation of either some fish or bird hunting law which warranted a citation. We know that 319 cow elk were killed illegally during the bull elk season; 19 spotlight hunters were arrested and convicted during a three-night concentrated night patrol. To me this is most disgraceful. Yet all too often the offender is referred to as a sportsman. Acts such as these can only add fuel to the fire of those groups which oppose hunting as a means of recreation. These groups have become most effective, and their signals are coming through loud and clear. The organized sportsmen of Washington decided they would give their help to stop such violations. They came up with a program called "Civilian Wildlife Patrol." This group of interested sportsmen reasoned that they could be of material assistance in preventing violations from occurring. Should they fail in prevention, they could still assist the agent in locating the culprit, and in some cases, if they so desired, could be witnesses in court. The sports clubs have prevailed upon the Game Department to furnish instructors to put on a training program describing how the sportsman may be of assistance to the wildlife agent in the event he sees or hears of a violation he doesn't approve of. Although the program is quite new, to date we have found the results most satisfying, with no ill effects.

I truly believe if sportsmen the country over were determined that violations affecting the out-of-doors be reduced, the results would be spectacular; thus the image of the hunter would be improved.

If you haven't got the message by now, what I am saying is — "Get involved!" — *insist your laws be enforced*.

I would feel quite remiss if I did not express my feelings of respect for the game wardens, game protectors, conservation officers, rangers, or wildlife agents, whatever name they may be called by. These men are the mainstay of any game department. These are the men who try to justify the season established by the Game Commission, even though sometimes it is difficult to do so. These are the men who are called upon to enforce regulations which may not be popular. These are the men who willingly work the extra hours and put out the extra effort, no matter what time of day or night. These are the men who are out away from their families Saturdays, Sundays, and holidays. These are the men whose wives handle most of the phone calls, and who all too often find themselves on the receiving end of a complaint by a disgruntled hunter or fisherman or an occasional farmer *about game depredation or hunter trespass*. You will not find a more dedicated, more courageous, or finer group of men and women — anywhere.

To these fine men and their wives, wherever you may be, I offer my salute!

**Discussion following Panel 4:**

**Question:** *Would you expand on your ideas concerning the testing or examination of hunters to improve their behavior in the field?*

**Reply by Richard Denney:** I feel that hunters should be tested for their physical ability; their eyesight should be equivalent to that required for a driver's license. I feel that there should also be some perception-and-identification examination related to the sex and age determination of certain species of wildlife. The second part of the examination could concern itself with the game laws and regulations; a third part could deal with marksmanship and fieldcraft. This fieldcraft would include the art of hunting; how to perform a clean, humane kill; the effects of various kinds of weapons and various ranges. The whole emphasis here would be to increase the effectiveness of the hunter and lessen the wounding losses.

**Statement from the floor (anonymous):**

*A statement was made urging more communication between the wildlife managers and researchers and with the biological science educators in the colleges and universities. The speaker felt that such communication could be mutually beneficial and that there was practically no communication between the two groups now.*



I have been asked to summarize briefly what has occurred over the last day and a half. You may not be aware that I'm the only amateur on the program; I'm a banker by profession. However, wildlife has been my lifelong interest. I spent much of my youth and half of my adult life in Germany, where I was exposed to the conservation system practiced in that country. Thus my thinking has been influenced by what I consider to be a very efficient, effective system, even though some gentleman referred to it yesterday as a remnant of the Dark Ages. I have also been President of the Colorado Wildlife Federation, and the state affiliate of the National Wildlife Federation the last two years, which has made me familiar with some of the problems that we face here in Colorado. So I hope that you'll bear with me after having heard so many qualified, highly knowledgeable speakers.

Those of us who have been involved in setting up the program and selecting the topics were intent on reaching a broad spectrum of our population. We all recognize that at past meetings we found ourselves talking to each other. So, in selecting or inviting people to attend this particular conference, we made a special effort to contact the educators, the civic groups, and the professional organizations. I would like to feel that many of these groups were represented here today and yesterday.

My remarks are directed mainly to these people, not to the professionals, although there are quite a few of them also in the group. To quote a famous book, and to repeat what was said a little earlier, "Go forth and teach ye all nations." Or to put it into our modern language, "Let's put the word out."

We all recognize that there are many misconceptions among the public about wildlife and the way wildlife is managed in this state. There are a number of messages which I feel we should have received clearly and distinctly from the presentations which we heard yesterday and today. I'd like briefly to touch on these. From the first panel we heard where we stand today in terms of our wildlife inventory. I'd like to feel that all of us going away from here with the

recognition that our wildlife is not as badly off as some people say. To the contrary, much is being done to assure that our wildlife resource will be properly managed and maintained.

We heard Harry Woodward point out that you and I and the public can look forward to carrying a larger burden in terms of financial support of our wildlife, particularly our nongame wildlife species. Let those people who have been critical of the hunters step up and put their 5¢ on the line to help take care of those species of wildlife that are not supported directly from our game cash funds. Those of us who are going to be called on to carry the greater financial burden in the future should do so with the realization that we are helping to take care of a valuable resource and that we have indeed had a bargain in the past in the cost of pursuing the sports of hunting and fishing.

The subject of "pay-as-you-go hunting" was also discussed. Let us recognize that many landowners encounter great expense in having wildlife spend much of the year on their land and that it is not our privilege or right to trespass on their land just to pursue what we feel are our fish and wildlife. I think all of us must recognize that the landowner does have his rights. As one of them put it to me, "I wonder how some of the city people would like it if somebody walked in their front door and out the back without even bothering to say hello."

With respect to wildlife and land-use changes, there's no question that we all need to be concerned about what happens to the land in this state. You heard from Senator Schieffelin about the proposed land-use bill, and he made a strong appeal that the public support his efforts. The use of our land is going to determine what is going to happen to our wildlife. We can't sit back and let the speculators determine what is going to happen to this land. When various development projects are suggested, let's ask ourselves whether they are really necessary or whether we have a better alternative.

On the subject of public interaction and involvement, there's no question that intergovernmental agency cooperation has been good in our state. This is something we can be very proud of. As far as the political aspects are concerned, you and I need to concern ourselves with some of the laws that are formulated or proposed in the state legislature. Again, based on personal experience, I'm amazed at how little public attention is paid to what goes on on Capitol Hill. Those of you who have the time should attend some of the meetings dealing with important wildlife issues. I can only encourage you to continue your efforts to expand them if you possibly can.

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# CONFERENCE SUMMARY

by Hans von Barby

The allocation of funds is an essential matter. Many millions of dollars of our license fee money is spent in ways determined by the state legislature, based on recommendations from the Wildlife Division. I'm amazed how many people don't realize how this money is spent or how the allocation of these funds is determined. It would be to your interest to look into this matter and to use your influence to see that funds are applied where they will do the most good.

On problems of public misunderstanding, I would like to comment on a subject which was perhaps not completely discussed yesterday. And that is deliberate or accidental misrepresentation of wildlife on TV and in the movies. I have two small children, a boy 8 and a girl 5½, who spend a lot of time watching television programs. I encourage them to look at wildlife-oriented programs, and it sometimes distresses me to see the way wildlife is portrayed in those programs. I'm sure those of you who have seen the tame African animals, collie and shepherd dogs, and other animals, are amazed at how human they are made to appear. And I think this is a mistake.

It is quite understandable to me that young children would wonder why you and I go out and hunt these animals which to them really seem like one of us. I think it is in the interest of all of us to explain to our children that what they see on television and in the movies is not necessarily the way it is.

I was asked recently to preview a film called "Say Goodbye" which was shown on television last night while we were meeting here for our banquet. Fortunately, we were able to persuade the management of Channel 9 to delete three scenes which some of us found particularly objectionable. The basic message was that our wildlife is very much threatened and in danger of extinction. This type of exaggeration and the excessive use of emotional appeal can be very damaging to our cause, and I think it's up to us to counteract it. There are some people who feel they have to make a point with a sledgehammer. I think this is a mistake.

I'm reminded of a question that was asked during a recent hearing of the Joint Budget Committee concerning the Wildlife Division budget proposal. One of the committee members asked Harry Woodward whether we can expect to maintain our wildlife population in view of the growth of our state's population and the development of our land. In answer to that question I would like to make a comparison with present-day conditions in Germany, a country about 90 percent the size of our state with 62 million people. Many people think things are getting crowded here with our slightly more than 2 million population. Germany has an abundance of wildlife. You ask yourself why. They have an efficient conservation system based on a very accurate knowledge of inventory, combined with extensive and efficient control of harvest. The point is, in an area where population is much denser than here, it is possible to properly manage and maintain good wildlife populations.

As far as wildlife management is concerned, I would heartily endorse some of the comments made earlier about policing the ranks of our hunters, of improving ethics, of observing regulations, and on insisting on proper enforcement of our game laws. I would also like to endorse the suggestion by Dick Denney concerning the requirements for examination before obtaining a hunting license. I think it would be a very difficult task to go back and require our adult hunters to take such an examination. Let's face it, most of them think they know everything there is to know about the sport. But I feel that there is lots to be gained by giving the young members of our society a thorough indoctrination in what hunting is all about. I think this would impress upon them that to be able to hunt in this country is not a right, but a privilege. I think that the young person who obtains a license after having passed through a somewhat difficult, extensive training period and taken a test will be not only a better hunter but a more appreciative outdoorsman as well. It would also possibly reduce the number of people who go out with a weapon and hunt without having the proper orientation or the proper motivation.

In closing, let me say a couple more things. There has been a good deal of criticism of our state Wildlife Division. I think there's no question that this organization is one of the best in the country and that it contains some of the best qualified, most experienced professionals that you'll find anywhere. They are deserving of our complete support. We also are very privileged to have very fine, experienced staff at CSU, and I think the combination of knowledge and experience found in these two organizations is bound to help us in the effort toward continued improvement of our wildlife resource.

I certainly want to thank the speakers and the organizations who made it possible for them to come here. Many of them have absorbed the expense of coming here, and we very much appreciate it. I'd like to thank the sponsors who contributed funds to help us defray some of our expenses. These in particular are Denver Jonas Taxidermists, Outdoor Sports Industries, Whitney Sporting Goods Company, the Gates Rubber Company, the Denver Chapter of International Safari Club, Mr. W. C. Hutchins of Denver, Malcolm Forbes of New York, Mahlon White of Pueblo, and the Adolph Coors Company of Golden.

Last, but not least, I want to thank those gentlemen who worked on the committee and helped select the topics, contact the speakers, and who did all the behind the scenes work that is so necessary for a successful conference. Ladies and gentlemen, this concludes our program. I want to thank you all for being such a good audience. And as I said before, please do us a favor and see that the knowledge that you have gained here the last two days is passed on to where it will do the most good.